PARLIAMENTARY SECRETARY FOR AGRICULTURE,
FISHERIES AND ANIMAL RIGHTS

National Agricultural Policy for the Maltese Islands 2018 – 2028

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Foreword

It is with great pleasure and satisfaction that after years of work we are now launching an Agriculture Policy for the Maltese Islands. Through this policy document, we have now laid down, in a transparent manner, the government's vision for agriculture in the Maltese islands for the next 10 years.

It is opportune to mention that the drafting of this policy was an electoral manifesto promise that is being delivered. It is a result of both an appraisal of where we stand in the sector as well as of an intense consultation process conducted both internally and externally with relevant stakeholders.

It is a policy that is a first of its kind in that it looks at the agricultural sector in a multi-dimensional manner, focusing on developing a vision for agriculture for the coming years with the scope of attracting more investment towards the agricultural sector and making it a more lucrative economic sector, attracting young farmers to take upon themselves the mantle instilled by our forefathers and to secure a balance between agriculture the environment and the resources it requires. Indeed the agricultural sector has to be developed with an environmental consciousness and at the same time ensure a just income to the people who invest in the sector and at the same time ensure social sustainability.

The work conducted is reflected through the breadth of the policy itself. The various aspects analysed and considered bear witness to this. Through the work done we looked at the primary sector, the land and the farmers but couldn't stop there. We had to focus along the whole value chain taking us from the very start to the very end of agriculture production. We have looked at our resources, the breeding material, the livestock and plant propagation material. We focused on the farmers, the field workers and animal breeders. We continued moving along the value chain and looked at the processors and all those involved in adding value to agriculture products. We also focused on the markets available to farmers as well as consumer trends to ensure that the policy takes into consideration the needs of the final consumer.

We didn't stop here either. We looked internally, at our internal administrative structures and tried to identify ways and means that will help us improve the way we can guide the sector forward. We also had to work with other departments that go beyond my Secretariat to foster joined-up government.

As a result, today we have a policy with a number of measures that aim at meeting six objectives.

Food presentation, labeling and traceability,Consolidation of land holdings,Sustaining water and key resources, Competitiveness and diversification, Adaptation to and mitigation of geo-climatic conditions and Research and development

To achieve these objectives 70 specific measures have been identified to be implemented in the coming years.

This document presents a clear vision to the farming community as to where we are charting the progression of the sector. It provides a basis for planning the investments that need to be made in order to make agriculture a more attractive sector and to embrace its metamorphosis to meet the realities experienced today both from a supply as well as a demand side. This is an important commitment by this Government which is binding itself to deliver a stronger agriculture sector in the coming years. At the end of the day agriculture is a sector that gives us, Maltese and Gozitans, an identity and it is our responsibility to safeguard it, nurture it and promote it to ensure that the sector is appreciated by the Maltese population as well as the millions of visitors that come to our shores.

Hon. Clint Camilleri
Parliamentary Secretary for Agriculture, Fisheries and Animal Rights

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i. Executive Summary

A comprehensive Agricultural Policy for the Maltese Islands was requested by various stakeholders in order to provide a strategic national direction for this dynamic sector. The agricultural sector in the Maltese Islands has been significantly re-shaped following Malta's accession to the European Union and changes throughout its various facets are still ongoing. Thus, this ten-year policy is intended to steer the agricultural sector into a more sustainable direction by providing the means along which it can develop and flourish, whilst remaining within the parameters of the Common Agricultural Policy and other pertinent regulations.

This policy document builds on the findings of a strategic review on the agricultural sector entitled 'Towards a new agricultural policy for Malta' that was carried out in 2013, which focused on a detailed economic analysis of the existing data as well as the involvement of key sector and government representatives. The outcome of this review included the current state and future potential of the agricultural sector in Malta and was presented in 2014. Following this sector review, the Directorate of Agriculture sub-contracted the development of a ten-year Agricultural Policy for the Maltese Islands to a firm of consultants with the scope of liaising with pertinent public and private stakeholders with a view to identify the most salient issues which require policy intervention. These consultants analysed all the relevant issues in line with new developments and trends in the agricultural sector (both in Malta and abroad), to develop a range of policy measures aimed at reviving agriculture in the Maltese Islands over the next decade.

The Agricultural Policy for the Maltese Islands 2018-2028 is intended to provide a clear direction to all relevant stakeholders ranging from public entities involved with certification, permitting and decision making to private entities directly involved in the agricultural scenario who intend to invest or diversify their business. As the overarching objective for this Agricultural Policy, a 'vision' for the Maltese agriculture sector was identified and agreed between government entities, representatives of the private sector and the farming community. This vision entailed the development of a policy that targets the following critical targets:

A. Increasing the competitiveness of active farmers and livestock breeders by focusing on quality and embracing diversification;
B. Facilitating the entry of young farmers by creating a cost-effective agri-business sector;
C. Fostering sustainability of farming activities by adapting to the local geo-climatic conditions;
D. Ensuring that farmland is managed by genuine farmers for agricultural purposes and related activities.

Following a wide consultation process, the consultants identified six (6) strategic policy objectives which stood as the basis for a comprehensive evaluation process and the development of policy measures for the upcoming decade. These strategic policy objectives include 1) Food presentation, labelling and traceability; 2) Consolidation of land holdings; 3) Sustaining water and key resources; 4) Competitiveness and diversification, 5) Adaptation to and mitigation of geo-climatic conditions and 6) Research and development. This policy document presents a total of seventy (70) policy measures organised in four (4) sets of operational objectives, namely a) Economic objectives, b) Social regeneration, c) Resources and d) Governance.

ii. Abbreviations and acronyms

ARPA	Agriculture and Rural Payments Agency
AWU	Annual Working Unit
CAP	Common Agricultural Policy
CN Code	Combined Nomenclature code
COGAP	Code of Good Agricultural Practices
DNO	Development Notification Order
DOK	*Denominazzjoni ta' Oriġini Kontrollata*
EAFRD	European Agricultural Fund for Rural Development
EC	European Commission
EU	European Union
FAO	Food and Agriculture Organisation
GAB	Governance of Agricultural Bioresources Agency
GDP	Gross Domestic Product
GNB	Gross Nitrogen Balance
HACCP	Hazard Analysis and Critical Control Points
HEI	Higher educational institutions
IACS	Integrated Administration and Control System
ICT	Information and Communication Technology
I.Ġ.T.	*Identifikazzjoni Ġeografika Tipika*
IPM	Integrated Pest Management
IT	Information Technology
L.N.	Legal Notice
LULUCF	Land use, Land-use Change and Forestry
MCAST	Malta College of Arts Science and Technology
MCCAA	Malta Competition and Consumer Affairs Authority
MEDE	Ministry for Education and Employment
MEPA	Malta Environment and Planning Authority
MESDC	Ministry for the Environment, Sustainable Development and Climate Change
NAP	Nitrates Actions Programme
NSO	National Statistics Office
ODZ	Outside Development Zone
PDO	Protected Denomination of Origin
PQ	Parliamentary Question
PV	Photovoltaic
RES	Renewable Energy Sources
R&D	Research and Development
R&I	Research and Innovation
RDP	Rural Development Programme
SEWCU	Sustainable Energy, Water and Conservation Unit
S.L.	Subsidiary Legislation
SME	Small and Medium Enterprises
SMPPMA	Special Market Policy Programme for Maltese Agriculture
SWOT	Strengths, weaknesses, opportunities and threats
TSE	Treated Sewage Effluent
TSG	Traditional Speciality Guaranteed
UAA	Utilised Agricultural Area
UoM	University of Malta
WCMP	Water Catchment Management Plan
WFD	Water Framework Directive
WSC	Water Services Corporation

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Introduction

1.01 Scope

Following the completion of a strategic review of the current state and future potential of the agricultural sector in Malta that was presented by a team of consultants in 2014, the Directorate of Agriculture within the Ministry for Sustainable Development, the Environment and Climate Change proceeded with commissioning the development of an Agricultural Policy for the Maltese Islands covering a period of ten (10) years. The strategic review entitled 'Towards a new agricultural policy for Malta' was carried out in 2013 and focused on a detailed economic analysis as well as a review of relevant documentation together with interviews with key sector and government representatives. The Agricultural Policy for Malta is intended a) to build on the findings of the strategic review by identifying all pertinent issues that are hindering progress in the sector in order to evaluate them in detail as well as b) addressing new developments and trends, enabling policy makers to identify a plausible direction, at least covering the next decade or so.

Atriga Consulting Services Ltd was entrusted with the drafting of Agricultural Policy for the Maltese Islands following a tendering process that was carried out in 2015. This task included the delivery of the following specific activities:

1) Identification of the main agricultural issues that are currently inhibiting progress in this sector. This involved a thorough desk research followed by an extensive consultation process with public and private stakeholders to identify the policy issues. A comprehensive review of the current state of affairs including various strategies and legislations led to the formulation of an 'Issues Paper' that was published for stakeholder consultation in March 2016.

2) Organisation of a 'National Consultation Event' over two days on the 28th and the 29th March 2016 to launch and evaluate the Issues Paper with various stakeholders and experts. Those present for this event were engaged in discussing the policy issues and actively participated in the drafting of focused SWOT analysis on each issue. All this generated pertinent recommendations aimed at eventual inclusion in respective policy measures.

3) Drafting of the Agricultural Policy for the Maltese Islands by a team of experts selected by the consulting firm, who placed major emphasis on a) key policy objectives that were identified in the Issues Paper, b) feedback received during the stakeholder consultation and c) the outcomes of the 'National Consultation Event', with particular reference to the SWOT analysis developed in the five (5) technical focus groups. The policy issues were evaluated in detail to develop a set of operational objectives and policy measures that are appropriate in the Maltese context.

4) Reviewing of the draft Agricultural Policy for the Maltese Islands by the Ministry for the Environment, Sustainable Development, and Climate Change and completion by the contractor.

Figure 1 below illustrates the various stages involved in the delivery of the Agricultural Policy for the Maltese Islands by the consulting firm. The development progress of the policy follows the five (5) stages identified below in an order from left to right starting from desk review and finishing with the publication of the Agricultural Policy.

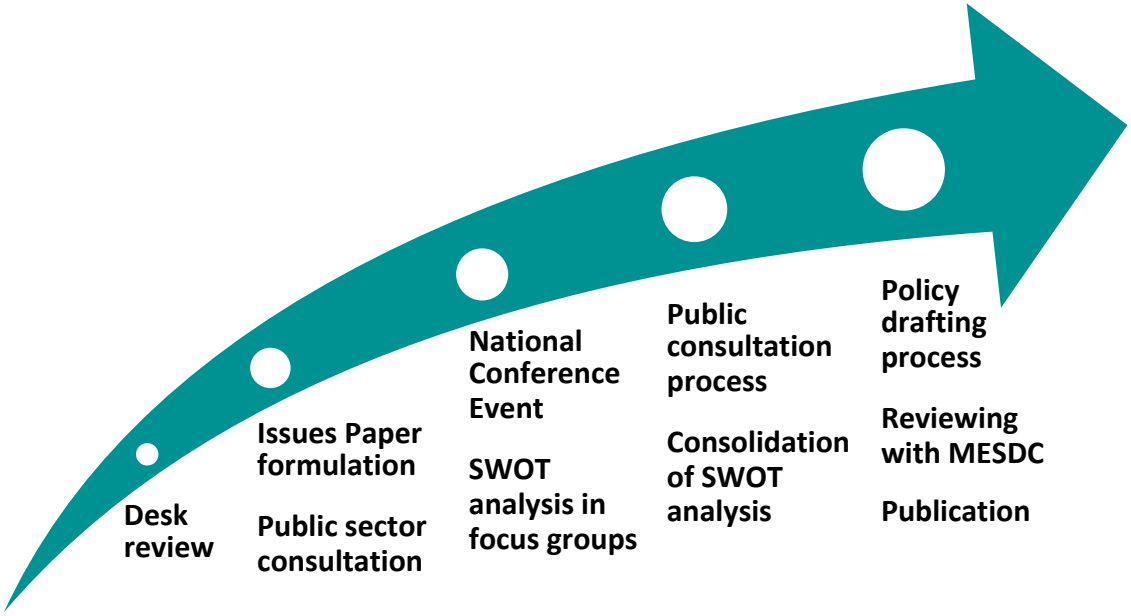


Figure 1: Development structure of the Agricultural Policy for the Maltese Islands 2018-2028

Figure 2: The National Conference Event held in March 2016

1.02 Methodology

This chapter aims at providing an overview of the selected methodological approach with a view to deliver the Agricultural Policy for the Maltese Islands, placing particular emphasis on the deliverables identified in Table 1 below. Each deliverable is linked with a corresponding reference number that reflects the pertinent section and order followed in this chapter.

Reference	Methodology
1.02.01	Strategic objectives
1.02.02	Issues Paper
1.02.03	Stakeholder involvement
1.02.04	Analytical process
1.02.05	Operational objectives and policy measures
1.02.06	Policy implementation

Table 1: Methodological structure of the Agricultural Policy for Malta 2018-2028

Figure 3: SWOT development in focus group meetings involving stakeholders

1.02.01 Strategic Objectives

As the overarching objective for the Agricultural Policy for the Maltese Islands, a 'vision' for the agriculture sector was identified in the early stages of the strategy formulation and it was agreed between the salient stakeholders including Government entities, representatives of the private sectors and the farming community. This overarching vision agreed upon provided the direction and framework for the development of more detailed policy objectives that were published in the 'Issues Paper'. The vision for the Maltese agriculture sector consists of a policy that aims at attaining the following critical targets, namely:

a) Increasing the competitiveness of active farmers and livestock breeders by focusing on quality and embracing diversification;
b) Facilitating the entry of young farmers by creating a cost-effective agri-business sector;
c) Fostering sustainability of farming activities by adapting to the local geo-climatic conditions;
d) Ensuring that farmland is managed by genuine farmers for agricultural purposes and related activities.

The tasks involved in the drafting of the strategy formulation required analysis of the means to achieve the critical targets in view of the various issues that could hinder their attainment. Six (6) strategic policy objectives were identified as the basis for the development of the National Agricultural Policy for the Maltese Islands, including:

1. Food presentation, labelling and traceability
2. Consolidation of land holdings
3. Sustaining water and key resources
4. Competitiveness and diversification
5. Adaptation to and mitigation of geo-climatic conditions
6. Research and development

These strategic policy objectives constituted the subject matter of the 'Issues Paper' that was issued for public consultation and evaluated in detail during the 'National Consultation Event' delivered on the 28th and the 29th of March 2016. The various stakeholders present for this event discussed these policy objectives in thematic workshops and delivered a detailed SWOT analysis on each one of them together with a set of recommendations to be incorporated in the respective operational objective within the policy.

1.02.02 Issues paper

Various public entities, directly and indirectly linked with the agricultural sector, were approached by the consulting firm in order for the latter to develop an issues paper in line with published strategies and legislations. Existing policies were evaluated to establish the desirable features of the Agricultural Policy for the Maltese Islands in line with the vision for the agricultural sector, whilst addressing the recommendations received from these stakeholders. Several entities, including government agencies and departments participated in this process between June and July 2015, including the:

- Agriculture Consultative Council, MESDC
- Agriculture and Rural Payments Agency, MESDC
- Directorate for Diversification and Competitiveness, MESDC
- Directorate for the Environment and Climate Change, MESDC
- Environmental Protection Directorate, (then) Malta Environment and Planning Authority
- Government Property Department
- Institute of Applied Science, Malta College of Arts, Sciences and Technology
- Malta Competition and Consumer Affairs Authority
- Ministry for European Affairs and Implementation of Electoral Manifesto
- Malta Resources Authority
- Plant Health Directorate, MESDC
- Rural Development Department, MESDC
- State Aid Monitoring Board
- Sustainable Energy and Water Conservation Unit, Ministry for Energy and Health
- Veterinary Regulations Department, MESDC

The Issues Paper was published online for a period of one (1) month between March and April 2016 and the issues were further consolidated following the feedback received from various stakeholders ranging from farmers, livestock breeders, consumers, lobby groups, policy experts and researchers. Indeed, greater holistic significance was given to the scope behind this policy document following the holding of a 'National Consultation Event' whose primary intention was to inform and involve a range of stakeholders and experts. The discussion that ensued in the event enabled the identification of policy issues as well as the development of a SWOT analysis on each issue. All this pre-empted various recommendations aimed at eventual inclusion in respective policy measures.

1.02.03 Stakeholder involvement

Compiling an agricultural policy, like any other policy, involves addressing a range of divergent interests and aspirations. The target audience for the Agricultural Policy for the Maltese Islands 2018-2028 is envisaged to be composed of:

- Members of the active farming community who struggle to make a living from agriculture, including active part-time farmers who produce a considerable amount of agricultural output from their farm activity;
- Entrepreneurs who would be prepared to invest in innovative forms of rural businesses and food production;
- Members of the part time farming community who consider farming as a supplement to other sources of revenue;
- Recreational farmers who produce agricultural products for their own consumption;
- Land owners and tenants;
- Agricultural students and graduates who have acquired farming knowledge and look forward to enter the agricultural sector but lack land and/or basic capital resources;
- Representatives of the agricultural sectors including cooperatives and producer organisations;
- Consumers who demand an abundant, safe, market-oriented, and high quality products at competitive prices;
- Entrepreneurs involved in the trading of fresh agricultural produce and livestock products;
- Government officials involved in policy implementation, enforcement, agriculture, veterinary, EU funds management, environmental protection, planning permitting, food standards, statistics and more;
- Research institutions and higher educational establishments interested in agriculture;
- Private entities ranging from food processing companies, food importers, product and equipment retailing establishments, butchers, hawkers, the catering industry, delivery services, consultancy agencies and more;
- Non Governmental Organisations, lobby groups and local councils, and
- Private citizens interested in the upkeep of the rural landscape through agriculture.

As explained in the previous section, stakeholders were involved at various stages in the development of the Agricultural Policy for the Maltese Islands. At the onset of drafting the Issues Paper, various public entities that are listed in Section 1.02.02 were actively involved in the development of the policy vision, the strategic policy objectives as well as the uptake of various recommendations. This feedback was integrated in the Issues Paper that was presented during the 'National Consultation Event' which was held on the 28 and 29 of March 2016. This two-day event was attended by seventy eight (78) stakeholders who actively participated in the creation of a SWOT analysis which constitutes the basis of the analytical review of this policy paper.

1.02.04 Analytical process

A team of experts selected by Atriga Consulting Services Ltd reviewed a) the information and statistics obtained through desk research, b) the key policy objectives that were identified in the Issues Paper, c) the feedback received during the consultation with various stakeholders and d) the outcomes of the 'National Consultation Event', with particular reference to the SWOT analysis and recommendations developed by the technical working groups. This led to the delivery of the analytical process that provides the framework for the operational objectives and policy measures developed in the Agricultural Policy for the Maltese Islands. The analytical process comprised two components, namely:

1) a situation analysis of agriculture in the Maltese Islands incorporating an overview of the agricultural activities in Malta, constraints that are limiting progress, sectoral information on farming and livestock breeding, environmental conditions and economic performance; and

2) a detailed analysis of all the themes identified in the Issues Paper and during the consultation period including the development of a set of horizontal issues, and a comprehensive SWOT analysis of each theme within the six (6) strategic objectives standing as the basis of this policy document.

Chapter 2 in this policy document presents the situation analysis by providing a general overview of agriculture in the Maltese Islands making reference to the available statistics and data. It also includes a section on the main economic, social, political and environmental constraints that the agricultural sector in Malta is facing. This is followed by sectoral information regarding various crop production and livestock production sectors, as well as other aspects related to agriculture in the Maltese islands.

Chapter 3 focuses on a SWOT analysis of fifty six (56) themes that were identified through the six (6) strategic policy objectives. This includes an in-depth evaluation of each strategic objective that reflects the work carried out by each thematic focus group during the 'National Consultation Event'. Each theme is analysed in line with the pertinent SWOT items for that policy objective, even if there could be an element of overlapping between issues that could fit in more than one theme. The SWOT analysis is based on twelve (12) horizontal issues that provide a cross-cutting relevance across all the identified themes and these are reflected within the analytical rationale.

1.02.05 Operational Objectives and Policy Measures

The operational objectives of the policy aim at building on the strength of the overall strategic objectives which tend to be quite generic in nature. Also, policy measures (which, amongst other things, include financial assistance, setting up of regulations, enforcement, the provision of services and various forms of assistance) as contemplated in this policy and which emanate from operational objectives, place emphasis on points of interventions required to ensure a smooth delivery of such objectives.

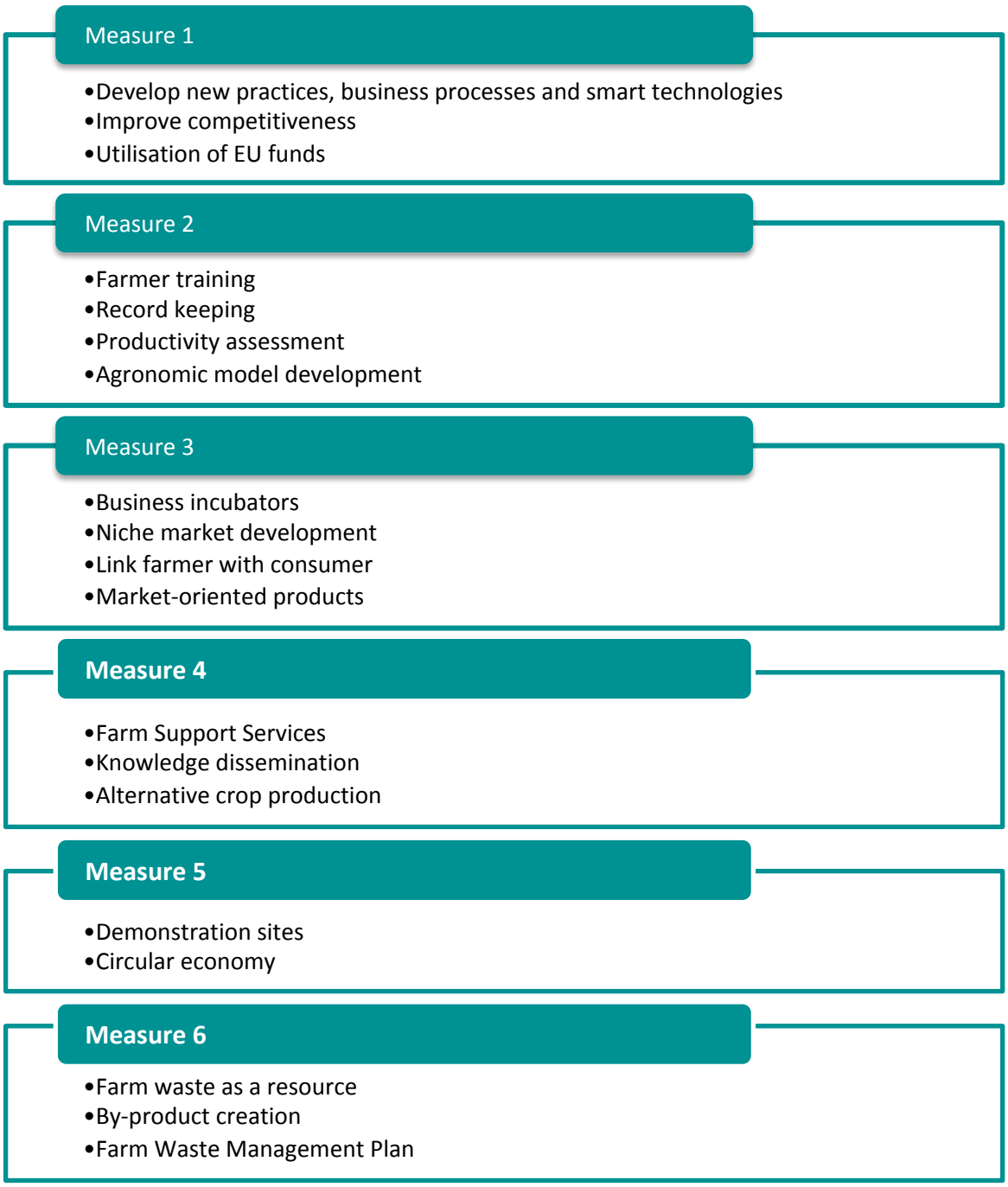
A set of four (4) operational objectives were developed by the consulting firm in collaboration with MESDC to cover and merge the various themes that were evaluated in the SWOT analysis. Each objective includes the means of intervention through a number of policy measures that, cumulatively, add up to a total of seventy (70). These measures make provisions for positive and negative incentives that are intended to affect the behaviour of the pertinent target audiences in order to achieve the agriculture policy targets over the coming decade. Operational objectives and policy measures are presented in Chapter 4.

Figure 4 below illustrates the various development stages with regards to objectives and targets of the policy, namely 1) the vision that was created at the onset and agreed upon with the salient stakeholders; 2) strategic policy objectives which were published in the Issues Paper that was circulated for public consultation and evaluated in detail during the 'National Consultation Event'; and 3) operational objectives that were developed from the analysis of the fifty six (56) themes that covered the six (6) strategic policy objectives.

Figure 4: Development stages of the objectives and targets forming the Agricultural Policy

1.02.06 Policy implementation

Chapter 5 presents the operational objectives in more detail including the policy measures, deliverables, responsible entities and prioritisation level. This information is intended to serve as the basis for the policy maker to effectively implement the established measures and serve as guidance on the direction to follow as well as to ensure the active involvement of the relevant stakeholders targeted by such measures. As pointed out in the previous section, there are seventy (70) policy measures emanating from a set of four (4) operational objectives. Figure 5 below illustrates the general outcomes being targeted by the measures identified in this ten-year policy.



Measure 7

- Utilise spent mushroom substrate

Measure 8

- Farmer clustering and collaboration

Measure 9

- Value chain collaboration
- Optimizing investment and reducing costs

Measure 10

- Premium product agriculture

Measure 11

- Bee keeping and honey production

Measure 12

- Innovation and niche market opportunities

Measure 13

- Development of rural tourism guidelines

Measure 14

- Upgrading the rural tourism product

Measure 15

- Link farming with gastronomy

Measure 16

- Rural service creation
- Job creation

Measure 17

- Pilot research projects for dissemination

Measure 18

- Media coverage and promotion
- Marketing standards

Measure 19

- Pilot projects in small holdings
- Recreational farming

Measure 20

- Tapping international niche markets

Measure 21

- Structured market research
- Consumer surveys

Measure 22

- Guidelines for rural festivals
- Nutritional and health information

Measure 23

- Farm Extension Services
- Stakeholder seminars
- Flexible career pathways
- Risk analysis

Measure 24

- Farmer skills audit

Measure 25

- Curricula development
- Hands-on training
- Applied teaching on farms

Measure 26

- Agribusiness training

Measure 27

- Agribusiness education at the secondary level

Measure 28

- Preserve and regenerate rural skills

Measure 29

- Maltese quality mark

Measure 30

- Ensure product traceability

Measure 31

- Pro-active extension services and promotional campaigns

Measure 32

- Involve stakeholders on adaptation and mitigation strategies

Measure 33

- Research on local livestock breeds

Measure 34

- Research and experiment on soil conservation techniques

Measure 35

- Experiment with multipurpose trees

Measure 36

- Restoration of rubble walls

Measure 37

- Maximise the use of experimental research centres
- Focus on sustainable cultivation practices

Measure 38

- Consolidation of land parcels

Measure 39

- Increase organic production

Measure 40

- Develop a farmland categorisation scheme
- Geographic Data Information System

Measure 41

- Training on groundwater use reduction

Measure 42

- Water-crop assessment and conservation methods

Measure 43

- National research programme on optimising water use

Measure 44

- Deficit irrigation strategies

Measure 45

- Rainwater runoff collection

Measure 46

- Smart irrigation systems

Measure 47

- Enforce on plant protection products

Measure 48

- Service provision on pesticide management and fertiliser application

Measure 49

- Data gathering on integrated pest management

Measure 50

- Develop a Soil Action Plan

Measure 51

Measure 52

- Upgrade seed bank
- Preservation of indigenous species

Measure 53

- Research on permanent crops and rootstocks

Measure 54

- Legally protected Maltese varieties
- Idea incubators

Measure 55

- Rural partnership team

Measure 56

- Stakeholder involvement through extension services and Agricultural Consultative Council

Measure 57

- Water Users Association

Measure 58

- Tackle data gaps in agricultural sector
- Create an information database

Measure 59

- Research and data collection platform

Measure 60

- Geographic Data Information System

Measure 61

- Customer care service on land ownership issues

Measure 62

- Improve farmland tenure and land consolidation

Measure 63

- Access to accredited laboratories

Measure 64

- Water use governance system

Measure 65

- Farmer benchmarking system and categorisation

Measure 66

- Financing the policy measures

Measure 67

- Maintain coherence and consistency of policy measures

Measure 68

- Avoid conflicting policies
- Communication between ministries

Measure 69

- Communication strategy
- Inform and involve the target audience

Measure 70

- Evaluate the policy measures
- Plan for future strategies

Figure 5: Generic outcomes targeted in policy measures

2

2. Situation analysis

2.01 Agriculture in the Maltese Islands

This chapter provides an overview of the agribusiness industry in Malta including constraints that are limiting progress, sectoral information on farming and livestock breeding, environmental conditions and economic performance. The latest data and information on farm structures, economic performance and demographics was used, even though it was found to be limited and, in most cases, fragmented.

The Maltese agricultural sector is comprised of land farmers and livestock breeders. In contrast with most European counterparts, livestock breeders in Malta are mostly landless and breed their livestock indoors by supplementing them with imported feed concentrate and fodder, together with local fodder. Land farmers practise two forms of farming, namely 1) dry (arable) farming that relies on rain to grow mostly fodder, onions, garlic, broad beans, potatoes and some permanent crops such as vines, olive trees and fruit trees, and 2) irrigated farmland in greenhouses and open fields where they grow a wider range of vegetables. With the exception of the spring potato for export, most farmers engage in mixed farming practices and do not specialise on particular cash crops.

In 2014, the agricultural sector represented 1.3% of the total Gross Value Added generated by the Maltese economy and accounted for 1.5% of all persons employed (NSO, Gross Domestic Product, 2014). These figures imply that the sector's contribution to the Maltese economy is low. Nevertheless, agriculture plays a multifunctional role ranging from food production, food security on an island state, culinary tradition, land stewardship, environmental conservation, recreational landscape and a backdrop for the tourism industry, that go beyond the direct economic relevance.

Agriculture in the Maltese Islands is characterised by small-scale holdings and farms that are confronted with a range of physical and structural constraints that reduce the competitiveness of operators. A non-exhaustive list of such constraints include 1) scarcity of land related to the small size of the islands and dense population; 2) lack of natural resources, in particular, water scarcity; 3) urbanization, land use pressures and opportunity cost of land; 4) dependence on imported fodder and other inputs that are costly in view of a limited bargaining power; 5) fragmentation of human and physical resources, and 6) individualism and general inability to exploit economies of scale. These constraints and a range of other relevant factors hindering progress in agriculture are analysed in detail in Chapter 3.

The average land holding size in Malta is extremely small especially when compared with the European average. This micro-farming aspect is a result of land scarcity, topography, dense population as well as inheritance regulations that permit land fragmentation. Agriculture holdings in Malta are predominantly small with 75.6% having a utilised agricultural area (UAA) of less than one (1) hectare each, 22% that are between one (1) and five (5) hectares, and 2.4% that have an area exceeding five (5) hectares (NSO, 2016). The total number of land holdings in 2013 amounted to 12,466 who were cultivating a total of 11,689 hectares of UAA. Table 2 below shows the size class of the agricultural holdings in terms of UAA (ha).

Utilised Agricultural Area (ha)								
Year	Total	0	0 - 0.5	0.5 - 1	1 - 2	2 - 5	5 - 10	>10
2005	11,071	190	5,330	2,572	1,782	966	202	29
2007	11,018	238	5,151	2,601	1,923	820	256	29
2010	12,529	340	6,291	2,572	1,931	1,120	232	43
2013	12,466	359	6,097	2,971	1,607	1,129	255	47

Table 2: Agricultural holdings by size class of Utilised agricultural area (ha)
(Source: Agriculture and Fisheries 2014 – Valletta: NSO, 2016)

With reference to Table 2 above, an agricultural holding is defined as a single unit, both technically and economically, which has a single management and which undertakes agricultural activities listed in Annex I of Regulation (EC) No 1166/2008 of the European Parliament and of the Council of 19 November 2008 on farm structure surveys and the survey on agricultural production methods (repealing Council Regulation (EEC) No 571/88). Data pertinent to these statistics was collected by the NSO biennially from 2003 to 2007 through the survey on the structure of agricultural holdings while the Census of Agriculture was last undertaken in 2010. A Farm Structure Survey was then carried out in 2013.

Employment within the agricultural sector in 2013 amounted to 19,065 people actively engaged in agricultural production, indicating a growth rate of 6.1% from 2005 to 2013. This growth is composed of an increase of 7.7% in part time employment and a decrease of 11.3% of full time farmers. Employment in agriculture is dominated by males with the female full-time employment representing 9.3% of the total full-time employment. Female participation in part-time activity amounted to 21.6% of all part-time employment. Females engaged in agricultural production add up to 20.7% of the total registered farmers in 2013, out of which 3.2% are full timers. Males registered as full-time farmers add up to 8.3% of the total male farmer population. Table 3 below illustrates this predominance of males working in the agricultural sector.

Category	2005	2007	2010	2013
Males Full-time	1,426	1,528	1,190	1,245
Males Part-time	13,038	12,316	13,409	13,869
Females Full-time	120	236	111	127
Females Part-time	3,348	3,068	3,829	3,824
Total Full-time	1,546	1,764	1,301	1,372
Total Part-time	16,386	15,384	17,238	17,693
Total Males	14,464	13,844	14,599	15,114
Total Females	3,468	3,304	3,940	3,951
TOTAL Farmers	**17,932**	**17,148**	**18,539**	**19,065**

Table 3: Employment patterns in agriculture between 2005 and 2013 based on gender and type of employment (Source: Farm Structure Survey in Agriculture and Fisheries 2014 – Valletta: NSO, 2016)

With reference to Table 3 above, the information was collected biennially by NSO through the Farm Structure Survey from 2003 to 2007 and the Census of Agriculture in 2010.

The 2013 employment data was made available through the Farm Structure Survey. Table 4 below illustrates the structure of employment by Annual Work Units (AWUs), in which the majority of persons employed in agriculture, or 70.3%, work less than 25% of 1 AWU. On the other hand, 1,372 farmers worked more or equivalent to 1 AWU and thus being considered as engaged full-time in the sector. The mean average gross salary in 2012 was almost €16,022, whilst for skilled agricultural operators it slightly exceeded €13,000. These figures indicate the relatively low income when compared with the level of commitment required to work in the sector. These factors, coupled with social disadvantages, discourage young people to remain or enter the agricultural industry.

Number of persons						
Year	**Total**	**0 - 25% AWU**	**25 - 50% AWU**	**50 -75% AWU**	**75 - 100% AWU**	**>100% AWU**
2005	17,968	13,624	1,788	578	432	1,546
2007	17,148	12,591	1,635	672	486	1,764
2010	18,539	12,653	2,694	1,041	850	1,301
2013	19,066	13,395	1,969	1,311	1,017	1,372

Table 4: Total employment (number of persons) in agriculture by Annual Work Unit (AWU)
(Source: Agriculture and Fisheries 2014 – Valletta: NSO, 2016)

The Agriculture and Fisheries report (NSO, 2016) delivered an analysis of the production process and the incomes generated by the industry through the Economic Accounts for Agriculture. The gross agricultural production at producer prices for 2014 was estimated at €132.5 million, a drop of 3.1% over 2013, as shown in Table 5 below. The final agricultural production at producer prices, after taking into consideration losses and intra-unit consumption, decreased by 3.1% to €125.3 million in 2014.

Category	**Year**		
	2012	**2013**	**2014**
Gross agricultural production at producer prices	**132,571**	**136,820**	**132,547**
Losses	-5,742	-5,779	-5,605
Intra-unit consumption	-1,664	-1,630	-1,605
Seeds	-216	-216	-216
Milk	-596	-602	-561
Grapes	-852	-812	-829
Final agricultural production at producer prices	**125,165**	**129,412**	**125,338**

Table 5: Gross agricultural production (€000) at producer prices
(Source: Agriculture and Fisheries 2014 – Valletta: NSO, 2016)

Table 6 below provides details on the final agricultural production at producer prices. It indicates that the producer value of crop output, which amounts to 37.64% of final agricultural production, went down 2.9% in 2014, mainly attributed to a decrease in the value of potatoes (12.7%). Animal output representing 56.77% of the final production, dropped by 3.5% over 2013. The producer value of slaughtered animals went down by 2.1%, attributed mainly to a drop in the value of slaughtered poultry (11.3%). Similarly, the value of animal products went down by 5.5% over 2013 linked with decreases of 6.2% and 3.6% in the value of milk and eggs respectively.

Category	Year		
	2012	2013	2014
Gross agricultural production at producer prices	132,571	136,820	132,547
Losses	(5,742)	(5,779)	(5,605)
Intra unit consumption	(1,664)	(1,630)	(1,605)
Seeds	(216)	(216)	(216)
Milk	(596)	(602)	(561)
Grapes	(852)	(812)	(829)
Final agricultural production at producer prices	**125,165**	**129,412**	**125,338**
Crop output	47,640	48,577	47,172
Forage	4,314	4,633	4,529
Vegetables and horticultural products	29,243	28,840	28,831
Potatoes	5,822	6,770	5,910
Fruit	6,418	6,605	6,728
Other crop products	1,844	1,730	1,674
Animal output	70,055	73,707	71,160
Cattle	3,556	3,512	3,191
Pigs	11,486	14,030	14,583
Sheep and goats	381	363	349
Poultry	7,794	7,747	6,874
Other animals (rabbit)	18,683	18,726	18,451
Milk	21,325	21,471	20,131
Eggs	6,619	7,648	7,371
Other animal products	210	210	210
Secondary activities	7,470	7,128	7,006
Wine	2,663	2,538	2,590
Other animal products: milk	4,807	4,590	4,416

Table 6: Final agricultural production (€000) at producer prices
(Source: Agriculture and Fisheries 2014 – Valletta: NSO, 2016)

Intermediate consumption (Table 7 below) for 2014 amounted to €64.4 million, down by 6.8% over 2013. Intermediate consumption represents the value of all goods and services used as inputs in the production process and excluding fixed assets. Products used in intermediate consumption are valued at purchase prices, net of VAT. This decrease was attributable to a drop in expenditure on almost all the items, mainly compound feeding stuffs (11.3%), veterinary services (9%) and fertilisers (5.4%). The latter is understandable since as production decreases the cost of production also decreases and this could be an indication of its multiplier effect on the economy. However since most goods are imported, the multiplier effect of this reduction is not significant on the agricultural activity.

Category	Year		
	2012	2013	2014
Total intermediate consumption	**-70,902**	**-69,122**	**-64,445**
Cropping			
Imported seeds and stock	-3,784	-3,770	-3,781
Fertilisers and soil improvers	-1,996	-2,109	-1,995
Plant protection products	-830	-835	-844
Animal feed			
Fodder supplied by other holdings	-4,055	-4,366	-4,270
Fodder produced and consumed on the holding	-259	-267	-259
Compound feeding stuffs	-31,616	-30,578	-27,112
Energy and lubricants			
Electricity	-1,632	-1,611	-1,576
Fuel	-8,068	-7,739	-7,448
Various services			
Maintenance of materials	-6,648	-6,564	-6,380
Maintenance of buildings	-2,144	-2,008	-1,862
Veterinary services	-1209	-1105	-1005
Other goods and services	-8662	-8171	-7914

Table 7: Final agricultural production (€000) at producer prices
(Source: Agriculture and Fisheries 2014 – Valletta: NSO, 2016)

The total subsidies absorbed by the industry in 2014 (Table 8 below) amounted to €20.8 million, up by 6.9% over the previous year. Subsidies directly linked to production declined by 15.5%, mainly due to lower amounts received in respect of crop products. In contrast, an increase of 8.9% or €1.6 million was registered in the subsidies not directly linked with production. Dependence on subsidies increased by 1.2%, from 26.6% in 2013 to 27.8% in 2014. In 2014, the factor income of the agricultural industry advanced by 2.5% to €74.7 million.

Category	Year		
	2012	2013	2014
Final agricultural production at producer prices	125,165	129,412	125,338
Subsidies on production	1,697	1,572	1,328
Final agricultural production at basic prices	126,862	130,983	126,666
Subsidies not directly linked with production	18,212	17,845	19,430
Total subsidies absorbed	**19,909**	**19,417**	**20,758**

Table 8: Subsidies absorbed (€000) by agriculture including crop farming
(Source: Agriculture and Fisheries 2014 – Valletta: NSO, 2016)

Table 9 below illustrates the gross agricultural production at producer prices by product and usage in 2014. The gross production represents the total value of agricultural goods and services produced over a particular period and include losses incurred on the agricultural holding. Domestic sales amounted to €115.7 million, representing 87.3% of gross agricultural production while farm consumption amounted to €7.2 million, or 5.4% of the gross production. Exports of agricultural products, mainly potatoes, amounted to a mere 1.7% of the gross production. Losses and intra-unit consumption add up to €5.6 and €1.6 million respectively.

Category	Total	Domestic sales	Losses	Exports	Farm consumption	Other uses	Intra-unit consumption
Gross Agricultural Production	**132,547**	**115,653**	**5,605**	**2,268**	**7,157**	**259**	**1,605**
Crop output							
Forage	4,529	4,270	-	-	-	259	
Vegetables and horticultural products	30,005	28,519	-	237	1,249	-	-
Potatoes	5,910	3,413	-	2,031	465	-	-
Fruit	7,557	6,270	-	-	458	-	829
Other crop products	216	-	-	-	-	-	216
Animal output							
Cattle	3,191	3,191	-	-	-	-	-
Pigs	14,583	14,583	-	-	-	-	-
Sheep and goats	349	331	-	-	17	-	-
Poultry	7,638	6,860	764	-	14	-	-
Other animals (rabbits)	23,064	16,606	4,613	-	1,845	-	-
Milk	20,692	20,061	-	-	70	-	561
Eggs	7,599	7,364	228	-	7	-	-
Other animal products	210	210	-	-	-	-	-
Secondary activities							
Wine	2,590	-	-	-	2,590	-	-
Other animal products: milk	4,416	3,975	-	-	442	-	-

Table 9: Gross agricultural production (€000) at producer prices by product and usage (Source: Agriculture and Fisheries 2014 – Valletta: NSO, 2016)

2.02 Constraints

This section focuses on the main constraints affecting development in the Maltese agricultural sector. An objective approach was adopted to assess the current situation involving all the stakeholders and the constraints hindering the sector from progressing. These constraints were identified through desk research and stakeholder consultation and resulted into an interlinked range of economical, social, political and environmental issues that are being described below.

2.02.01 Economic constraints

Farmers and livestock breeders, as in any other economic activity, aim at making a profit from what is produced in the field or on the farm. Thus, their economic activity is linked with a demand for food which is one of the basic commodities required by consumers. The main issue with this demand is that prior to EU accession, the Maltese trade policies protected local produce due to levies imposed on food imports, therefore to a certain extent food supply was guaranteed.

Following EU accession in 2004, Malta migrated towards the elimination of import levies on agricultural commodities to get in line with the Common Agricultural Policy (CAP). In order to cater for structural adjustment of certain sectors, Malta was granted the Special Market Policy Programme for Maltese Agriculture (SMPPMA) part of which was coupled with production as in the case of fresh fruit and vegetables, potatoes, tomatoes for processing, wine, pigs, dairy, poultry and eggs. Some sectors benefitted from this support up till 2010, whilst others kept on accessing this funding mechanism till 2014. Unfortunately, the SMPPMA mechanism may have encouraged quantity production rather than steering agricultural sectors towards quality production to compete with imported quality products and address the changing consumer mentality that was being sustained by an open market. Table 10 below illustrates the total amount of financial assistance in million Euros agreed in the Accession Treaty through SMPPMA to the nine (9) sectors mentioned above.

Sector	SMPPMA Financial Assistance (€ Million)
Fresh fruit	19.32
Fresh vegetables	7.62
Tomatoes for processing	18.53
Wine	12.98
Pigs	27.05
Dairy	13.17
Poultry	9.15
Eggs	11.13
Total	**118.95**

Table 10: Total amount of SMPPMA financial assistance per sector (in € Million)
(Source: ANNEX XI. List referred to in Article 24 of the Act of Accession: Malta)

Since EU accession, those agricultural sectors that were not organised and ready to compete in an economical scenario without import levies, started to face an unstable market with an irregular demand that resulted in income irregularity. Consumers' choices increased since imported food products on the local market and in large supermarket chains become more available whereas they found little or no publicity encouraging them to buy local.

A number of farmers and livestock breeders responded to these changes by investing in modernisation to increase their productivity aided through the RDP funds, which are considered as the second pillar of the CAP, whilst others which were not capable of sustaining such investments left the sector. However, the notion to invest in modern technology to become more productive, more efficient and ensure economy of scale in a small archipelago like the Maltese Islands caused unintended consequences in the form of overproduction and a false logic to compete through quantity rather than quality. This situation was made worse in most sectors due to lack of planning, lack of unity, intra-sectoral competition, a traditionalist approach to modern issues, lack of innovation, helplessness, and dependence on the authorities and on middle men, amongst various other issues that are being tackled in this policy.

Due to the various economic constraints faced by the agricultural community, the farming community is increasingly becoming an ageing population that does not regenerate enough young farmers to carry on working on the fields and farms. More than the physical hardships of working in this sector or the natural constraints, young farmers claim that the most significant push factors are the irregularity of income and the lack of capital to invest in modern machinery and equipment. Now that this period of income irregularity has been around for over a decade in most farming sectors, these sectors require policy direction towards incentives that encourage technical progress and larger profit margins from agricultural activities.

In a wider economic perspective, the ageing farming population that is phasing out might not necessarily create a labour force vacuum since farm labour is being replaced by capital inputs and the farming character is constantly being transformed through market demand. The farming community is learning (the hard way) that, for example, it makes little or no sense to produce large quantities of watermelons and flood the market since this defeats the whole purpose of efficient production in terms of profit, resources and quality of life.

As a response to these difficulties, the CAP allocated €134 million from the EU budget to the Maltese farming sector and rural areas for the period 2014-2020. The main priorities for the funding budget include job creation, growth, sustainability, modernisation, innovation and quality and it is allocated in two forms, 1) Direct payments under the first pillar of the CAP at €37 million and 2) Rural Development Funds at €97 million. Direct payments under the CAP include 1) voluntary coupled support payments for dairy, beef, sheep and tomato production; 2) greening scheme for large arable holdings; 3) a flat-rate simplified system for small farmers at a maximum of €1,250 each to reduce administrative burdens and ease controls; and 4) a 25% aid supplement for young farmers for five (5) years. The Rural Development Programme for Malta 2014-2020 aims at creating a more environmentally-friendly farming in terms of improving biodiversity, water and soil, increase resource efficiency and reduce the effect of climate change, and improving competitiveness of the agricultural sector by allocating funds for investments in physical assets, collaboration, farm development as well as payments to areas facing natural constraints. The RDP budget increased from €78 million in the 2007-2013 period to €97 million for 2014-2020.

2.02.02 Social constraints

Apart from being considered as an economic activity, agriculture has a strong social aspect inherent to it since it is primarily a lifestyle with skills and knowledge that are mostly acquired through practice. When farmers speak about the notion of inheritance, they do not only refer to passing over their farms or fields to their offspring but also the means to work in the sector including rural skills that are alien concepts to the non-farming population.

Notwithstanding the fact that such skills can be improved through education, research and capacity building, the farming lifestyle does not permit much free time in order for the farmer or livestock breeder to engage in formal education. Moreover, most adult farmers discourage their children from carrying on their trade so as to give them a chance to improve their standard of living through more stable employment opportunities. This rural skill drain coupled with a general traditionalist approach of the farming population is stifling agricultural progress in Malta since the sector is not well equipped to respond to a constantly changing economic scenario.

Farming, having a strong social element, is traditionally based on 'family farm units' in which the basic resources such as land and capital are considered as collectively owned by the next of kin and the family becomes the master of its destiny. Until one or two generations ago, these family farm units used to work as an independent unit to provide enough food for their family members, fodder for the farm animals and share the profits from the remaining produce. This is however not the case anymore since most family members move into other economic sectors that offer them space for manoeuvring and a stable income with better working conditions. Some family farm units still kept their structure and consolidated their production through investment in efficient technology and through the hiring of non-family labour. Nevertheless, when considering the working conditions and the dwindling profit margins, farm labour is usually not remunerated according to prevailing standards in other sectors and thus most farmers claim that it has become next to impossible to hire farm labourers.

Faced with a situation of an ageing farming population without the ability to create new farmers, the socio-environmental fabric of rural areas is risking collapse. The basic farming package including skills, knowledge, the working capital, farmland or farm structures and other assets is mostly available to young farmers from farming families. Such a package, especially farmland or animal farms are not easily obtainable by persons coming from outside the sector and thus, even if there could be interested youths to embark on new farming niches, the stumbling blocks to enter the sector are huge. Moreover, the social status given to farmers in Malta is still that of 'food producers' and not 'stewards of the land'. A farmer entrepreneur interested to enter the sector would be more incentivised to invest where the efforts carried out on the farm are recognised and supported.

Individualism and lack of collaboration are also stifling progress in most agricultural sectors. Success is not gauged through the volume of produce that individual farmers generate over a year, especially if such production leads to further reduce their competitiveness and strain the limited natural resources.

In a situation where most farmers persist in reapplying the same techniques that are ingrained in their social fabric even knowing that they have failed year after year, the effort by cooperative farmers to become more competitive results to be futile. In certain cases, head of holdings suppress innovation and on-farm investments by their offspring since they persist on following traditional process or products. This self-centred mentality and individualism are constraining development both at the farm level as well as across most sectors where economies of scale are not being addressed.

2.02.03 Policy constraints

When farmers or livestock breeders discuss policy matters, their primary demand invariably refers to 'protection' of domestic production. This is understandable when one considers the degree of insecurity related to the current farming system within an open market that promotes the free movement of goods in comparison to a protected market with import levies on agricultural commodities up till over a decade ago. In view of the trade and state aid regulations at EU and international level, the solutions for such policy issues can only be found beyond the trade regulations themselves.

In respect to the multi-faceted nature of farming (ranging from food production, food security on an island state, culinary tradition, land stewardship, environmental conservation, recreational landscape, rural tourism and more) there are various means of increasing value of the available local produce of the agricultural community that could be provided to those who contribute towards its success. In view of the lack of a holistic policy for the agricultural sector, government intervention has so far been based on schemes, measures and strategies on an ad hoc basis. Thus, even if necessary, such interventions may not reach their full effectiveness as they do not follow a complete direction based on policy. Nevertheless, any policy measures proposed should be congruent with the Common Agricultural Policy, which provides financing to the agricultural sector in the Maltese Islands by investing €134 million in direct payments and for rural development for the period 2014-2020. Moreover, the direction established through a ten-year agricultural policy should lead towards facilitating the formulation of the subsequent funding period of the CAP by providing the guiding principles to be followed by the agricultural sector.

2.02.04 Environmental constraints

Agriculture is dependent on natural resources such as fertile soil and water both for the production of crops and for the breeding of livestock. The main source of freshwater used by agriculture in the Maltese Islands is groundwater that is extracted from aquifers in which rainwater accumulates after percolating through the porous limestone rock.

There are two main types of aquifers in the Maltese geological strata, these being the perched aquifers and the mean sea level aquifers. Perched aquifers are found within the Upper Coralline Limestone formation, held by the impermeable Blue Clay formation and are not in contact with seawater. These aquifers are found in areas where the Blue Clay formation is present, namely in the Rabat-Dingli uplands, the north of Malta and in Gozo, and their depth varies between twenty (20) and fifty (50) metres.

The mean sea level aquifer is found in the Lower Coralline Limestone formation and consists of a freshwater lens that floats above sea water, held in place due to differences in freshwater and saline water density. Mean sea level aquifers are distributed almost all over the Maltese Islands and since they have a lens-shaped formation, they are thicker in the central part of the islands and thinner closer to coastal areas. Figure 6 below provides an indication of the location of mean sea level aquifers and perched aquifer in the Maltese Islands.

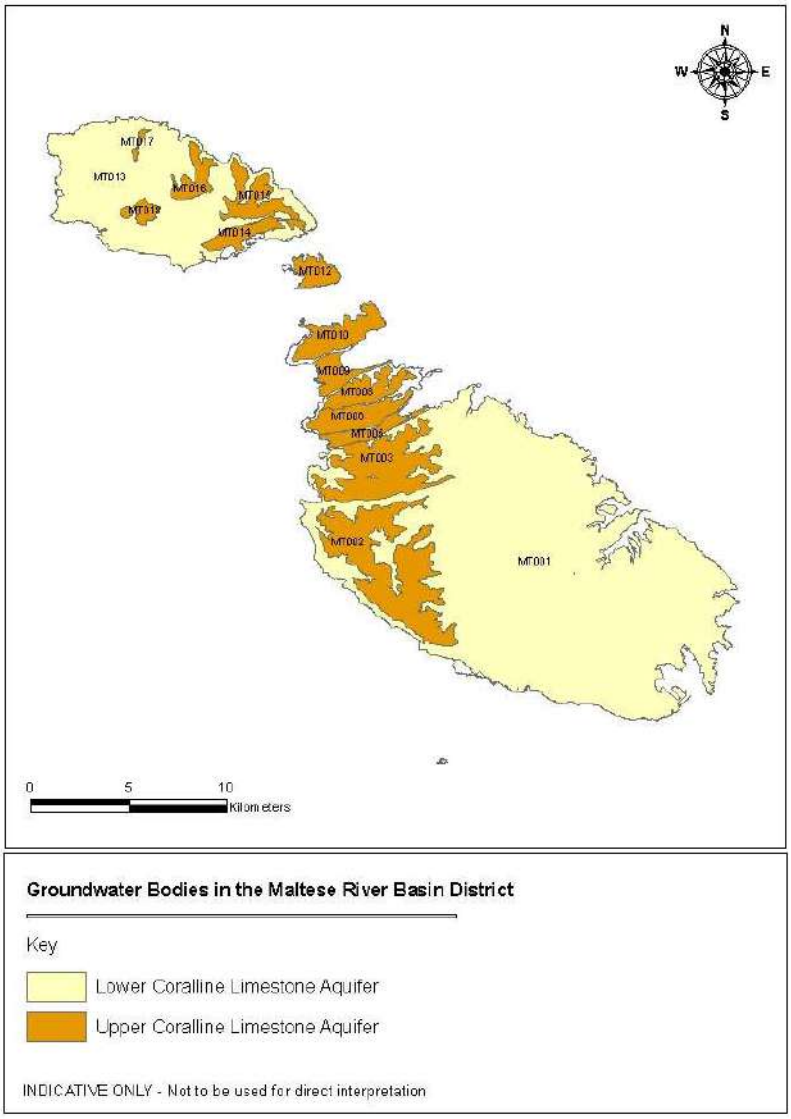


Figure 6: Groundwater bodies in the Maltese Islands (Source: WCMP, 2011)

The Water Catchment Management Plan (WCMP) is the policy framework adopted in Malta in 2011 to reflect the implementation of the EU Water Framework Directive (WFD) and it was superseded by the 2nd WCMP that was published in 2015. It describes the main requirements for the management of water resources in the Maltese Islands and proposes measures to deal with these issues.The WCMP provides tools that are required to protect, enhance and improve water resources in a holistic approach through the integrated management of surface and ground waters at the water catchment scale. For this purpose, the Maltese Islands have been designated as one whole Water Catchment district with distinct river valley systems or 'widien' and their related catchment areas that are mostly seasonal watercourses.

Principal threats to groundwater from agriculture that were defined in the WCMP include pollution by nitrates, intrusion of saline waters and over abstraction. Threats to inland surface waters also include nitrate contamination through crop production and animal husbandry (Figure 7 below). Since agriculture is highly dependent on groundwater and inland surface waters, these threats are directly linked to this economic activity and thus are being addressed in the agricultural policy. As with the case of other existing policies, plans and programmes, the purpose of this policy is to integrate with the WCMP so as to direct the agricultural community towards common targets whilst facilitating their implementation.

Water supply and pollution are critical issues for Malta particularly in the context of climate change patterns, increasing demographic pressures and urbanisation. The state of the water resources is currently poor and notwithstanding that a significant portion of the domestic water demand is being catered for by reverse osmosis plants, statistics are indicating that the demand for groundwater is outstripping its supply. There is an urgent need to reverse these trends through sustainable demand management, supply augmentation and strategic protection of ground water resources (FAO, 2006 in Dwyer et al., 2014). These aspects are analysed in further detail in Section 3.04.03 below.

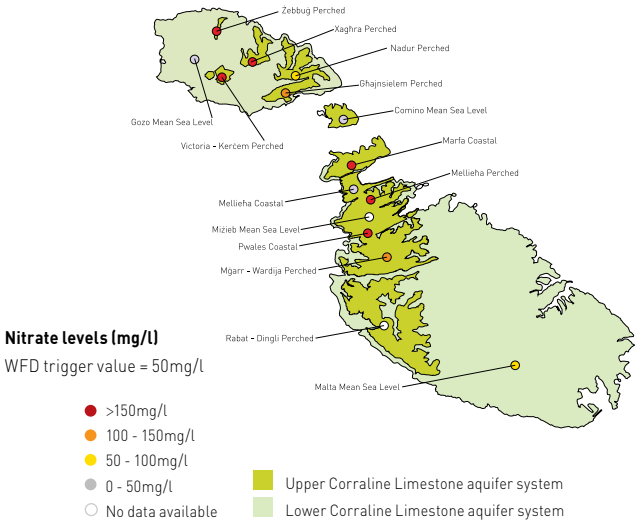


Figure 7: Nitrate levels (mg/l) in groundwater bodies (Source: MEPA, 2012)

2.03 Crop production

Crop farming in Malta is composed of 1) dry (arable) farming that relies on rain to grow mostly fodder, onions, garlic, broad beans, potatoes and some permanent crops such as vines, olive trees and fruit trees, and 2) irrigated farmland which is used to grow a wider range of fruit and vegetables utilising mostly drip irrigation and sprinklers. The amount of irrigated farmland proliferated over the last three (3) decades as a result of widespread groundwater tapping. However, the number of active farmers has been decreasing and most of the current farming population in Malta is mostly ageing. The number of registered farmers is still very high when compared to active portion within that population. Table 11 below illustrates the utilisation of farmland in the Maltese Islands by type of farming in the years 2005, 2007, 2010 and 2013.

Type of farming									
Year	**Total**	**Forage**	**Potatoes**	**Permanent crops**	**Vineyards**	**Market Gardening**	**Kitchen Gardens**	**Other areas**	**Fallow land**
2005	10,254	4,574	820	429	661	1,594	968	93	1,115
2007	10,326	4,690	712	570	751	1,851	987	89	676
2010	11,453	5,553	701	637	614	1,661	1,123	157	1,007
2013	11,689	5,290	689	581	683	1,909	1,458	121	959

Table 11: Utilised agricultural area (hectares) by type of farming
(Source: Agriculture and Fisheries 2014 – Valletta: NSO, 2016)

A range of vegetables are cultivated in Malta either as field crops or protected in greenhouses. In the latter, Maltese farmers cultivate tomatoes, cucumber, aubergines, zucchini, bell pepper, runner beans, lettuce, strawberries, melons, watermelons as well as a variety of herbs. These vegetables are also grown as field crops requiring irrigation. Other common field crops include potatoes, onions, garlic, kohlrabi, cauliflower, cabbages, broccoli and broad beans. Spring potatoes in Malta are grown exclusively for export, to reach the early market in the Netherlands, Germany, Switzerland and UK. The potato winter crop, which is less popular among farmers, is grown only for the local market. Most tomatoes cultivated in the open fields are grown to supply agro-processors of the traditional *Kunserva* tomato paste and a range of other products. Besides this, other table tomato crops are produced for fresh local consumption.

The average annual volume of vegetables sold through official markets between the years 2010 and 2014 was that of 40,848 tonnes with an average value of €16,799,600. During the same years, the average annual volume of fruit sold through the same markets was that of 2,624 tonnes with an average value of €2,813,400. Table 12 below illustrates the annual volume (in tonnes) of vegetables and fruit sold through official markets between the years 2010 and 2014 as well as their wholesale value. It is followed by two (2) more detailed tables on vegetables and fruits respectively (Table 13 and Table 14)

Year	Vegetable		Fruit	
	Weight	Value	Weight	Value
2010	41,240	17,179	2,634	3,032
2011	42,465	16,770	3,223	2,759
2012	38,542	17,117	2,694	2,573
2013	40,900	17,000	2,176	2,804
2014	41,092	15,932	2,392	2,899

Table 12: Annual volume (tonnes) of vegetables and fruits sold through official markets (Source: Agriculture and Fisheries 2014 – Valletta: NSO, 2016)

Table 12 above illustrates the variety of crops produced by Maltese farmers to supply the fresh local market rather than specialising for further processing or transformation. An interesting aspect emanating from these statistics is the dominance of vegetables over fruits both in volume and value of production. Many farmers cultivate a wide variety of crop types on very small parcels of land. Table 13 and Table 14 below show the variety and annual volume of vegetables and fruit sold through official markets over five (5) years. Physical aspects such as good soils and availability of water are the main factors leading to concentration of horticultural production, such as in the Imġarr and Pwales valleys. Marginal fields with less fertile soils and those areas without access to irrigation are generally used to produce rain fed fodder or crops, or even left fallow.

Crop type	Year				
	2010	2011	2012	2013	2014
Bell pepper	767	687	595	659	653
Broad beans	500	508	501	441	595
Cabbages	2,513	2,835	2,889	3,339	3,297
Carrots	1,351	1,313	971	1,294	1,221
Cauliflowers	3,869	3,824	3,094	3,578	3,630
Celery	412	437	427	439	414
Cucumber	799	718	736	735	829
Dry onions	3,133	2,950	2,396	2,723	2,833
Eggplant	747	745	694	747	777
Globe artichokes	574	545	585	480	565
Green onions	322	273	260	341	229
Kohlrabi	999	920	844	835	793
Lettuce	3,306	3,464	3,391	3,804	3,490
Potatoes	3,712	4,588	3,285	3,542	3,515
Pumpkins	591	539	547	530	541
Sugar melons	1,633	2,257	2,012	1,826	1,886
Tomatoes	5,404	5,095	4,629	4,750	4,563
Vegetable marrows	3,334	3,308	3,002	3,098	3,364
Watermelons	2,666	2,932	3,149	2,813	3,011
Other vegetables	4,606	4,529	4,533	4,928	4,887
Total	**41,240**	**42,465**	**38,542**	**40,900**	**41,092**

Table 13: Annual volume (tonnes) of vegetables sold through official markets by type (Source: Agriculture and Fisheries 2014 – Valletta: NSO, 2016)

Fruit type	Year				
	2010	2011	2012	2013	2014
Bambinella	85	66	98	78	50
Cherry plums	24	67	119	14	28
Dry figs	6	10	7	10	3
Early figs	82	70	88	69	43
Grapes	185	152	228	187	192
Lemons	307	288	220	268	289
Nectarines	77	145	58	51	54
Oranges	177	184	128	108	144
Peaches	518	916	422	348	383
Pomegranates	65	77	71	69	66
Strawberries	575	635	777	600	713
Sweet oranges	304	371	264	199	277
Other fruit	231	241	216	175	150
Total	**2,634**	**3,223**	**2,694**	**2,176**	**2,392**

Table 14: Annual volume (tonnes) of fruit sold through official markets by type
(Source: Agriculture and Fisheries 2014 – Valletta: NSO, 2016)

The tables below indicate the land cover registered in the IACS system as updated in 2016 in data that was provided by the Agriculture and Rural Paying Agency (ARPA). This data indicates that the 1) registered arable land in IACS totals 7843.49 hectares; 2) the area with registered greenhouses covers a total of 78.21 hectares; 3) the area with no minimum annual activity covers 498.93 hectares; 4) there are 569.5 hectares of vines producing mostly grapes for the production of wine; 5) there are 128.5 hectares of registered olive tree orchards producing mostly olives for olive oil production, and 6) fruit trees registered in IACS system cover an area of 749.24 hectares (ARPA land cover data, 2016). These figures are presented in the tables below and ranked in a top-ten format per locality for each category, including a total of other remaining localities and a cumulative total for all the Maltese Islands.

LOCALITY	Arable Land (ha)
RABAT (Malta)	800.671
SIGGIEWI	670.3732
MGARR	454.0085
SAN PAWL IL-BAHAR	428.8811
ZEBBUG (Malta)	353.0387
MELLIEHA	346.498
NAXXAR	319.5915
KERCEM	270.5799
ZURRIEQ	263.1638
ZEBBUG (Għawdex)	226.5938
Others	3,710.09
TOTAL (Top 10)	**4,133.4**
TOTAL Maltese Islands	**7,843.49**

Table 15: Arable Land cover registered in IACS system including top ten localities and total (Source: ARPA land cover data, 2016)

Table 15 above indicates that the top ten (10) localities with most arable land cover 4,133.4 hectares or 52.7% of the total arable land registered in the IACS system. Rabat (Malta) has 800.67 hectares of registered arable land (10.2%), followed by Siġġiewi with 670.37 hectares (8.55%) and Imġarr with 454 hectares equivalent to 5.79% of the total registered arable land in the IACS system.

LOCALITY	Greenhouses (ha)
MGARR	20.0557
SAN PAWL IL-BAHAR	6.7271
RABAT (Malta)	6.6709
RABAT (Victoria)	6.3509
MELLIEHA	6.2454
ZABBAR	3.6322
ZEBBUG (Malta)	3.1481
QORMI	2.8153
SIGGIEWI	2.7886
DINGLI	2.7219
Others	17.05
TOTAL (Top 10)	**61.16**
TOTAL Maltese Islands	**78.21**

Table 16: Greenhouses land cover registered in IACS system including top ten localities and total (Source: ARPA land cover data, 2016)

Table 16 above indicates that the top ten (10) localities with most greenhouses cover 61.16 hectares or 78.2% of the total greenhouses registered in the IACS system. Imġarr has an absolute majority of greenhouses with 20.06 hectares (25.64%), followed by San Pawl il-Baħar with 6.73 hectares (8.6%) and Rabat (Malta) with 6.67 hectares of registered greenhouses (8.5%).

LOCALITY	NMM (ha)
RABAT (Malta)	81.7953
MELLIEHA	45.4578
SIGGIEWI	37.0157
MGARR	33.9008
DINGLI	33.5201
ZEBBUG (Għawdex)	21.1111
NADUR	20.0614
GHARB	18.728
SAN LAWRENZ	15.5987
SAN PAWL IL-BAHAR	13.8652
Others	177.88
TOTAL (Top 10)	**321.05**
TOTAL Maltese Islands	**498.93**

Table 17: Arable land with no minimum annual activity registered in IACS system including top ten localities and total (Source: ARPA land cover data, 2016)

Arable land with no minimum annual activity refers to field parcels that had no tillage, no cutting of grasses and no cultivation in the reference year. Parcels that were classified with this code have been checked on the spot for verification as well as through consultation of the satellite imagery archive. This figure is worrying since there were 498.93 hectares with no minimum activity in 2016 out of a total cultivable registered land of 9867.91 hectares. This indicates that 5.05% of potentially cultivatable land is being left untilled whilst there are active farmers requesting farmland consolidation and field rotation to produce healthier crops (refer to Chapter 3.04.02.).

LOCALITY	Vines (ha)
MGARR	99.7506
RABAT (Malta)	96.4409
SIGGIEWI	70.1785
SAN PAWL IL-BAHAR	55.1001
ATTARD	32.5914
XAGHRA	21.0124
ZEBBUG (Malta)	20.3679
MOSTA	18.6345
MELLIEHA	18.2246
NAXXAR	12.7455
Others	124.48
TOTAL (Top 10)	**445.05**
TOTAL Maltese Islands	**569.53**

Table 18: Vines registered in IACS system including top ten localities and total (Source: ARPA land cover data, 2016)

Table 18 above illustrates the top ten (10) localities with most vine cover that total 445.05 hectares or 78.14% of the total vines registered in IACS. Lines of vines along boundary walls also fall under this category.

Imġarr has the largest concentration of vines with 99.75 hectares (17.51%), followed by Rabat (Malta) with 96.44 hectares (16.93%) and Siġġiewi with 70.17 hectares (12.32%). Following the lack of rainfall and extreme weather conditions in 2015, a large number of vines were grubbed up, especially traditional bush vines that are not irrigated.

LOCALITY	Olive trees (ha)
SIGGIEWI	15.1775
RABAT (Malta)	11.714
MELLIEHA	10.7072
SAN PAWL IL-BAHAR	9.2671
MGARR	8.2224
ZEBBUG (Malta)	6.346
XAGHRA	5.6446
DINGLI	5.0121
LUQA	4.1321
QALA	3.9889
Others	48.29
TOTAL (Top 10)	**80.21**
TOTAL Maltese Islands	**128.5**

Table 19: Olive trees registered in IACS system including top ten localities
(Source: ARPA land cover data, 2016)

Table 19 above shows the top ten (10) localities with most olive tree cover that total 80.21 hectares or 62.42% of the total olive trees registered in IACS. Lines of olives along boundary walls also fall under this category. Siġġiewi has the largest concentration of olive trees with 15.18 hectares (11.81%), followed by Rabat (Malta) with 11.71 hectares (9.11%) and Mellieħa with 10.7 hectares (8.32%). Most olive trees were planted in the last two (2) decades and this is a growing industry both in terms of new planting and the olive producing capacity of olive trees that are reaching maturity.

LOCALITY	Fruit trees (ha)
RABAT (Malta)	147.0632
SIGGIEWI	82.2451
MGARR	74.1808
NADUR	48.1441
SAN PAWL IL-BAHAR	41.2141
MELLIEHA	29.9416
ZEBBUG (Malta)	26.9768
DINGLI	25.6538
XAGHRA	20.5587
ATTARD	16.9109
Others	236.37
TOTAL (Top 10)	**512.88**
TOTAL Maltese Islands	**749.25**

Table 20: Fruit trees registered in IACS system including top ten localities and total
(Source: ARPA land cover data, 2016

Table 20 above shows the top ten (10) localities with most fruit tree cover that total 512.88 hectares or 68.45% of the total fruit trees registered in IACS. Fruit trees in orchard plantation, isolated or along boundary walls fall under this category. Rabat (Malta) has the largest concentration of fruit trees with 147.06 hectares (19.63%), followed by Siġġiewi with 82.25 hectares (10.98%) and Imġarr with 74.18 hectares (9.9%). Common fruit trees in Malta include peaches, figs, plums, grapes, oranges, nectarines, lemons and the small Bambinella pear. Summer is the main fruiting season in Malta, starting from May till late September. However, citrus fruits like oranges and lemons as well as pomegranates are harvested in the autumn and winter months.

2.03.01 Fruit and vegetables

Maltese fresh fruit and vegetable produce is predominantly marketed at the Pitkali markets in Ta' Qali which is owned and regulated by the Government through the 'Marketing of Agricultural Produce Regulations' through Subsidiary Legislations 117.04 and 117.20. Farmers deliver fresh fruit and vegetables at this market, mostly on Mondays and Thursdays, in green Pitkali crates for which they pay a commission for cleaning and replacement. After the farmers deposit their produce, it is auctioned by middlemen to licensed hawkers through the Pitkali Markets. The middlemen known as 'Pitkala' receive 8% commission on sale and the farmers are paid monthly for the produce delivered at the Pitkali Markets. A voucher system is in place that is collected by the farmer in the next visit to the market. This voucher contains the amount of produce delivered, the weight and the price for which it was auctioned.

In 2014, 41,092 tonnes of fresh vegetables and 2,392 tonnes of fresh fruit passed through the Pitkali Markets. As indicated in Table 12 in Section 2.03 above issued in the Agriculture and Fisheries report (NSO 2016), over a period of five (5) years, the average annual sale of fresh vegetables was 40,848 tonnes whilst that of fresh fruit was 2,624 tonnes. Between the year 2010 and 2014, the average value for fresh vegetables passing through the Pitkali Markets was €16,799,600 and that for fresh fruit was €2,813,400. Farmers delivering their produce at the Pitkali Markets are benefitting from a voluntary withholding tax rate of 3% on agricultural produce that is declared for income tax purposes on the RA1 Form. They may opt to have their income taxed on a flat rate of 3% calculated on the turnover or else declare their net income from agricultural produce to claim back the 3% tax withheld in case that agriculture is not their only form of income. This policy instrument is regulated by Subsidiary Legislation 123.80 entitled 'Sale of Agricultural Produce Rules' and it is incentivising farmers to deliver their produce through the Pitkali Markets.

An exercise carried out in September 2016 by the Rural Development Department at MESDC included an evaluation of the sales from pitkalija between the years 2011 and 2015 to categorize farmers according to their annual sales from the Pitkali Markets. A summary of the farmers delivering produce at pitkalija in selected categories is being presented in Table 21 below.

EURO (€)	2011	2012	2013	2014	2015
0 – 5,000	1,467	1,345	1,288	1,229	1,167
5,000 – 10,000	211	195	200	176	173
10,000 – 15,000	109	93	74	74	76
15,000 – 20,000	40	48	47	46	43
20,000 – 25,000	30	30	37	34	37
25,000 – 30,000	26	35	25	22	23
30,000 – 40,000	34	28	32	27	35
40,000 – 50,000	24	18	14	23	22
50,000 – 60,000	13	13	9	11	15
> 60,000	40	43	52	46	58
TOTAL	**1,994**	**1,848**	**1,778**	**1,688**	**1,649**

Table 21: Amount of farmers and annual turnover from pitkalija between 2011 and 2015 (Source: MESDC, 2016)

As indicated in Table 21 above, the total number of farmers delivering produce to the pitkali markets dropped from 1,994 in 2011 to 1,649 in 2015, that is equivalent to a 17.3% drop over a period of four (4) years. Although this drop was reflected within the small turnover categories, there was an increase in the large turnover categories that indicates consolidation of active farmers at the expense of recreational farmers who delivered small amounts of produce to the market. The same table also indicates that those farmers who deliver up to €15,000 worth of produce fell down by 20.76% between 2011 and 2015, whilst those farmers producing over €40,000 turnover annually from pitkali markets increased by 23.37% in the same period. This trend is even more accentuated in the €0 to €5,000 category that dropped by 20.45% over four (4) years from 1,467 to 1,167.

The above findings can be interpreted as a reduction in the motivation of recreational farmers to deliver their produce at the pitkali markets coupled with a major disruption in the production of permanent crops that were cultivated by part time farmers. Large number of fruit trees such as peach trees, figs and vines were grubbed in the last four (4) years due to harsh climatic conditions and a widespread tree borer infestation on fig trees. Moreover, this trend could also be linked with a changing lifestyle where part time farming on a small scale is no longer viable in monetary and time management terms. The category of farmers cultivating small amounts of vegetables such as potatoes, onions and garlic for own consumption and selling the surplus at the market is declining since the input and opportunity costs no longer justify such practices.

When one considers the large turnover categories in Table 21 above, active farmers who deliver over €20,000 worth of produce annually increased by 13.77% from 2011 in 2015. In fact, there were 190 farmers in this category in 2015 when compared to 167 in 2011 even if the total number of farmers entering the pitkali markets shrank by 17.3% in the same period. The most active category of farmers who deliver more than €60,000 worth of produce per year increased by 37.73% over the same period, from 53 to 73 farmers in 2011 and 2015 respectively.

The latter constituted 2.66% of the total farmers entering pitkalija in 2011 that increased to 4.43% in 2015. These trends are all signs of consolidation of the active farming community but they do not reflect profit or better return on investments from the same farmers. This requires further investigation of the actual inputs and outputs at the field level as well as the opportunity cost of being a full-time farmer in comparison to engaging into another economic activity in conjunction with farming.

A small number of farmers are also engaged in direct sales at the Farmers' market in Ta' Qali since October 2010 and the Farmers' market in Birgu since August 2013. The Ta' Qali market is composed of thirty (30) farmers who trade fresh fruit and vegetables together with other permit holders who sell rabbit meat, pork, chicken, eggs, cheeselets, wine, mushrooms, honey and fresh fish. It opens on Tuesdays and Saturdays between 7am and 5pm and has become popular with customers who appreciate buying directly from the farmer rather than from other sources. The Birgu farmers' market caters for the fresh produce of up to twelve (12) farmers and opens on Saturdays. Both markets are regulated by Legal Notice 54 of 2011 (as amended by Legal Notice 2 of 2014 and Act XIII of 2015) and fall within the responsibility of the Parliamentary Secretariat for Agriculture, Fisheries and Animal rights.

The main purpose behind the farmers' markets is to provide customers with the opportunity to buy local fresh produce in season yielding better value for money. Purchasing from a farmers' market is actually cheaper than buying from hawkers, grocers and supermarkets as the mark-up attributed to the middlemen are eliminated. Apart from the economic benefit, this proved to be a positive initiative because it brought consumers and producers together, rendering them more sensitive to each others' concerns and realities. On their part, farmers are taking into account the feedback they obtain from their direct communications with consumers to adjust the diversity and quantity of their supply to harmonise their offer with consumer demand. This is changing their outlook on the viability of their activity because they recognise that they can have a stronger say on their methods of operation and sale of produce.

Not all farmers can be engaged in the farmers' market setting since most of them do not possess the required human resources to retail their produce without compromising the production aspect. Such a setup would require the engagement of more human resources to cater for the retailing aspect or to cultivate fields while the farmer is interacting with customers. In most cases, engaging other workers within micro-farming units would not make economical sense since the sales from the farmers' market cannot offset the increase in staff costs. In response to this, some farmers started specialising in particular crops to retail at the farmers' market and adapted their farming schedule to this new approach.

Article 6 in the Farmers Market Regulations (S.L. 117.31) regulates the eligibility for permitting a stall operator in a Farmers' Market. This implies that the operator is either 1) a farmer registered with the Department of Agriculture as a full-timer or a part-timer; or 2) a producer organisation registered in terms of the Producer Organisations Act which sells agricultural produce cultivated or grown locally by its members; or 3) a registered cooperative constituted within the agriculture or

fisheries sector, or 4) a person who produces products being direct derivatives of local agricultural, animal husbandry or fisheries primary produce.
The same article adds that operators can act as a substitute or as an assistant to a permit holder. This does not apply to farmers who are in possession of a hawker, peddler or busker licence in terms of the Trading Licenses Regulations.

Apart from the official fruit and vegetable trading at the pitkali markets and the farmers' markets, a number of farmers are also involved in direct sales from farm gate or vegetable shops. Such experiences have exposed the limitations of direct sales from small-scale producers that provide limited choices for customers who would prefer a one-stop shop for their shopping needs. There are also farmers who supply the hotel and catering sectors directly but invariably face the issue of late payments due to lack of organisation, representation and contractual agreements. These initiatives are intended to shorten the supply chain and sideline middlemen but the lack of organisation and the micro-farming scale in Malta are not in favour of farmers. Unfortunately, there are no statistics on the amount of fruit and vegetables retailed through direct sales.

Theoretically, if producers embark on direct sales through the removal of middlemen, this should widen their profit margin and reduce costs for the consumer. However, this requires investment in alternative means for retailing and marketing to replace the role of the middleman. There are various means, including technological, that can facilitate these tasks but producer collaboration is always a must since production in Malta is on a micro-scale. Investment in grading, packaging and labelling are all good examples that upgrade the product presentation and provide more quality and traceability. Another aspect of direct sales of fruit and vegetables in Malta, including at farmers' markets, is the price which is influenced by the Pitkalija prices that are issued by the Pitkala even when the produce is not sold through the Pitkali centre.

The Agriculture and Fisheries report issued in 2016 by the National Statistics Office produced data on Supply Balance Sheets of Agricultural Products, including vegetables and fruits. The Supply balance sheets show Malta's supply of a particular agricultural product over a specific period of time. The supply of an agricultural product is made up of the total production of the product added to the total quantity of the imported product, and adjusted to any change in stocks that may have occurred during the reference period. The supply balance sheets also provide information on the usage of the specific agricultural product. Table 22 below illustrates the Supply Balance Sheet for vegetables for the years 2011 till 2014. This table shows that between July 2013 and June 2014, vegetable consumption in Malta was that of 76,400 tonnes per year, of which 8,000 or 10.47% was imported from EU countries as based on official data.

Crop Year (July to June)			
	2011/2012	2012/2013	2013/2014
Total resources	**76.9**	**75.3**	**76.4**
Usable production	66.9	66.7	68.3
Imports	9.9	8.6	8.0
From EU	9.9	7.5	8.0
Total Uses	**76.9**	**75.3**	**76.4**
Exports	0	0	0
To EU	0	0	0
Change in stocks	-	-	-
Domestic uses	76.8	75.3	76.4
Human Consumption	76.8	75.3	76.4

Table 22: Supply Balance Sheets of Agricultural Products – Vegetables in 000 tonnes
(Source: Agriculture and Fisheries 2014 – Valletta: NSO, 2016)

Crop Year (July to June)			
	2011/2012	2012/2013	2013/2014
Total resources	**11.5**	**11.6**	**11.6**
Usable production	3.3	2.6	2.5
Usable production	8.1	9.0	9.1
Imports	7.8	8.6	6.4
Total Uses	**11.5**	**11.6**	**11.6**
Exports	0.0	0.0	0.0
To EU	0.0	0.0	0.0
Change in stocks	0.0	0.0	0.0
Domestic uses	11.5	11.6	11.6
Human Consumption	11.5	11.6	11.6

Fresh fruit does not include nuts, citrus fruit, dried fruit and table olives

Table 23: Supply Balance Sheets of Agricultural Products – Fresh fruit in 000 tonnes
(Source: Agriculture and Fisheries 2014 – Valletta: NSO, 2016)

Table 23 above indicates that in the crop year 2013/2014, Malta utilised 11,600 tonnes of fresh fruit per year, of which 9,100 or 78.45% was imported from other countries as based on official data.

Crop Year (July to June)			
	2011/2012	2012/2013	2013/2014
Total resources	**13.9**	**12.1**	**11.1**
Usable production	1.7	1.6	1.8
Imports	12.2	10.5	9.3
From EU	9.6	6.9	7.0
Total Uses	**13.9**	**12.1**	**11.1**
Exports	0.0	0.0	0.0
To EU	0.0	0.0	0.0
Change in stocks	0.0	0.0	0.0
Domestic uses	13.9	12.1	11.1
Human Consumption	13.9	12.1	11.1

Table 24: Supply Balance Sheets of Agricultural Products – Citrus in 000 tonnes
(Source: Agriculture and Fisheries 2014 – Valletta: NSO, 2016)

Table 24 above indicates that in 2013/2014 crop year, Malta utilised 11,100 tonnes of citrus per year, of which 9,300 or 83.78 % was imported from other countries as based on official data.

2.03.02 Viticulture

Viticulture is the term used to define the cultivation of vines for the production of grapes. In Malta, the bulk of grape production from this sector is intended for wine production. Around half a century ago, more wine was produced in Malta than what is currently produced and it used to be exported in bulk. A Farmers' Wine Cooperative was set up in the 1960's to safeguard the farmers' interests but with dwindling profit margins and restrictions, most vine growers gave up viticulture and switched to other crops.

During the negotiations on Malta's entry in the European Union, a quota of 1,000 hectares for vine-growing was established to protect the quality of grapes produced in Malta. Nevertheless, this quota has not been reached. As indicated in Table 25 below, the amount of UAA in vineyards was 661 hectares in 2005, increased by 13.62% to reach 751 hectares in 2007, dropped by 18.24% to 614 hectares in 2010 and increased again by 11.24% to 683 hectares in 2013 (NSO, 2016). In 2013, land holdings with vineyards being smaller than two (2) hectares comprised 31.92% of the total, those measuring between two (2) hectares and five (5) hectares added up to 35.72% and those exceeding 5 hectares covered 32.6% of vineyards.

Size class: Utilised Agricultural Area (ha)							
Year	Total	<0.5	0.5-<1	1-<2	2-<5	5-<10	>10
2005	661	68	76	168	202	93	54
2007	751	43	92	216	231	113	56
2010	614	27	71	137	190	107	82
2013	683	9	58	151	244	125	96

Table 25: Area under vineyards by size class in hectares
(Source: Agriculture and Fisheries 2014 – Valletta: NSO, 2016)

In the early years following EU accession, a widespread vine planting initiative took off in response to a generous vine planting scheme of Lm480 per tumulo and subsequent subsidies handed to the sector under the Special Market Policy Programme for Maltese Agriculture (SMPPMA) regime. Farmers who benefitted from such schemes had to oblige with planting methods, material used and enter into a ten (10) year agreement for grape cultivation. This vine planting introduced international varieties such as Chardonnay and Merlot together with the established Maltese Ġellewża and Girgentina varieties. Nevertheless, there was a lack of planning of grape varieties with regards to linkage with the consumer demand triggering a lowered price regime for grapes. The outcome was that a number of vineyards were grubbed up following the expiry of a ten-year vine contract with Directorate of Agriculture.

Following EU accession and associated trade liberalisation, Maltese markets were inundated with very cheap wine with consequential downturn of prices obtained for local grapes. This also led to the near-extinction of the backyard wine making hobby based on *Ġellewża* and *Girgentina* varieties grown using the bush vine method. Such home-made wines were commonly found all over the Island prior to EU Accession but virtually disappeared soon after.

This challenge was addressed with a vigorous drive towards the production of quality wines from Malta-produced grapes and, as a consequence, Maltese wine quality has gained a considerable reputation over the past decade. This improvement was hinged on robust investment and effort on the part of farmers and vintners alike together with comprehensive sector restructuring supported by a sound legal framework.

In the Maltese Islands, quality wines having a PDO denomination are labelled as 'D.O.K.' wines and are regulated by Legal Notice 416 of 2007. DOK wines have a 'Denomination of Controlled Origin', which means that they achieve the highest quality level as vine growers and winemakers must respect stricter parameters. These wines are followed by 'I.Ġ.T.' wines that have a 'Typical Geographical Indication' label which guarantees high quality wine but with yields per hectare that are higher than those for D.O.K. wines. I.Ġ.T. wines produced in the Maltese Islands are regulated by Legal Notice 167 of 2007. These regulations lay down the definitions and technical specifications of these two wine product categories, the respective oenological practices, as well as labelling and presentation requirements, traditional terms and restrictions.

The production protocols of wine grape varieties that may be cultivated in the Maltese Islands are regulated by Legal Notice 188 of 2006. Nowadays, one can find a range of Maltese quality wines on retail or offered in restaurants that reflect the dedication of local farmers and vintners.

Grapes which do not achieve a D.O.K. or I.Ġ.T. nomenclature fall under the category of 'Table Wines'. These are commercial wines which are sold on the market with a more competitive price since they are produced from grapes that are cultivated under less stringent regulations that permit higher yields of grapes per vine. Notwithstanding the quality parameters mentioned above, D.O.K. wines are not necessarily better tasting or more expensive than I.Ġ.T. wines. Such factors are determined by the wine producer, the brand and by the market. Thus the role in producing quality wine is dual; the vine grower has to produce grapes of the highest quality and the vintner has to create a wine product that satisfies the consumer and market demands.

The wine grape varieties from which Maltese quality wines are produced include mostly international varieties such as Chardonnay, Sauvignon blanc, Syrah, Cabernet sauvignon and Merlot. However, such wines are also being produced from the local red Ġellewża and white Girgentina. These are either blended with other international grape varieties or else used exclusively to produce single variety wines. The latter are very important for Malta since these two indigenous grape varieties are not found in any other wine-producing country. Thus, they have a unique character that calls for further research and investment both on quality production and marketing, especially since they are a common heritage to the Maltese population.

Table 26 below illustrates the area under vineyards with local varieties for the production of wine, the international varieties for the production of wine and table grapes. In 2013, there were 89 hectares or 13% of local varieties for wine production, 548 hectares or 80.23% with international varieties, and 46 hectares or 6.73% that produced table grapes. There was a sharp drop of 71.19% in the local varieties for the production of wine between 2005 and 2013, a considerable increase in international varieties of 98.55 that almost doubled in 8 years and a 39.47% decrease in area under vineyards for table grapes.

Year	Total	Type of Vine		
		Local varieties for wine production	International varieties for wine production	Table grapes
2005	661	309	276	76
2007	751	354	264	133
2010	614	103	434	77
2013	683	89	548	46

Table 26: Area under vineyards by type of vine in hectares
(Source: Agriculture and Fisheries 2014 – Valletta: NSO, 2016)

There are currently 952 farmers producing grapes for wine production and they are cultivating 39 varieties from the permitted 57 different vine varieties (MSDEC, 2016). These farmers are cultivating an area of circa 290 hectares exclusively for the production of D.O.K. and IGT wines equivalent to a total quota ranging between 3.48 to 5.19 million kilogrammes of grapes depending on the wine category.There are currently nineteen (19) registered local wineries and the total wine production (DOK and IGT) in 2016 was 14,082 hectolitres, with a grape production of circa 2 million kilogrammes.

Following a severely dry winter season (2015-2016), many vines succumbed the following summer. Further loss of vines occurred as a consequence of the grubbing up trend targeted at vines that were released from the ten year obligation related to the planting aid given in the period 2004-2006. As a result, there is currently a vine scarcity that requires a vine replanting exercise to catch up with the demand. The agricultural policy intends to strengthen the sector so that it can overcome such one-off structural issues so that the supply of grapes catches up with the wine demand.

In recent years, established wineries as well as a number of small wineries started investing in the production of estate wines. Small wineries have an interest to produce limited amount of wines that are of exceptional quality, being produced from grapes that are cultivated in their own vineyards, using the strictest quality parameters (Green Paper on Maltese Wine Sector, MRRA, 2012). In such setups, wineries have full control over the cultivation process up to the finished wine product. This trend reflects the need to focus on quality wines in tandem with the micro-farming nature of vineyards in Malta. As with the case of other farming sectors, Maltese wines cannot compete with commercial wines through quantity as land and resources are scarce. Estate wineries produce wines that are based on a limited yield per hectare so that the production is controlled and grapes can achieve the required quality parameters. The latter might involve practices such as ‘green harvesting’ where the viticulturalist removes grape bunches from the vine when their number is considered too high so that the remaining branches can mature properly. Alternatively, at various intervals, individual bunches are selected from a range of vines for optimal maturity and sugar content and then fermented in relatively small quantities to produce boutique wines.

Table 27 below indicates the Supply Balance Sheets of wine showing the years 2011 till 2014. The supply of wine is made up of the total production of the product added to the total quantity of the imports, and adjusted to any change in stocks that may have occurred during the reference period. The supply balance sheets below also provide information on the usage of wine. Table 27 below indicates that in 2014 Malta utilised 101,600 hectolitres of wine, of which 21,200 or 20.97 % were locally produced and 55,800 or 55.19% were imported. The human consumption of wine in Malta is estimated at 76,300 hectolitres or 75.1% of the total supply whilst the rest is listed as stocks. A detailed analysis of this sector can be found in Section 3.04.01.3 below.

Crop Year (July to June)			
	2011/2012	2012/2013	2013/2014
Total resources	**93.2**	**96.9**	**101.6**
Usable production	19.8	21.9	21.2
Imports	47.8	55.0	55.9
From EU	39.9	42.1	47.3
Total Uses	**93.2**	**96.9**	**101.6**
Exports	0.0	0.0	0.0
To EU	0.0	0.0	0.0
Change in stocks	-5.6	4.6	0.7
Final stocks	20.0	24.6	25.3
Initial stocks	25.6	20.0	24.6
Domestic uses	73.2	72.3	76.3
Human Consumption	73.2	72.3	76.3

Table 27: Supply Balance Sheets of Agricultural Products – Wine in 000 hectolitres
(Source: Agriculture and Fisheries 2014 – Valletta: NSO, 2016)

2.03.03 Tomatoes for processing

Tomatoes in the Maltese Islands are produced for processing as well as for fresh table consumption. There are various tomato growing methods that differ in the way the tomato plant is cultivated. Tomatoes that are grown for processing are mainly low plant cultivars that are harvested in summer. Farmers enter into agreements with the agro-processors and are trained to adopt the best crop husbandry methods to obtain a product that is suitable for processing and above all suits the production of the traditional Maltese *Kunserva* paste. The latter is a Maltese speciality that has become a staple food that is complimentary with Maltese bread and olive oil, as well as with a range of dishes, mainly in sauces and broths.

The seeds used for the low plant cultivars to produce tomatoes for processing are supplied by the agro-processors, who provide guidance and training to farmers on the production methods. Normally, this crop is planted in early March and harvesting takes place in August. Subsidiary Legislation 117.13 as emended in LN 409 of 2007 controls tomato paste and sale of tomatoes for processing purposes in the Maltese Islands. This legislation caters for the ideal conditions of tomatoes, inspections, pricing, manufacturing licences, record keeping as well as container labelling.

Kunserva is a thick tomato paste that is marketed from producer companies and sold in large quantities all over the Maltese Islands and in export markets. Its taste, adaptability with food and widespread availability all contribute to its fame. Moreover, *kunserva* is recognised by the European Commission (EC 1132/2004) as being a traditional and well-defined Maltese product. The definition of Kunserva in EC 1132/2004 states that: The product is obtained by concentrating tomato juice, obtained directly from fresh tomatoes, containing added sugar and salt, having a dry matter content of 28 % to 36 %, packed in hermetically sealed containers labelled "kunserva" and falling within CN code ex 2002 90.

The main stakeholders in the local *kunserva* industry are the tomato growers and three (3) kunserva processors, two (2) located in Gozo and one (1) in Malta. Subsidiary Legislation 117.13 as emended in LN 409 of 2007 controls tomato paste production and the sale of tomatoes for processing purposes in the Maltese Islands. This legislation defines the ideal conditions of tomatoes, inspections, pricing, manufacturing licences, record keeping as well as container labelling. Moreover, EC 1764/8640 as emended in EC 1132/2004 states that in the case of *kunserva*, sugar shall be added, representing between 8 % and 25 % by weight of the finished product.

The annual tomato production for processing in the Maltese Islands for 2016 was 6,971 tons and the area used for tomato cultivation exceeded 132 hectares. Normally, this crop is planted in early March and harvesting takes place in August. Farmers are organised in four (4) Producer Organizations/Cooperatives and the total number of members is one hundred and seventy one (171) (MSDEC, 2016). Whilst tomatoes for fresh consumption keep on producing fruit for multiple-harvests, the harvesting of tomatoes for processing is done only once and this work is done either manually or mechanically by apposite tractor attachments. One has to note that the Mediterranean climatic conditions favour this produce to be harvested early and above all develops an excellent taste that makes it of high quality.

This product has been recognised as being one of the most important crops in Malta, largely owing to the presence of the agro-processing industry that produces a range of tomato products and employs a significant number of persons. Prior to Malta's accession to the European Union, negotiations on this sector focused both on the tomato producers as well as on the processing industry itself. Malta agreed to remove all levies by membership and instead introduce compensatory measures for the tomatoes for processing sector that totalled €18.53million between 2004 and 2014. This compensation consisted of SMPPMA coupled payments as well as an additional marketing aid in the form of a campaign promoting tomato produce aimed at assisting associations and incentivise growers to increase the production of tomatoes for processing.

In 2014, the SMPPMA programme was exhausted and the last rate issued for tomatoes for processing was €0.09 per kilogramme. This was followed by the introduction of a Voluntary Coupled Support mechanism capped at a total of €900,000 per year that started being issued in 2015 to aid this sector for the production of *Kunserva*. This is the only crop sector that will benefit from coupled support from the RDP 2014-2020 funding regime and the amount allocated constitutes 17% of the total.

Each participating farmer has to have a contract with a producer organisation or cooperative involved in this sector and produces tomatoes for processing over at least one (1) tumulo of land. This support will be based on yields per hectare that reflects the contract signed with the producer organisation in line with EC Regulation 1307/2013. A more detailed analysis on this sector is provided in Section 3.04.01.4 below.

2.03.04 Potatoes

The potato crop is intimately associated with Maltese agriculture and it is considered as the most important cash crop for Maltese farmers who have been exporting potatoes for over a hundred years. Maltese export potatoes are very appreciated on the Dutch market, where they achieve premium prices surpassing similar produce from other countries. In fact Maltese potatoes are often referred to in the trade journals as the 'Maltas'. The Dutch consumers, especially those of traditional eating habits, have acquired a preference for Maltese produce for which they are ready to pay high prices. There are also other markets for this product in Germany, Belgium, Switzerland and the UK.

Despite the fact that Maltese spring potatoes are renowned for their taste and quality in various north European countries, no adequate local research has ever been carried out to investigate the potential improved yield, precocious harvest and the quality parameters of the product. The yellow-fleshed variety Alpha has established a solid foothold on the Dutch market. Potatoes are exported in bulk and the mark-up between the wholesale and retail price is such that the Maltese producers are examining the situation to establish whether a different marketing strategy could yield an enhanced return for their product. In recent years, several trials have been carried out testing different varieties of potatoes under different cultivation conditions and in different soils. Moreover the number of varieties of potatoes currently being cultivated for export has increased considerably. However the results of these trials have not been made available and, without a detailed breakdown of the trial parameters the results could have scant scientific significance.

The Maltese potato product has unique organoleptic properties and a traditional link with Malta, even if it is produced in various other countries that compete on an international market. Potato packing houses take orders for seeds and import them from Ireland and the Netherlands in autumn so that farmers can plant them between the months of November and January. Apart from taking orders and importing seeds, the packing houses manage the exportation including grading, product marketing and the export markets. Exportation is mostly carried out in April and May of each year and crop abundance is highly dependent on climatic conditions ranging from amount and frequency of rain, hail, temperature extremes, humidity, wind patterns and various forms of diseases.

The area dedicated to the cultivation of potatoes in the Maltese Islands declined from 1,100 hectares in 2004 to 700 hectares in 2014 (Faostat online data, extracted in 2016; http://www.fao.org/faostat). During the same period, the total estimated volume of potatoes produced by Maltese farmers fell from 22,783 tonnes to 12,559 tonnes and exports fell from 7,200 tonnes in the 2004/2005 crop year to 3,100 tonnes in 2013/14. Export levels fell drastically in the years 2015 and 2016 but this was attributed to extreme weather conditions in particular the shortage of rainfall. Apart from missing a clear strategy to improve the export market, in the last decade the Maltese product had to compete with North African potatoes that were allegedly placed on the market using the Maltese label. Moreover, the SMPPMA assistance which reached €22.08 million Euros over a period of ten (10) years came to an end in the year 2014.

Notwithstanding such potential for potato production that can be grown almost all-year round, a considerable amount of potatoes are imported from other countries to satisfy the domestic and tourist consumption. The amount of potatoes produced for the Maltese market is considerable but there are issues with fungal, insect and bacterial infections during storage that raise about chemical applications. Through proper investments in upgraded potato storage, the demand for this staple food during the summer period from locals and tourists could be satisfied through Maltese production. Potatoes are non-perishable tubers that can be stored for long periods and thus with the correct policy direction, local products can substitute a large share of imported potatoes in various forms. A more detailed analysis on these issues is provided in Section 3.04.01.5 below.

Table 28 below indicates that the amount of UAA under potatoes was 820 hectares in 2005 that dropped by 13.17% to reach 712 hectares in 2007, by 1.55% to 701 hectares in 2010 and by 1.71% to 689 hectares in 2013 (NSO, 2016). In 2013, land holdings under potatoes being smaller than 2 hectares comprised 38.6% of the total, those being between 2 hectares and 5 hectares added up to 41.1% and those exceeding 5 hectares covered 20.32% of area under potato cultivation. However, this data does not differentiate between potatoes for export and those for the local market.

Size class: Utilised Agricultural Area (ha)							
Year	**Total**	**<0.5**	**0.5-<1**	**1-<2**	**2-<5**	**5-<10**	**>10**
2005	820	53	89	215	342	106	16
2007	712	22	81	175	305	116	13
2010	701	37	107	198	249	86	25
2013	689	23	90	153	283	105	35

Table 28: Area under potatoes (ha) by size class
(Source: Agriculture and Fisheries 2014 – Valletta: NSO, 2016)

Table 29 below indicates the Supply Balance Sheets of potatoes for the years 2011 till 2014. The supply of potatoes is made up of the total production of the product added to the total quantity of the imports, and adjusted to any change in stocks that may have occurred during the reference period. The supply balance sheets below also provide information on the usage of potatoes. This table indicates that in 2014 Malta utilised 45,900 tonnes of potatoes, of which 19,000 or 41.39% were produced locally and 27,000 tonnes or 58.82% were imported. Potato export for the 2014 period stood at 3,100 tonnes, dropping by 27.9% over the previous year. The human consumption of potato in Malta was estimated at 35,300 tonnes or 76.9% of the total supply.

Crop Year (July to June)	2011/2012	2012/2013	2013/2014
Total resources	**41.7**	**41.3**	**45.9**
Usable production	14.6	17.0	19.0
Imports	27.1	24.3	27.0
From EU	27.0	24.2	26.9
Total Uses	**41.7**	**41.3**	**45.9**
Exports	4.5	4.3	3.1
To EU	4.5	4.3	2.9
Change in stocks	-3.8	-1.5	7.3
Final stocks	6.9	5.5	12.8
Initial stocks	10.8	6.9	5.5
Domestic uses	41.0	38.5	35.5
Seeds	0.2	0.2	0.2
Human Consumption	40.8	38.3	35.3

Table 29: Supply Balance Sheets of Agricultural Products – Potatoes in 000 tonnes
(Source: Agriculture and Fisheries 2014 – Valletta: NSO, 2016)

2.03.05 Olive cultivation

Genetic studies carried out at the University of Malta indicate that there are at least four (4) indigenous olive tree varieties in the Maltese Islands (Source: http://www.um.edu.mt/think/maltese-olives-and-their-genes/). These are *il-Bidni*, *il-Malti*, *il-Bajda* and an *Olea Oleaster* wild olive species. Notwithstanding that the geo-climatic conditions are ideal for the growth of olive trees and the production of olive oil, this industry had been abandoned and it didn't recover even after the planting of thousands of trees in the 1950s and 1960s. It was only in the 1990s that olive tree planting on a considerable scale for the production of olive oil took place. The project PRIMO (Project for the Revival of the Indigenous Maltese Olive) was fundamental in the revival of the *Bidni* olive variety as approximately 30,000 trees were grafted and planted to set the groundwork for a niche industry. Nevertheless, the majority of olive trees varieties that were planted in Malta in the last two (2) decades are Italian oil producing varieties such as *Frantoio*, *Leccino*, *Carolea*, *Cipressino* and *Pendolino,* as well as table olive varieties such as *Uovo di Piccione* and *Bella di Spagna.* Olive trees are also planted in field margins and as wind breakers since they have a dual-role of landscaping and crop production.

Olive oil is a staple in the Mediterranean diet and it thus generates interest in terms of culinary and medicinal aspects. Through further investment in product traceability, genuine Maltese olive oil can fetch premium prices for its quality and low production levels so that it is not marketed on the same level as other highly-commercial olive oils. The descriptions and definitions of olive oil in the Production of Olive Oil Regulations (Legal Notice 66 of 2014) include the following:

1) 'Virgin Olive Oils' that are obtained from the fruit of the olive tree solely by mechanical or other physical means under conditions that do not lead to alterations in the oil, which have not undergone any treatment other than washing, decantation, centrifugation or filtration, to the exclusion of oils obtained using solvents or using adjuvants having a chemical or biochemical action, or by re-esterification process and any mixture with oils of other kinds. Virgin olive oils are exclusively classified and described as follows:

a) Extra virgin olive oil having a maximum free acidity, in terms of oleic acid, of 0.8g per 100g, the other characteristics of which comply with those laid down for this category;

b) Virgin olive oil having a maximum free acidity, in terms of oleic acid, of 2g per 100g, the other characteristics of which comply with those laid down for this category, and

c) Lampante olive oil having a free acidity, in terms of oleic acid, of more than 2g per 100g, and/or the other characteristics of which comply with those laid down for this category.

2) 'Refined Olive Oils' obtained by refining virgin olive oil, having a free acidity content expressed as oleic acid, of not more than 0.3g per 100g, and the other characteristics of which comply with those laid down for this category.

3) 'Olive Oil' which is composed of refined olive oils and virgin olive oils obtained by blending refined olive oil and virgin olive oil other than lampante olive oil, having a free acidity content expressed as oleic acid, of not more than 1 g per 100 g, and the other characteristics of which comply with those laid down for this category.

4) 'Crude Olive-Pomace Oil' obtained from olive pomace by treatment with solvents or by physical means or oil corresponding to lampante olive oil, except for certain specified characteristics, excluding oil obtained by means of re-esterification and mixtures with other types of oils, and the other characteristics of which comply with those laid down for this category.

5) 'Refined Olive-Pomace Oil' obtained by refining crude olive-pomace oil, having free acidity content expressed as oleic acid, of not more than 0.3g per 100g, and the other characteristics of which comply with those laid down for this category.

6) 'Olive Pomace Oil' obtained by blending refined olive-pomace oil and virgin olive oil other than lampante olive oil, having a free acidity content expressed as oleic acid, of not more than 1g per 100g, and the other characteristics of which comply with those laid down for this category.

Olive oil processors have to operate in line with LN 66 of 2014 which aims at controlling the *modus operandi* for commercial olive oil production in Malta and its placement on the market. It involves licensing for the production of olive oil, a link with the register for olive growers, submission of olive oil production declarations, keeping of an olive oil record book, as well as the participation in olive certification schemes. The implementation of this Legal Notice is challenging as most olive production is undertaken by recreational farmers on very small parts of their land parcels and record keeping is challenging at this very small scale.

Various pests and pathogens (e.g. *pseudomonas*, *prays olea*, *coleoptera and the recent threat from Xylella fastidiosa)* have made their appearance at an incremental rate in Maltese olive groves, and, since most olive grove owners are not full time farmers but are basically recreational cultivators, they are not well versed with regards to protection, precautions and pest control.

Olive oil pressing kicks off at the fruit maturation period, starting with the harvesting of early crops in September to late production in December. Most Maltese olive oil producers press their olives at one of the registered olive presses and produce olive oil for their own consumption. Other producers have invested in larger olive groves and are retailing the surplus olive oil on an ad hoc basis. Thus, notwithstanding the considerable potential of this sector, Maltese olive producers are still not adequately organised and represented. Since Maltese olive oil is considered as a high quality product, strict enforcement is required to monitor olive oil that is labelled as being Maltese extra virgin. The olive registry and annual harvest declarations are aimed at providing traceability of olive oil that is produced and sold as Maltese, whilst flagging irregularities regarding volume and quality.

The olive oil sector in Malta requires an investment in the treatment of olive mill waste that is generated from the olive presses in the form of pomace or wet olive cake. Most olive presses in Malta utilise the two-phase olive oil extraction technology that does not produce large amounts of wastewaters but it creates a semi-solid sludge residue known as 'two-phase olive mill waste' or 'wet olive cake'.

This type of waste is difficult to handle but it can be recovered to produce various forms of by-products such as soil conditioners and organic fertilisers. There could be three alternatives for the disposal of olive mill waste in Malta, either 1) through composting in a lined structure so that the waste can be spread over a large area whilst exposed to sunlight for drying and is rotated using machinery, 2) deposited in a biogas plant mix to use it for energy generation, or 3) integrated into farmland to add soil organic matter and increase its water retention capacity.

LOCALITY	Olive trees (ha)
SIGGIEWI	15.1775
RABAT (Malta)	11.714
MELLIEHA	10.7072
SAN PAWL IL-BAHAR	9.2671
MGARR	8.2224
ZEBBUG (Malta)	6.346
XAGHRA	5.6446
DINGLI	5.0121
LUQA	4.1321
QALA	3.9889
ZEJTUN	3.9003
NADUR	3.0344
XEWKIJA	2.928
ZEBBUG (Għawdex)	2.6388
ZURRIEQ	2.4787
SAN LAWRENZ	2.2581
NAXXAR	2.1886
QRENDI	2.0957
GHAXAQ	1.9599
ZABBAR	1.8287
BIRZEBBUGIA	1.7524
QORMI	1.7006
GHARB	1.6252
MOSTA	1.6006
KERCEM	1.4672
ATTARD	1.3332
MDINA	1.3037
MARSAXLOKK	1.106
GHASRI	1.0831
GHAJNSIELEM	1.0521
Total (over 1 ha)	**119.5472**
TOTAL Maltese Islands	**128.5**

Table 30: Olive trees registered in IACS system including localities having over 1 ha (Source: ARPA land cover data, 2016)

Table 30 above shows the distribution of olive trees in hectares for localities having an olive tree cover that exceeds one (1) hectare. This data was extracted from the land cover registered in the IACS system as updated in 2016. There is a total of 128.5 hectares covered in olive trees, that make up to 8.88% of the permanent crop cover and 1.3% of the total utilisable agricultural land registered in the IACS system. Lines of olives along boundary walls also fall under this category and are thus included in the olive tree land cover.

Siġġiewi has the largest concentration of olive trees with 15.18 hectares (11.81%), followed by Rabat (Malta) with 11.71 hectares (9.11%) and Mellieħa with 10.7 hectares (8.32%). Most olive trees were planted in the last two (2) decades and this is a growing industry both in terms of new planting and olive producing capacity of olive trees that are reaching maturity. A more in depth analysis of the olive oil sector is carried out in Section 3.04.01.6 below.

2.03.06 Controlled cropping

Controlled cropping involves the cultivation of various crops in an environment where such climatic conditions as temperature, light and humidity are controlled and manipulated to suit and optimize the growth stage of particular crops depending on the market exigencies. In Malta, there are four (4) main types of controlled cropping, these being 1) greenhouses that in general do not exceed the height of 3.5 metres, 2) single plastic tunnels that are approximately two (2) metres high, 3) clotches or low plastic tunnels, 4) shade houses used to cultivate seedlings and saplings. Mushroom sheds are also considered a form of controlled cropping since elements such as light, humidity and temperature are rigidly controlled to favour optimum growth of the crop.

Table 31 below shows the distribution of greenhouses in hectares for localities having more than half (0.5) of a hectare. This data was extracted from the land cover registered in the IACS system as updated in 2016. There is a total of 78.21 hectares covered in greenhouses that add up to 0.93% of the registered arable land and 0.76% of the total utilisable agricultural land registered in the IACS system. There are 25.64% of all greenhouses located in Imġarr (Malta) with a total of 20.06 hectares, followed by San Pawl il-Baħar with 6.73 hectares (8.6%) and Rabat (Malta) with 6.67 hectares (8.5%).

LOCALITY	Greenhouses (ha)
MGARR	20.0557
SAN PAWL IL-BAHAR	6.7271
RABAT (Malta)	6.6709
RABAT (Victoria)	6.3509
MELLIEHA	6.2454
ZABBAR	3.6322
ZEBBUG (Malta)	3.1481
QORMI	2.8153
SIGGIEWI	2.7886
DINGLI	2.7219
GHAJNSIELEM	2.499
NAXXAR	2.1389
ATTARD	1.659
IKLIN	1.4803
MOSTA	1.0499
NADUR	0.9063
XEWKIJA	0.8162
ZEJTUN	0.7161
LIJA	0.5904
SANTA VENERA	0.5903
XAGHRA	0.5694
KERCEM	0.5387
TOTAL (>0.5ha)	**74.71**
TOTAL Maltese Islands	**78.21**

Table 31: Greenhouse land cover registered in IACS system including localities that exceed 0.5 hectares (Source: ARPA land cover data, 2016)

2.03.07 Hydroponics and aquaponics

Hydroponics refers to cultivation where the plants are suspended in a water solution with controlled levels of nutrients which circulates continuously amongst the plant roots. This method has the advantage of avoiding fungal and microbial infections from the soil such as *Fusarium* and *Verticillium* which attack the plants' roots. Hydroponically-produced plants do not grow in soil and hence have a much reduced probability of them being attacked by these fungi (hydroponics media are generally flushed of these fungi when produced) and even if attacked by these fungi, these media are changed every one (1) to two (2) years eliminating the contaminating source altogether (water can be changed and/or treated any time). Moreover, hydroponic systems allow farmers to target water and fertilizer use precisely when and where plants need it.

Rising prices for agricultural inputs like water and fertilizers are fuelling the development of smart farming technologies and techniques to produce more with less. As an added environmental benefit, targeting fertilizer to where it is most needed can significantly reduce greenhouse gas emissions from farming.

Contrary to common perception, hydroponic systems do not consume large quantities of water because the water used is circulated continuously amongst the plants and only the actual amounts needed by the plant are used up. Conversely, traditional cultivation in soil consumes larger quantities of water as most of it is leached to the substrata and is lost especially when farrow irrigation is used. Hydroponics systems are advantageous since they provide plants with a balanced nutrient combination and concentration, thus promoting a gradual plant growth and reducing phytosanitary challenges.

Data on hydroponic systems in Malta is not available. There are currently a small number of farmers experimenting with this system particularly through the utilisation of Nutrient Film Technique (NFT) where bare-rooted plants are cultivated in watertight channels, especially for the production of lettuce and herbs. This type of farming system requires a high investment level per square metre both in terms of capital and recurrent costs. It also implies a specialised technical input on the part of the producer and a rigorous adherence to the cultivation programme.

Aquaponics is a production system that integrates hydroponics and aquaculture by combining vegetables and fish in one complete ecosystem. Such an ecosystem is based on the concept that fish excrements are used to fertilize plants, without introducing any synthetic fertilizers or chemical pesticides in the process. In an aquaponics system, water from the fish tank cycles through filters, to plant beds and then back to the fish. Mechanical filters act to remove solid fish waste while bio filters process the dissolved wastes through nitrification whereby bacteria convert ammonia into nitrate, which is a more accessible nutrient for plants. As the water containing nitrates enters the plant beds, plants uptake these nutrients and the purified water returns to the fish tank. This cyclical process allows for a symbiotic existence for fish, plants and bacteria to create a healthy growing environment for each other. As with the case of hydroponics, aquaponics systems function properly when the operator comprehends the management of an ecosystem that incorporates three groups of organisms: fish, plants and bacteria (Somerville, C. Et al, 2014).

2.03.08 Organic farming

Organic farming is a system, which revives the natural ability of the soil to provide protection from pathogenic and insect challenges through beneficial micro-organisms and populations of predator insects. This diverse farming system utilises onsite resources, aims at improving the soil structure, reduces excessive tillage, increases biodiversity, improves soil-water retention and integrates plant companionship.

Due to the small parcel size and the fragmented Maltese farmland, sources of contamination between parcels presents a major challenge in the proliferation of organic farming practices. Rubble walls, plant hedges, and vegetation buffers all assist in creating barriers from conventional farming and other sources of pollution.

The Census of Agriculture (NSO, 2010) indicated that there was a total of 26.1 hectares of organic farming, 7.4 hectares (28.35%) of which is certified whilst the remaining 18.7 hectares (71.65%) is organic farming in a status of conversion. An update of this figure was produced in 2016 in the Eurostat website that indicated a total of 21 hectares of registered organic farmland and 3 hectares in conversion (http://ec.europa.eu/eurostat/statistics-explained/index.php/Organic_farming_statistics). With a total of 21 hectares of converted land and 14 farmers registered for the production of organic products, the Maltese Islands have the lowest level of organic farms at EU level (Directorate of Agriculture, 2017). The perceived strict, complex and long process for obtaining permits to attempt alternative ways to farm the land dissuade farmers from experimenting with organic farming. A more detailed analysis on organic farming is provided in Section 3.04.04.11.

2.03.09 Cereals and legumes

Table 32 below indicates the Supply Balance Sheet of cereals utilised in Malta in the year 2014. This data set comprises the supply of cereals that is totally made up of imports and indicates adjustments in stocks that may have occurred during the reference period. The supply balance sheets below also provide information on the usage of various types of cereals in Malta. Table 32 below shows that in 2014 Malta utilised 134,400 tonnes of cereals, of which 56,200 tonnes included wheat (41.82%) and 78,300 tonnes included other cereals (58.26%). Animal feed represented by a total amount of 63,200 tonnes (47%) included 46,000 tonnes of maize (34.23%), 16,100 tonnes of barley (11.98%), 1,200 oats and mixed grains (0.89%).

Crop Year (July to June)			
	Cereals	**Wheat**	**Cereals other than wheat**
Total resources	**134.4**	**56.2**	**78.3**
Usable production	-	-	-
Imports	134.4	56.2	78.3
From EU	122.5	52.2	70.3
Total Uses	**134.4**	**56.2**	**78.3**
Exports	7.1	2.6	4.5
To EU	3.2	0.2	3.0
Change in stocks	-4.7	-2.7	-2.0
Final stocks	24.4	9.6	14.8
Initial stocks	29.1	12.3	16.8
Domestic uses	132.0	56.3	75.8
Animal feed	63.2	-	63.2
Industrial uses	0.3	-	0.3
Human Consumption	68.5	56.3	12.3

Table 32: Supply Balance Sheets of Agricultural Products – Cereals in 000 tonnes
(Source: Agriculture and Fisheries 2014 – Valletta: NSO, 2016)

The usable production, that is the amount of cereals produced in Malta, is nil since it is not a viable prospect for Maltese farmers due to a lack of deep soil and reliable rainfall. The demand of cereals for animal feed is considerable but it makes the livestock sector particularly vulnerable since it depends on importation. With the advent of new water in certain parts of Malta, the production of cereals and legumes exclusively for the production of silage and hay could turn out to be a viable option. This is particularly required to provide a better nutritional regime for livestock, especially animals which require high levels of forage. Examples of fodder crops that could be experimented to target this form of production include alfalfa, vetches, maize, corn and sorghum amongst others. Further analytical details on this theme are provided in Section 3.04.02.5 and Section 3.04.02.8.

2.03.10 Amenity horticulture

The expanding tourist activity in the Maltese Islands, coupled with a heightened civic awareness stimulated by initiatives on the part of local councils have generated a robust demand for gardening and landscaping services. The latter are required for creating pleasant green spaces in a wide variety of public spaces from centre strips and roundabouts to town parks and squares, recreational areas and gardens of educational institutions, children's playgrounds, cemeteries, airports, and more.

This situation presents a demand for gardening and landscaping skills both in the design and the application dimensions. Thus various opportunities for new jobs in amenity horticulture are being created and with some dedicated determination, these could be tailored to qualify as green jobs on various levels. Nevertheless, the current amenity experience and philosophy is predominantly based on a cosmetic exercise with the salient characteristic of the landscaping and embellishing amenity works visible in Maltese streets and parks lacking respect to local natural resources like water and the integration of indigenous species.

The Agricultural Policy for the Maltese Islands could be instrumental in providing incentives and guidance to encourage a distinctive approach to amenity horticulture through a well researched and soundly structured formal vocational course in the science and practice of identification, propagation and cultivation of indigenous flora species that are suitable for amenity projects because of their aesthetic, aromatic and climatic resilience attributes. Such an approach to amenity horticulture, the required services and skills could be directed towards the development of a cohort of youths pursuing agricultural studies. This would promote a grassroots basis for Maltese amenity projects with these tasks and projects becoming increasingly accessible and available to rural youths who could exploit such opportunities to complement their inadequate income from their mainstream crop production or livestock enterprises. Rural youths can be guided to embark on service provision that includes amenity horticulture as part of their portfolio so that they can diversify their production.

A directed amenity horticulture approach would also help to bridge the green corridors and spaces in our urban areas to the rural countryside through the harmonisation and integration of the species used. These initiatives would also familiarise the general public with the indigenous species that constitute a vital component of the Maltese natural heritage and enhance the public understanding of the qualities and attributes of the ecological biodiversity. Moreover, such an approach to amenity horticulture could be integrated with EU funding opportunities due to the accentuated ecological and environmental component of these projects.

2.03.11 Agricultural services

Traditional agricultural activity, for the greater part, depended on the farmer's family carrying out all the tasks and developing all the necessary skills for efficiently addressing all the requirement of the agricultural activities on the farm, from preparation of the seedbeds to the production of the seedlings for the next crop, to creating windbreaks from reed canes and to harvest, threshing and winnowing of grain and seeds.

Today, farmers need to streamline their operations so that they could compete on the market with the varieties that the market demands and the season when their product would fetch the most attractive prices. Consequently farming operations are increasingly depending on contracted professionals to carry out certain tasks so that they themselves could concentrate on the chores and tasks that are required to cultivate their crops properly. In this respect, there are many instances when farmers contract out the heavy ploughing of their fields and even the furrowing of the rows and the mulching with polythene and the spreading of cloches along the rows.

The number of such tasks that are being contracted out is ever increasing with the most notable being that of production of seedlings. Many full-time farmers and even part-time farmers engaged in commercial crops have no time to sow their own seedbeds and order their seedlings directly from such service providers who produce large quantities of seedlings in their dedicated greenhouses or order them in the required quantities from their agents abroad. Service provision can also improve professionalism since the service provider gets accustomed to certain practices and improves his/her skills.

Even in livestock production where traditionally farmers would insist that nobody enter their farm unless absolutely necessary, some chores are contracted out as for example, the insemination of cows, the transportation of pigs or cattle to abattoir, veterinary treatment, and the delivery of feed. In some spheres of agricultural production, farmers have come to realise that they often fall into the trap of carrying out certain tasks when they have time to spare for them and not at the time best indicated for such chores. In other instances these tasks are carried out hastily because other chores are waiting. As agricultural production evolves to become more market and customer oriented, farmers are becoming more inclined to contract these jobs out to ensure that they are done properly and at the propitious time. Sometimes, it is a case that the task requires particular specialized machinery or equipment which would only be used once annually and therefore it is not cost effective. In other cases it is a task that requires experienced skill and which would be more professionally and therefore, more reliably done, if carried out by a skilled professional who would offer his/her services to a whole range of farmers.

There are other agricultural services that entail simply the retailing of materials and equipment required on the farm to carry out various tasks. One of the most noteworthy failures of Maltese farmers is their negligence of record keeping. Most of their decisions are based on just guesswork or on what they can remember of the previous season's performance. Today, computers are ubiquitous and software is available for farm management.

While some retailers offer this software for sale, there are others who actually offer to operate the management programme for the client, log in all the entries and issue regular bulletins on performance and recommendations based on the trends that emerge from the integration of all the data.

Whichever form of agricultural services are made available, a reliable operational protocol needs to be provided for. Whilst the agricultural policy needs to cater for these activities by providing the grounds for effective training courses, ensure reliable preparation and award qualifications, these professions also need to be recognised by our institutions. They also need to be monitored and scrutinised by the pertinent regulators to ensure that the services they offer are *bona fide* and adhere to established standards especially with regards to the quality of service they provide but also with regard to health and safety both for themselves as well as for their clients and any passerb

2.04 Livestock production

The livestock-breeding sector in Malta has various physical and structural disadvantages when compared to European counterparts. Maltese livestock farms are mostly landless and breed their livestock indoors by supplementing them with imported feed concentrate and fodder, together with domestically produced fodder. This issue is linked with the scarcity of arable land on such small and densely populated islands as well as with the small size of land holdings due to land fragmentation. With a lack of pasture land and a total utilised agriculture area (UAA) of 11,689 hectares, the only plausible solution to breed livestock is indoors.

Apart from land availability and land use issues, the Maltese Islands do not receive enough rainfall to sustain pastures and produce high quality fodder crops. Fodder production, albeit covering 56% of the arable farmland, depends on rainfall which is unreliable and unpredictable. Moreover, the low organic content in Maltese soil affects the quality of forage produced in Malta, which is mostly wheat. These constraints place extra financial pressure and vulnerability on livestock breeding in Malta since it is reliant on imported fodder that is costly when considering the 1) high sea transport costs, 2) the weak bargaining power of small volumes on the international market, and 3) the logistical issues associated with the geographical location of Malta in relation to the main fodder producing areas.

The Agriculture and Fisheries report issued in 2016 by the National Statistics Office produced data on the annual volume of carcass weight in tonnes for slaughtered livestock between 2010 and 2014. These figures, which are illustrated in Table 33 below, show that animal production registered a decrease from between the years 2010 till 2012, followed by a slight increase up till 2014. In the year 2014, the annual volume of carcass weight 1) for cattle meat stood at 1,129 tonnes indicating a decrease of 0.44% over the previous year, 2) for pig meat stood at 6,153 tonnes

indicating an increase of 3.94% over the year 2013, and 3) for broiler meat was 3,916 tonnes indicating a 4.84% decrease over the previous year.

The total annual carcass weight for these three (3) livestock sectors in 2014 stood at 11,198 tonnes, which reflects a 0.27% increase over the previous year but a 16%

	Year				
Type	**2010**	**2011**	**2012**	**2013**	**2014**
Cattle	1,422	1,128	1,111	1,134	1,129
Pigs	7,511	7,305	5,665	5,920	6,153
Broilers	4,398	4,155	4,244	4,115	3,916
Total	**13,331**	**12,588**	**11,020**	**11,168**	**11,198**

Table 33: Annual volume (carcass weight: tonnes) of slaughtered livestock by type of animal (Source: Agriculture and Fisheries 2014 – Valletta: NSO, 2016)

Table 34 below illustrates the annual producer value of slaughtered livestock by type of animal, reflecting the volume presented in Table 33 above. The producer value of slaughtered livestock decreased by 2.53% to €24.6 million in 2014 from €25.3 million in 2013. In comparison with the year 2010, when the total annual carcass weight was 16% higher, the annual producer value in 2014 is merely 0.34% lower. This indicates that the annual average producer price of slaughtered livestock increased considerably over the years. The latter is relevant in case of the cattle and pigs sectors which show an increase from €0.33 and €0.59 per kilogramme respectively from 2010 to 2014. The annual average producer price for the broilers sector decreased from €1.77 to €1.75 per kilogramme from 2010 to 2014, with an increase in the other years up to €1.88 in 2013. These figures are summed up in Table 35 below.

	Year				
Type	**2010**	**2011**	**2012**	**2013**	**2014**
Cattle	3,563	3,371	3,556	3,512	3,191
Pigs	13,370	13,186	11,486	14,030	14,583
Broilers	7,787	7,712	7,780	7,732	6,860
Total	**24,719**	**24,269**	**22,822**	**25,274**	**24,634**

Table 34: Annual producer value (€000) of slaughtered livestock by type of animal (Source: Agriculture and Fisheries 2014 – Valletta: NSO, 2016)

	Year				
Type	**2010**	**2011**	**2012**	**2013**	**2014**
Cattle	2.50	2.99	3.20	3.10	2.83
Pigs	1.78	1.81	2.03	2.37	2.37
Broilers	1.77	1.86	1.83	1.88	1.75

Table 35: Annual average producer prices (euro/kilogramme) of slaughtered animals by type of animal (Source: Agriculture and Fisheries 2014 – Valletta: NSO, 2016)

The total estimated milk production (Table 36 below) in 2014 amounted to 46.2 thousand tonnes, an increase of 4.1% over 2013. This was the result of an increase of 4.5% in cow milk production while a drop of 3.8% and 3.6% was registered in the sheep and goats milk production respectively. Although the cow milk production remained relatively stable over these five (5) years with an average of 43,090 tonnes, sheep milk production and goat milk production kept on decreasing at a rate of 10.79% and 15.28% respectively between the year 2010 and the year 2014.

	Year				
Type	**2010**	**2011**	**2012**	**2013**	**2014**
Cow's milk	42,996	42,570	44,283	41,851	43,752
Sheep milk	1,734	1,713	1,703	1,608	1,546
Goats milk	1,106	1,009	987	973	937
Total	**45,834**	**45,292**	**46,973**	**44,432**	**46,235**

Table 36: Total estimated milk production (tonnes) by animal
(Source: Agriculture and Fisheries 2014 – Valletta: NSO, 2016)

Table 37 below indicates the total estimated egg production in Malta between the year 2010 and the year 2014. There was an increase of 2.5% to 84.5 million eggs in 2014, from 82.5 million eggs in 2013. The average annual amount of eggs produced over the five years is that of 74.82 million eggs since the production of eggs in the years 2011 and 2012 was low at 55.38 and 69.63 million eggs respectively. The amount of eggs produced locally in 2014 constitutes 85.25% of the amount used in Malta, with the rest being imported (Table 38 below).

Year	2010	2011	2012	2013	2014
Eggs	82,108	55,386	69,628	82,475	84,503

Table 37: Total estimated egg production (000 eggs)

	Year		
	2012	2013	2014
Total resources	**5.0**	**5.8**	**6.1**
Usable production	4.3	5.1	5.2
Imports	0.7	0.7	0.8
From EU	0.7	0.7	0.8
Total Uses	**5.0**	**5.8**	**6.1**
Exports	0.0	0.0	0.0
To EU	0.0	0.0	0.0
Change in stocks	-	-	-
Domestic uses	5.0	5.8	6.1
Eggs or hatching	0.1	0.1	0.1
Losses	0.3	0.3	0.3
Industrial uses	0.6	0.7	0.8
Human Consumption	4.0	4.7	4.8

Table 38: Supply Balance Sheets of Agricultural Products – Eggs
(Source: Agriculture and Fisheries 2014 – Valletta: NSO, 2016)

The Agriculture and Fisheries report (NSO, 2016) presented an analysis of the production process and the incomes generated by the industry through the Economic Accounts for Agriculture. The animal output in 2014, which represented the equivalent to 56.8% of total agricultural production, dropped by 3.5% over 2013. The producer value of slaughtered animals went down by 2.1%, mainly due to a drop in the value of slaughtered poultry of 11.3%. Similarly, the value of animal products in 2014 went down by 5.5% over 2013 on account of decreases of 6.2% and 3.6% in the value of milk and eggs respectively. Intermediate consumption, which represents the value of all goods and services used as inputs in the production process and excluding fixed assets, for the same year amounted to €64.4 million, down by 6.8% over 2013. This decrease was attributable to a drop in expenditure on almost all the items, mainly compound feeding stuffs (11.3%) and veterinary services (9%). Products used in intermediate consumption are valued at purchase prices, net of VAT. These figures are illustrated in Table 39 below.

	Year		
	2012	2013	2014
Total intermediate consumption	**-70,902**	**-69,122**	**-64,445**
Cropping	-6,610	-6,714	-6,620
Imported seeds and planting stock	-3,784	-3,770	-3,781
Fertilisers and soil improvers	-1,996	-2,109	-1,995
Plant protection products	-830	-835	-844
Animal feed	-35,930	-35,211	-31,640
Fodder supplied by other holdings	-4,055	-4,366	-4,270
Fodder produced and consumed on holding	-259	-267	-259
Compound feeding stuff	-31,616	-30,578	-27,112
Energy and lubricants	-9,700	-9,350	-9,024
Electricity	-1,632	-1,611	-1,576
Fuel	-8068	-7739	-7448
Various services	-18663	-17848	-17161
Maintenance of materials	-6648	-6564	-6380
Maintenance of buildings	-2144	-2008	-1862
Veterinary services	-1209	-1105	-1005
Other goods and services	-8662	-8171	-7914

Table 39: Intermediate consumption (€000) for agriculture
(Source: Agriculture and Fisheries 2014 – Valletta: NSO, 2016)

2.04.01 Cattle

This provides a brief overview of the cattle sector including farm structure data for both dairy cows and beef production, adding to the information provided in the previous section on milk and cattle production. Statistics are based on the Agriculture and Fisheries survey of 2014 is by the NSO. Information on cattle stocks has been entirely compiled from the Bovine Register, maintained and controlled by the Veterinary Regulatory Directorate. This data is collected in compliance with Regulation (EC) No 1165/2008.

The cattle stock as at 1 December 2014 amounted to 14,883 heads distributed across 281 farms (Table 40 below). This represents a decline of 3.1% of cattle farms over the previous year, while the number of heads decreased by 2.2%. The largest concentration of cattle is in Gozo with 32.8% of cattle and 16.37% of farms, followed by the South Eastern district of Malta with 23.28% of cattle and 37% of farms and by the Western district with 15.44% of cattle and 14.59% of farms.

District	Farms	Cattle
Maltese Islands	**281**	**14,883**
Southern Harbour	23	1,370
Northern Harbour	34	1,232
South Eastern	104	3,466
Western	41	2,298
Northern	33	1,636
Gozo and Comino	46	4,881

Table 40: Cattle farms and cattle population per district in 2014
(Source: Agriculture and Fisheries 2014 – Valletta: NSO, 2016)

Dairy cows, which represented 43.7% of all cattle in 2014 (Table 41 below), registered an annual increase of 2.7% to 6,502 heads. Table 41 shows that cattle between 1 and 2 years old decreased by 15.9% over 2013. Cattle less than 1 year old and cattle over 2 years of age rose by 4.3% and 1.1% respectively. Notwithstanding the presence of these statistics, they do not include sufficient detail to enable useful conclusions, especially since fluctuations in the herd population are normal occurrences with the rate of replacement depending on variable factors.

District	Cattle aged less than 1		Cattle between 1 and 2 years			Cattle over 2 years of age				
	Males	Females	Males	Female heifers	Other females	Males	Heifers for slaughter	Other heifers	Dairy cows	Other cows
Maltese Islands	**2,024**	**2,459**	**1,008**	**1,220**	**937**	**129**	**129**	**373**	**6,502**	**102**
Southern Harbour	200	173	112	109	84	31	14	36	600	11
Northern Harbour	162	206	70	110	84	10	11	31	543	5
South Eastern	508	508	345	259	196	36	35	85	1,441	53
Western	456	403	109	194	153	14	16	52	889	12
Northern	175	285	100	133	104	9	18	45	750	17
Gozo and Comino	523	884	272	415	316	29	35	124	2,279	4

Table 41: Cattle population by age and sex per district in 2014
(Source: Agriculture and Fisheries 2014 – Valletta: NSO, 2016)

An interesting data set for the Cattle sector is provided in Table 42 below that illustrates the cattle population by herd size. These figures indicate the level of consolidation of the sector in terms of herd size per farm. The majority of cattle bred in Malta (61.70%) are held on farms with a capacity that is larger than 100 heads and 80.31% of the cattle bred in Gozo are bred in herds exceeding 100 heads. The amount of farms with a capacity between 50 and 99 cattle represent 20.21% in Malta and 17.19% in Gozo. Out of the total cattle population, only 18.10% in Malta and 2.50% in Gozo are reared on farms with a capacity of less than 50 heads. When one considers the dairy cows separately from the total cattle population, the trend is slightly different. Overall, there are 35% of dairy cows bred in herds over 100 heads, 38% of dairy cows are housed in herds between 50 and 99 heads, 18% in herds between 30 and 49 heads and the remaining 9% are housed in small farms not exceeding 29 heads.

Herd size: Number of cattle								
District	**Total**	**1 - 2**	**3 - 9**	**10 - 19**	**20 - 29**	**30 - 49**	**50 - 99**	**>100**
Maltese Islands	**14,883**	**87**	**321**	**357**	**408**	**759**	**2,860**	**10,091**
Southern Harbour	1,370	4	35	14	63	84	272	898
Northern Harbour	1,232	19	42	39	28	-	285	819
South Eastern	3,466	27	153	175	243	323	821	1,724
Western	2,298	22	31	55	26	120	241	1,803
Northern	1,636	8	29	60	26	184	402	927
Gozo and Comino	4,881	7	31	14	22	48	839	3,920

Table 42: Cattle population by herd size per district in 2014
(Source: Agriculture and Fisheries 2014 – Valletta: NSO, 2016)

Another data set that sheds light on the type of cattle farms found in the Maltese Islands is cattle population and cattle size by island (Table 43 below). There are 35 farms in Malta (14.89%) with a capacity that is larger than 100 heads and 21 farms in Gozo (45.65%) that breed over 100 cattle. The amount of farms with a capacity between 50 and 99 cattle are 28 in Malta (11.91%) and 11 in Gozo (23.91%). There are 172 farms in Malta breeding less than 50 heads and these make up to 73.19%. In Gozo the trend is different, with 14 farms having less than 50 heads and these constitute 30.43% of the total.

	Herd size: Number of cattle							
	Total	1 - 2	3 - 9	10 - 19	20 - 29	30 - 49	50 - 99	>100
Malta								
Number of cattle	10,002	80	290	343	386	711	2,021	6,171
Number of farms	235	52	59	26	16	19	28	35
Gozo and Comino								
Number of cattle	4,881	7	31	14	22	48	839	3,920
Number of farms	46	4	7	1	1	1	11	21

Table 43: Cattle population by herd size per island in 2014
(Source: Agriculture and Fisheries 2014 – Valletta: NSO, 2016)

The cow dairy sector is organised through a vertical structure integrating the producer, the agro-processor and marketing mechanisms. The milk producer cooperative has managed to shorten the supply chain and produce a range of dairy products through effective marketing exercises. This sector can be used as a best practise model for other Maltese farming sectors that are still not benefiting from a united supply chain and still depend entirely on middlemen or processors for decision making.

In the last decade, dairy farmers have invested significantly in structural and technological upgrades on their farms to attain sustainability and viability in all the relevant dimensions including economic, environmental, hygiene as well as food safety and traceability. The majority of these investments were supported by RDP funding mechanisms that provide a 50% co-financing rate and are capped at €150,000. Most dairy farmers were financially burdened by the high capital investment that they had to entail due to restructuring necessities and modernisation of their production base. Thus, they are currently bridging this deficit with their own family funds which could render the family budget very tight and placing pressure on the young generation of livestock breeders. A more in-depth analysis of this sector is presented in Section 3.04.01.8 below.

Cattle farming for beef production in Malta is considered to be a by-product of the dairy industry. Although the Holstein Friesian cow is being utilised by some livestock breeders for both the production of milk and beef, it cannot compete in either quality of meat or in efficient growth rate with renowned beef cattle such as the Angus, Hereford, Simmental or the Charolais. Beef producers in Ireland, Britain, France, Italy and other countries raise beef cattle mainly on pasture. Grass-fed beef is reputed to be healthier and to taste better than the grain-fed counterparts. It's also more viable because there are no feed bills to pay and no housing costs to take into account.

Unfortunately, these options are not available to Maltese farmers and they are constrained to compete with imported beef. Nevertheless, there is still a strong traditional market for particular recipes such as *brodu taċ-ċanga friska* and *braġjoli*, for which consumers prefer Maltese beef. A more detailed analysis of this sector is presented in Section 3.04.01.9 below.

2.04.02 Swine

This section provides a brief overview of the swine sector including farm structure data and pig production, adding to the information provided on pork production and supply balance sheets for meat products in Section 2.04 above. Statistics referred in this section are based on the Agriculture and Fisheries survey of 2014 issued by the NSO. Information on pig stocks reflects the pig census that is carried out every year in accordance with Regulation (EC) No.1165/2008. Malta has been compiling these statistics on an annual basis since 2000. A postal census was sent by NSO to all licensed pig breeders, all of whom responded to the questionnaire. Monthly statistics related to pig slaughters are provided by the Veterinary Regulatory Directorate.

In 2014, 47,465 pigs were registered on 100 farms in the Maltese Islands, indicating a pig population drop by 4% over 2013 (Table 44 below). The largest concentration of swine production is in the Western district with 34.94% of pigs and 37% of farms, followed by the Northern district of Malta with 22.33% of pigs and 10% of farms and by the South-eastern district with 18.54% of pigs and 26% of farms. There are eleven (11) swine farms in Gozo, housing 10.6% of the pig population in Malta.

District	Farms	Pigs
Maltese Islands	**100**	**47,465**
Southern Harbour	10	2,576
Northern Harbour	6	4,358
South Eastern	26	8,801
Western	37	16,582
Northern	10	10,600
Gozo and Comino	11	4,548

Table 44: Pig farms and pig population per district in 2014
(Source: Agriculture and Fisheries 2014 – Valletta: NSO, 2016)

Table 45 below illustrates the swine population by type of pig per district. Young pigs (including piglets) and breeding stock decreased by 9.8% and 12.6% respectively over the previous year. On the other hand, fattening pigs (>50kg) increased by 3.7% over 2013. Statistical data such as this is a snapshot of a situation at a particular time and it doesn't help understand the dynamics of an

industry sufficiently to draw useful conclusions. In fact, the increase of fatteners on the farm is indicated in the advance of 3.7% over the year 2013 but this does not reflect increased productivity but rather depressed demand leaving mature slaughter pigs on the farms. Correspondingly, farmers responded to this situation by reducing the number of sows and thus producing fewer piglets the following year. This indicates an urgent need to collect structured data that clearly indicates the dynamics behind the figures.

District	Piglets <20kg	Young pigs 20-50kgs	Fattening pigs >50kgs	Breeding sows	Gilts	Breeding boars
Maltese Islands	**11,022**	**12,026**	**19,803**	**3,781**	**564**	**269**
Southern Harbour	683	530	1,047	220	31	65
Northern Harbour	1,222	1,006	1,669	379	58	24
South Eastern	2,183	2,340	3,429	698	99	52
Western	3,493	4,206	7,260	1,377	172	74
Northern	2,472	2,428	4,764	741	156	39
Gozo and Comino	969	1,516	1,634	366	48	15

Table 45: Pig population by type of pigs per district in 2014
(Source: Agriculture and Fisheries 2014 – Valletta: NSO, 2016)

Table 46 below illustrates the pig population by herd size. The majority of swine bred in Malta (78.47%) are held on farms with a capacity that is larger than 400 heads and 62.70% of the pigs in Gozo are bred in herds exceeding 400 heads. The amount of farms with a capacity between 200 and 399 pigs represent 12.44% of the pig population in Malta and 23.86% in Gozo. Out of the total pig population, only 9.50% in Malta and 13.43% in Gozo are reared on farms having a capacity of less than 200 heads.

Size class: Number of pigs						
District	**Total**	**1- 49**	**50 - 99**	**100 - 199**	**200 - 399**	**>400**
Maltese Islands	**47,465**	**170**	**743**	**3,596**	**6,424**	**36,532**
Southern Harbour	2,576	145	0	169	1,003	1,259
Northern Harbour	4,358	0	0	292	341	3,725
South Eastern	8,801	5	270	1,246	714	6,566
Western	16,582	20	406	1,345	2,486	12,325
Northern	10,600	0	0	0	795	9,805
Gozo and Comino	4,548	0	67	544	1,085	2,852

Table 46: Pig population by size class per district in 2014
(Source: Agriculture and Fisheries 2014 – Valletta: NSO, 2016)

The pig population as at 1 December 2014 amounted to 47,465 heads that were distributed across 100 farms (Table 47 below). Out of these 100 farms, 38 house more than 400 heads, 22 farms house between 200 and 399 pigs, 24 farms rear between 100 and 199 pigs, 10 farms house between 50 and 99 pigs whilst 6 small farms rear between 1 and 49 pigs.
Thus, 38% of the farms account for 76.96% of the total pig population in the Maltese Islands, whilst the remaining 62% of the pig farms account for 23.04% of the pig population.

Size class: Number of pigs						
	Total	1- 49	50 - 99	100 - 199	200 - 399	>400
Malta						
Number of pigs	42,917	170	676	3,052	5,339	33,680
Number of farms	89	6	9	20	19	35
Gozo and Comino						
Number of pigs	4,548	0	67	544	1,085	2,852
Number of farms	11	0	1	4	3	3

Table 47: Pig population and pig farms by size class in 2014
(Source: Agriculture and Fisheries 2014 – Valletta: NSO, 2016)

2.04.03 Poultry

This section provides a brief overview of the poultry sector including broilers and layers. The farm structure and poultry production data being presented adds to the information provided in the introductory section on livestock production above, particularly with data and supply balance sheets for meat products and egg production. Statistics referred to in this section are based on the Agriculture and Fisheries survey of 2014 issued by the NSO. Information on broilers and layers reflects the Farm Structure Survey that is carried out in accordance with Regulation (EC) No.1166/2008. A more detailed analysis of the broilers and layers sectors is provided in Section 3.04.01.11 and 3.04.01.12 below respectively.

Table 48 below illustrates the holdings with total heads of poultry by size class of farm. These figures reflect the statistics for the years 2005, 2007, 2010 and 2013. In 2013, a total of 779 poultry farms had a combined total of 918,426 poultry. The majority of these poultry holdings (63.8%) had a mere 0.5% of the total poultry stock indicating that they are either very small or are engaged in other agricultural activities. On the other hand, 118 poultry holdings produced a total of 909,166 heads or 99% of the total poultry stock with an average of 7,700 heads on each farm. These figures show a general decline in the number of poultry farms as well as in the heads produced. In 2007, there was a total of 1,233 poultry holdings or 36.82% more than in 2013, which produced 1,224,268 heads or 24.98% more than in 2013.

Size class: Number of poultry								
	Total		<20		20 - <100		>100	
Maltese Islands	Holdings	Heads	Holdings	Heads	Holdings	Heads	Holdings	Heads
2005	1,099	1,052,013	690	6,750	229	7,816	180	1,038,078
2007	1,233	1,224,268	823	6,856	236	7,086	174	1,210,326
2010	765	970,291	484	4,247	160	5,121	121	960,923
2013	779	918,426	497	4,261	164	4,999	118	909,166

Table 48: Holdings with poultry size by class
(Source: Agriculture and Fisheries 2014 – Valletta: NSO, 2016)

Out of the total poultry produced in Malta in 2013, 616,974 were broilers and 297,188 were laying hens (Table 49 below). There were various changes in the amount of poultry produced over the years. Broilers increased by 14.78% from 2005 to 2007, followed by another slight increase of 0.89% between 2007 and 2010, and a decrease of 7.38% by 2013. From 2005 to 2007, there was a 20.17% increase in the amount of laying hens, followed by a drop of 46.67% by 2010 and a further slight reduction of 1.16% by 2013. The total amount of laying hens in 2013 is 63.34% of the amount present in 2005, indicating a sharp decrease in laying hen population within eight (8) years.

Type of poultry				
Maltese Islands	Total	Broilers	Laying hens	Other poultry
2005	1,052,013	575,152	469,188	7,673
2007	1,224,268	660,215	563,814	238
2010	970,291	666,143	300,667	3,481
2013	918,426	616,974	297,188	4,264

Table 49: Poultry distribution by type (Source: Agriculture and Fisheries 2014 – Valletta: NSO, 2016)

An amount of 480,750 of the total amount of broilers in 2013 (77.92%) were produced on holdings with 10,000 broilers or more and 65,193 broilers or 10.57% were produced in farms with a capacity range between 5000 and 9999 heads (Table 50 below). There are signs of consolidation in larger farms in this sector since in 2005, 64.52% of broilers were produced in farms with 10,000 broilers or more and 15.73% were reared in farms holding between 5000 and 9999 heads.

Size class: Number of broilers									
Maltese Islands	Total	1 - 99	100 - 499	500 - 999	1000 - 2999	3000 - 4999	5000 - 9999	10000 - 49999	> 50000
2005	575,152	1,414	0	2,114	40,331	69,705	90,515	308,073	63,000
2007	660,214	1,514	0	550	51,905	88,269	96,305	421,671	0
2010	666,143	1,362	300	850	33,414	64,920	96,804	468,493	0
2013	616,974	219	599	623	25,297	44,293	65,193	374,356	106,394

Table 50: Broiler farms by size class (Source: Agriculture and Fisheries 2014 – Valletta: NSO, 2016)

The distribution of laying hens in 2013 followed a similar pattern with 297,188 layers, of which 86.98% were found on agricultural holdings with 10,000 laying hens or more (Table 51 below). There were 61.68% of layers produced on farms growing more than 10,000 laying hens in 2005, indicating that there was a drive for consolidation over the years, especially following the Laying Hens (protection) Regulation (S.L. 439.07) that requested upgrades on enriched hen cages and housing requirements by end 2011.

Size class: Number of laying hens									
Maltese Islands	Total	1 - 99	100 - 499	500 - 999	1000 - 2999	3000 - 4999	5000 - 9999	10000 - 49999	> 50000
2005	469,188	12,837	7,659	0	36,154	40,016	83,125	181,614	107,783
2007	563,814	12,197	9,102	550	37,990	49,279	67,245	289,618	97,833
2010	300,667	7,645	2,599	1,700	13,440	13,900	53,827	207,556	0
2013	297,188	1,600	8,050	1,095	7,521	6,220	14,200	258,502	0

Table 51: Laying hens on farms by size class
(Source: Agriculture and Fisheries 2014 – Valletta: NSO, 2016)

2.04.04 Sheep

This section provides a brief overview of the sheep sector. The farm structure and sheep production data being presented adds to the information provided in the introductory section on livestock production above, particularly with data and supply balance sheets for milk production. Statistics referred to in this section are based on the Agriculture and Fisheries survey of 2014 issued by the NSO. Information on sheep is gathered every year since 2003 in accordance with Regulation (EC) No.1165/2008 but data presented by NSO also includes records from the Bovine Register that is administered by the Veterinary Regulatory Directorate. A more in-depth analysis of the sheep sector is provided in Section 3.04.01.13 below.

Whether for own consumption or for commercial purposes, sheep in Malta are primarily reared for their milk, that is mainly used to produce traditional cheeselets (ġbejniet). Lambs are also retailed for meat. The total sheep population registered in the Maltese Islands as at the end of December 2014 amounted to 10,526 heads (Table 52). As in previous years, sheep stocks fell by 3.7% over the previous year. The largest concentration of sheep is found in Gozo with 27.43% of the population, followed by the South-eastern district at 23.49% and the Western district with 22.49%.

District	Sheep
Maltese Islands	**10,526**
Southern Harbour	729
Northern Harbour	760
South Eastern	2,473
Western	2,367
Northern	1,310
Gozo and Comino	2,887

Table 52: Sheep population distribution by district
(Source: Agriculture and Fisheries 2014 – Valletta: NSO, 2016)

Table 53 below illustrates the sheep population by type of sheep by district. Out of a total of 10,526 heads in December 2014, there were 294 male lambs (2.79%), 494 female lambs (4.69%), 1,152 ewe lambs (10.94%), 8,322 ewes (79.06%) and 264 rams (2.51%).

District	Total	Male Lambs	Female Lambs	Ewe lambs	Ewes	Rams
Maltese Islands	**10,526**	**294**	**494**	**1,152**	**8,322**	**264**
Southern Harbour	729	22	37	75	560	35
Northern Harbour	760	20	36	81	607	16
South Eastern	2743	60	103	281	1,942	87
Western	2367	60	103	247	1,900	57
Northern	1310	28	47	107	1,091	37
Gozo and Comino	2887	104	168	361	2,222	32

Table 53: Sheep population by type per district
(Source: Agriculture and Fisheries 2014 – Valletta: NSO, 2016)

Table 54 below illustrates the sheep population by herd size. A large percentage of sheep bred in Malta (33.62%) are held on small farms with a capacity that is smaller than 10 heads. The amount of farms with a herd size between 10 and 49 sheep represent 45.65% of the sheep population in Malta and 42.50% in Gozo. Out of the total sheep population, 20.28% in Malta and 25.08% in Gozo are reared on farms having a herd size of more than 50 heads. This indicates that there are 21.59% of sheep in the Maltese Islands bred on farms with over 50 heads on the farm.

Herd size: Number of sheep						
District	**Total**	**1 - 9**	**10 -19**	**20 - 49**	**50 - 99**	**>100**
Maltese Islands	**10,526**	**3,539**	**1,795**	**2,919**	**1,445**	**828**
Southern Harbour	729	180	219	135	75	120
Northern Harbour	760	191	109	196	0	264
South Eastern	2,473	888	617	770	198	0
Western	2,367	823	317	520	369	338
Northern	1,310	521	148	456	185	0
Gozo and Comino	2,887	936	385	842	618	106

Table 54: Sheep population by herd size per district
(Source: Agriculture and Fisheries 2014 – Valletta: NSO, 2016)

2.04.05 Goats

This section includes a brief overview of the goat sector in the Maltese Islands based on the available statistics. The farm structure and goat production data being presented here add to the information provided in the introductory section on livestock production above, particularly with data and supply balance sheets for milk production. Statistics made reference to in this section are based on the Agriculture and Fisheries survey issued by the NSO in 2014. Information on goats is gathered every year in accordance with Regulation (EC) No.1165/2008 but the data presented by NSO also includes records from the Bovine Register, which is administered by the Veterinary Regulatory Directorate. A more in-depth analysis of the goat sector is provided in Section 3.04.01.13 below.

Whether utilised for own consumption or for commercial purposes, goats in Malta are primarily reared for their milk, which is mainly used to produce traditional cheeselets. The total goat population registered in the Maltese Islands as at the end of December 2014 amounted to 4,627 heads (Table 55), a marginal increase of 0.6% over the previous year. The largest concentration of goats is found in Gozo with 24.55% of the population, followed by the South-eastern district at 22.58% and the Western district with 19%.

District	Goats
Maltese Islands	**4,627**
Southern Harbour	800
Northern Harbour	399
South Eastern	1,045
Western	879
Northern	368
Gozo and Comino	1,136

Table 55: Goat population in Malta
(Source: Agriculture and Fisheries 2014 – Valletta: NSO, 2016)

Table 56 below illustrates the goat population by type of goat by district. Out of a total of 4,627 heads in December 2014, there were 126 male kids (2.72%), 375 female kids (8.1%), 348 goats mated for the first time (7.52%), 3,454 goats that have already kidded (74.65%) and 324 male goats (7%). Since this data was issued, the goat population in the Maltese Islands has been decreasing and it would thus be interesting to compare with updated statistics.

District	Total	Male kids	Female kids	Goats mated for first time	Goats that have already kidded	Male goats
Maltese Islands	**4,627**	**126**	**375**	**348**	**3,454**	**324**
Southern Harbour	800	28	91	51	580	50
Northern Harbour	399	2	5	17	319	56
South Eastern	1045	23	64	89	791	78
Western	879	25	71	77	642	64
Northern	368	13	34	15	274	32
Gozo and Comino	1136	35	110	99	848	44

Table 56: Goat population by type per district
(Source: Agriculture and Fisheries 2014 – Valletta: NSO, 2016)

Table 57 below illustrates the goat population by herd size. A large percentage of goats bred in Malta (42.58%) are held on small farms with a capacity that is smaller than 10 heads.
The amount of farms with a herd size between 10 and 49 goats represent 35.55% of the sheep population in Malta and 14.79% in Gozo. Out of the total goat population, 23.37% in Malta and 22.18% in Gozo are reared on farms having a herd size of more than 50 heads. This indicates that there are 23.08% of goats in the Maltese Islands bred on farms with over 50 heads on the farm.

Herd size: Number of goats						
District	Total	1 - 9	10 -19	20 - 49	50 - 99	>100
Maltese Islands	**4,627**	**1,970**	**881**	**708**	**594**	**474**
Southern Harbour	800	177	37	205	131	250
Northern Harbour	399	220	48	25	0	106
South Eastern	1,045	494	242	242	67	0
Western	879	359	211	47	144	118
Northern	368	184	143	41	0	0
Gozo and Comino	1,136	536	200	148	252	0

Table 57: Goat population by herd size per district
(Source: Agriculture and Fisheries 2014 – Valletta: NSO, 2016)

2.04.06 Rabbits

Rabbit meat has traditionally been the most popular meat in Malta possibly because it was the only edible wild animal to be found in the countryside. Moreover, it is a small animal that could be easily bred under domestic conditions and requires very little room in a backyard to be accommodated. The rabbits' prolific breeding cycle, including a short gestation interval of just one (1) month coupled with a large litter, endow it a very efficient productivity profile. Many backyard breeders, both in the countryside and in the towns, traditionally raised their rabbits on grass and a variety of plants which they picked from the wild or else on scraps and leaves and residues from market vegetables. Stale bread was also dried in the sun and fed to the rabbits as concentrate supplement.

Other farmyard animals such as chickens, goats and sheep were not considered as meat producers since they were needed to produce eggs, milk and cheese. These animals would only, very occasionally, be slaughtered for meat when they were no longer productive. Thus the onus of providing regular meat on the table for most families of low or modest income fell on the rabbit. Consequently, many ways of cooking rabbit evolved to render its flesh palatable, especially since it is a high protein meat and needs thorough cooking. In time, these rabbit recipes became part of the Maltese ethnic culinary heritage. Indeed, rabbit recipes have become so popular that, even those who do not raise their own rabbits will make an effort to buy some rabbit to cook on special occasions. So much so that many restaurants have sprung up specialising in rabbit dishes and, naturally, accompanied by a selection of wine.

Many small rabbit farms have operated in the countryside for many years, some of them breeding just five (5) to ten (10) does while others who provide rabbits to restaurants or to butchers have set up operations of twenty (20), thirty (30) or even fifty (50) does. As soon as rabbit breeding takes on an intensive dimension, the risk of disease increases exponentially. Coping with a large number of rabbits of different ages becomes problematic especially if the housing, cages and climate have been addressed on an ad-hoc basis. Many of these makeshift farms have encountered disease problem and have, time and again, lost all (or almost all) of their breeding stock. Some of those who were really keen to embark on rabbit production as a professional occupation have invested in the construction of well-designed rabbit farms that can deliver a high productive performance while, at the same time, due animal welfare considerations, a rigorous sanitary regime and full adherence to EU directives regarding operating protocols and waste management provisions.

Large rabbit farms are equipped not only with all the facilities that guarantee animal comfort and climate control to reduce stress levels to the absolute minimum (since these are factors that have a direct impact on productivity), but they are also served with an in-house slaughtering plant which allows the full-term fryers to be slaughtered with the least possible stress and disturbance possible since they do not have to be transported in crowded cages for any long distance to arrive at the slaughterhouse. Although exhaustive data and statistics on the rabbit sector in the Maltese Islands were not available, the Veterinary and Regulations Department confirmed that there are eighty one (81) rabbit breeding premises registered with them.

2.04.07 Bees

Bee keeping and honey production have been associated with Malta since time immemorial. The geographical insularity of Malta in the centre of the Mediterranean has isolated the local bee species from other bee populations around the Mediterranean littoral with the result that there is the endemic sub-species *Apis mellifera ruttneri* (Sheppard WS et al, 1997) that has, over the years developed resistance and resilience to the particular climatic conditions prevalent in these islands. This endemic sub-species of honeybee is known to have inhabited the Maltese Islands for centuries. It is a sub-species of the Western honeybee or European honeybee (*Apis mellifera*), but is different from other Mediterranean bees. Up to recent times, it was the sole honeybee species in the Maltese Islands (Attard E. and Bugeja Douglass A., 2010).

The Maltese bee is slightly smaller in size, dark in colour with apparently no yellow bands, and is resistant to certain diseases, but is aggressive and highly active. Comparing the Maltese bee to the North African bee and the Sicilian bee, it results that it has shorter legs and wings. The wings of the Maltese bee are also much narrower. It has also a very wide abdomen, with the hair on its abdomen being also very long. After centuries of local colonization, this bee has adapted well to the Maltese Islands' climate and environment (Sheppard WS et al, 1997). However, *Apis mellifera ruttneri* is a very productive bee as it can work on windy days and also during very hot weather. During the hot summer of Malta, when temperatures can increase to 40°C, the bee tends to work early in the morning and in the afternoon till sunset while taking a short break during mid-day. From local beekeepers' observations, it cleans the hive very well and removes any foreign material promptly. Nevertheless the drawback is its aggressiveness (Attard E. and Bugeja Douglass A., 2010).

Bees perform very important roles in the agricultural sector both as pollinators of mainstream crops and orchard fruits as well as colonisers of many garigue areas. These beneficial aspects of garigue landscapes act as a persuasive motive for protecting and conserving this unique and vastly biodiverse habitat. The honey bee can be cited as the perfect example of a green economy. Honey production provides a good income for bee keepers through a collaborative synergy between keeper and bee colony. The bees collect pollen and nectar from plants and trees found in garigue and maquis habitats as well as from cultivated areas. The bee keeper maintains and protects the areas which bees use for foraging and thus performs environmentally-sound activities that are beneficial for all concerned. While the bee keeper harvests the surplus honey produced by the bees, he in turn protects them from disease, predators and other hazards and also provides supplementary feed when pollen and nectar are, for some reason, in scarce availability. The bee keeper also provides ready-made boxes and wax sheets so that the bees do not have to waste any energy and resources to build their hives and honeycombs.

Maltese honey is produced from different floral sources depending on the season and the location of the apiaries. In optimal climatic conditions, beekeepers usually harvest three (3) times during the year with the first harvest taking place in spring, the second harvest in summer and the third harvest in autumn. The first type of honey that is harvested in the Maltese Islands is the spring multi-flora honey. This type of honey is produced from the nectar of several types of flowers that are present in spring time. Typical plants include red clovers (*Hedysarum coronarium*), boar thistle (*Galactites tomentosa)* and borage (sometimes called starflower) (*Borago officinalis*).

This type of honey is collected during May and has the tendency to solidify in a few months (Attard E. and Bugeja Douglass A., 2010).

The second type of Maltese honey is the summer wild thyme (*Thymus capitatus*) honey, produced from a shrub that starts flowering by late May. The nectar of wild thyme produces honey which has a delicious and spicy taste. In the summer season, honey usually starts in the last week of May and ends between the end of June and the first week of July. This honey has been very famous since ancient times and is a type of honey that is sought by both locals and foreigners. The last season of Maltese honey production is the autumn season, which usually kicks off from the month of August and ends in November. By the end of August, bees start collecting nectar from the flowers of Eucalyptus (*Eucalyptus melliodora*) and later in October, nectar from the carob trees (*Ceratonia siliqua*). Some beekeepers harvest the eucalyptus honey and then afterwards harvest the carob honey. Other beekeepers harvest only once in late autumn to produce a multi-floral honey made from eucalyptus flowers, carob flowers and some other flowers that the bees might find in the beginning of the season such as Japanese medlar (*Eriobotrya japonica*). Local tradition indicates that honey produced from carob is effective for sore throats (Attard E. and Bugeja Douglass A., 2010).

From a product perspective, honey is a complete food that is highly nutritious and health preserving. Spring honey is believed to have anti-allergic qualities if taken in small doses on a daily basis. This could be since it contains a wide spectrum of the various pollens that fill the air in spring and thus, gradually build up resistance in the human body against these pollens. Wild thyme honey is particularly fragrant and absorbs many of the valuable medicinal qualities of this aromatic herb that is so representative of the Maltese garigue landscape. It is traditionally recommended for winter ailments especially colds, influenza and the associated symptoms. Naturally, with such a versatile product available, it can be easily understood how Maltese honey has become part and parcel of a wide range of recipes in sweets, pastries, hot drinks and condiments and marinates. Honey bees can be kept and managed without a great deal of hard work and could therefore offer farmers and their families a supplementary form of income to boost the income from their mainstream agricultural activities.

2.04.08 Others

Other innovative forms of farming requiring research and innovation have been lacking in the Maltese islands since most businesses are small and cannot afford to fund research projects. This has led to the adaptation of international research to the local scenario when the process or technology has been on the market for a long time. Initiatives such as snail farming, insect protein production farms, aquaponics, vermicomposting and the production of predator insects for Integrated Pest Management have not yet gained ground in Malta. There could be possibilities for agro-processing franchise or farm entrepreneurs who embark on such initiatives in the coming decade.

2.05 Agro processing industry

Agro processing activities in Malta are carried out, on one level or another, practically in all the various sectors of the agricultural spectrum. These processing operations vary from each other both in the types of processing they employ and in the dimensions of the activity. Some of the processes simply preserve the primary product through salting, pickling or drying whilst other processes transform the primary product into something else such as fermenting grape juice into wine, lemons in *limoncello*, milk into yoghurt, or tomatoes into *kunserva* or ketchup. Some sectors such as dairy, tomato processing and wine production have developed a strong structured agro-processing industry whilst other such as the sheep cheeselet and honey sectors are more producer-based and carried out on a small scale. A non-exhaustive list of agro-processing activities in Malta is being provided below:

1) Dairy producers have been organised throughout the years to deliver to consumers a range of dairy products that satisfy the Maltese market, successfully competing with imported products on an open market. Apart from fresh milk in various presentations, there is a whole range of milk products produced, including various types of yogurts, cheese and fresh cream that are supplied exclusively from pasteurised fresh milk originating from Maltese dairy farms. The dairy sector (excluding sheep and goats) is organised through a vertical structure where the milk producer cooperative has managed to shorten the supply chain and produce a range of dairy products through effective marketing and branding exercises.

2) Tomato processing has a long traditional link with Malta and *Kunserva* has been recognized through Legal Notice 250 of 2013 as being a traditional Maltese product manufactured from tomatoes in conformity with Article 3(2) of EC Regulation No. 1535/2003. This recognition implies that a product shall be called '*Kunserva*' only if it conforms with such regulations that imply the manufacturing of a one-stage process involving the extraction and concentration of fresh tomato juice derived directly from tomatoes harvested between 15 June and 15 November, and which is packed immediately following production in hermetically sealed containers in the same establishments where the juice has been extracted. There are other tomato products such as pastes and ketchup that are being exported by Maltese tomato processors.

3) Wineries in Malta produce a range of wines including estate and boutique wines. Quality wines in Malta have to be produced in line with the D.O.K. and I.G.T. regulations (LN 416 of 2007 and LN 166 of 2007 respectively) which govern these two (2) wine product categories, the respective oenological practices, as well as labelling and presentation requirements, traditional terms and restrictions. The Directorate of Agriculture carries out inspections at wineries during the harvest period to monitor the sugar levels of the grapes entering the wineries for compliance with the D.O.K. and I.G.T. regulations. Moreover, this unit gathers data on annual grape harvesting from farmers and wine production and wine stocks from vintners so as to monitor the wine market in line with the Wine Act (2001).

4) Feed mills in Malta have a history of providing a relatively good service to the livestock industry. However, in the past, the addition of antibiotics in a wide variety of feeds was commonplace. It is important that feed compounding is strictly monitored so that consumers could rest assured that there are no medicinal or chemical residues in the meat or meat products that are produced locally. Records of sales of feeds should also be made available to Veterinary Services to enable them to monitor feeding and management practices of livestock farmers. From an environmental perspective, feed mills need to be adequately regulated to ensure that dust emissions are curbed and environmental guidelines are faithfully adhered to.

5) Flour mills turn wheat and other cereals into flour for baking bread and other confectionaries. But they do not, normally, mill local grains since the local production of wheat and barley (and some other grains) is basically aimed at the production of animal fodder.

6) Meat processing was originally intended for swine meat but has now spread over to every other meat sectors such as beef, chicken, rabbit, goat, lamb, and horse which were previously intended for the fresh meat market. The high perishability of pig meat due to its high fat content, had over the centuries generated a wide variety of processing methods specifically designed to address that perishability factor. Pig meat had appeared on the market for many years in the shape of bacon, salt pork, back fat, luncheon meat, mortadella, gammon, cooked ham, salami, sausages, black pudding, and in many other presentations. Most of these products were developed centuries ago when refrigeration was not available and pig meat had to be preserved by using various forms of curing, including drying, smoking, boiling, salting, and the addition of various herbs and spices to enhance the flavour of the meat. Many of these processed products became convenience meats appealing for their taste and utility in preparing sandwiches, cold platters, hors d'oeuvres, and are still in great demand not only by households for preparation of school and work lunches and quick snacks but also in the catering industry for fast food, pizza, cold platters, buffets, and appetizers.

Thus, processed pork meat has evolved from a preservation concept to a versatility and convenience dynamic and in Malta the expanding and diversifying tourism and leisure industry has created a surge of demand for these products which testifies to a great potential for this industry that needs to be shared with Maltese pig producers.

The versatility of processed pig meat is now being applied to other meats and the consumer can today find a variety of luncheon meats, sausages, burgers, and other forms of convenience meats processed from chicken and turkey. However, even other meats such as lamb, goat meat, and beef are being used in the production of an increasing variety of processed meat, including burgers, sausages, salami, smoked meat, corned meat, pâtés and others.

Most meat processing also includes various methods of treating internal organs and other offals in order to either remove or blend overpowering flavours with a whole range treatments including marinating, leaching, mixing with aromatic herbs and spices. Some internal organs lend themselves to straightforward processing as is the case with liver and tongue. Others require a whole process of transformation. In the case of intestines and other parts of the alimentary canal, the processing involves cleaning through steaming and scraping. The resultant product could then be used as casings for sausages or ground up and used as meat in sausages, mortadella, luncheon meats and other processes. Such utilisation of offals for processing into food items requires a sophisticated dedicated slaughter and processing infrastructure including a rigorous HACCP provision.

7) Processing of vegetables traditionally had two objectives: 1) to utilise surplus vegetables by transforming them into some form that could be used at a later stage and 2) preserving them under some non-perishable form so that they could be used at a time when those vegetables were not available. While some forms of processing require industrial grade equipment, others can be carried out at home or in backyard operations. The latter include various forms of pickling, brining, salting, sun drying, candying, marmalades, jellies, and preserving in oil. All of the above methods basically constitute some form of transformation.

Recently however, other forms of processing have appeared on the agricultural scene. The object of this form of processing is not preservation but convenience to reflect the changing lifestyle in which very little time is left for dedication to household chores including preparation and cooking of meals. Some entrepreneurs have homed in on this reality and have placed on the market a whole range of mixed salads and vegetables which have been specifically dimensioned, graded and packaged to facilitate the task of the working parent who needs to prepare a meal as quickly as possible as soon as s/he gets back home from work. In such cases, the processing involves the washing and drying of vegetables, grading them and then selecting and mixing the suitable ones for the objective at hand and measuring them out in the appropriate quantities for packaging.

This development of processing and packaging for convenience can be seen also in the processing of certain vegetables and herbs through transformation into sauces, gravies, chutneys as condiments for pasta and pizza dishes and relishes to go with certain meats and fish or as dips. Many of these sauces and other forms of processing have adopted Maltese characteristics or have been adopted specifically to cater for typically Maltese soups, minestrone, pasta, and favourite platters.

8) Small ruminant cheeselet production by 1) a large number of small herds whose owners produce homemade cheeselets that are sold directly to a select clientele, and 2) a smaller number of sheep breeders who adopted regulatory and sanitary protocols to be able to produce a packaged and properly labelled product which is sold in major retail outlets.

The cheeselets, known as *ġbejna* (singular) and *ġbejniet* (plural) are sold mainly fresh on the same day that they are curdled and set. However, there is also a consistent demand for dried cheeselets as well as seasoned ones which are produced by pickling the dried cheeselets in a mixture of vinegar, olive oil and black pepper.

9) Poultry and rabbit processing basically follow the same approach with the difference that poultry producers are dependent on the slaughter houses whilst rabbit producers do their own slaughtering, cutting, packaging and marketing. The processing of these two animal carcasses involves 1) the slaughter itself, plucking (or skinning) and evisceration; 2) grading and cutting up of the carcass in conventional portions and 3) packaging either for the fresh meat market or for freezing. Some of the carcasses are packaged whole while some of the carcasses or portions there from which have been bruised or downgraded for some reason or other would be sidelined for stripping, mincing and transformed into burgers, sausages, or other forms of processed convenience meat.

11) Olive oil production was recently regulated through LN 66 of 2014 that is directed mainly at olive oil presses with the aim of controlling the modus operandi for commercial olive oil production in Malta and its placement on the market. This legal framework includes licensing for the production of olive oil, a link with the register for olive growers, submission of olive oil production declarations, and keeping of an olive oil record book. Most olive oil producers press their product in one of the olive presses and produce olive oil for their own consumption. There are others who have invested in large olive groves and developed olive oil products that are branded individually. Most often the amounts of olive oil bottles produced is limited and hardly ever satisfies the demand. Larger operators generally operate their own olive presses and supply a considerable amount of olive oil on the local market or for export purposes.

12) Small licensed producers of honey, jams, preserves, fruit liqueurs, pickles, dried products, syrups, olives and other delicacies. While some operators are diligently pursuing such practices, there still are issues with labelling and retailing of ad-hoc products on the market. Authenticity of attributes on labels, methods of productions, origin of primary products utilised in these confections, and a host of other parameters need to be properly regulated in line with current legislations.

2.06 Rural development

Apart from the agronomic perspective, the farming community is directly involved in the maintenance of the rural landscape and its development. Throughout history, agricultural activities have shaped the Maltese landscapes in rural areas and the upkeep of the countryside reflects the intensity of the farming activities and the reliance of the population on farmland. A simple exercise to prove the effect of farming on the landscape is by comparing a photograph of the Maltese countryside taken in the early 20th Century with the same site today.

In the last two (2) generations, land use changed, the farming intensity changed, maintenance of rubble walls decreased, natural vegetation increased in marginal fields, whilst field fragmentation and farm roads increased.

Another element of change in the agricultural landscape was the disappearance of sheep and goat grazing which led to changes in the growth patterns of vegetation, removed the deposition of animal manure from various landscapes, and contributed to a dry grass landscape that increased fire hazards in summer.

The RDP for Malta 2014-2020 defines rural areas as those areas having a population density lower than 5,000 persons per square kilometre, a minimum of 10% of the locality being agricultural land, and a minimum of 35% of the locality being outside the development zone (ODZ). Based on this definition, there are 33 localities in Malta and 14 in Gozo that can be considered as rural areas. However, this definition of rural areas does not imply that these localities maintained their agricultural fabric and the traditional link with the farmland. Agricultural land may still be a dominant feature in these localities but in reality the economic activity of the rural population is not predominantly agricultural.

Rural areas in Malta are located close to urban areas and there is a fraction of the rural population that is employed in agriculture. Most rural traditions, skills and way of life were lost and the mentality has become predominantly urban. Moreover, since most consumers are concentrated in urban areas, most processes along the chain are carried out in non-rural areas, thus diluting the income retained by rural communities. Reversing such trends could be partially achieved through investments in agriculture, which could revive the character of remaining farming communities so that they can benefit from their heritage.

Rural development is a widely used term that in real terms is very complex to achieve since most of the economic activity is concentrated where the population lives and development in rural areas is more risky and restrictive. Investment in rural communities can become viable when the agricultural landscape is maintained and there is room for innovative initiatives that build on a solid social fabric. Thus, it would be of no use to aspire to convert dormant rural areas into nostalgic living museums when the living traditions and the rural character gave way to a modern lifestyle.

The Agricultural Policy for the Maltese Islands will link with the Rural Development Programme 2014-2020 to encourage the creation of an attractive countryside through an agricultural economy that stimulates employment opportunities and attracts income to rural areas. There are various financing opportunities through the RDP 2014-2020 that have to be exploited to consolidate agricultural activities and rural development. Urgent issues that have to be tackled in rural areas include 1) the creation of adequate employment opportunities, 2) addressing the ageing farming population, generational renewal, and the rural skill drain in countryside areas, 3) investing in the creative use of on-farm and off-farm technology and in the processing of primary produce, 4) creating sound organisational structures and sustainable business models, 5) reversing land abandonment and 6) assisting in biodiversity regeneration.

2.07 Education, research and development

The Census of Agriculture (NSO, 2010) indicated that around 90.15% of the 11,713 sole holder managers declared that they were exposed to agricultural training only from practical experience. A mere 8.6% of these sole holder managers, equivalent to 1,004, had basic training and only 1.3% or 149 had full training in agriculture. These figures refer to the sole holder holdings that make up to 90.7% of the total annual work units in agriculture, with the rest being limited liability companies and partnerships. It has to be noted that 83.8% of all sole holder managers were aged over 45 and 64.9% worked less than 25% of one (1) annual work unit in agriculture. Thus, farming in Malta is predominantly a part-time activity, practised by an ageing population with the majority of farmers having only practical experience.

In Malta there are two (2) higher educational institutions (HEI) training people in agriculture. These are the University of Malta's Division of Rural Sciences and Food Systems within the Institute for Earth Systems and the Centre for Agriculture, Aquatics and Animal Sciences within the Malta College of Arts, Science and Technology. For the scholastic year 2015/2016, the graduates from these two HEI are listed below:

Division of Rural Sciences and Food Systems at the University of Malta:

- Diploma in Agriculture (MQF Level 5): 4 students
- BSc in Med Agro-Ecosystems Management (MQF Level 6): 6 students

Centre for Agriculture, Aquatics and Animal Sciences at MCAST:

- Diploma in Animal Care (MQF Level 3): 16 students
- Diploma in Horticulture (MQF Level 3): 5 students
- Advanced Diploma in Animal Management (MQF Level 4): 15 students
- Advanced Diploma in Horticulture (MQF Level 4): 6 students
- Higher National Diploma in Animal Management (MQF Level 5): 5 students
- Higher National Diploma in Horticulture (MQF Level 5): 2 students
- B.Sc. (Hons.) in Animal Management (MQF Level 6): 7 students

Apart from the educational and training scope, HEI have an essential role in research and development (R&D) linked with agriculture in particular with the development of analytical tools that enable the 1) identification and analysis of problems and constraints, 2) assessment of the suitability of technologies or innovations pertinent to farmers' situations, 3) planning, monitoring and evaluation of on-farm trials and demonstrations, as well as 4) investigation of alternative production and farming strategies. Farm managers can collaborate with HEI to generate vital farm-level information on the impact of new technologies, innovations and development options through guiding on-farm trials and demonstrations on selected fields or farms. However, these aspects are either missing in Malta or the research that has been carried out so far was fragmented and its dissemination was very limited, thus not assisting the farming community.

Most of the students pursuing such studies do not find the scope to implement them or to widen their knowledge through further experimentation on the field after graduation. Ideally, agricultural studies should evaluate the likely profitability and the expected rate of adoption of a new practice by farming enterprises or by clusters of farmers.

The role of HEI could be of a great contribution if their research programmes can be shaped to meet the critical needs of farmers. Thus, prioritisation in farm research and budgeting methods are essential in order to support decisions on the allocation of scarce human and financial resources by HEI. The latter can involve the farming community in the evaluation of essential points of intervention within their research programmes, whilst the findings of farm-level investigations can be used to influence the allocation of funds for research. Nevertheless, this approach is missing in Malta and pertinent HEI in Malta 1) lack the necessary funding in a subject that requires a large amount of resources to achieve the desired pedagogical levels, 2) face a situation where the recruitment of students is not easy as the sector is not attractive and does not offer secure future opportunities, 3) lack collaboration with the business community to develop a differentiated job spectrum that links with the educational levels achieved, and 4) have a limited pool of experts who keep up to date with international developments and thus creating the risk of providing outdated or Malta-centred teaching that does not embrace innovation elements.

Research and development (R&D) in agriculture requires a consistent budget allocation to fund research over several years as well as highly qualified staff that is able to develop the research and create innovative technologies. As already noted above, the farming community should have a participatory role in defining priorities for R&D by identifying the main issues that require research, existing constraints to innovation and to the adoption of new methods. Research is critical to wean the Maltese agricultural sector from the conservative approach since it is the basis for the creation of improved agricultural methods, increased productivity or the tapping of international markets. R&D also assists in developing new practices, processes and technologies that address new challenges faced by the agricultural sector such as climate change and in exploiting various other opportunities.

R&D in Malta, particularly in agriculture, is lacking since the benefits of research are not understood by most economical operators. Apart from a lacking a general research culture in Malta, most businesses are small and do not permit to fund research projects. This has led to the adaptation of international research to the local scenario when the process or technology has been on the market for a long time. The general lack of research and the presence of vast data gaps in the agricultural sector are hindering basic sectoral evaluation that are needed to embark on R&D. In fact, most decisions taken by the agricultural community are based on traditions, trial and error and very often do not embrace advice or change leading towards long-term benefits. Furthermore, extension services are directly related to research since without research there would be no extension and no public-sector support and without extension, research has little to offer. Without the feedback of information from farmers and extension workers to researchers, the content of research efforts have little relevance. Thus, synergies between research, extension services and farmers are critical for effective technology innovation, development and transfer.

The facilities at Għammieri Experimental Farm currently administered by the Diversification and Competitiveness Directorate should serve as the base for the industry-academia links that are required. It is to be noted that a memorandum of understanding between MESDC and MEDE was signed to allow for better cooperation between Għammieri Experimental Farm and the Centre for Agriculture, Aquatics and Animal Sciences at MCAST, so that the existing facilities are being made available for student traineeship as well as for joint research work. This positive development can be expanded by reaching a similar agreement with the University of Malta to maximise the potential of such facilities.

3

3. Analytical Process

3.01 Rationale

This chapter focuses on a detailed SWOT analysis of fifty six (56) themes that were identified through the six (6) strategic policy objectives. There is a separate SWOT analysis for each strategic objective that reflects the outcome of each thematic focus group that worked on their composition during the 'National Consultation Event'. Each theme is analysed in line with the pertinent SWOT items, even if there could be an element of overlap between issues that could fit in more than one theme. The SWOT analysis is based on twelve (12) horizontal issues that have a cross-cutting relevance across all the identified themes and these are reflected throughout the analytical rationale. These horizontal issues are illustrated in Figure 8 below and their scope is described in the following section.

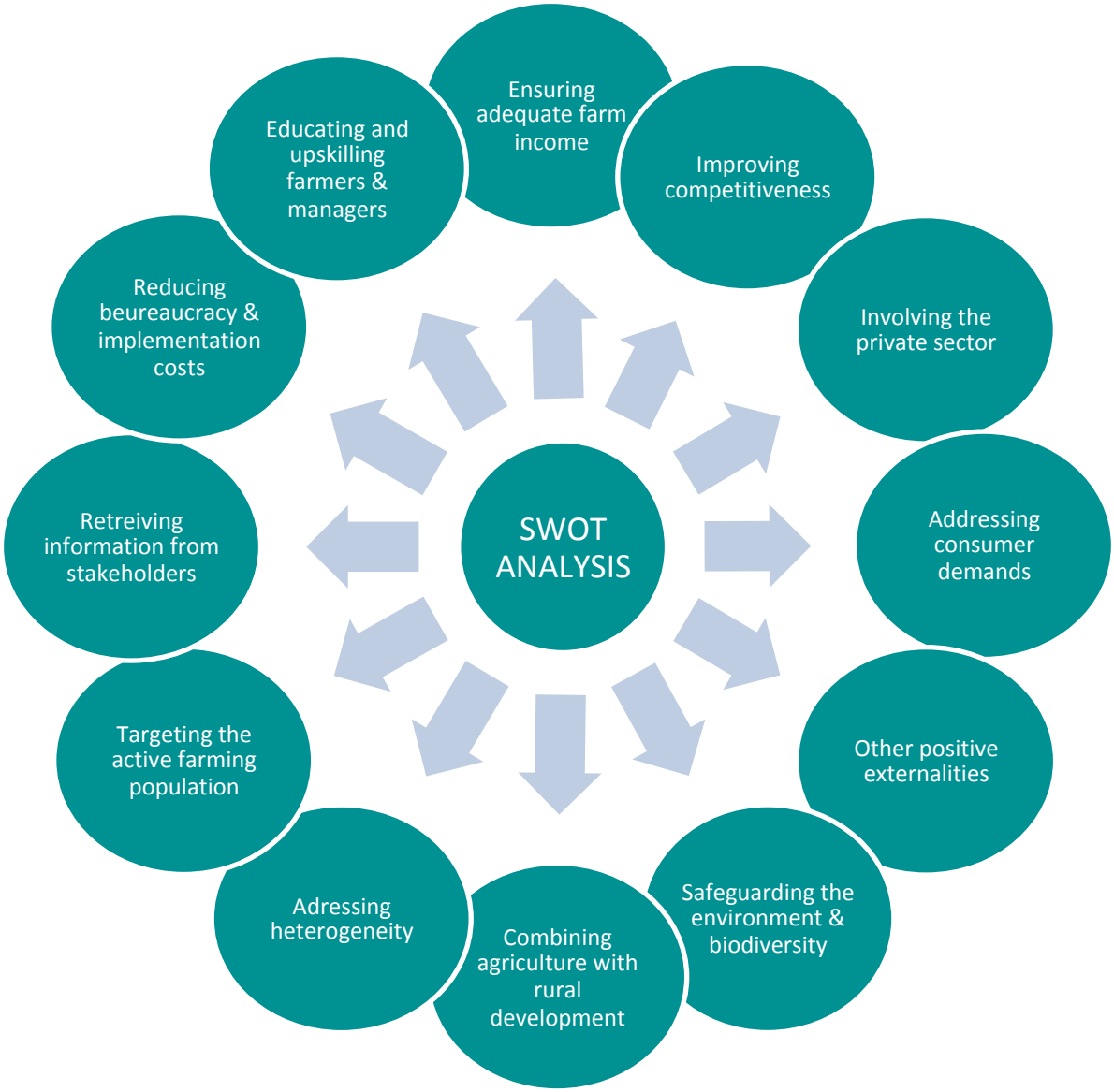


Figure 8: Horizontal Issues addressed in the SWOT analysis

3.02 Horizontal issues

Twelve (12) horizontal issues were identified as constituting cross-cutting relevance for the agricultural policy. These issues received rigorous attention throughout the detailed analysis presented in this chapter as well as throughout the following chapters. Thus, the significance of horizontal priorities shall be reflected across this chapter within each theme as well as within all the operational objectives and policy measures being proposed in this policy document. Table 58 below lists the horizontal issues and provides a corresponding reference number that reflects the pertinent section and order followed in this section.

Reference	Horizontal Issues
3.02.01	Ensuring adequate farm income levels
3.02.02	Improving agricultural competitiveness
3.02.03	Involving the private sector
3.02.04	Addressing consumer demands
3.02.05	Other positive externalities
3.02.06	Safeguarding the environment and biodiversity
3.02.07	Combining agriculture with rural development
3.02.08	Addressing heterogeneity
3.02.09	Targeting the active farming community
3.02.10	Retrieving information from stakeholders
3.02.11	Reducing bureaucracy and implementation costs
3.02.12	Educating and up skilling farmers and farm managers

Table 58: Horizontal issues identified for the National Agricultural Policy

3.02.01 Ensuring adequate farm income levels

All the policy objectives aim at ensuring adequate farm income levels to sustain the agricultural sector and keep farmers on the land. This does not imply that the Government should assist farmers and livestock breeders financially without any commitments or provide retiring farmers with golden handshakes. Traditionally, agriculture policies used to address this issue in the form of market price support which is a mechanism aimed at safeguarding the variability of farm income. However, in many cases the income transfer efficiency of such policies into outputs was low since financial assistance ends up being paid to input suppliers or is capitalised into land values (Van Tongeren, F., 2008).

3.02.02 Improving agricultural competitiveness

Improving agricultural competitiveness is an overarching target to be reached through policy measures. The farming community has to be guided and trained to provide products and services as or more effectively and efficiently than their relevant competitors. This implies sustained success in the market without the need of protection or subsidies, thus increasing the value added of their production.

3.02.03 Involving the private sector

The role and the participation of the private sector is an essential factor to the success of any policy and this also applies to the agricultural sector. Centralised policies aiming at improving competitiveness can also be applied at the farm level, such as for example, knowledge and information dissemination in the form of education and extension services. The private sector may be better suited to carry out certain initiatives such as research, development and innovation aimed at improving productivity, which could be incorporated as mainstream policy if proven to be applicable. Public-private partnerships between higher educational institutions and businesses involving human resources and knowledge exchange are also being encouraged in order to develop novelty products and services, as well as new knowledge and thinking that can facilitate policy implementation.

3.02.04 Addressing consumer demands

The way of life keeps changing rapidly and addressing consumer trends is a challenging task. With the phenomenon of digital revolution and the increasing resident population, the product supply is not catching up with the fast evolving demands for such a commodity as food. Through this policy, the government aims at incentivising the agricultural sector to provide an abundant, safe, market-oriented, and high quality product at acceptable prices. On their part, agri-businesses should adapt adequate strategies to improve their product to meet the needs of the consumer and changing market demands. Financing for innovative approaches to improve presentation, labelling, branding and marketing of agricultural products can be partly sourced from the available RDP Funds.

3.02.05 Other positive externalities

The agricultural policy is not only intended to meet the nourishing requirements of the population but also other aspects of society. Indeed, apart from food and fibre, agriculture provides also a range of non-commodity outputs such as, among others, the upkeep of the cultural landscape that can provide social and economic returns when well managed. These external assets sustained by the farming community can be appreciated by society as long as the agricultural community thrives. This agricultural policy has the dual role of incentivising the environmental benefits of agriculture whilst addressing the negative impacts of agriculture on the environment. Education, training, advisory services and extension services are all essential mechanisms to steer the agricultural sector in an optimal direction that caters for all these societal needs. Notwithstanding the fact that the policy will focus primarily on the needs of farmers and livestock breeders, the requirements of the wider rural community and urban citizens have not been neglected. Indeed, these aspects should go hand in hand since the farming sector will be incentivised to reduce the impact on the environment considering the potential for tangible returns from value-added activities.

3.02.06 Safeguarding the environment and biodiversity

Farming practices need to geared towards safeguarding the environment and biodiversity since farming constitutes the major land-use in rural areas and plays a major role in environmental sustainability. Nevertheless this could be a challenging objective to monitor through quantifiable data since information systems that link agricultural policy measures with environmental impacts are not always straightforward. This target can be offset through the development of a combination of indirect indicators that are relevant to the local situation.

Further research and ongoing data collection are of utmost importance to back the development of forms of agriculture associated with environmental sustainability and biodiversity conservation. The private sector and research institutions are therefore being encouraged to take up research proposals within this policy document in order to bridge the gap between research and its application.

3.02.07 Combining agriculture with rural development

In view that agriculture is the dominant land user in rural areas, this policy will be addressing the missing links between agriculture and rural development. In reality, economic activity in rural areas is not dominated by agriculture since only a fraction of the rural population is employed in agriculture. Since most consumers are concentrated in urban areas, the retailing of produce is predominantly located in non-rural areas and follows various processes along the chain which dilute the income retained by rural communities. Moreover, since rural areas in Malta are located close to urban areas, many rural traditions, skills and way of life have been either diluted or lost entirely and the mentality has become predominantly urban. This trend needs to be reversed through investments in agriculture and rural heritage that revive the character of the farming community so that it can benefit from its heritage and exploit the urban-rural gap in favour of agriculture.

The policy will be addressing these aspects by encouraging the regeneration of an attractive countryside through agriculture that stimulates employment opportunities and attracts income to rural areas. Financing for innovative approaches in this area can be achieved through the LEADER funds allocated under the Rural Development Programme for Malta. Rural development can also be consolidated through innovative farmer-consumer relationships (e.g. direct farm-gate sales and consumer-supported agriculture) that are being encouraged through this policy.

3.02.08 Addressing heterogeneity

Notwithstanding that the Maltese Islands are geographically small; they offer a vast natural and social diversity that affects agricultural production. This theme was rarely addressed in previous strategies and the whole archipelago was, in most cases, considered as homogeneous. Farmers and livestock breeders are aware of the diversity in natural resources, agronomic conditions, production methods, consumer behaviour and various other elements that can justify a heterogeneous approach for agricultural policy measures.

3.02.09 Targeting the active farming community

Targeting the active farming community is being considered as the basis for any policy instrument in order to sustain the livelihood of genuine farmers and livestock breeders and to safeguard a future in the sector for their offspring. The amount of registered full-time and part-time farmers in Malta is very high but the active segment that produces food for the population is merely a fraction of the total. This situation is a far cry from ensuring equity as non-active recreational farmers are taking a free ride from benefits relating to the status of being a farmer at the expense of genuine diversification and innovation efforts. Any scheme, strategy and policy measure can only be effective if it is directly intended to serve and can be accessed by active farmers. It is thus being proposed that at the inception stage, the agricultural policy should embrace the establishment of a farmer and livestock breeder classification system based on verifiable criteria to be linked with a range of policy measures. By doing so, the policy would not only be safeguarding the rights and dignity of the remaining active farming population, but also the right of the tax payer to consume safe local food as well as enjoy a well-maintained rural landscape.

3.02.10 Retrieving information from stakeholders

Involving stakeholders in retrieving information and pertinent statistics to improve policy implementation is another fundamental horizontal issue. Agriculture, like any other economic activity, requires information from the various stakeholders along the production chain so that the policy maker can be in a position to assess progress, flag issues and adjust the policy direction. However, the socio-political structure of the agricultural sector makes it more difficult to retrieve information since most trading is done traditionally through relationships with the middlemen. Thus, it would be ineffective to invest in a complex information system for data collection that depends entirely on the voluntary declaration of stakeholders. As an alternative, policy measures such as land transfer schemes that incentivise the provision of correct data would be more effective in retrieving information that is vital for policy monitoring and evaluation. The policy maker should utilise the potential of IT administrative systems to organise the retrieved data as well as pool such information with other authorities to reduce policy implementation costs and strengthen inter-ministerial data sharing.

3.02.11 Reducing bureaucracy and implementation costs

Bureaucracy and implementation costs reduction is being envisaged across all the initiatives being proposed in the agricultural policy. A win-win situation for the policy maker and the agricultural community would be created when policy measures are target-oriented, focus on active farmers and retrieve information from the target audience. This approach increases resource efficiency across the board for the policy maker ranging from easier identification of programme recipients, progress monitoring, claim handling, reduction in paper work, lowering staff costs and sparing time to focus on other tasks. Farmers and livestock breeders benefit by adapting to clear mechanisms that classify them in a particular category and they are thus motivated to improve their current situation in view of the tangible returns for their efforts. When resources are distributed evenly and fairly between those who are genuinely implementing the agricultural policy measures, collaboration with the authorities will be taken to a new level. Moreover, those collaborative stakeholders who take up policy incentives steer the farming sector towards the established policy direction through demonstration and good practise. They are usually the most innovative and competitive since they respond faster to the market signals. The agricultural policy envisages to reward this nucleus of farmers through the establishment of point systems for particular policy measures such as for land transfer schemes and subsidy schemes.

3.02.12 Educating and up skilling farmers and farm managers

A general comment floated during the consultation period involved the integration of educational courses aimed at up skilling farmers and livestock breeders both through educational institutions as well as through the provision of dynamic extension services. An improved and meaningful access to education and research could assist entrepreneurship and innovation in agriculture that lead to improved profitability and sustainability for small farm settings. Certification related to such educational courses should be provided and utilised to consolidate the farmer and livestock breeder classification systems through recognition of educational level and skills. Young farmers are struggling to reduce input costs and to become more efficient they require professional training and up skilling from a pool of Maltese agricultural experts that is currently not available. The latter can be composed of agricultural graduates as well as professionals in the public and private sphere willing to uptake re-training and up skilling in horticulture and veterinary sciences. There is an urgent need to build up this pool of experts by developing a train-the-trainer programme that includes hands-on training for experts on farms and fields both in Malta and abroad, as well as applied agricultural teaching that could be used for the provision of extension services. The wide range of benefits that the national economy obtains from agricultural activity needs to be better recognised and appreciated. These benefits go far beyond food production, and this goal can only be achieved through adequate investment in educational resources, in up skilling and increasing the expert pool, as well as in the various research and development themes that are being identified within this policy document.

3.03 SWOT analysis by objective

Figure 9 below illustrates all the fifty six (56) policy issues covered by the six (6) strategic policy objectives that were identified for a more detailed SWOT analysis. A SWOT analysis for each strategic objective is being presented in this section to reflect the outcome of each thematic focus group that composed them during the 'National Consultation Event'. Each policy issue being analysed in this chapter follows the order presented in Figure 9 below.

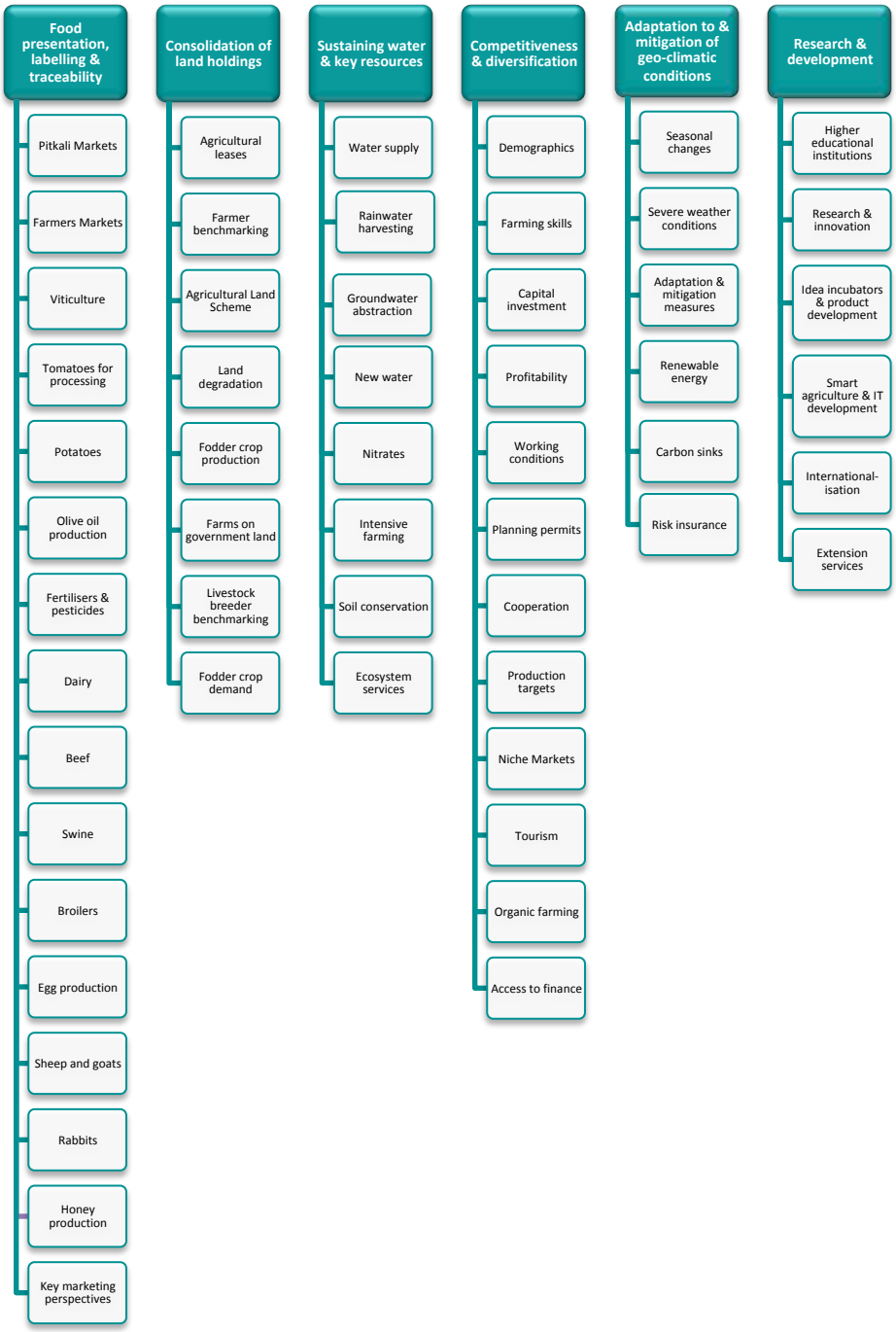


Figure 9: Strategic policy objectives and pertinent policy issue themes

3.04 Detailed SWOT analysis by area

This section provides a detailed SWOT analysis pertinent to each of the six (6) strategic objectives based on the fifty six (56) policy issues presented in Figure 9 above. Thus, each theme was analysed by a team of experts in line with the SWOT items in the related strategic policy objective. This implies that, for example, 'Pitkali Markets' and 'Farmers markets' were evaluated in relation to the SWOT items identified for Strategic Objective 1 that is 'Food presentation, labelling and traceability, whilst 'Agricultural leases' and 'Farmer Benchmarking' were analysed in accordance with the SWOT items in Strategic Objective 2 that involves 'Consolidation of land holdings', and so on. Nevertheless, there could be themes that overlap between strategic objectives, but this is understandable since there are issues that could fit in more than one theme.

3.04.01 Food presentation, labelling and traceability

The first strategic policy objective that was identified for the development of the National Agricultural Policy entails 'food presentation, labelling and traceability'. Following a consultation process with various stakeholders, a set of themes relevant to this policy objective was created for the development of an Issues Paper. The latter was discussed during the national conference event, in which the working group in charge of this policy objective carried out a SWOT analysis and elicited several recommendations to include in the policy measures. A total of sixteen (16) policy issues were identified for this strategic policy objective and they were grouped under three (3) categories, namely 1) issues related with 'crop production', 2) issues related with 'livestock breeding' and 3) 'cross-sectoral' issues. As indicated in Table 59 below, each area is being provided with a reference number that reflects the order being followed in this chapter.

Policy Objective 1	Sector	Reference	Policy issue
Food presentation, labelling and traceability	Crop production	3.04.01.1	Fruit and vegetables – Pitkali Markets
		3.04.01.2	Fruit and vegetables - Farmers markets
		3.04.01.3	Viticulture
		3.04.01.4	Tomatoes for processing
		3.04.01.5	Potatoes
		3.04.01.6	Olive oil production
		3.04.01.7	Fertiliser and Pesticide application
	Livestock breeding	3.04.01.8	Dairy
		3.04.01.9	Beef
		3.04.01.10	Swine
		3.04.01.11	Broilers
		3.04.01.12	Egg production
		3.04.01.13	Sheep and goats
		3.04.01.14	Rabbits
		3.04.01.15	Honey production
	Cross-sectoral	3.04.01.16	Key marketing perspective

Table 59: Policy issues identified for Policy Objective 1 with reference number

The policy issues included in this strategic policy objective are being tackled in a sector-based format since the issues related to food presentation, labelling and traceability are not homogeneous across the farming sectors. More information on these sectors has been presented in Chapter 2 above that provides an overview of agriculture in the Maltese Islands as well as a sector-specific situation analysis. Moreover, this policy objective is being directly addressed in one of the five themes identified in the Rural Development Programme 2014-2020, entitled 'Maltese quality produce: improving quality, traceability, strategic marketing, adding value, branding and promotion'. Thus the analysis of the pertinent themes listed in Table 59 above is also being carried out in line with the rationale of the Rural Development Programme for Malta 2014-2020.

Figure 10 below illustrates the SWOT items which were identified for the first strategic policy objective 'food presentation, labelling and traceability'. This is followed by a concise analysis of each theme that was identified for this policy objective corresponding with these SWOT items, and in the format presented in Table 59 above.

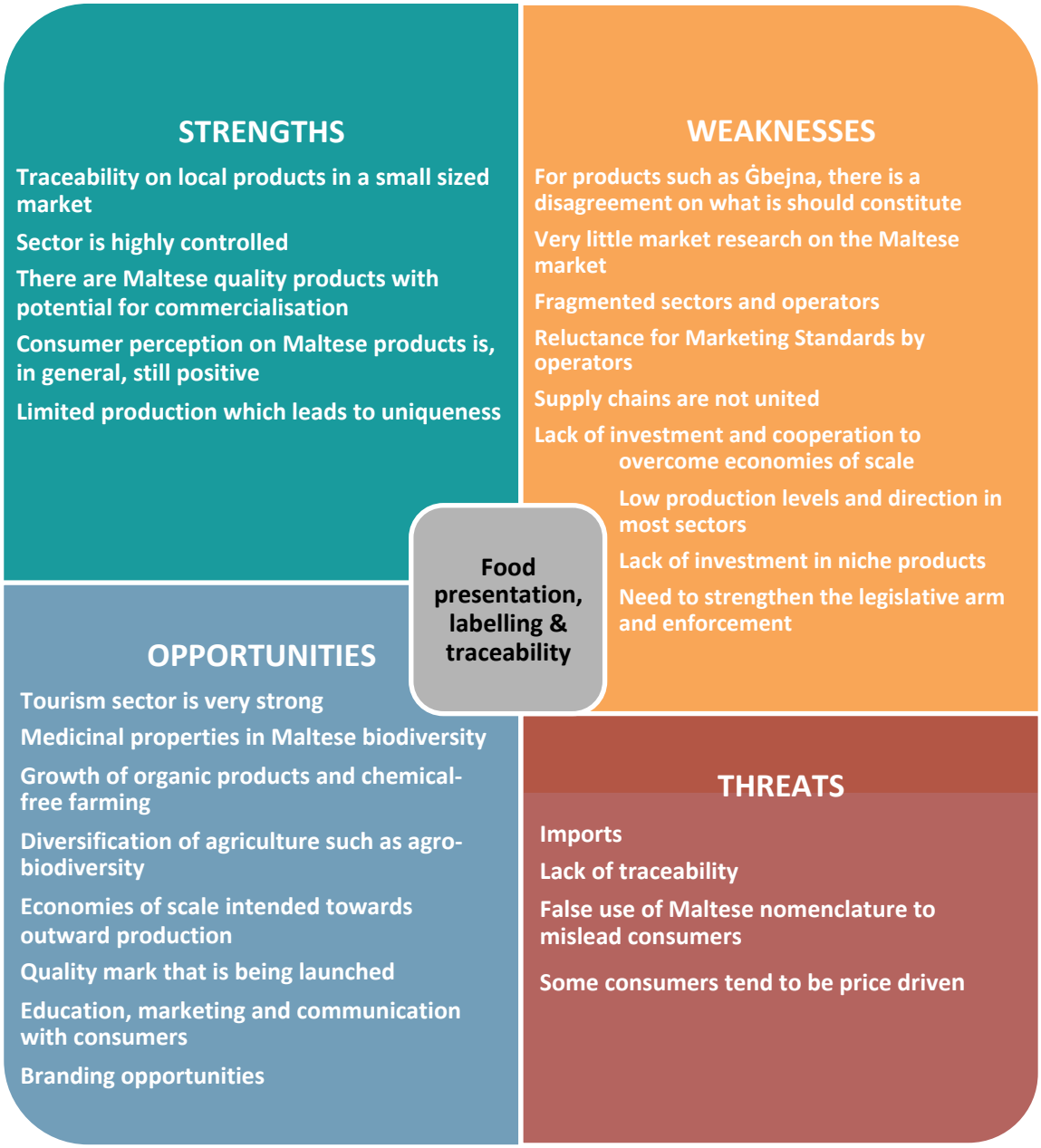


Figure 10: SWOT analysis for Strategic Objective 1 - Food presentation, labelling and traceability

3.04.01.1 Fruit and Vegetables – Pitkali Markets

As explained in Section 2.03.01 above, Maltese fresh fruit and vegetable produce is predominantly marketed at the Pitkali markets in Ta' Qali. As things currently stand, there is an urgent need of an effective mechanism capable of guaranteeing traceability of produce passing through the Pitkali Markets. Fruit and vegetables in pitkali crates are delivered by the farmer to the Pitkala and placed in their sheds. Data inputting such as weight and price per kilogramme is still done manually and a handwritten delivery note together with the previous voucher are handed to the farmer, who has no safeguards on the actual weight and price assigned to the produce. The Pitkala negotiate the prices with hawkers based on its visual appearance and availability on the market. Pitkala are required to forward all the deliveries and sales data to the Pitkalija Administration, which in turn is responsible for entering such data in a central IT system and for processing the sales vouchers and hawkers' invoices.

Apart from the onus being totally placed on the Pitkala to deal with the farmers' produce, there is still no grading structure in place to secure and trace quality standards and ensure a transparent pricing system for farmers' produce. Farmers who grade their produce are investing their time and resources, sometimes even purchasing plastic punnets to improve the product presentation and leaving their product in the hand of Pitkala to decide on the price and grade. There are seventeen (17) independent Pitkala and three (3) Pitkala member of the Farmer Central Cooperative Society. Farmers can choose one or more Pitkala where they can deliver their product. Prices are determined by the demand of the day.

The current pitkali crate system involves the placing of fruit and vegetables in green crates and tagging them with the farmer registration number using a simple adhesive sticker. Notwithstanding the fact that the system is regularly provided with a constant supply of these green crates, farmers delivering their produce at Pitkalija who participated in the consultation sessions claimed that the issue of scarcity of pitkali crates resurfaces when the summer season approaches. Such crates, being composed of plastic and available only in two (2) sizes, do not cater for all the different products and thus incur damage and have to be replaced in large batches every year. A typical example is the utilisation of the large crates for watermelons for which they are not suitable in size or in shape as they do not permit stacking.

Apart from damage and replacement, farmers argued that there was an issue with lack of circularity of green crates due to 1) various other uses of crates by other sectors that reduce the amount available for farmers, 2) hoarding of crates by farmers who produce seasonal crops instead of exchanging them with coupons and 3) storage of such crates for long time by hawkers and retailers even when they have no use for them. This situation was addressed through the introduction of Legal notice 210 of 2015 which emended Subsidiary Legislation 35.13 for the purpose of providing new crates for the market. The latter also involved an increase in the nominal fee contribution that is levied for the cleaning, production and replacement of pitkali crates. Between 2016 and 2017, a total of 120,000 crates were procured in order to replenish the stock (MESDC, 2017).

Effective traceability on fresh fruit and vegetables marketed through the Pitkali Markets can be achieved by means of enforcing a) the production of a crop plan, b) marketing standards, together with c) an IT system upgrade that registers the crates' origin, weight, grade, price and the time delivered at market. Traceability should be ensured up till the retail point on the hawkers' van or on the retail outlet's shelf. One has to consider that the perishable nature of fresh produce demands processes or systems such as refrigeration that guarantee the freshness of the product until such time as it is retailed.

A major weakness in the fruit and vegetable sector is that it is one of the most fragmented sectors with limited representation and outdated structures. It is also generally non-responsive to market mechanisms. The upgrading of the role and setup of existing cooperatives as well as the setting up of producer groups or farmer clusters is urgently required so that the sector can be re-organised to plan production according to demand trends, strengthen representation with authorities, process excess production of certain crops, reduce production costs through collaboration, promote best practise, as well as carry out research and targeted information campaigns.

Education, marketing and communication with consumers can be facilitated once marketing standards are correctly followed and the labelling extends to the retailing stage enabling consumers to trace the origin, variety and class of products offered. Apart from information and traceability, this system facilitates marketing of local products with consumers. Market research with consumers as well as information campaigns are required to target the range of consumer expectations through knowledge dissemination and effective marketing.

Marketing standards and the Quality Mark for Agricultural products in Malta are effective instruments that can safeguard the interests and needs of the producer and consumer by providing an effective mechanism that can trace the origin, quality and consistency of the produce on the market. The trading mechanism for farmers at the Pitkali Markets should be revamped in such a way that an attractive product on the market can fetch an appropriate price corresponding to its grade and quality, thus securing viability and incentive for the farmer. This issue can be further addressed through market research and targeted information campaigns with consumers.

3.04.01.2 Fruit and Vegetables – Farmers markets

As indicated in the situation analysis of this sector in Section 2.03.01 above, the main objective behind the farmers' market is to provide customers with local fresh produce in season at a favourable price since the regulated commissions paid to the Pitkala is avoided. While price convenience remains a major consideration, farmers' markets also consolidate the link between the consumers and the producers, further exposing them to the reality on the other side. In view of this scenario, farmers involved in this form of retailing are adjusting their supply according to the consumer demand and thus they have more autonomy on their methods and sale of produce.

Notwithstanding the advantages provided by farmers' markets, the involvement in this form of retailing is not possible for the majority of farmers since they do not have the adequate human resources to sell their produce in tandem with the cultivation of their land. The latter would imply employing human resources to cater for the retailing aspect or to cultivate fields while the farmer is interacting with the customers. In most cases, engaging other workers with the family farm unit might not make economical sense since the sales from the farmers' market do not justify the increase in staff costs. As a response to this, some farmers started specialising in particular crops to retail at the farmers' market and adapted their farming schedule with the new lifestyle.

Farmers involved in the farmers' market claim that the attitude of buying cheap from the market where prices can be slashed is also present at the farmers' market. They argue that apart from reducing the profit margin for the farmer, this mentality diminishes the quality and reputation of the local fresh produce. Nevertheless, there is a range of consumers with varying demands and expectations. A market survey that analyses the various consumer typology and needs should serve as a starting point to cater for the customer at the farmers' market as well as increase in appeal to attract other potential customers. Notwithstanding that some consumers may be price driven, all consumers should be given the opportunity to identify better quality food through consistent grading and labelling.

Another aspect that needs to be considered is that the upgrading of the Pitkali Markets could reduce the significance of farmers' markets for its operators. If farmers are presented with a Pitkali Market system that creates a fair return in their pocket from a graded, labelled and traceable product, they would not need to go through the extra effort to retail their product and could also save precious time. So far, fresh fruit and vegetable production in Malta has been mostly market-driven but not market-oriented. Moreover, retail prices at the farmers' markets are based on prices established at the Pitkali markets. There is no collaborative crop planning or long term direction on the type or amount of crops that should be cultivated to supply the market. Decisions such as the type of produce, method of production, volume of production, and resource use are usually taken by the farmer on an ad-hoc basis by intuition on the performance of crops in the previous season and the type of crops that could be on request the following season. This form of decision making gave satisfactory results when the market was protected by import levies and the products supplied the local market without direct competition from imports. This approach is no longer suitable and the response to it should not merely be focused on farmers becoming more productive and trying to compete with quantity, since this generally leads to overproduction and aggravates the issue at hand.

Farmers utilising the farmers' market setup are generally family farm units who respond to the customer demand by providing fresh fruit and vegetables produced on their holding. However, with an increase in popularity and higher expectations from customers, some farmers were not coping with the demand as their production time was reduced due to time dedicated at the market. A collaborative approach to farming, even if in small farm clusters, can alleviate the low production levels and increase efficiency in terms of farm resources and time management. Fresh fruit and vegetable farmers can become more efficient if they form clusters to specialise in certain crops and create a joint approach to supply fresh produce.

For example one of the farmers could have the ideal resources and skills to produce lettuce as a main crop whilst another farmer can focus on greenhouse tomatoes. Together, these two farmers can supply these two main crops and supplement them by a range of other crops that are requested by customers.

3.04.01.3 Viticulture

As explained in Section 2.03.02 above, viticulture is the cultivation of grapes intended mainly for wine production. The price of grapes dropped during the first years following EU accession and the liberalization of trade markets. At the time, the viticulture sector in Malta underwent comprehensive transformation with the proliferation of vineyards growing international grape varieties alongside the established Maltese Ġellewża and Girgentina varieties. This investment came about as a response to a generous vine planting scheme and subsequent subsidies awarded to the sector under the Special Market Policy Programme for Maltese Agriculture (SMPPMA) regime. Nevertheless, there was a lack of planning of grape varieties corresponding to consumer demand for wine. This led to a decrease in the price for grapes and, consequently, a number of vineyards were grubbed up following the expiry of a ten-year vine contract with ARPA.

D.O.K. wines in the Maltese Islands are regulated by Legal Notice 416 of 2007 and I.G.T. wines produced in the Maltese Islands are regulated by Legal Notice 166 of 2007. These regulations govern these two (2) wine product categories, the respective oenological practices including labelling and presentation requirements, traditional terms and restrictions. The production protocols of wine grape varieties that may be cultivated in the Maltese Islands are regulated by Legal Notice 188 of 2006. Notwithstanding the regulative frameworks governing viticulture in Malta, farmers producing wine grapes are still missing the link with the end consumer since the end product is controlled by two main processors and other small estate wineries. In a situation where wine processors dominate the market, producers have little say on the final product, its marketing and the pricing system.

Maltese wines have gained a considerable reputation in the last decade following a restructuring backed by a sound legal framework. Nowadays, one can find a range of Maltese quality wines on retail or offered in restaurants that reflect the dedication of local farmers and vintners. Notwithstanding that D.O.K. wines and I.G.T. wines produced in the Maltese Islands are well regulated, including their production protocols, there is still work to be done to identify and secure peculiarities in the Maltese varieties. The particular organoleptic properties present in the indigenous grape varieties of the white Girgentina and the black Ġellewza still require proper identification and registration. These tasks should involve the consolidation of the fragmented research carried out so far and investment in targeted research through the involvement of the viticulture sector.

There is currently a vine scarcity following a severe dry season and this requires a vine replanting exercise to catch up with the demand. The agricultural policy intends to strengthen the sector so that it can overcome such one-off structural issues so that the supply of grapes catches up with the wine demand. Nevertheless, there are no means to support vine planting through the RDP 2014-2020 programme and thus farmers have to absorb all the expenses and hard work required to nurture vines in their most vulnerable early years, especially if dry winter weather persists. Thus, there is the need for a clear vision for Maltese quality wines for the coming years since vines take several years to be established and start producing grapes especially in an open market where the choice for imported wines is vast and caters for extremely competitive prices. Market surveys should be carried out to address the current production inconsistencies in order to address future market demand.

3.04.01.4 Tomatoes for processing

As described in Section 2.03.03 above, the price of tomatoes for processing was reduced drastically over the years whilst it was supported by the SMPPMA scheme. Tomato producers have a membership with producer organisations that represent their interest with the processors and authorities. Each member signs a contract with processors to abide with production standards, including protocols for pest control methods. Spot checks in the field are carried out regularly during the tomato growing period, with samples being taken for testing for pesticide residues, crop diseases and plant health. Nevertheless, the farmer setups in this sector are not functioning as producer organisations since they can be considered as 'contract farmers' with processors.

Kunserva has been recognized as a traditional Maltese product manufactured from tomatoes through Legal Notice 250 of 2013 in conformity with Article 3(2) of EC Regulation No. 1535/2003. This implies that *Kunserva* is a traditional Maltese product manufactured by a one-stage process involving the extraction and concentration of fresh tomato juice derived directly from tomatoes harvested during the stipulated harvesting period, between 15 June and 15 November, and which is packed immediately following production in hermetically sealed containers in the same establishments where the juice has been extracted. 'Hermetically sealed containers' refer to any container of any shape and material that prohibits any contact between tomatoes or tomato derivative and the air. This implies that only a product conforming to these regulations will be able to be labelled *Kunserva*.

A Voluntary Coupled Support mechanism capped at a total of €900,000 per year was launched in 2015 to aid this sector for the production of *Kunserva*. This is the only crop sector that will benefit from coupled support during the RDP 2014-2020 funding regime. Each participating farmer has to have a contract with a producer organisation or cooperative involved in this sector and produces tomatoes for processing over at least one tumulo of land.

Since this sector is recognized for the production of a traditional product and regulated through specific legislation, it is highly controlled. The seeds used for the low plant cultivars to produce tomatoes for processing are provided by the processors, who deliver guidance and training to farmers on the production methods. Normally, this crop is planted in early March and harvesting takes place in August. Tomatoes for processing are a pertinent example of Maltese products that have a potential for commercialisation. Other products that can benefit from the long Maltese growing season and the optimum taste derived from the Maltese climate and *terroir* should follow suit for research, testing and commercialisation. The geography of the Maltese Islands being an archipelago provides uniqueness in food production since it is influenced by the close proximity to the sea, has a long growing season, high humidity, windy conditions and a characteristic soil structure. These physical aspects coupled with traditions and limited production all lead to product specialisation that should be exploited as with the case of *Kunserva* and other processed tomato products.

When considering the traditional aspects of *Kunserva*, it can be benefit from the Quality Products Scheme issued by the Maltese Government. The Quality Scheme for *Kunserva* products could guarantee a level of investment by farmers that goes beyond the basic regulations. The Legal Notice for the voluntary national quality mark has already been accepted by the European Commission and the generic standards have been published. Stakeholders within the tomato sector can benefit from such a scheme by developing guidelines, control procedures and quality standards that are within the quality scheme parameters. Moreover, farmer participating in this scheme can benefit from funding through RDP 2014-2020 through Measure 3 – Support for new participation in quality schemes, which was launched in 2017.

Marketing of *Kunserva* and tomato products has been carried out extensively in Malta for many years. In fact, *Kunserva* is marketed as a traditional Maltese product that is closely associated with tomatoes produced by local farmers and has established itself as a ubiquitous product on the local market that is a common ingredient in a whole range of recipes. Market research on Maltese eating habits, consumer preferences, tourist perception, and the willingness to pay for certified traditional products is essential to identify the role of *Kunserva* and other products that could qualify for a quality label or a geographical indication. In this context, it is important that tomato producers benefit from such labels in the form of adequate returns on their investment so that they can be incentivised to sustain the final quality product.

More collaboration between farmers is required in this sector as in all other farming sectors so as to avoid manual work and increase efficiency. Producer organisations should target this collaborative element between their members but most farmers remain fiercely individualistic and generally fail to collaborate effectively. An alternative could include the hiring of agricultural service providers such as for field preparation and pesticide management. This would increase uniformity of production by reducing inconsistencies and variability of inputs. Technical experts and agricultural advisors identified by the producer organisations can assist both the service providers and the farmers in producing a standardized crop in line with the production parameters.

This industry is facing a threat from *Tuta absoluta* infestations that was first reported in Malta in 2009. *Tuta absoluta* is a harmful leaf mining moth with a strong preference for tomato (*Solanum lycopersicum*), but it can also attack potato, coloured peppers and other solanaceous plants. Since then, the distribution of this pest has grown and is now found widely across Malta and Gozo. The infestation level has fluctuated, with low levels observed during certain years due to control measures taken by growers. However, in 2015, the level of infestation was seen to rise again. This could be due to the development of resistance by the pest to the active ingredients being used. Control methods for this pest vary from 1) the sporadic use of pheromone traps intended to give an early warning of the presence of the pest and also to monitor the infestation density of the pest, 2) mass trapping using a higher number of traps, 3) a mix of traps with other measures to achieve a lower level of damage and to reduce the reliance on insecticide treatment, 4) chemical control that should not be used early in the cropping season or in high levels on low infestations, 5) non chemical treatment such as using Neem oil and *Bacillus thuringensis* and 6) an Integrated Pest Management (IPM) system that also includes soil cleaning, mass trapping, a mix of chemical with non-chemical applications as and when required, and the elimination of infected plants during the growing season and of the remnants of the crop immediately after the last fruits have been harvested. These measures are controlled through the Plant Quarantine Act (CAP. 433) *Tuta Absoluta* (Control) Regulations 2010, L.N. 26 of 2010.

3.04.01.5 Potatoes

Maltese spring potatoes are renowned for their taste and quality in various north European countries such as the Netherlands that have consistently continued to import this early season product from Malta. Notwithstanding the high quality product and the demand from importing countries, Malta has so far only managed to tap low-value bulk packaging since it is more economical. Albeit this delicacy is graded prior to its packaging and export, there could be possibilities for higher value presentation to obtain a better price on the market. This could be achieved through improved cultivation methods, presentation and promotion in order to enhance the demand for such a niche product, maintain and update the relevant farming skills and motivate the rural population engaged in the cultivation of a value-for-money export product. Combining research on the Maltese potato crop with a holistic branding and marketing campaign together with an enhanced packaging strategy, this product can reach higher returns for farming communities. The nomenclature associated with the Maltese identity of the export potato should, therefore, be exploited further following targeted research on the varieties grown in Maltese soil.

As described in Section 2.03.04 above, the potato sector is currently organised by the packing houses through seed importation, farmer training, certification, organisation of harvest season, grading and packaging as well as export. In the last decade, the Maltese product had to compete with North African potatoes that are allegedly placed on the market using the Maltese label.

Apart from lacking a clear strategy to improve the export market, this sector has consistently failed to explore and exploit economically-viable potato storage facilities for local consumption especially in the summer months to supply the local domestic and leisure markets with a versatile food product that is rich in carbohydrates and energy.

Potatoes are one of the products that are synonymous with Maltese agriculture. However, such reputation does not imply that the export sector is guaranteed or that there should not be any research and innovation carried out to secure the long-term sustainability of this sector. Thus, initiatives aimed at studying the particular characteristics of the Maltese potatoes, improving the growing techniques and producing a high quality export product, should be promoted. A recent initiative set up by the Qrendi Local Council together with potato producers and exporters includes an annual potato festival that promotes potato farming, machinery, culinary links with the product as well as the sale of potatoes. The consolidation of such efforts and further cooperation in this sector, as in any other agricultural sector, is prone to lead to better organisation, management, efficiency, product marketing and promotion.

3.04.01.6 Olive oil production

In recent decades, olive oil production in Malta increased both in terms of number of trees planted and the yield produced per tree. This sector was recently regulated through LN 66 of 2014 directed mainly at olive oil processors, aimed at controlling the modus operandi for olive oil production in Malta and its placement on the market. It involves licensing for the production of olive oil, a link with the register for olive growers, submission of olive oil production declarations, keeping of an olive oil record book, as well as the participation in olive certification schemes.

As pointed out in Section 2.03.05 above, a number of olive oil processors have still to regulate their position with LN 66 of 2014. The implementation of this Legal Notice is challenging as most olive production is undertaken by recreational farmers on very small parts of their land parcels and record keeping is challenging at this very small scale. There are various pests and pathogens (e.g. *pseudomonas*, *prays olea* and *Coleoptera and the threat of Xyella bacterium)* that are increasing and, since most olive growers are not professional farmers, they are not well versed with regards to protection, precautions and pest control.

The provisions in Legal Notice 66 of 2014 requiring olive growers to register their olive groves and submit olive oil production declarations together with provision for the licensing of olive oil processors and participation in olive certification schemes are practical tools aimed at safeguarding the local olive oil production and traceability. They also constitute obligatory criteria under Marketing Standards Regulations. Nevertheless, enforcement is required to monitor olive oil labelled as being Maltese olive oil. The olive registry and harvest declarations, currently being managed by the Directorate of Agriculture, should give an indication of the olive oil produced and sold as Maltese, and could be instrumental in flagging irregularities.

The olive registry is aimed at organising the production aspect of olives in the Maltese Islands and thus the authority can better manage this sector. The operators in the sector are not yet organised in a representative organisation that can guide them on production, training and best practise. Most olive oil producers press their product in one of the olive presses and produce olive oil for their own consumption. Others who invested in large olive groves retail the surplus olive oil on an ad hoc basis. Thus, notwithstanding its potential, this sector is still fragmented and producers act individually. An organisational setup that represents the interests of the olive oil producers in Malta would assist in the proliferation of best practice, address the erratic cultivation methods, and harmonising currently inconsistent processing protocols. It is also required to identify market strategies for this prestigious product at favourable prices and, most importantly, to analyse the sector potential so as to create a clear strategy for reaching production targets.

Investment in the olive oil sector was not lacking as in the last decade olive tree planting and olive oil production increased considerably. However, cooperation to overcome economies of scale is still lacking and this sector is still facing issues such as 1) organic olive producers do not have a certified facility where to press their olives separately so that they can certify their olive oil as an organic product all the way to the processing stage, and 2) waste streams from olive oil pressing such as olive pomace are still not being addressed due to the small production levels and lack of initiative.

Research on Maltese olive oil, such as on acidity and oleuropein levels, could provide farmers and land owners with various opportunities to expand this sector. Currently, research on oil properties such as the polyphenolic content, chlorophyll content and peroxide value are being carried out at the University of Malta. With further investment in the production, processing and research of Maltese varieties, the supply can be increased to match the demand and maximise on the commercial potential of this industry. Efforts to register indigenous Maltese varieties should carry on the momentum gathered so far and propagation of such varieties should increase and be promoted as an ideal permanent crop with farmers as well as land owners. The latter also contributes to increasing the tree cover with all the associated beneficial effects such as the creation of microclimates and carbon capture.

3.04.01.7 Fertiliser and pesticide application

Natural and mineral fertilisers have been intensively used in order to increase agricultural production and are considered a necessity for the local agronomic situation. Environmental awareness in relation to contamination of groundwater bodies has resulted in pressures to reduce the use of fertilisers. A study on the gross nitrogen balance (GNB) for Malta was published in the year 2008 by the National Statistics Office. NSO calculated the GNB for Malta based on a survey covering the period between September 2006 and August 2007. Information on fertiliser usage was collected from farmers and growers with holdings larger than 0.2ha who cultivated eleven (11) selected crops (forage, potatoes, onions, carrots, tomatoes, vegetable marrows, sugar melons and water melons, grapes, peaches and citrus crops), including greenhouse vegetables.

The gross nitrogen balance provides an indication of potential water pollution and identifies those agricultural areas and systems with very high nitrogen loadings. The indicator estimates the potential surplus of nitrogen on agricultural land by calculating the balance between nitrogen added to an agricultural system and nitrogen removed from the system per hectare of agricultural land. As the indicator integrates the most important agricultural parameters with regard to potential nitrogen surplus it is currently the best available measure for nutrient leaching risk. The NSO study calculated that the GNB for Malta was at 117kg/N per hectare or 1,234,752kg over a crop area of 10,562.5ha. This figure is two and a half times more than the average GNB for EU Member States, which was 47kg/N per hectare.

As part of the Water Framework Directive (WFD) implementation process, the MRA undertook a detailed monitoring programme of the quality of all groundwater bodies in the Maltese Islands in 2008. The main goal of this monitoring programme was to analyse the status of groundwater bodies in relation to the qualitative requirements of the WFD and thus identify those parameters for which more detailed monitoring is required. The results of this study confirmed that ten (10) groundwater bodies have high nitrate levels, in excess of the EU quality standard of 50mg/l and with three (3) of them exceeding the nitrate levels by more than six-times. Figure 7 in Section 2.2.04 above illustrates the nitrate levels (mg/l) in groundwater bodies.

Sustainable fertilizer use requires knowledge of quantities to be applied and on methods and frequency of application, as well as knowledge about soil diversity and structure. The risks of over application of such agricultural chemicals to the environment, human health and agriculture industry, are not appreciated by all producers. An effective regulatory framework has been set up together with extensive information sessions on the obligations of farmers with respect to the Nitrates Directive, yet the farming community requires additional assistance for the execution of the whole process, including soil sample collection and testing for the eventuality of a fertiliser plan. Many farmers are still unsure how the Nitrates legislation is to be employed for specific cropping systems, in particular protected crops.

An Integrated Pest Management (IPM) Strategy was formulated by MCCAA in 2015 and is regulated by Legal Notice 489 of 2011 (Sustainable Use of Pesticides Regulations). This strategy provides direction on the utilisation of available plant protection methods and the subsequent integration of appropriate measures that discourage the development of populations of harmful organisms.

The aim is to keep the use of plant protection products and other forms of intervention to levels that are economically and ecologically sustainable and reduce or minimise risks to human health and the environment.

The IPM strategy emphasises the growth of a healthy crop with the least possible disruption to agro-ecosystems. The General principles of IPM include the prevention or suppression of harmful organisms through practices such as 1) crop rotation; 2) use of adequate cultivation techniques (e.g. optimum sowing dates and plant densities, intercropping, conservation tillage, pruning and direct sowing); 3) use of resistant and tolerant cultivars as well as standard or certified seeds and planting material; 4) use of balanced fertilisation, liming and irrigation or drainage practices; 5) preventing the spreading of harmful organisms through precautions and hygiene measures; 6) protection and enhancement of important beneficial organisms such as by adequate plant protection measures or the utilisation of ecological infrastructures inside and outside production sites.

More collaboration between farmers is required so as to avoid manual work and increase production efficiency. Farmer organisations should ideally exploit this collaborative element between their members but most farmers persist on individualism. An alternative could include the hiring of agricultural service providers such as for fertiliser and pesticide management. This would increase uniformity in production by reducing inconsistencies and variability of inputs, apart from exposing the farmers to new concepts and diversification. Technical experts and agricultural advisors identified by the farmer organisations can assist both the service providers and farmers in producing a standardized crop in line with the production parameters.

Conversion from conventional to organic methods is most often deemed problematic especially since the local situation is not conducive to such practices. Inhibiting factors include land fragmentation, proximity to conventional farmers and main roads, windy conditions leading to pesticide drift, poor soil conditions and, more importantly in practical terms, the availability and affectivity of plant protection products allowed in organic farming. Certain land parcels that are not located in intensive agricultural areas can be utilised for these purposes if they are made available. An increase in environmental sustainable farming would also create a spill over effect on practices employed in conventional farming, especially since most farmers are facing difficulties in controlling certain pests and pathogens with chemical methods. A positive trend that has emerged and should be consolidated is the promotion of more targeted biological treatments and remedies. Nevertheless, farmers adopting such practices should ideally be provided with technical advice as well as professional follow up on their fields on a case by case basis. Functional extension services with dedicated expertise on this farming system would be an asset for the proliferation of organic practices.

3.04.01.8 Dairy

A situation analysis of the cattle sector, including the dairy sector, is provided in section 2.04.01 above. The dairy sector (excluding sheep and goats) is organised through a vertical structure where the milk producer cooperative has managed to shorten the supply chain and produce a range of dairy products through effective marketing exercises. In the last decade, dairy farmers have also invested significantly in structural and technological upgrades on their farms to improve production efficiency, production levels, product quality, welfare standards and environmental obligations.

Dairy producers are delivering a range of products to consumers that satisfy the Maltese market and successfully compete with imported products on an open market. Apart from fresh milk in various forms, this range includes various types of yogurts, cheese and fresh cream that are supplied exclusively from pasteurised fresh milk originating from Maltese dairy farms. Notwithstanding the success of this comprehensive range of products and effective marketing campaigns, there is still ample room for consolidation and expansion. The sector needs to establish whether it would be more beneficial to carve out an additional consistent market niche for fresh milk through products such as ice-creams, milk drinks, new ranges of yoghurts and cheese spreads, which are ideal for rapid turnover and returns, or, alternatively, invest in long-term products such as hard cheeses that would require consistent volumes of milk and would not be susceptible to volatile market trends since the products would keep for many years and gain in value the longer they are cured and aged.

Although the investments and achievements of the dairy sector are exemplary in terms of the Maltese agriculture sector, there is still ample room for development before dairy farmers could hold their ground and face future challenges. A case in point symptomatic of such challenges is the relocation process of dairy farms which are in the proximity of residential areas for which a plan had been drawn up to construct a cluster of dairy farms in a non-residential rural area. This project which included state of the art farm structures equipped with a communal manure digester was faced with harsh objection even if the area already had several dairy and poultry farms. As a matter of fact a Court ruling decided against the outline planning permit for this long awaited and much needed project. Since then, the original outline planning permit is no longer valid and the relocation project in itself was no longer feasible since a number of farms which were originally included in the relocation process either closed down or managed to find alternative sites where to relocate their farm. Government is still trying to assist the remaining few farms to find alternative sites where to relocate their farms.

Malta is a densely populated small island with urban spread encroaching on rural areas hosting livestock farms and agricultural activities. Without a comprehensive development plan that would organise livestock activities holistically in such a way that the genuine needs of all stakeholders are objectively addressed, the different and differing economic, cultural and leisure activities hosted in our countryside are definitely and inexorably set on a collision course. Livestock breeders should comprehend that by resisting all manner of change or adaptation to new realities could be counterproductive to their economic sustainability.

The natural response of livestock breeders towards encroaching development is that they have always been there and other activities have crept up on them. Most of them have so far resisted taking into account the demographic complexities deriving from the fact that, with an expanding population and expanding middle class, together with a much higher awareness of health and leisure needs, people in towns are increasingly heading for the countryside to relax and unwind from their weekly stressful jobs. The challenge that this raises for farmers is not limited to the sporadic letters of objection, letters to the newspapers or interventions on TV and Radio channels. Even more significant are the impressions that consumers accumulate whenever their interests and their sensitivities clash with the realities of farm buildings and livestock rearing sites in areas of great scenic beauty and which they would rather enjoy without. Such confrontations could very easily translate into a subconscious antipathy towards the fresh dairy products which had previously attracted their preference.

In this context it is important to underline the necessity of drafting policies that would actively and vigorously encourage farmers to explore all the measures that could help them continue to raise their cattle with the minimum amount of environmental impact and with an active environmental regeneration programme that would enamour them with regulators and public alike. Most dairy farmers were financially burdened by the high capital investment they had to entail due to restructuring necessities and modernisation of their production base. Some of them claim that investment projects supported by RDP funding mechanisms, that provide a 50% co-financing rate and are capped at €150,000, do not adequately address their needs to invest on their farm since the capping rate does not reflect the actual scale of investment required on a modern dairy farm. Maltese dairy farmers are currently bridging this deficit with their own family funds but this could render the family budget very tight and young farmers could perceive the future for dairy farms as being bleak and fraught with hardship.

3.04.01.9 Beef

Local beef production is considered to be a by-product of the dairy industry. Although the Holstein-Friesian cow is being bred by some livestock breeders as a dual-purpose cow being a good milker and is also utilised for beef production, it cannot compete in either quality of meat or in growth rate with renowned beef cattle such as the Angus, Hereford, Simmental or the Charolais. Beef producers in Ireland, Britain, France, Italy and other countries raise beef cattle mainly on pasture. Grass-fed beef is reputed to be healthier and to taste better than the grain-fed counterparts. It's also more economic because there are no feed bills to pay and no housing costs to take into account. But these options are not available in Malta. Therefore the increased production costs and competiveness issues in this sector when compared to non-local beef products need to be carefully considered.

The local beef sector can 1) either remain a marginal activity with minimal profits or else 2) invest in rearing systems based on prime beef cattle that are fed a mixture of grain and locally-produced silage in order to obtain tender but flavour-full beef cuts that could compete with other beef imported from traditional prime beef centres in other EU countries. This model has been proven to be feasible with large bulls that need to be kept restrained due to their large size and potentially aggressive behaviour. They are permanently housed and restrained with feed being provided in large mangers. The bulls can be raised to a very large size, obtaining the extra flavour of mature animals which, however, remain largely very tender because they have not been allowed to exercise. However, given the scarce possibility of growing sufficient hay crops to produce suitable silage all year round and on grounds of animal welfare, the investment in such a model is not viable locally.

There are a number of traditional Maltese recipes that are preferred with fresh beef cuts. Maltese consumers have developed, over the years, their own methods for cooking their beef which allows them to make tasty, succulent dishes out of beef cuts that are not tender enough to serve as steaks. Imported beef cuts are usually selected for serving as steaks whilst Maltese fresh beef still retains a certain appeal on the market for broth, stews and casseroles and certain customers still insist that the shank they want for their beef broth has to be Maltese beef. The latter reflects the economic viability for importers to utilise their valuable storage space for imported cuts of higher value. Should the quality of Maltese beef improve in tenderness and consistency, there is room for a higher share of the local market on the basis of it being fresh and locally produced.

Consumer perception and quantitative and qualitative assessment of production levels together with seasonal demand and supply all need to be properly researched before any reliable empirical conclusion could be reached about this sector. The dynamics of the local beef sector needs to be carefully researched with regard to the 1) cost-benefit assessment, 2) level of opportunistic operations, 3) real cost of imported fodder in comparison with locally-grown fodder, 4) comparative nutritional assessment and antibiotic use, 5) the gastronomic value of the different cuts of Maltese beef when compared with imported varieties, and 6) demand for fresh beef in contrast to frozen beef. This could indicate that the market could easily sustain a much greater production of local fresh beef if this were competitive in price and in quality.

Thus, it is imperative to research this issue properly and establish which constraints have so far tethered beef production to a status of by-product.

3.04.01.10 Swine

This sector is being severely affected by the price of imported feeds, water and electricity that limit any investment in value added production. Operators in this sector keep on blaming feed costs for lack of competitiveness. If feed costs more in Malta, heating bills are also hefty in other countries while Maltese breeders slightly heat the farrowing units and weaner pools because the weather is much milder. In fact, Maltese farms consume more energy to cool and ventilate buildings rather than to heat them. Growing local fodder can be costlier than importing it and the only way forward is to secure the market and this can only be achieved through collective commitment. Pig breeders deliver their pigs to the abattoir and their cooperative follows up with the meat processors through mutual agreements. It was only lately that cutting and deboning were introduced on the slaughter line to provide a marketable alternative to whole carcasses and to gain direct access to households.

Following the improved housing, nutrition and management regimes adopted by Maltese pig producers in 1980 in the aftermath of the outbreak of African swine fever of 1978, productive efficiency on Maltese Farms made a quantum leap forward and, by 1984 it started to emerge that the local pork market was heading for a surplus. Producers and processors held extensive talks which led to an agreement to regulate production through a quota system whilst the processors bound themselves to purchase all the carcasses slaughtered within this quota. The quota was an important instrument, which stabilized production and prevented the collapse of the whole pork production regime.

The Maltese market is too small to be able to withstand hefty market fluctuations. Many producers would not survive an extended market glut that would inevitably result from uncontrolled production. Nevertheless, the adopted quota had two flaws which would eventually lead to conflict. The first flaw was that the quota was based on the assumption that each sow would produce twelve (12) slaughter pigs per year. Therefore the quota was set up using the formula of 'number of licensed sows multiplied by twelve (12) per year' meaning that each producer was entitled to a monthly slaughtering quota equivalent to the number of licensed sows on his books. Most farmers could only limit themselves to these numbers by reducing the number of sows on the farm because each sow was producing more than twelve (12) slaughter pigs annually.

The other flaw was that, when the quota system was established, Maltese pork production was protected against imported pork through a levy system. Thus pork producers could exploit a pork price ex-abattoir that was unequalled anywhere in Europe. Producers continued to raise their pork whilst neglecting to introduce management models that would shrink costs and optimize production efficiency per pig space. Their lucrative returns from an advantageous price system compensated for their management deficiencies.

The consequence was that, upon Malta's entry in the EU, the levies disappeared and EU pork meat flowed into Malta at little more than half the cost of Maltese pork. Fresh pork sales plummeted and pork producers were in dismay and started blaming everyone for this debacle except themselves.

The quota system officially ceased to exist upon Malta's accession to the EU and Subsidiary Legislation 36.28 is currently being repealed. Nowadays, production rights are being utilised instead of a quota but this resulted in pig producers reducing their sow herd and keeping pigs on reduced rations so as not to grow too fast and not ending up having their pens full of pigs for which there is no market. This state of affairs threatens to destroy the positive reputation of Maltese pork because pigs reared in this way and kept beyond their optimal slaughter age yield tougher meat and possibly boar taint in the male cohort. The production rights system has also had another negative impact on pork producers who, in order to consolidate, ended up purchasing additional rights from producers who were retiring and had no one to inherit their operation. The price obtained for these production rights was often exorbitant and those producers who bought these rights are now left with little more than the option to slaughter a few more pigs per month.

Apart from a health mark for each pig and a label for the carcass issued by the slaughtering house, the pig cooperative embarked on the 'Majjal ta' Malta' brand label. Even if such a label boosts the domestic product on the market, it could easily be abused as it lacked a proper traceability system and therefore could be placed on any pork cut or positioned anywhere on the display. Moreover most pork cuts are sold skinless and therefore no identification or grade marks can be seen on the cuts. Meat outlets and caterers have pounced on the opportunity to purchase imported pork at much cheaper prices than the Maltese counterpart. On the other hand, pork producers and their cooperative have failed to invest in their own processing plant where pork meat could be cut up and packed in confections as desired by Maltese consumers. They thus remain dependent on processors and distributors who buy the minimum amount possible to justify their claim that they retail Maltese pork. This is definitely a missed opportunity because Maltese pork is preferred by Maltese and foreign consumers alike.

Each side of pork is easily traceable in Malta because all pork is slaughtered at two (2) Government controlled abattoirs and each carcass has a number corresponding with the farm of origin. Therefore carcass traceability is very simple. Traceability of fresh cuts, however, remains problematic since most cuts are trimmed of skin and fat. At that stage, any marks of identification disappear altogether and traceability documentation on any labels added to the package would depend on the processor's adherence to an audited production trail. This can only be guaranteed if the Pork Producers' Cooperative invests in its own processing plant and in its own retail outlets. Control mechanisms are easily applied in Malta with its small size. Thus, the conditions are there to maintain a very efficient and rigorous compliance regime. However, the real control and adherence to compliance parameters has to come from inside. There is the need to install an auto-regulating mechanism that ensures that all producers faithfully adhere to sanitary and animal welfare regime that would automatically qualify their product for a quality label. This initiative must come from the cooperative.

The profitability issue with the pig sector is that prior to EU membership, farmers were operating in a protected market and did not prepare for what was to come. When pork products started flooding in and the local pork market share fell drastically, the entire rationale of the sector's profitability disappeared. Moreover, the pork producers were now obliged to adhere to EU directives regarding housing, animal welfare, and waste management. Although some of the restructuring efforts were assisted through EU funding, most pig farmers have spent their capital on restructuring their farms to meet EU directives but in the meantime EU pork producers have stolen their market. Now they need to get that market back at all costs even if they have to, temporarily, reduce their profit margins.

The domestic and catering market, boosted by an expanded tourist influx, offer a very attractive market potential for the Maltese pork industry. This however calls for sectoral restructuring that should include education, marketing and communication with consumers. Composting of manure is seen as problematic in Malta due to contents such as copper and zinc. Slurry can be collected and delivered in composting plants for biogas energy production together with by-products in landscaping and agriculture. The produced gas could also be utilised as a fuel for agricultural machinery (more efficient) and for heating purposes. Another possible opportunity is to identify strategic partners on at least two fronts: 1) to examine and explore the possibility of using Malta as a base for production of breeding stock by established breed companies to exploit the relative isolation status of Malta as an island that is distant from all the major pig producing areas, and 2) to explore the possibilities of introducing new strains of pigs that are suitable for pork production destined for curing into high value added delicatessen products.

3.04.01.11 Broilers

An update of the poultry sector including broilers is provided in Section 2.04.03 above. Broiler slaughterhouse keepers have contracts with the producers and act as de facto wholesalers. It is they who supply the market with locally produced broilers and broiler cuts. Thus they control the sector by maintaining exclusive access to the market determining crop timing and the supply of chicks to the individual broiler operation depending on their market exigencies. Notwithstanding that the slaughterhouse instructs the broiler keeper when to order the new chicks, it at times refuses a batch of fully-grown broilers at the expense of the producer who loses profitability through added inputs related to keeping the birds longer on the farm. Moreover, the slaughtering plants in Malta market the product with their label rather than the producers through an organisation. The Maltese product is perceived as being fresher than imported meat but the product origin remains unclear when it is retailed in the form of fresh cuts. Packed whole chickens are labelled with the Malta Poultry Slaughtering Plant (MPSP) that refers to a Maltese origin, although not exactly identifying that the chicken was bred in Malta.

Poultry sanitary, housing and welfare parameters have largely been transposed from EU Directives. Indeed many broiler farmers are conscious that environmental conditions change constantly inside the poultry house due to fluctuations in climatic temperature, humidity, direction and strength of wind currents. Therefore, they are always careful to adjust housing features that could mitigate these climate changes and apply measures to render the climate in the broiler house more comfortable. They have become aware, with experience, that any dramatic deterioration in the broiler house climate could spell disaster. This is another reason why they become very upset when the slaughterhouse delays processing their broilers, by say, a week. Not only would this incur extra costs but the broilers grow at a faster rate at this stage and the housing space may not be adequate, especially during summer.

There various opportunities for diversification in every sector including for poultry meat production. In Malta, remoteness is never an issue since no village is of any considerable distance from even the furthest one. There could be experiments with many breeds of poultry, including the Black Maltese, and if necessary devise new ways of serving them so that the meat has a taste of its own while remaining sufficiently tender to be enjoyed fully. But this drive towards diversification was so far very limited. Broiler chicks are available on order and so producers do not feel that they need to experiment with any other breeds or species. They cash in the modest margin each batch yields to them and move on to face another day. However, Malta presents a mild climate that permits the breeding of just about every conceivable fowl. Moreover, there is a gastronomic culture that is conducive to new adventures in culinary discoveries. A lot of old world recipes were specifically devised to be able to draw out the natural flavours of the meat by cooking it slowly and thus also rendering it tender.

The main issue being faced by broiler producers is turnover and the dependence on slaughterhouses to market their broilers is pushing them towards applying for their own slaughterhouse and/or cutting plants adjacent to their broiler operations. They are confident that they would be able to sell their broilers directly to consumers, restaurants and butcher shops. Broiler farmers need to invest more effort in organising their operations in order to diversify as much as possible, even by branching out into duck or goose farming or into quail farming or pheasants, guinea fowl, pigeons, and others. The agriculture policy has to be directed at facilitating their initiatives and providing effective training opportunities and assistance with identifying EU and other funding and applying effectively for such funds. Acknowledging the hesitance that farmers experience about cooperation and joining forces, the authorities could also help out initially by providing meeting-equipped places and perhaps appointing a reporter who could also supervise meetings and help bring about agreement.

Opportunities for this sector lie in research, or the application of existing research, on feed conversion ratios and efficient rearing methods and poultry varieties. Producers need to compete by placing more focus on cooperation, education and efficiency. On farm costs can be reduced by becoming more self sufficient in resources such as re-using farm waste to generate energy and heating as well as generating a by-product from the waste. Barn structures can be used to install PV panels and reduce the electricity bill. Market opportunities are also available since hotels and the catering industry consume large amounts of chickens but they have no time to negotiate with individual producers.

The only way this could be achieved is through a producer organisation or a cooperative which slaughters and packages all the poultry of its members. Ideally, these members would not all produce broilers but would also offer a variety of poultry ranging from quail to geese.

3.04.01.12 Egg production

As indicated in Section 2.04.03 above, the majority of laying hens bred in Malta (86.98%) in 2013 were found on farms rearing 10,000 laying hens or more. There were 61.68% of layers kept on farms housing more than 10,000 laying hens in 2005, indicating that there was a drive for consolidation over the years, especially following the Laying Hens (protection) Regulation (S.L. 439.07) that requested upgrades on enriched hen cages and housing requirements by end 2011. Notwithstanding the substantial investments that have been made on Maltese layer farms, this sector is still vulnerable to foreign competition since producers compete with each other rather than with foreign producers. Provisions need to be made to improve the enforcement system to ensure that existing egg marketing regulations are effectively enforced to avoid having imported eggs labelled and printed as local.

Egg production in Malta is currently delivered through a small number of layer farms that have invested in packing houses and on some farms also with self-marketing systems. Thus, food presentation, labelling and traceability within the layer sector have reached the required standards, even if some producers argue that there should be more market enforcement on traceability. The free movement of goods across all EU frontiers necessarily creates problems with regard to traceability of origin, especially when dealing with fresh produce.

In Malta, eggs are imported in large quantities because large companies can produce eggs cheaply exploiting considerable economies of scale with large factory farms using fully automated systems for feeding, lighting, egg collection and even manure disposal. Local egg producers have switched to enriched housing systems at considerable cost and their comparatively small operations do not lend themselves to investment in fully automated systems. Hence they are at a disadvantage when their products try to compete against the imported substitutes.

This sector is adequately controlled but more enforcement is needed on the market to secure that the amount of eggs produced from a farm reflects the amount of hens kept on that farm. The amount of Maltese farms is small, so enforcement should not be complicated. This could entail comparing amount of egg production declared with amount of eggs invoiced to retailers, catering establishments and confectioners. The rigorous regulation of this sector is considered to be a priority not only from an animal welfare perspective but also to ensure that both Maltese consumers and bona fide Maltese egg producers are adequately protected. Moreover, egg producers should be incentivised to organise their sector in one national egg board which could ultimately play an important monitoring role in best practise sharing and assisting authorities in the control of unfair competition.

The demand for eggs from the local market coupled with the tourist industry is large since this product is a staple. However, lower priced imported eggs or processed eggs are used in various catering establishments in the quest to reduce input costs. Unity and organisation go hand in hand if there is any chance of achieving long term planning and direction. Therefore, if egg producers unite and organise themselves, they would be more empowered to fight abuses and unfair competition.
Moreover they would be in a stronger position to ensure that Maltese consumers are served with healthy, fresh, 'zero-kilometre' eggs, which would further enhance consumers' confidence in the Maltese product.

Notwithstanding the fact that Maltese layer farms have invested considerably to improve their production methods, there was little effort to invest jointly to overcome the economies of scale. Such investments can include biogas plants between farm clusters (not just layer farms) and the utilisation of end products such as energy and heating. Joint research or applying existing research, on feed to egg ratios, efficient rearing methods and poultry breeds can also be facilitated through cooperation.

3.04.01.13 Sheep and goats

As indicated in the sector overview in Section 2.04.04 and Section 2.04.05 above, the sheep and goat sector is fragmented in small herds and there is a general lack of investment on farms. Moreover, the sheep and goat population is decreasing and there is an ageing sheep producer population that is not being replaced by young livestock breeders. Planning permits and structural upgrades are a challenge for most farms since the profit margin from cheeselet production does not justify large capital investments. The cheeselet or *Ġbejna*, which is the main product, is nonetheless well-sought after and is considered a traditional delicacy. A farmer representative association is working on organising the sector to abide by the upcoming Ġbejna legal notice that will complement the PDO protocol.

The Ġbejna is a staple food product that is considered as the typical cheese produced in the Maltese Islands. The peculiarities of this food product have been studied and evaluated through an EU funded project that served as the basis for the development of the production protocol in line with the PDO application. Various aspects were considered through the T-Cheesimal project including feed composition, animal housing, hygienic practices, chemical composition in cheese, technological implements used, traditional knowledge and the socio-cultural aspect, presentation of the Maltese Ġbejna on the market and best practice along the value chain. The demand for ġbejniet is consistent and increasing as they are being included in many restaurants specialising in Maltese dishes. Thus, the studies carried out so far should be pursued to valorise this traditional product.

Cheeslets produced from cow-milk are produced by dairy processors, providing a product that is ever-present on the market and with a longer shelf life. This particular product is utilised in appetisers and Maltese platters, where it is sliced in small pieces to compliment *galletti* and *bigilla*. Nonetheless, many argue that Ġbejniet are traditionally produced from sheep milk rather than from cow milk and they should be preserved, without hindering the sales of cow-milk cheeselets. With the introduction of the Ġbejna PDO protocol, the traditional production method will be protected and thus any other forms of cheeselets, including those made from cow milk, will have to change the product name on the label. On the other hand, it is also argued that the Maltese word 'Ġbejna' simply means "small cheese" or "cheeselet". Traditionally, it referred to sheep cheeselets for the simple reason that no dairy cows were kept for milk production on the islands and the only cattle present were of a breed suitable for heavy work like ploughing and pulling heavy loads. In fact the word 'Ġbejna' was used for sheep cheeselets and if milk cows had been part of the dairy herd when the word was first coined, it would have equally been applied to cheeselets made from cow's milk as well. Drinking milk was procured from goats when cows were not present on the Maltese Islands.

Whatever the outcome of the controversy over the term 'Ġbejna' and whether or not this could be applied to all cheeselets produced in Malta and Gozo, irrespective of the animal source of the milk, the sheep 'Ġbejna' will always be very clearly distinguishable from other cheeselets because of the taste. Having a higher fat content, the sheep cheeselet is highly creamier and is characterised by its intense taste when compared to the goat cheeselet that has lower fat content, with the latter being milder and much more digestible. In this respect, as long as the 'Ġbejna' is properly labelled, and the animal source is clearly indicated, there should be no competitive disadvantage even if the nomenclature 'Ġbejna' is applied to one type of cheeselets.

Fresh, white, basil, herbs, and peppered Ġbejniet are found in most supermarkets packed in single use plastic containers or are bought directly from producers. Apart from being consumed fresh to accompany the staple Maltese bread or *ftira*, Ġbejniet are also integrated in renowned Maltese recipes such as in *soppa tal-armla*, a traditional minestrone soup, as well as used as filling for ravioli and pies. Upmarket restaurants are also adding the Ġbejna to their menus under various forms but mostly adhering to old rural recipes. However, being a fragmented sector, there is confusion regarding production methodologies. In fact, different producers have different recipes for the production of Ġbejniet since they utilise different quantities of salt, use different sources of rennet, apply diverse maturation time and drying methods as well as use varying amounts of pepper and vinegar and oil. The result is that the moisture content, the fat content, the flavour and texture of Ġbejniet can vary significantly between different producers. These variables have to be resolved in the production protocol linked with the Ġbejna PDO.

As with other livestock sectors, fodder is a major issue for the production of sheep and goats in Malta since most of the feed is imported. The latter raises issues concerning national food security and the territorial link of a Maltese product along the production chain. Innovative ideas to increase the local fodder in the sheep and goat diet are being identified by the farmer representative association to complement the requirements of the upcoming Ġbejna PDO protocol.

3.04.01.14 Rabbits

Maltese rabbit breeders have a competitive disadvantage as they have to use imported feeds with very high importation costs. The price of imported rabbit meat cannot be matched by local farms with the current production costs. Nevertheless, there are some rabbit breeders who have invested in commercial farms with over three hundred (300) breeding does and equipped these units with modern rabbit housing to abide by hygiene regulations as well as with animal welfare standards.

A positive traceability effort to distinguish Maltese meat from imported rabbit meat was the introduction of tags supplied by the Veterinary Services through a pilot project. It is in the interest of the producers to source funding for such initiatives to safeguard their sector. Many retailers and catering establishments are not interested in the origin of the rabbit meat they sell or serve to their clients. They see a chance for an extra profit and they take advantage of the opportunity. This is threatening the future of rabbit breeders on two counts: 1) they have lost a considerable part of their traditional market and 2) people who used to be avid consumers of rabbit meat are switching to other meats. These retailers and caterers do not label their rabbit meat as imported but, on the contrary, when challenged, insist that they only serve Maltese rabbits. This could ultimately persuade some people to go off rabbit meat altogether.

There are various strengths for this sector since the Maltese bred rabbit has a particular flavour and consistency which lend them to the traditional method of frying and casseroling. These recipes enjoy a high level of popularity in Malta amongst locals and visitors alike and for most Maltese people, rabbit is considered as the national dish. When friends agree to go out for an informal get together, the automatic choice is to go for a 'fenkata' and there are many restaurants that specialise in this dish. Moreover, rabbit meat is an optimal white meat with the only fat that can be found in the carcass being around the kidneys and the other offals like the liver. Therefore there is great potential for promoting it as a healthy meat for people who feel they have to avoid fatty foods. Although the traditional way to cook rabbit is by frying, there are many other methods of cooking rabbit that avoid frying and nevertheless obtain a very tasty, flavoursome rabbit meat.

The traceability issue and clamping on fraudulent sale of imported rabbit passing as Maltese rabbit would help to increase the market share of locally produced rabbit meat and would also ensure that when a diner orders rabbit, s/he gets Maltese rabbit with all its distinctive flavour. This would sustain the high reputation that Maltese rabbit has always enjoyed both in households and in restaurants. Although traditional forms of cooking rabbit are still very popular, there are many other opportunities for diversifying the product both with regards to ways of cutting or processing the meat as well as different ways of cooking it such as in the form of burgers, deboned and filleted.

New research, together with, the application of existing research on feed conversion ratios and efficient breeding methods and rabbit breeds should be incentivised. Market research on local and imported rabbit consumption especially in the catering industry can provide data to facilitate decision making in relation to ensuring traceability of local rabbit and follow up with a marketing campaign on benefits of consuming local rabbit.

Investment in tagging, grading and traceability on rabbit meat is also required to safeguard this product as well as the Maltese recipes through a quality label such as a Traditional Speciality Guaranteed (TSG).

3.04.01.15 Honey production

As pointed out in Section 2.04.07 above, beekeeping in the Maltese Islands is mainly practised by recreational farmers with the majority of the bee keepers having a small number of colonies as a hobby. Due to the small and fragmented nature of land parcels in the Maltese Islands, beekeepers face difficulties with regards to space for bee keeping as well as risks posed by pesticide application by third parties. Malta is well known for the quality of the honey produced in the Maltese Islands and there is a traditional link with honey production that goes back millennia. Nevertheless, the demand for honey, especially following dry winter seasons, outstrips the supply. Currently, most bee keepers are concentrating on augmenting their honey output because there is a ready market for all the honey they manage to produce.

Various studies are being carried out at the University of Malta on the characteristics of Maltese honey and the honey bee *Apis mellifera rutnerii*. Apart from the production of honey, bees produce wax and propolis, whose potential as niche products have not yet been sufficiently exploited. Beekeeping is also important for pollination, since bees collect nectar from wild plants, trees, flowering agricultural crops making them essential pollinators, especially for fruiting trees.

Maltese beekeepers produce three (3) types of honey that vary according to seasons. There is the spring multiflora honey that is produced form the nectar of various flowers and produces a golden yellow colour; the wild thyme honey produced in July and August that is particularly aromatic and amber coloured; and the intensely flavoured autumn honey that is produced mostly from carob and eucalyptus plants which produces a dark amber to dark brown colour.

Since the most popular and most renowned honey is that produced by bees foraging on wild thyme which grows in garigue habitats, government agencies should actively examine the possibility of launching a project for the mass propagation of wild thyme plants to be planted in disturbed and unused agricultural sites, disturbed garigue areas, nature reserves and any extensive areas which have been left bare due to soil erosion or human intervention. Such a project should also identify those plants, bushes, herbs and even trees which support bee foraging throughout the year to ensure that local bees will always find suitable foraging material within reach. This will not only provide for more viable bee colonies which will earn a good return for their keepers but will also ensure that the bee population in Malta and Gozo remains large and healthy enough to provide adequate pollination for all the crops and fruit trees that depend on bees for their pollination.

Extensive foraging spaces would encourage the expansion of this activity and bee keepers could then diversify their bee products, placing on the market not only a greater amount of honey derived from nectar of different types of flora but also different products that have beneficial medicinal and recuperative qualities such as propolis, wax for skin creams, royal jelly and more.

Apprenticeship in Apiculture should also be offered to young graduates to facilitate their integration in the research sector and develop queen bees for local use. Such a population of Maltese bees should target to cover the whole of the Maltese Islands and new comers in the sector (even recreational farmers) should be provided training and financial aid to invest in this niche sector.

3.04.01.16 Key marketing perspective

An in-depth analysis of the current situation with regards to the common knowledge and perception of agricultural products is required so that targeted marketing and promotion can be developed. Most stakeholders that were involved in the national conference argued that there is a lack of food pride amongst Maltese, and there is still a lot of ground to cover in order to facilitate consumer choices. Apart from educating consumers on the various benefits of consuming fresh agricultural produce, there are various aspects which direct them to opt for alternative foods such as cheaper pricing, shopping convenience, standardized products, better presentation and packaging, as well as comprehensive information on labels. Local fresh food is in most cases not attractive and conveniently presented to meet today's busy lifestyle.

Bulky vegetables, large fruits that do not fit in a refrigerator, lack of packaging options, lack of traceability and branding are some of the factors that keep on widening the gap between the producer and the consumer.

Private initiatives to provide fresh food that is packaged and processed in a way that is attractive (e.g. packaged fresh mixed fruit or vegetable salads) have so far been limited in variety and distribution. Collation of the research carried out so far on Maltese products and the identification of neglected research areas is urgently required to create a register of Maltese varieties and their characteristics. Such an exercise can bear fruit when supported by media and branding exercises including television programmes and popular concepts such as 'eat parade', 'slow food' and 'zero kilometres' that are known to influence consumers' choices and preferences.

Education from the sector itself and the involvement of media even in cooking session on television creates a better appreciation of the farming trade. Moreover, since the environment is high on the media's agenda, merging it with agriculture and incorporating the production and preparation of food would obtain much more powerful impact.

Various Maltese quality products that have a potential for commercialisation were discussed in previous sections. It is imperative to secure standardization in presentation through grading, traceability and on-the-market controls that can secure a strong link with customers. From a rural planning perspective, proposals for the construction of a multitude of buildings for on-farm grading stations and packaging, particularly on small land holdings or farms, would contribute to the further intensification of buildings in the countryside. Cumulative impacts on undeveloped rural land, the rural character, openness of rural areas and the landscape could be of major concern. Thus, small-scale on-farm facilities in a rural context should be linked with a considerable amount of produce that makes the development justifiable such as for a cluster of farmers or an extended family farm unit. In other cases, centralised or regional stations should be encouraged.

Promotion of local products through festivals, albeit localised and not frequent, has helped with the valorisation of certain products such as strawberries, olive oil, milk, pork, wine and others. These initiatives have to be undertaken through better organised and intensive promotional campaigns to obtain far reaching benefits for the producer and the consumer. A holistic marketing strategy including a campaign on the benefits of eating local should be aimed at improving the competitive element vis-à-vis imported products and attract more consumers through sound traceability. Such initiatives promoting local food provide a win-win situation for all stakeholders involved. When the private sector or local councils embark on promotional activities, authorities should assist in order to promote healthy eating, zero kilometre concept, climate change adaptation and mitigation as well as other relevant matters that would in turn lead to reduce expenses in health services, help sustain local producers, improve the sustainability of the rural environment, and expand the national economy.

Certain local products provide a marketing advantage linked with a unique geography, climate, history and traditions that could be better exploited. Niche products can be developed based on target-oriented market research to meet the need of consumers and tourists. Collaboration and cooperation are the starting point to succeed in any form of investment to produce niche products

or to improve the economy of scale. This should comprise a clear direction and a professional management set up that make use of business and marketing planning tools prior to delving into new niche sectors. In order to fully benefit from the tourism sector, stakeholders involved in local food production have to team up and promote the beneficial aspects of buying fresh agricultural products. The lack of food pride amongst Maltese and general knowledge on agriculture should be tackled through targeted education and clear communication campaigns that have to be based on market research and clear long-term planning.

3.04.02 Consolidation of land holdings

The second strategic policy objective that was identified for the development of the National Agricultural Policy involves the 'consolidation of land holdings'. Following a consultation process with various stakeholders, a set of themes relevant to this policy objective was drawn up for the development of an Issues Paper. The latter was evaluated during the national conference, in the course of which, the working group in charge of this policy objective carried out a SWOT analysis and proposed recommendations to be included in the upcoming policy measures. Eight (8) policy issues were identified for this strategic policy objective and they were grouped under two (2) categories including issues related with 'crop production' and those with 'livestock breeding'. As indicated in Table 60 below, each area is being given a reference number that reflects the order that is followed in this chapter.

Policy Objective 2	Sector	Reference	Policy issue
Consolidation of land holdings	Crop production	3.04.02.1	Agricultural leases
		3.04.02.2	Farmer benchmarking
		3.04.02.3	Agricultural Land Scheme
		3.04.02.4	Land degradation
		3.04.02.5	Fodder crop production
	Livestock breeding	3.04.02.6	Farms on government land
		3.04.02.7	Livestock breeder benchmarking
		3.04.02.8	Fodder crop demand

Table 60: Policy issues identified for Policy Objective 2 with reference number

This strategic policy objective includes five (5) policy issues that are relevant to the crop production sector and three (3) policy issues pertinent to the livestock breeding sector. However, all the policy issues are interlinked since consolidation of land holdings helps strengthen the competitiveness of Maltese agriculture, from which all the sectors can benefit. More information on these sectors has been presented in Chapter 2 above providing a general overview of agriculture in the Maltese Islands as well as a sector-specific situation analysis.

The appraisal of the eight (8) themes identified for this strategic policy objective was carried out in line with the existing agricultural leases and land inheritance regulations and strategies that are in place. Focus is particularly being placed on Government-owned land or farms that are leased to farmers and livestock breeders since these are a priority for intervention considering that they are not privately owned and constitute a common resource for the Maltese population in terms of food security.

Figure 11 below provides a summary of the SWOT items that were identified for the second strategic policy objective 'consolidation of land holdings'. This is followed by a concise analysis of each theme that was identified for this policy objective in line with these SWOT items, and in the format presented in Table 60 above.

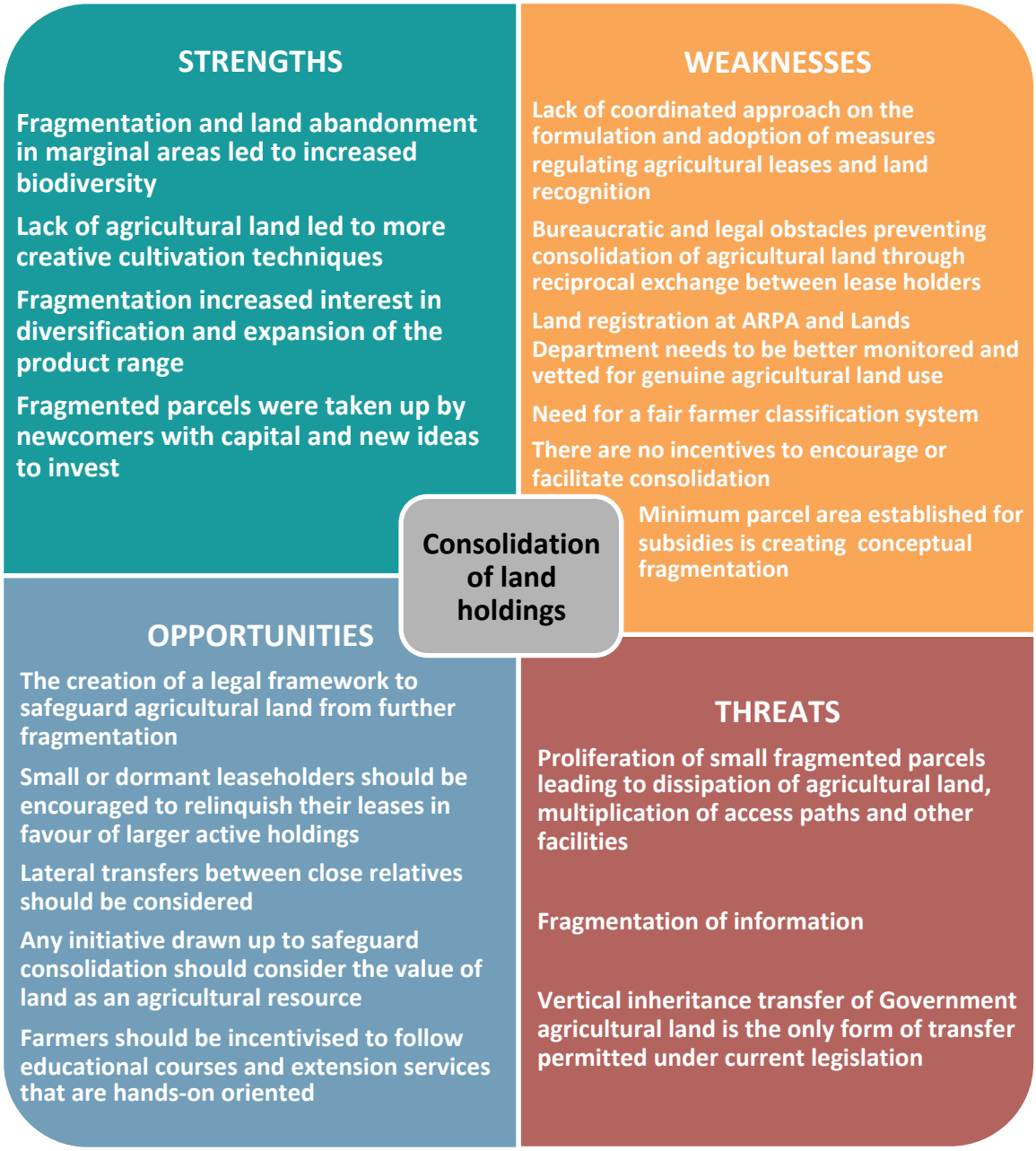


Figure 11: SWOT analysis for Strategic Objective 2 – Consolidation of land holdings

3.04.02.1 Agricultural leases

Farmland in the Maltese Islands is predominantly Government-owned and is leased to farmers through agricultural leases (*qbiela*) that are renewed every year. Such leases were determined many years ago based on the cultivation of land at a rent of a few cents per tumulo.

The legislation governing these leases is based on Chapter 199 (The Agricultural Leases (Reletting) Act) of 1967, with subsequent amendments. There are four (4) ownership categories of farmland that include civil government ownership, church-owned land, private ownership and freehold farmer-owned land.

The present inheritance law on agricultural land encourages further fragmentation of land through dvision between siblings, even when these may not be inclined to pursue farming. Land inheritance through *qbiela* passes through a vertical structure (parents to siblings) and not horizontally between siblings. This implies that if one of the children chooses to transfer his/her share of the farmland to a sibling, this could only be done by first relinquishing that share back to the parent (upward vertical transfer) and then the parent would be able to transfer that share to the indicated sibling (downward vertical transfer). Thus, farmers who do not have offspring cannot transfer the title of their land to other farmers. The actual physical size of parcels is just one aspect of land fragmentation and most farmers have become accustomed to tilling a number of separate small fields located in the same area even if this reduces their effectiveness. Recommendations issued in the national conference include the revision of the land inheritance system in order to prevent subdivision of land holdings beyond a certain size and prevent further fragmentation of land holdings. The dissipation of agricultural land further increases the multiplication of access paths and other facilities in the countryside and thus consolidation counteracts landscape degradation.

In 2012, an amendment to the legislation was approved to introduce a measure of flexibility in Government land transfer procedures. With this amendment, Chapter 268 (Article 3, Section 6 (d), Disposal of Government Land Act) was adjusted to consider horizontal land transfer only in cases where the recipient is a full-time farmer with a minimum annual turnover of €20,000 supported by proof of sale and from the declarations made in VAT returns. Another change to land transfer regulations was introduced through Legal Notice 159 of 2017, referred to as the Agricultural Land Regulations, 2017. The latter permits land transfers of agricultural land to *bona fide* farmers subject to the approval of the Board of Governors of the Lands Authority. This legal notice also caters for agricultural students by providing land on lease at a favourable rate for the first five (5) years. Moreover, the Lands Authority can issue agricultural land through a tendering process. However, this process has often failed to distinguish between the different uses of agricultural land.

One positive impact attributable to land fragmentation and farmland abandonment in marginal areas is the increased biodiversity. With a reduction in the farming population over the years, marginal areas such as sloping land, inaccessible farmland or fields with degraded soils were abandoned since farmers tend to till the most favourable parcels to become as efficient as possible. In most cases, these marginal areas that were left untilled were colonised by a succession of flora and fauna, thus regenerating the habitat for biodiversity. This scenario could present a potential opportunity for eco tourism and organic farming practices since ecology is an essential element in these economic models.

Another strength related to the various restrictions faced by farmers who work small fragmented agricultural land included the adaptation of situation-specific agronomic measures. Maltese farmers adopted micro-cultivation techniques and practices that cater for the geographical conditions and market situation in Malta.

Nevertheless this scenario was sustainable as long as the market was protected by import levies and the products on the local market were mostly sourced from local farmers without facing direct competition from imports. This closed market scenario is no longer realistic and the response to competition on an open market should be focused on farmers becoming more effective and trying to compete in quality and not in quantity. Thus consolidation of farmland coupled with crop rotation practices for those farmers who will still be active in the coming decade, is considered a must.

A weakness identified by stakeholders is the lack of mechanisms through which consolidation of agricultural land can take place through reciprocal exchange between lease holders. Consolidation of farmland should prioritise active farmers, farm-entrepreneurs and young agribusiness graduates who have a clear business direction in the sector even if the total number of farmers declines. As pointed out above, the needs of agricultural students was partly addressed through the introduction of Legal Notice 159 of 2017. The purchasing of farmland is expensive and these key stakeholders should be backed by financial assistance in the form of start-ups and favourable loans so that they can secure a dynamic future for agriculture in Malta. Land consolidation is thus an essential element to provide the means for motivated young farmers and entrepreneurs so that they secure a healthy farming future in the Maltese Islands. Ideally such legal means provide for land transfer opportunities where there is consensus between the lease holders and the farmer.

The current trend indicating a decline in the number of farmers should not necessarily result in the increase of abandoned agricultural land. If a system which favours the transfer of land holdings and deters those who misuse agricultural land is articulated, potential productive farmers would benefit. Land consolidation is not merely an issue related with the agri-business sector but also concerns safeguarding the countryside through sustainable economic activities since land degradation and the rural skill drain are not easily reversible. On the other hand, other recreational activities providing higher opportunity costs are rapidly taking over farmland and reversing their impact would not necessarily be a straightforward task.

During the national conference, various arguments emerged on the need to create a legal framework to restrain further (Government-owned) land fragmentation, including the facilitation of lateral transfers between close relatives. Active farmers are requesting a one-time scheme for the transfer or recognition of agricultural land for active farmers who generate a specific turnover from agricultural activity (e.g. fresh fruit and vegetables, crops for processing such as grapes, olives and tomatoes, potatoes for export, etc). They argue that there should already be an agreement between both parties and the recipient farmer identifies the land that is required for consolidation of his/her holding. Another suggestion included the encouragement of small leaseholders or dormant leaseholders to surrender their leases through a set of incentives in favour of larger, agriculturally active adjacent holdings. In practise the latter could turn out to be very difficult to carry out since persuading leaseholders to give up their lease would get into complicated and lengthy legal procedures.

3.04.02.2 Farmer benchmarking

As pointed out in Section 3.02.09 above, a horizontal goal within the agriculture policy is to target the active farming community within all the suggested policy measures in order to sustain the livelihood of genuine farmers and livestock breeders and to safeguard a future in the sector for their offspring. As a matter of fact, the amount of registered full-time and part-time farmers in Malta is very high and there is no means to classify the active farmer segment that is producing food for the population.

This lack of farmer benchmarking is conducive to abuse, where non-active recreational farmers benefit from the status of being a farmer at the expense of genuine diversification and innovation efforts. Thus, any scheme, strategy and policy instrument that is proposed, risks being abused. There is currently an identification system, based on a full-time or part-time status, where anyone can register at JobsPlus. At this point registration can occur even on a back-dated basis and a self declaration by the applicant of having been farming for a number of years is the minimum requirement. This full-time or part-time status is most often sought for tax purposes, planning applications, EU funding schemes and more.

The agricultural policy aims at establishing a farmer classification system based on verifiable criteria to be linked with a range of policy measures. By doing so, the policy would be safeguarding the rights and dignity of the remaining active farmers as well as the right of the tax payer to consume safe local food as well as enjoy a well-maintained rural landscape. Maltese farmers are competing against imported products that are better presented, labelled and traceable. Thus, the limited financial and land resources at hand should be utilised wisely to target the active farming population that is willing to invest and improve the sector. This demands the creation of a fair farmer benchmarking system where every stakeholder can benefit from the respective farmer classification standards.

Farmers have been criticising the current farmer registration system at JobsPlus for many years since it is prone to abuse from recreational farmers who can benefit from any schemes by competing with active farmers, ending up diluting the benefits intended for productive farming or complicating the process for genuine farmers. Some farmers who participated in the national conference event argued for the establishment of a minimum land holding as benchmark criteria to distinguish between a full time and part time farmer status. However, counter arguments indicated that a small but dynamic holding could exploit various operational technologies to generate efficient levels of production to provide a comfortable livelihood. Moreover, others argued that the improved and meaningful access to education and research could prove to be an effective antidote to the drawbacks of smallholdings. Thus, one cannot base a farmer benchmarking system on mere land holding size.

For the next decade, the agricultural policy is intending to halt land fragmentation and strike a balance between sustaining an active farmer population and embracing new farm entrepreneurs. A fair and effective farmer benchmarking system should be capable of identifying levels of farming activities that distinguish between active farmers, recreational farmers and new-comers in the sector.

Such a system should be capable of recognizing the economic activity and contribution of the farmer within the sector. Thus, the variables to be considered should ideally include the declared profit from agricultural sales in the Tax Return form and the system should not discriminate between full and part time as long as the farmland is kept in production.

Such a system can lead to a hierarchical structure that indicates the farming level of each category based on the declared turnover at the official markets or retail points and on the RA1 declaration form. When such a benchmarking system is linked with tangible aspects such as planning permits, subsidy schemes and land transfer schemes, farmers will be incentivised to increase their turnover. If an average turnover of the previous three (3) years is taken into consideration, this could help since the sector is influenced by various factors that can disrupt the turnover pattern such as severe weather conditions and the farmer's health. Young farmers and new comers could be incentivised to enter the system through a concession that gives them a period of setting up to reach the desired turnover. A point system can also be introduced in particular policy measures (e.g. for land transfer schemes, planning permits and subsidy schemes) that apart from assigning points according to the active farmer class, other points are included to target specific situations. Criteria such as farm holding size, holding fragmentation, accessibility issues, educational level, research orientation, farming intensity and innovation can all be utilised to identify eligible farmers for a particular scheme.

A farmer-benchmarking scheme can be linked with functional incentives including land transfer schemes and reform in the inheritance legislation to overcome such sectoral uncertainties. There is already a worrying trend showing a decline in the amount of farmers and an increase of abandoned agricultural land. These two aspects shouldn’t necessarily be connected as a smaller number of farmers can still sustain agricultural activity in the coming decade. Nevertheless this has to be backed by incentives which 1) favour the transfer of land holdings, 2) deter those who misuse agricultural land, and 3) assist potential productive farmers and farm entrepreneurs. Reversing the current land abandonment trends and the rural skill drain should lead to economic benefits in rural areas as well as social and environmental benefits by safeguarding the countryside and promoting sustainable rural activities.

3.04.02.3 Agricultural Land Scheme (2001)

The Agricultural Land Scheme (2001) was launched by the Government Property Division in 2001 to allow cultivators of Government-owned agricultural land to apply for a new lease reserving various benefits to the lease holder. These benefits included the right of first refusal if Government decides to sell the land within a period of fifteen (15) years and the inclusion of the tenants' name in the Property Title Certificate as appearing at the Land Registry. This was a one-time scheme and it provided a stronger commercial base in that the annual rent was increased at least tenfold where the lease for each tumulo of agricultural land was set at Lm4 (four Maltese Liri).

Notwithstanding that the Agricultural Land Scheme was a one-time initiative; a number of applications are still being processed sixteen (16) years after they were submitted. This delay reflects the large number of applications that were submitted, the laborious nature of such work and the limited resources available to process these applications. Each application requires research on the land parcel history including lease ownership and form of tenancy. Where the lease is found to be *in solidum*, a group of farmers would have a say on that particular tenement and thus complications arise. Farmers who had their Agricultural Land Scheme application processed recently, had to issue a lump sum payment to cover the accumulated rent from the date of application. Agricultural stores and other amenities are charged at a higher rate per metre squared and thus the lump sum payment of farmers owning such amenities added up to a hefty amount.

Land recognition schemes and rural planning policies which are not target-oriented in the identification of active farmers and the agricultural value of the land itself, create a risk of land consolidation for non-agricultural purposes that leads to land speculation and the destruction of biodiversity. Thus, such strategies should not be geared towards land consolidation at all costs but they should identify genuine farmers or entrepreneurs who earmark land for consolidation of their holding, enhancement of their agri-business activity and the general well-being of the rural environment. Marginal areas that have been taken over by natural vegetation should also be appreciated for their ecological value and role as biodiversity refuge and regeneration.

Agricultural land schemes and legal frameworks that target land consolidation for farming purposes are urgently required to safeguard the active farming population and to encourage their progeny to continue farming the land. They would also expand the resource base, increase efficiency and improve the output from land holdings. Thus, sound farming enterprises that attract new farmers in the sector will not just increase the interest in farming activities but also thwart divergent land uses in rural areas. If farmland is used for farming and ancillary activities, urban features and formalization in the countryside such as multiplication of access gates and paths and other facilities can be counteracted with less effort. Consolidation of a farm holding could involve adding parcels within one kilometre or within the locality's boundary and not necessarily the adjacent land parcel. Apart from the reluctance of neighbouring farmers (that most often have kinship ties), in particular locations, the physical consolidation of agricultural land parcels may be an issue from an environmental point of view, due to potentially damaging activities including site engineering operations, levelling of terraced land, damage to natural habitats and loss of topographical features, amongst other issues.

3.04.02.4 Land degradation

In the absence of sizeable and consolidated land holdings, crop rotation is not possible for most farmers and they are forced to keep on practising monocultivation methods. This implies that the most active farmland is over cultivated and has been drastically depleted of nutrients leading to a drop in productivity and an increase in soil pathogens. The situation in which land holding consolidation is not being made possible led to 1) further depletion of farmland and groundwater resources, 2) degeneration in the working conditions for farmers as well as 3) a decrease in efficiency from crop production.

Furthermore, land parcelling and fragmentation resulted in an increase in the number of farmers having small agricultural land holdings. This has increased pressures for the physical subdivision of agricultural land, often leading to the construction of non-traditional rubble walls; opening up of new access roads and rights of way; construction of additional buildings for storage, reservoirs and pump rooms on smaller land holdings; and in certain cases, reclamation of natural habitats and features for agricultural use of the land. These pressures contribute to further proliferation of built structures in the countryside, as well as impacts on the scenic qualities of rural areas, natural habitats and features, rural character and the overall landscape.

Lack of schemes or measures that permit agricultural land transfers lead to further land degradation and the effect is down spiralling as this is further increasing the rural skill drain and farmland is being taken over by non-farming activities. Moreover, the current rural planning policy is increasing fragmentation of agricultural land and further facilitating the speculation of ODZ land such as through the reconstruction of derelict buildings for residential purposes. Urban sprawl within ODZ is being encouraged by change of use of abandoned farms and land as well as by lacking the proper means to enforce and providing the possibility to sanction certain developments that are not in line with the policy.

With reform in the inheritance regulations, the agricultural sector should be strengthened through farmland consolidation. This aspect should not be viewed only in terms of the benefit for the farm holding itself. Effectively safeguarding the Maltese countryside requires adequate reinforcement of the agricultural sector, so that farmers would feel motivated to resist relinquishing their land to divergent land users. Improving the land holdings of active farmers both in terms of quantity (for crop rotation and feasibility) and quality (healthy soils and agro-environmental benefits) is a major aspect of strengthening the sector to become more productive and sustainable both internally (economically and socially) and externally (GDP, environment, value added, and politically).

The agricultural policy aims to encourage the creation of an attractive countryside through an agricultural economy that stimulates employment opportunities and attracts investments in rural areas. Financing for innovative approaches in this area can be achieved through the LEADER funds allocated under the Rural Development Programme for Malta. Rural development can also be consolidated through innovative farmer-consumer relationships such as direct farm-gate sales and consumer-supported agriculture or even through spin off industries. All these initiatives would generate a higher level of income for a wide spectrum of rural residents.

3.04.02.5 Fodder crop production

As pointed out in Section 2.03.08 above, 45.3% (NSO, 2016) of the utilised agricultural land in Malta is being cultivated for fodder crop cultivation. It is a common practice for fodder to be sowed, fertilised and harvested through service providers with a large number of leaseholders hardly ever setting foot on their farmland. For many decades, this system was considered practical since most farmland was being cultivated without the need of the landowner to get directly involved in the farming activities. However, most landowners making use of such system are claiming that in certain years the price of fodder crop drops drastically and in certain instances they had to pay the difference in costs to the service provider rather than get paid for the fodder produced on their land.

Wheat is the most common fodder produced in Malta for various reasons such as that it was considered to be more easily digested by cows. Fodder crops were traditionally harvested when they had matured and dried. At this stage the barley heads, with their long barbs were more likely to cause problems than the wheat. Even though, trends regarding fodder and hay production have now shifted, the bias in favour of wheat still persists. The range of fodder crops produced half a century ago was far more diversified than the current one with crops such as common vetch, scorpion-tail vetch, bitter vetch, black kidney vetch, sulla, and barley. This reflects the range of animals reared by family farms that produced fodder for their own farm animals. Nowadays, wheat is the most common fodder produced, followed by barley and sulla which are cultivated utilising modern machinery for soil preparation, seeding, fertilisation, harvesting, raking and bailing.

With a reduction in the price of fodder crop due to importation of fodder from neighbouring countries, wheat could no longer be a viable crop to grow in such circumstances. Reduction in price of local fodder crop is mostly attributed to the availability of cleaner and more convenient alternatives that are being imported at competitive prices and delivered to the farm door. Thus, livestock breeders are losing interest in local fodder that is not consistent in quality, with complaints of finding stones, plastic and weeds in bales, leading to clogging TMR machines or adverse health problems in animals. Increasingly, wheat is being harvested earlier when still green to improve the palatability, digestibility and nutritional content when used as fodder for cows because of the higher protein content. Nevertheless, extensive research is required regarding fodder and hay crops to assess how Maltese farmers can best utilise resources and exploit to their rural productive capacity.

With mechanisms in place geared at consolidating land holdings, the agricultural sector can be injected with new dynamism stimulating the emergence of new farming ventures. Service providers involved in the production of fodder crops can diversify their product range and address seasonality issues related with the utilisation of different farm machinery for a short period of time. Moreover, active farmers also stand to benefit from land holding consolidation and profitable fodder production since they can integrate new types of fodder in their crop rotation schedule as is a common practice in other countries that utilise catch crops following the cultivation of edible crops. Innovation in fodder crop production and exposure to new methods being developed abroad do not come about effortlessly. There is an urgent need to educate, expose, train and advise the farming generation that will be active in the upcoming decade so that they can invest their

resources as efficiently and rationally as possible for the benefit of their business and the sustainability of the farming sector in general.

3.04.02.6 Farms on Government land

Emphyteusis and lease complications associated with livestock farms on Government land are a major issue being faced by young livestock breeders taking over their family farm unit. Without a sound entitlement to the farm structure, these breeders find it difficult to commit capital investments for farm restructuring and upgrading. Livestock Farms on Government land are basically operating on tolerance. Their legal tenure is restricted exclusively to the land on which their farm buildings have been constructed. So far, this system does not guarantee blanket security of farm tenure.

Government lease of agricultural land includes an annual rate for farmland and a separate property lease for any structures on that land whether such structures were there when the lease was first granted or not. Most farmers do their utmost to purchase agricultural land that is privately owned to avoid land ownership issues on Government land. However there are areas especially in the north of the islands where the land is predominantly government owned. The current lease scheme allows vertical inheritance of these leases and therefore there is no difficulty in leaving the farm to direct descendants. There are, however, farmers who have no children or they have pursued other careers and the farmers' most suitable successor is either a lateral relative or an unrelated youth who helps with everyday tasks and has virtually become a partner.

It is crucial that the land tenure of active livestock farms on Government land is recognised for livestock breeding through an appropriate leasing scheme. Leases should be rendered affordable, yet within State Aid permitted parameters, by livestock farmers and be secured for a viable period, say twenty five (25) years, with an option for renewal at the expiration of that period. That renewal could be made to depend on whether the farm is still operating according to its license and whether it has a positive track record of compliance. Additional parameters could be used to determine renewal approval including environmental virtuosity such as proper maintenance and repair of rubble walls, extensive landscaping with indigenous trees and shrubs, removal of clutter and shabby structures, and absence of justified third party complaints. The value of leases for farm structures on government land should be examined carefully by a special board made up of Government Property Department officials, MESDC officials, independent agricultural professionals and representatives from the agricultural community and finally endorsed by the State Aid Monitoring Board. This board should discuss the various factors that could influence the value of such leases and make recommendations to the competent authorities.

Since vertical inheritance transfer of Government agricultural land is the only form of transfer permitted under current legislation, the current lease scheme of farms on Government land permit vertical inheritance only and therefore the farm should pass on to direct descendants.

Thus, a scheme that recognises active livestock breeding farms that can avail of an emphyteusis agreement for a period of years that could be renewed, is required. The purpose of the farm activity should remain strictly for livestock breeding or ancillary activities but not necessarily for one type of livestock (e.g. a current pig farm can be transformed into a chicken farm or sheep farm as long as the scope is livestock breeding).

3.04.02.7 Livestock breeder benchmarking

As pointed out in Section 3.02.09 above, one of the horizontal goals within the agriculture policy is to target the active farming community within all the suggested policy measures in order to sustain their livelihood as well as safeguard a future in the sector for their offspring. Apart from the employment registration system at JobsPlus, the Veterinary Services regulate the livestock breeding sector through certification and registration which go hand in hand and are intimately related to the licensing procedure. Moreover, most livestock breeders are represented by a cooperative or producer organisation. Notwithstanding the work carried out by the regulator and the livestock breeders, there is little promotion of such efforts and the public perception is still critical of the level of monitoring, inspection and enforcement of sanitary, safety, and animal welfare regulation.

A livestock breeder benchmarking system can target abuse related to non-active breeders who benefit from the livestock breeder status at the expense of genuine diversification and innovation efforts. Thus, any policy instrument that is proposed risks ending up non-effective as a large amount of applicants benefit from lacunae in the system to access subsidies, permits in ODZ, tax benefits and other incentives intended for the active livestock breeder segment. The agricultural policy is establishing a livestock breeder classification system based on verifiable criteria to be linked with a range of policy measures. By doing so, the policy aims at safeguarding the rights and dignity of the remaining active breeders as well as the right of the tax payer to consume safe local food as well as enjoy a well-maintained rural landscape.

A classification scheme can be set up for livestock breeders and it can entail 1) prerequisites such as a valid registration with the Veterinary Services and a registration number, and 2) classification as a dairy breeder or pig breeder or beef producer or egg producer or broiler producer or rabbit breeder or small ruminant breeder or a mixed farm with a minimum turnover that is not less than the minimum wage from the relative agricultural activity, backed by the declared income tax return or evidence of sales for the previous three (3) years. Such a benchmarking system can be linked with tangible aspects such as planning permits and subsidy schemes, so that breeders will be incentivised to increase (or properly declare) their turnover. If an average turnover of the previous three (3) years is taken into consideration, this could help since the sector is influenced by various factors that can disrupt the turnover pattern. Young or new farmers could be incentivised to enter the classification system through a concession that gives them a period of settling time to reach the desired turnover.

Mixed farms (e.g. poultry and swine) can produce a cumulative turnover whereas mixed crop farmers and livestock breeders can choose their main source of income and classify accordingly as a farmer or a livestock breeder.

A general comment floated during the consultation period involved the integration of educational courses aimed at up skilling farmers and livestock breeders both through normal channels as well as through the provision of dynamic extension services. An improved and meaningful access to education and research could assist innovation methods that improve profitability and sustainability from small farms. Certification related to such educational courses should be included in the livestock breeder classification system so as to consolidate the benchmarking system with educational and research abilities of breeders.

3.04.02.8 Fodder crop demand

As pointed out in Section 2.03.08 and Section 3.04.02.5 above, 45.3% (NSO, 2016) of the utilised agricultural land in Malta is dedicated to fodder crop cultivation. Wheat is the most common fodder produced in Malta since 1) there is a historical link of wheat production for the production of bread, 2) farmers have traditionally always dedicated part of their holding for the production of wheat and the wheat harvest was considered a major cultural event in the annual calendar, 3) most of the heavy farm work such as ploughing, tilling, and transport of produce to and from the field depended on beasts of burden, therefore a good supply of fodder and grain for these animals including chickens, sheep and goats was essential for the wellbeing of the farm family, and 4) the nutritional value of wheat for dairy cows.

With a reduction in the demand for local fodder crop due to importation of fodder from neighbouring countries, wheat production is being affected. Experimentation on other fodder crops is limited to a few dairy farmers owning farmland and in most cases with crop varieties that require irrigation. Some farmers are already starting to harvest wheat earlier when it is still green to improve the protein content in milk quality when used as fodder for cows. Moreover, green fodder is imported from other countries by the dairy sector to supplement the dietary requirements of fibre and protein. Apart from roughage, ruminant fodder includes also concentrates in pelletized form that are processed locally by the feed mills.

Fodder crops that require irrigation (such as corn) could be cultivated with the introduction of new water and this can also contribute to carbon sequestration. Research on fodder crops that produce more than one harvest should be prioritised since the soil cover is kept for longer, ploughing is reduced and efficiency is increased. In the absence of adequate fodder produced from farmland, livestock farms can be incentivised to invest in fodder machines utilising hydroponic methods to create fresh fodder and improve the product quality and link with the Maltese territory.

Cattle farm waste is generally stored in manure clamps during the closed season in line with the Nitrates Directive. During this period, this manure loses a considerable amount of the moisture

content and it is easily spread on farmland intended for fodder production towards the end of summer. This is a traditional circular system that has been around since time immemorial and without such practise, Maltese soils would be impoverished of all organic material.

Newcomers in the agricultural sector and entrepreneurs interested in investing in farming should start considering innovative means or varieties of fodder crop cultivation aimed at feeding Maltese livestock. The Maltese livestock sector depends on expensive imported fodder whilst at the same time farmland is not being utilised properly to supply adequate fodder so as to reduce the dependency on other countries and increase food security in an overpopulated and insular country. Livestock production in Malta can be safeguarded both in terms of widening the profit margin as well as by increasing the range and quality of locally-produced fodder in the food chain. The latter is vital in promoting animal products produced in Malta since the production chain provides value added benefits for the Maltese economy, more control over the sector as well as reduce the carbon footprint.

3.04.03 Sustaining water and key resources

The third strategic policy objective that was identified for the development of the National Agricultural Policy entails 'sustaining water and key resources'. Following a consultation process with various stakeholders, a set of themes relevant to this policy objective was created for the development of an Issues Paper. The latter was discussed during the national conference, in which the working group in charge of this policy objective issued a SWOT analysis and proposed recommendations to include in the policy measures. Subsequently, a total of eight (8) policy issues were identified for this strategic policy objective and they were grouped in two categories, namely issues related with 'crop production and livestock breeding' and issues specific only to the 'crop production' sector. As indicated in Table 61 below, each area is being allotted a reference number that reflects the order that is followed in this chapter.

Policy Objective 3	Sector	Reference	Policy issue
Sustaining water and key resources	Crop production and Livestock breeding	3.04.03.1	Water supply
		3.04.03.2	Rainwater harvesting
		3.04.03.3	Groundwater abstraction
		3.04.03.4	New water
		3.04.03.5	Nitrates
	Crop production	3.04.03.6	Intensive farming
		3.04.03.7	Soil conservation
		3.04.03.8	Eco-system services

Table 61: Policy issues identified for Policy Objective 3 with reference number

The first five (5) policy issues within the strategic policy objective 'sustaining water and key resources' are being tackled across the wider agricultural spectrum since these concern water-related issues that have cross sectoral implications. The other three (3) policy issues namely intensive farming, soil conservation and eco-system services are linked with the crop production sector and focus on key resources that go beyond water-related issues. More information on these sectors is being presented in the 'situation analysis' found in Chapter 2 above that provides an overview of agriculture in the Maltese Islands as well as a sector-specific situation analysis. Moreover, this policy objective is being directly addressed in one of the five themes identified in the Rural Development Programme 2014-2020, entitled 'Water, wastes and energy: improving sustainable use and generating renewable energy'. The appraisal of the themes being presented in Table 61 above is being carried out in line with the rationale of the RDP 2014-2020 as well as with the Water Catchment Management Plan for Malta. A collaborative approach with the Sustainable Energy and Water Conservation Unit was adopted in the formulation of policy measures in the agriculture policy that are pertinent to water issues.

Figure 12 below provides a summary of the SWOT items that were identified for the third strategic policy objective 'sustaining water and key resources'. This is followed by a concise analysis of each theme that was identified for this policy objective in line with these SWOT items, and in the format presented in Table 61 above.

Figure 12: SWOT analysis for Strategic Objective 3 – Sustaining water and key resources

3.04.03.1 Water supply

As pointed out in Section 2.01 above, the Maltese Islands are facing a major water supply challenge and agriculture, for which water is a lifeline, is on the forefront to suffer from this water shortage. The small size of the islands, the lack of permanent water bodies, and a semi-arid climate coupled with a dense population, make for high water demand and lack of water supply.

The agricultural sector has an over dependence on groundwater which constitutes a major threat since the mean sea level aquifer systems are suffering from quality deterioration linked with saline water intrusion and nitrate pollution. Apart from other sources, groundwater pollution is also linked with agricultural practices such as management practices of livestock waste and the use of chemical fertilisers and pesticides.

The Maltese farming sector has been responding to the water shortage threat with investment in rainwater harvesting, the metering of groundwater sources and various other initiatives on the farm level to increase water efficiency such as through drip irrigation, computerised systems, water valves, irrigation sensors, and more. However, when considering the whole water supply scenario, these investments were either too fragmented or were introduced at a late stage to prove effective. With the introduction of new water, the supply will increase in those areas that are serviced from this investment but it does not guarantee an increase in the sustainable use of water resources. Thus water utilised for agriculture in the coming decade requires a holistic strategy that can sustain effective farming practices and respect the needs of the wider population.

With the agriculture sector depending on this resource, a clear direction and action plan within this sector is of strategic importance so as to safeguard local food production, the farming population and water resources. Contribution from farmers and livestock breeders is of utmost importance for the sustainability of this vital resource, but this requires target-oriented planning, sustained education, targeted awareness campaigns and thorough monitoring at the farm level. Agricultural operators can be trained and guided to adjust their practices to utilise water resources in a rational manner, as long as they are provided with the means to do so.

Crop farming in Malta is composed of 1) dry farming that relies on rain to grow mostly fodder, onions, garlic, broad beans, potatoes and some permanent crops such as vines and olive trees and 2) irrigated farmland which is used to grow a range of fruit and vegetables utilising drip irrigation and sprinklers. The amount of irrigated farmland proliferated over the last three (3) decades as a result of widespread groundwater tapping. This development created a boost in unplanned crop production that led to short term benefits for farmers but also over production of certain crops, deteriorating water quality and quantity as well as a downgrade in the quality of life of farmers who ended up competing through quantity rather than with quality production. Such a situation brought about a false perception of a free unlimited water supply that led to lack of investment in rainwater capture and shifted efficiency on irrigation systems rather than on safeguarding the water supply.

Water policies can be more effectively monitored due to the small size of the islands but effective enforcement is paramount to safeguard the genuine use of water for agricultural purposes. It is a well known fact that the active Maltese farming population is dwindling whilst the amount of registered farmers is still very high. Thus, it would not be effective to implement water policies in agriculture without targeting and prioritising on the active farming segment for the provision of water that is linked with genuine food production. Any policy instrument that focuses on water supply to farmers and livestock breeders should ideally be linked with a recognised benchmarking system that is referred to in Section 3.04.02.2 and Section 3.04.02.7 above.

Prioritisation is fundamental when dealing with the allocation of scarce resources but it cannot be achieved without sound classification systems in place.

Farmers are technical experts on the field whilst policy makers focus on the macro perspective and have the scientific background necessary to implement policy measures. Thus, the policy maker should continuously consult, train, educate and inform the farmer in order to establish the required means of intervention in a timely manner. A set of instruments aimed at improving water supply sustainability and its rational use should be identified so that farmers are adequately guided and informed on clear targets to be reached. Ideally, agricultural holdings should 1) not rely entirely on one single source of water, 2) significantly reduce groundwater abstraction, 3) increase rainwater capture, 4) tap high-quality New Water if this is available, 5) monitor water use and plan to reduce wastage, 6) plan to avoid contamination of water resources and 7) experiment with methods of reducing water usage without compromising their economic return.

A strength identified during the national consultation event is that young farmers and breeders are more willing to conserve water and resources. One should avoid generalisation on the farming community since some farmers are well informed and show initiative to improve their knowledge base. Young farmers and livestock breeders are being brought up in a situation where farm resources such as water are a major hurdle for their business and a stumbling block to reach their aspirations. Thus, they struggle to reduce input costs and become more efficient through training and up skilling. The older generation, who experienced a totally different scenario with a higher profit margin coupled with less effort and restrictions, are generally far less motivated to conserve water and resources. The latter can be linked to their ingrained *modus operandi* as well as with a dwindling profit margin for which they see no use in improving resources at such a late stage in their life.

The RDP 2014-2020 focuses on the importance of increasing the security in water supply, particularly in view of the emerging climate change impacts. Emphasis is placed on restructuring abandoned water reservoirs and distribution networks that are no longer in use. These reservoirs are usually small since they were originally constructed to serve small land parcels and have since faced other issues related with the division of holdings into smaller parcels that may not be adjacent or in the same area. These aspects lead to multiple problems, including the reluctance to invest in large scale irrigation, the use of costly water bowsers to transport water to isolated parcels of land and irrigation systems have often become economically inefficient to utilise due to the small scale of operation. Thus restructuring of abandoned water reservoirs might not be viable and alternatively new underground reservoirs can be constructed if this makes economical sense in view of land fragmentation.

One of the threats identified in the SWOT exercise includes the over reliance on ground water and desalination. Unfortunately crop production in Malta is over reliant on ground water extraction and this trend can be reversed with the onset of new water in focal farming areas. An ideal scenario should include a mix of water sources that is made available to farmers for concurrent use so as to increase resource security and improve the water status. Livestock breeding is also heavily reliant on groundwater but there are also farms that utilise tap water which is derived mostly from desalination processes which are expensive to operate apart from competing with other domestic

and commercial uses. There are still situations in which water bowser operators are pumping groundwater from sources registered as agricultural and commercialise the water for other uses which are anything but agricultural. The agricultural sector is also competing for groundwater with other users such as for landscaping purposes, water bottling, cement factories and other activities that pump excessive amounts of water on a continuous basis.

3.04.03.2 Rainwater harvesting

Rainfall intensity and distribution patterns in Malta vary widely, thus reducing the rain storage capacity that could be used during the long summer months when water is mostly required. Thus, most rainwater stored in reservoirs is utilised in spring and the same reservoirs can be topped up in summer through replenishment with groundwater. More rainwater harvesting is needed both on the farm level as well as on a national level with the recovery of disused reservoirs and other catchments, especially since climate change is further disrupting weather patterns with increased rain inconsistency and flash floods. The Sustainable Energy and Water Conservation Unit (SEWCU) estimates that with the necessary infrastructure in place, there is a potential to increase the rainwater catchment by 200% on the current supply that is being utilised for agriculture.

Since EU accession and through the tapping of RDP funds, there were a number of initiatives undertaken by farmers to construct underground reservoirs for the collection of rainwater, especially from the roof of greenhouses. The same is being done on livestock farms with investment for the collection and storage of rainwater from farm and barn roofs. A number of farmers who contributed in the consultation process claimed that the planning process led to a restriction on the size of reservoir that they had requested even if it was to be located underground and covered with soil. This reduced their ability to store water and such a policy ran counter to the national water security, groundwater abstraction and farming sustainability. However, this issue was addressed in recent years. The RDP 2014-2020 places a large emphasis on the importance of increasing the security in water supply, particularly in view of the emerging climate change impacts.

Pertinent planning policies and funding mechanisms should aim at increasing the rainwater storing ability of farmers and thus incentivise them to construct adequate reservoirs on their land holdings that are ideally located for water catchment without causing visual impacts. An applicant for such schemes should ideally be registered as a farmer but reservoirs for rainwater harvesting should also be permitted to any other users in order to reduce the impact on groundwater by utilising rainwater for such farming practices. There are recreational farmers and potential active farmers in the sector who are restricted from progressing due to lack of water and most often they either resort to purchasing water from water bowsers at a hefty price or refrain from cultivating their land. Thus, investments in reservoirs should be facilitated to increase the cultivated farmland and generate interest by new comers to embark on farming practices.

A number of active farmers are investing in water saving technologies such as hydroponic systems since they can create a more favourable business model. Apart from increased production efficiency per square metre and better pest control, such systems require less water to operate since they recycle water through pump systems that distribute water and fertilisers to plants in the amounts required. Thus, farmers can exploit systems that produce more with less, and this should be a positive drive in the local scenario where water and land resources are very limited. The increasing availability of solar powered panels facilitates water pumping from reservoirs in remote areas. Moreover, the farmers' knowledge should never be underestimated at the cost of taking desk decisions without consulting the real expert in the field. This is also the case with rainwater harvesting since farmers will have gained knowledge on the hydrology on their land holding or the valley system that can be utilised to maximise the effectiveness of rainwater harvesting.

A weakness identified during the consultation process is the poor understanding amongst the general public of the difficulties associated with food production, the need for a constant water supply and food security. The first decision taken by any person who is interested to cultivate land or breed animals is on the provision of water. Addressing water issues in the Maltese Islands out of context without being exposed to the realities of agriculture is in itself counterproductive. Citing the argument that farming is not important since the Maltese population can avail from imported food products is dangerous on various aspects such as for food security, land stewardship, safeguarding culinary traditions, resisting further urbanisation, preserving rural skills and local agricultural species. Food security is not just related to what we consume today but it entails having an active farming population with the capacity to produce food for the local population in case that the current situation is disrupted. Such an active farming population might be producing cash crops for export or fodder to supply local farms but as long as it is kept employed in agriculture, the skills and active farmland are kept intact.

The seasonal climate experienced in the Maltese Islands is a threat to farming since it is not optimal for effective rainwater harvesting since rainfall is concentrated in the winter months and the stored water is fully utilised during the early spring months. Thus in cases where farmers have small catchments, rain does not replace the water used in spring which is required for the long summer months. Apart from the seasonality issues, changing weather patterns are causing rainfall intensity during thunderstorms followed by dry spells, which are not the optimal conditions for soil saturation. Moreover, rainfall distribution patterns vary widely both during the same season as well as from season to the other. Although reservoirs can hold a substantial quantity of water, this may not prove sufficient to cater for the needs of a farmer and as such this could not be a viable solution on its own. In severe dry seasons such as during the winter 2015-2016, normal irrigation frequencies might not be sufficient and therefore increased water consumption would be required.

3.04.03.3 Groundwater abstraction

Groundwater is abstracted from both the public WSC extraction sites and private boreholes. As illustrated in Table 62 below pertinent to World Water Day statistics (NSO, 2013), the average amount of groundwater extracted over nine years between 2004 and 2012 was 13.55 million cubic metres whilst that extracted for irrigation is 22.04 million cubic metres. This implies that if this is divided with the amount of irrigated farmland that is around 3,900 hectares (NSO, 2010), the average volume of water per hectare used for irrigation is 5,651m³ equivalent to 635 m³ per tumulo. The Sustainable Energy and Water Conservation Unit (SEWCU) estimated that in 2015, 86% of water utilised for agriculture derived from groundwater sources, with merely 9% coming from rain water and 5% from treated water. This situation is not tenable and agriculture should start shifting on more efficient groundwater use and the utilisation of alternative water sources.

Year	Abstraction by Water Services Corporation	Abstraction for irrigation
2004	14.9	16.6
2005	14.0	19.0
2006	13.1	19.6
2007	14.0	22.6
2008	14.1	21.7
2009	12.7	19.1
2010	12.8	28.2
2011	13.1	25.1
2012	13.3	26.5

Table 62: Average amount of groundwater extracted (million m³) between 2004 and 2012
Source: NSO (2013) World Water Day: International Year of Water Cooperation 056/2013

A large number of boreholes were dug in the last thirty (30) years to tap groundwater for various uses, primarily agricultural but also for domestic and commercial purposes. Unfortunately, the quantity and quality of groundwater has severely deteriorated in some areas due to over abstraction. Borehole registration took place in 1997 and in 2008, with the latter being followed by a moratorium in 2010. The closure of domestic sources and the metering process on registered agricultural boreholes started in 2011 and is still ongoing. There are as yet no formal abstraction rights in place and the only entity that can extract groundwater is the WSC.

A major limitation for decision-making in this delicate issue is the lack of data for groundwater abstraction amounts, land use mapping, water demand and type of cropping amongst other data gaps. This is hampering planning and implementation of abstraction control mechanisms and measures to reduce water pollution. With the availability of such data, agricultural development in Malta can be enhanced by implementing quantitative control measures such as crop planning with planned inputs and outputs. Further studies on water use in agriculture will also assist decision making and lead to rational estimates on groundwater abstraction by the agricultural sector.

An abstraction sample from metered boreholes was carried out by WSC in 2015 and this gave a snapshot of the abstraction patterns from agricultural boreholes. Out of a sample of 460 metered boreholes, 37 were not being utilised between January and December 2015. The average abstraction from these boreholes during the same period was that of 2,192m³. Nevertheless, a staggering 67,735m³ was being extracted from one borehole. The latter implies that groundwater extracted from this particular borehole exceeds the total amount abstracted from 231 boreholes which were in the category of less than 1,000m³. This sample indicated that groundwater extraction between October and March is minimal and it reaches its peak in May, July and August, thus reflecting the agricultural crop patterns.

The situation being faced by young farmers and livestock breeders is one in which they have to struggle to reduce input costs and utilise farm resources such as water in the most efficient way. Water requirements have increased both within the crop sector that is mostly based on a competition through quantity production as well as within certain livestock farms that have been restructured in such a manner that they require more water for cleaning purposes and the physiological water needs of livestock that are increasing. Thus, young farmers are facing this challenge together with insecurity on the future of their water supply that is predominantly sourced from groundwater. This implies that they are more willing to invest in water conservation and resource efficiency.

Farmers and livestock breeders in Malta aim at increasing production by maximising on the limited space available and in most cases they are constrained to work intensively since they do not have enough land for crop rotation or for animal grazing. This quantity-oriented approach leads to over utilisation of resources such as water and soil with the consequence of quality deterioration. Resource planning is seldom put in the equation when new field investments or farm extensions are carried out. This leads to further water abstraction and resource depletion at the expense of reducing the product quality. In the case of crop production, intensive farming on the same land parcels leads to the accumulation of pathogens in soil and pesticide tolerance that place more burden on both the environment and the farmer's pocket. The RDP 2014-2020 funds for investments are placing emphasis on water saving technologies and switching a great proportion of agricultural water use to effective rainwater harvesting and new water to significantly benefit groundwater reserves.

A weakness to which reference was made during the SWOT exercise is the scientific and technical knowledge gap within the farming community. Aquifers and the Maltese geology are themes that might not be fully comprehended by segments of the farming community who are making use of groundwater. There is an academic and technical knowledge gap in this area which requires information dissemination and training with the farming community. The RDP 2014-2020 makes emphasis on 'efficiency in water use, encouraged by more effective training, demonstration, skills development and appropriate technology. These changes would represent an effective adaptation to climate change impacts and would bring benefits to biodiversity through reduced demand for groundwater in agriculture. There is also the need for training and demonstration in ways which are attractive and accessible to the majority of farmers.

Offering management services to enable farmers to absent themselves from their farms to attend training and demonstration sessions will be considered.'

Any initiative that improves efficient water usage and reduce the dependence of agriculture on groundwater should be incentivised as long as any resultant environmental issues are taken into consideration. Most farmers drilled boreholes out of necessity to compete with other farmers who got a strategic advantage over them by accessing groundwater. The Maltese authorities never issued permits for groundwater abstraction and all drilling was done illegally with the users registering their sources in 1997 and 2008. Groundwater is considered a common good and thus users have the responsibility of not wasting such resource to secure its sustainability. However, most users perceived this resource as an access to an unlimited amount of water. Thus, the drive to utilise water saving technologies in the recent past was primarily motivated by necessity and resource degradation. Water metering on boreholes is also providing a means to monitor and improve water usage, especially where farmers are conscious that groundwater is not an infinite resource.

With a decrease in the amount of active farmers, the amount of water utilised for farming should be declining but this is not the case. A reason for this could be that water is utilised for recreational farming and other purposes that go beyond the production of food. Following the completion of the borehole metering exercise, monitoring should be carried out on the quantities extracted in order to flag irregular patterns of water abstraction that can be compared with the farmer status and the agricultural status of the land holding. Such exercises can assist in the better control of water abstraction and use as well as target wastage linked with bad practices and non-agricultural use.

3.04.03.4 New water

Agriculture in Malta is groundwater-dependent and rainwater harvesting is not an adequate replacement to meet the water supply. The potential to re-use treated sewage effluent in agriculture is high as it can serve to reverse the trend of over-abstracting groundwater. In order to provide another source of water for agriculture, estimated at seven (7) million cubic metres per year, the Water Services Corporation (WSC) is currently undertaking an infrastructural project to deliver new water to main agricultural areas in the north of Malta, the south of Malta and in Gozo. This water is derived from treated sewage effluent that was being treated and then discharged into the sea. Investment in polishing plants and distribution networks are completed and this water started being supplied in the north of Malta in the second quarter of 2017.

The RDP 2014-2020 focuses on the importance of increasing the security in water supply, particularly in view of the emerging climate change impacts. The provision of new water in predominant agricultural areas still requires investment in distribution infrastructure to reach agricultural holdings.

The latter can take place in a top-down approach with the central water authority investing in the distribution network or through cooperation projects that link together various stakeholders. The quality of new water is being guaranteed as having a low salinity and a balanced mineral supply such as sodium and boron based on levels indicated by the Food and Agriculture Organisation (FAO).

New water is being envisaged to partly cater for the water supply problems faced by the various agricultural sectors, but in order to be effective, it has to merge with on-farm water conservation practices. A number of farmers have already investing in water saving technologies such as water sensors, pressure gauges and computerised fertigation systems to utilise their resources in a more effective manner. Hydroponic systems are increasingly being employed in Malta in order to increase the production efficiency and reduce water consumption. Thus, some farmers are starting to benefit from existing technologies that produce more with less, and this should be promoted with other farmers to maximise from the shortage of water and land. With the advent of new water, such systems still need to be encouraged so as to make the utmost from a recovered water supply that is used with utmost efficiency without wastage.

A weakness identified in the consultation process is the public perception in Malta that treated sewage effluent is of an inferior quality to other water sources. This is still evident in the consumer discourse at farmers' market and fresh vegetable retail points. An information campaign, together with demonstration projects on crop production utilising new water is required to encourage the applicability of this water in farming and reverse the public perception. The latter is pivotal since there is a negative perception of crops irrigated with treated sewage effluent linked with the outdated and inappropriately used technology at Sant Antnin Sewage Treatment Plan. Such a campaign should be carried out by utilising local and foreign expertise on the quality of new water and its safety for the intended use.

Another issue pointed out during the SWOT analysis discussion concerns the effects of utilising 'new water' on surface and ground water are not yet studied. Research carried out so far on the production of lettuce and cabbage by MCAST students was promising in terms of product quality and shelf life. Demonstration projects and continuous research on new water should be sustained to gather essential data so that the new water project can be delivered successfully with both farmers and consumers being satisfied with results and practices.

The supply and distribution of new water brings about various queries by farmers who demand information on the water quality, the crop performance and the consumer perception. These queries are legitimate since most farmers are laymen in the engineering behind the production of new water and the uptake of this resource should be based on trust of the authorities. This hurdle can be tackled through information sessions and farmer training courses that include knowledge dissemination on water conservation at the farm level. The RDP 2014-2020 makes emphasis on 'efficiency in water use, encouraged by more effective training, demonstration, skills development and appropriate technology. These changes would represent an effective adaptation to climate change impacts and would bring benefits to biodiversity through reduced demand for groundwater in agriculture. There is also the need for training and demonstration in ways which are attractive and accessible to the majority of farmers.

Offering management services to enable farmers to absent themselves from their farms to attend training and demonstration sessions will be considered.'

Accessibility to new water should ideally be planned with the collaboration of the farming community to avoid creating teething issues that compromise the whole project. Such a project should be farmer-oriented in such a way that product testing with new water should be carried out by farmers and utilised for comparative analysis with other water sources for demonstration purposes. Moreover, fragmented farm holdings and their access provide a major hurdle for the distribution network that implies the need for a case by case evaluation and regular meetings on site. New water should not be viewed as the final solution to the water resource problems being faced by the Maltese Islands but it will be essential in the optimization of an agricultural water mix which reduces the dependency on groundwater abstraction and secures the sustainability of the agricultural sector.

3.04.03.5 Nitrates

As pointed out in Section 3.04.01.7 above, most of the groundwater bodies in the Maltese Islands exceed the EU nitrate limit value. In both 2010 and 2011, eleven (11) of the fifteen (15) groundwater bodies had nitrate levels higher than the 50mg/l EU limit value. One such source of water pollution is the leaching of nitrates from fertilisers into groundwater. The Nitrates Action Programme (NAP) for Malta was published in 2011 to mitigate for nitrate pollution from agricultural sources. Through the NAP, various measures are being enforced both on livestock farms as well as on farmland. Livestock breeders are obliged to comply with a number of measures regulating the storage, handling and transport of animal manure, whilst keeping the necessary records and carrying out the required infrastructural updates on their farm. Farmers are obliged to apply fertilisers according to fertilisation plans, follow an open period for manure and inorganic fertiliser application, as well as keeping records, amongst other requirements.

Notwithstanding the adoption of the Nitrates Directive and the level of enforcement in place, farmers claim that the parameters utilised for fertiliser planning contain a large element of bias through assumptions, errors of judgement and techniques that are being utilised for fertiliser planning. They are also concerned with the restricted season for application of fertilisers that has been perceived as not being ideally suited for the Maltese agronomic situation in which the main growing season is in winter. However, there are legislative provisions for this, in that farmers creating a fertiliser plan through an approved technical advisor will be able to apply inorganic fertilisers given that the fertiliser plan indicates the need to do so.

Farmers participating in the national consultation event claimed that the fertilizer plans being created on which they have to base their nutrient application do not take into consideration the nitrate levels in specific groundwater sources, the soil type on their land holding and the various

agronomic conditions of their land parcels. They also comprehend that in order to address all these variables it would entail a larger burden for the enforcement body and higher costs.

This lacuna calls for practical instruments that could target these heterogeneities such as by creating a soil type classification or land quality assessment that is integrated in the same IT system that produces fertiliser plans. The creation of such instruments requires the adaptation of existing research to Maltese conditions with the collaboration of researchers and producers.

A weakness identified during the consultation period is that there is a conservative farming community that opposes change in agricultural practices, especially if they include costs. This statement is partly true since there still is a conservative mentality embraced by the older farming generation, who are nostalgic about the higher profit margins of yesteryear and who are generally far less motivated to change their agricultural practices. Such a lack of motivation reflects on the adaptation of the NAP which for most farmers is considered as an added burden on their operations in terms of paperwork, restrictions and a diversion from the actual production. Some farmers argue that a dwindling profit margin does not justify the restrictions being imposed by the NAP and the resources dedicated to produce fertiliser plans are an added financial burden. Others argue that the nitrates issue is being tackled by enforcing on the agricultural sector which is the weakest in financial terms, whilst not addressing sewage infrastructure that could have a considerable contribution to nitrate pollution of the aquifers.

An effective regulatory framework has been set up together with extensive information sessions on the obligations of farmers with respect to the Nitrates Directive, yet the farming community requires additional assistance for the execution of the whole process, including soil sample collection and testing for the eventuality of a fertiliser plan. Many farmers claim that they are still unsure how the Nitrates legislation is to be employed for specific cropping systems, in particular protected crops. Public awareness campaigns on the consequences of excessive fertilizer application, similar to the Info Nitrates Campaign carried out in 2013, can be delivered over an extended period of time.

3.04.03.6 Intensive farming

Intensive farming practices involve high capital and labour input per unit land area and thus aim at producing more from less. This concept runs counter to resource sustainability as it reduces the quality and quantity of basic resources such as water and soil as well as induces wider environmental impacts linked with excessive inputs of artificial substances. Most often, this kind of farming is not chosen by farmers but it is imposed on them by the prevailing economic system and the available natural assets. In a scenario where farmers compete with each other on a quantity based production, the response would be to intensify production to the extent of overburdening their limited resources and capital with negative impacts on their own quality of life.

A mechanism that is perceived to have boosted intensive farming practices in Malta was the Special Market Policy Programme for Maltese Agriculture (SMPPMA) which provided coupled support for fresh fruit and vegetables, potatoes, tomatoes for processing, wine, pigs, dairy, poultry and eggs during the period 2004 to 2014. The focus of the agricultural policy is to reduce the negative effects of intensive farming and concentrate on quality production that addresses the changing consumer needs in an open market.

Sustainability in resource quantity and quality is an important factor that needs to be considered when evaluating intensive farming practices, that basically involve the crop farmer producing a vast range of vegetables from a small land holding with the intention of making high profits from at least one or two particular crops while breaking even with the other crops. Crop planning, organisational structures and efficient collective decision making are almost non-existent amongst Maltese crop farmers. Collaboration measures are being catered for in the RDP 2014-2020 funds for Malta but their uptake is crucial to facilitate clustering and to break away from a system of sterile individualism.

Crop farming in Malta consists of two (2) basic categories of cultivations, namely 1) seasonal dry (arable) farming that relies on rainfall and is mostly reverted to for the cultivation of fodder crops, onions, garlic, broad beans, potatoes and some permanent crops such as vines and olive trees and 2) irrigated farmland which is used to grow a range of fruit and vegetables mainly utilising drip irrigation and sprinklers, with the former being applied in covered cropping as well as in open fields. The amount of irrigated farmland proliferated over the last (3) three decades as a result of widespread groundwater tapping. This development created a boost in unplanned crop production that led to short term benefits for farmers and led to over production of crops, deteriorating water quality and quantity as well as a downgrade in the quality of life of farmers who ended up competing through quantity rather than with quality production. Such a situation brought about a false perception of a free unlimited water supply that led to lack of investment in rainwater capture and shifted efficiency on irrigation systems rather than on safeguarding the water supply. Efficient irrigation systems such as drip irrigation are not effective if they are utilised through a wasteful production model and thus the approach to crop production should be planned and based on a collective approach to meet the market needs. Production efficiency on a macro scale coupled with intelligent irrigation systems that provide adequate water and nutrients to the plant should be prioritised to avoid degradation of water and soil resources.

Young farmers are struggling to cope with increased market demands and dwindling farm resources. Those who are still actively involved in the sector are generally well informed and are eager to improve their knowledge base in the conservation of resources. However, they claim that intensive farming and monocultivation with all the related environmental and economic burdens are a direct result of lack of space that renders crop rotation impracticable. Land holdings are small and without crop rotation, farmers are spending large amounts of money on pesticides, fertilizers and soil sterilisation, thus defeating all their efforts to achieve profitability and productivity. This is a down spiralling system with one factor triggering the other and even if young farmers comprehend the need to diversify their production to add value through quality production, they are caught in a system that does not incentivise their goals. A viable way forward for young farmers is to tap agricultural niches and avoid becoming over productive in any one product even within the same niche markets. The latter calls for sector organisation, long-term planning, collaboration even in small farmer clusters, training and up skilling.

A strength pointed out during the SWOT discussion is that the recognition and appreciation of local landraces for their resistance to changes in weather conditions is increasing. With a changing climate and declining resources, the time is ripe for rediscovering Maltese landraces that are adapted to the local conditions and to experiment with drought tolerant crops that are produced in arid climates. Investment on local landraces such as fruit trees, olive trees, bees, poultry and sheep is increasing as the quest to produce authentic products that are more adaptable to the Maltese geo-climatic conditions has become evident. Other sectors should follow suit to research the peculiarities of Maltese landraces that were pushed aside by the introduction of international varieties in order to increase their production and create niche markets for their commercialisation.

Amongst other environmental issues, intensive farming practices such as unplanned monocultivation of the same crop, create over production and hinder resource sustainability. Unfortunately, the Maltese farming community is learning this the hard way and crop farmers have now realised that it makes little or no sense to produce large quantities of crops and flood the market since this defeats the whole purpose of efficient production in terms of profit, resources and quality of life. Some farmers argue that they can do nothing about this situation due to lack of effective collaboration, the prevailing economic system and the lack of natural assets. Apart from the high capital investments linked with intensive farming such as greenhouses or cloches, most seeds and seedlings are imported and are very costly.

Moreover, farmers are aware that there is no guarantee that their investment would yield adequate profits or that disease or severe weather conditions would not destroy their crops. Any profits from such an investment need to be reinvested the following season and if the decision to produce a range of crops based on intuition turns out to be successful, the farmer might end up collecting returns that still do not reflect the productive time spent in the field. However, one can argue that even if farmers produce crops for the market, they cut costs on their food spending by consuming part of their products. In order to cater for disruptions in crop cycles, there is the need to establish a set of indicators that are continuously monitored in order to establish trends that can support quick decision making such as for compensation or risk insurance.

An opportunity for the farming community over the next decade is education on the proper application of fertilisers and pesticides. Sustainable fertilizer and pesticide use requires knowledge of quantities to be applied and on methods and frequency of application, as well as knowledge about contamination and precautions. The risks of misapplication of agricultural chemicals to the environment, health and the agricultural economy are still not fully appreciated by all operators. Farmers have an obligation to follow nitrates and pesticides regulations and they have been repeatedly exposed to information sessions on their obligations and tests leading to certification. However, the farming community requires continuous assistance for the execution of certain technical issues such as fertiliser planning, including soil sample collection and testing. In order to back environmentally sound practices in the field, a vast range of organic plant protection products should be made available on the local market to replace environmentally challenging chemicals and their application should be properly explained within an Integrated Pest Management scenario.

3.04.03.7 Soil conservation

Soil is a fundamental resource for farming and livestock breeding as it is the medium in which most crops and fodder are produced. Apart from maintaining and supporting crops and vegetation, soil manages water retention and distribution. Soil in the Maltese Islands is in general of a shallow profile and lacks organic matter, which is a basic element for soil productivity. Organic matter, which is the living part of the soil, influences the exchange of nutrients, water retention and soil ecology. The average organic matter found in Maltese topsoil in 2006 was 2.1% which is low and is a sign of unhealthy soils with low productivity (State of the Environment Report, MEPA). There are various intervention measures that can be carried out at farm level to increase the organic matter and fertility in soil such as by adding compost, soil conditioners, livestock manure as well as mulching and shredded pruning waste.

Intensive crop farming practices such as frequent tilling, ploughing, the application of chemical fertilisers and pesticides prevail in Malta since the economic scenario is dictated by maximising production. Thus, soils in active farmland areas in Malta are being severely degraded by over cultivation and intensive farming, causing deterioration in their physical structure as well as the inclusion of pollutants that reduce the soil quality and integrity. Even if practices such as soil sterilisation utilising Methyl bromide were phased out, the effect on microorganisms in soil were severe. Continuous use of pesticides, herbicides and fungicides on particular land parcels increases the risk of soil contamination and reduction in fertility. Moreover, excessive ploughing of soil and the utilisation of rotary cultivators that disintegrate the soil structure and compactness, further reduce the soil-water retention capacity and fertility. Irrigation with groundwater having high conductivity is also leading to soil deterioration since the levels of salts accumulating in soil are increasing.

The agriculture policy is aligning its targets on issues that overlap with other strategies, where this is possible and applicable. Soil is one of the natural resources that are covered in the Malta's National Biodiversity Strategy and Action Plan (NBSAP, 2012-2020) together with water and land. Target NR2 states that: 'Land uses are commensurate with the management of soil and by inference, water resources across the Maltese Islands. This is required in order to promote 1) the build-up and maintenance of soil organic matter; 2) the enhancement of soil biodiversity; 3) the reduction (and reversal, where possible) of soil erosion, contamination and compaction; 4) the minimisation of salinization/sodification levels (where applicable); 5) the mitigation of flood-induced soil mass displacement/land sliding; and 6) the increase in infiltration and moisture retention in the soil.'

The NBSAP also calls for soil conservation measures to be incorporated in a soil action plan that is required to address these goals in terms of how to mitigate the threats to Maltese soils and adopt measures aimed at integrated soil conservation. The soil action plan together with other national relevant policies shall contribute towards the requirements of the Convention to Combat Desertification (UNCCD) to develop desertification national action programmes. Policy measures in the agricultural policy are also being directed to reach these targets.

Climate change and changing weather patterns increase the vulnerability of food production and safeguarding water resources, especially on an overpopulated island archipelago. Long-term planning based on the available data and ongoing research is essential to create an effective soil utilisation strategy for the Maltese Islands that reflects the genuine needs of agriculture and food production whilst curbing deviant practices. Ideally, such a plan should also integrate aspects of soil-less agriculture such as hydroponic and aquaponic systems as well as urban farming to create a mixed food production strategy, including the production of fodder for animals.

3.04.03.8 Ecosystem services

The farmland value for recreational use has far outstripped its value for farming purposes and this is of great concern for the sustainability of the rural community as well as all the related environmental and social aspects. The latter include various aspects that should not be under estimated such as the value of farmland as a visual asset, the food security aspect in cases of crises, farmland as a backbone for tourism development, traditions and rural skills.

Intensive farming practices, in particular monocultivation, run counter to farmland sustainability in terms of the key ecosystem services of water and soil as Maltese farmers are missing out on nutrient planning, reducing crop wastage, working decent hours, improving soil quality as well as the surrounding environment. In fact, all these aspects are interlinked and can all lead to improved agro-ecosystem services for the benefit of the farmers, the consumer and the environment. Nevertheless, Maltese farmers should not be saddled with the blame for practicing intensive farming since certain intensive agricultural practices were dictated by the circumstances. It is not fair to stigmatise intensive farming practices in Malta without evaluating the whole picture, including possible alternatives, scope for farmers to adopt agronomic changes, risks of failure, capital already invested and funds available to operate. A coordinated approach with researchers, farmers, and consumers to embark on more sustainable forms of food production could help alleviate this situation and this could be achieved through pertinent EU funded projects.

Fragmentation of land holdings into very small land parcels due to inheritance and transfer or sale of land is one of the principal factors that conserve the status quo in terms of intensive farming production. The relatively high land prices and the attractive location of particular rural areas also encourage the sale or transfer of agricultural land to third parties. Farmers inheriting land tend to manage it separately rather than joining efforts to consolidate their land holding. Moreover, some people inheriting agricultural land have little interest in genuine arable farming and may seek alternative uses of the land such as for recreational use or as an opportunity for property development. Others may engage in small-scale kitchen gardening or micro farming as a recreational activity that provides part of their fresh food supply.

There is a general lack of coordinated policy mechanisms regarding environmental protection and agriculture, as well as lack of proper financial initiatives to encourage farmers, especially young farmers, to become environmental stewards and agri-environmental managers of the countryside, in order to protect and enhance biodiversity and maintain the traditional rural landscape and its natural features as a public good for the well-being of society. This might be the result of lack of opportunities for the sector to attract new comers that have fresh ideas and some of the young farmers could be conditioned by their own parents since early childhood and thus reproduce the same approach and attitude.

Investment in organic farming is very low in the Maltese Islands and most farming is conventional and predominantly intensive. This trend is difficult to change with the current constraints such as land fragmentation, inheritance issues, access to farmland and proximity of fields.

Fields with natural, physical or topographical constraints such as steep slopes are more difficult to cultivate but are very important for their biodiversity, cultural and landscape value. Such marginal areas need to be valued for their ecological value and their management should ideally be based on agro-ecological basis.

Young farmers and new comers in the sector should be trained to place more focus on the management of agro-ecosystems and their services to promote cross-sectoral sustainability in agriculture. Biodiversity plays a key role in increasing resilience to ecosystem changes and disturbances arising from climate change. The role of biodiversity in ensuring productivity and ecosystem resilience should be made clear to the farmers who will still be active in the coming decade to enable them to sustain their livelihood and maintain the farmland that is a public good. When one considers the small size of the Maltese Islands and the increasing urbanisation trends, the countryside and open farmland can be considered as the islands' remaining green area. Thus, young farmers have to embrace a resource conservation approach that provides for agro-ecosystem services.

Apart from the benefits related with farm productivity and reduced input costs, farmers should comprehend that investing in local landraces (and by-products) could be crucial for a thriving agricultural sector in a changing economic and climatic scenario. Farmers should aim at transforming their role from mere food producers to true land stewards in terms of agri-environmental managers of the countryside in order to protect, maintain and where required restore its environmental qualities. This approach will secure a wider role for the farming community and a larger appeal with the general public whilst opening up opportunities in the tourism industry that have not yet been sufficiently exploited by the farming community.

Training, cooperation and involvement of the private sector and businesses in environmental conservation should be encouraged. There is a marked gap between the farming population and environmental entities that is reflected in the limited application of existing research material on sound approaches and technologies, market-based instruments and green accounting. In turn, pertinent reporting systems at a national level are lacking on this aspect with most entities utilising unreliable data to evaluate the agricultural sector. Moreover, the integration of business and entrepreneurs with farming community does not only boost the technical knowledge but also provides networking opportunities with potential customers as well as exposure on an international platform.

3.04.04 Competitiveness and diversification

The fourth strategic policy objective that was identified for the development of the National Agricultural Policy involves 'competitiveness and diversification'. Following a consultation process with various pertinent stakeholders, a set of themes relevant to this policy objective were integrated into an Issues Paper that was discussed during the national conference event, in which the working group in charge of this policy objective issued a SWOT analysis and proposed recommendations to include in the upcoming policy measures. A total of twelve (12) policy issues were identified for this strategic policy objective and the arguments refer to both the 'crop production' and the 'livestock breeding' sectors. As indicated in Table 63 below, each area is being given a reference number that reflects the order that is followed in this chapter.

Policy Objective	Sector	Reference	Policy issue
Competitiveness and diversification	Crop production and Livestock breeding	3.04.04.01	Demographics
		3.04.04.02	Farming skills
		3.04.04.03	Capital investment
		3.04.04.04	Profitability
		3.04.04.05	Working conditions
		3.04.04.06	Planning permits
		3.04.04.07	Cooperation
		3.04.04.08	Production Targets
		3.04.04.09	Niche markets
		3.04.04.10	Tourism
		3.04.04.11	Organic farming
		3.04.04.12	Access to finance

Table 63: Policy issues identified for Policy Objective 4 with reference number

This strategic policy objective includes twelve (12) policy issues that are considered essential for the development of a competitive farming sector, and is especially addressed towards young farmers and new farm entrepreneurs. These policy issues were identified as intervention areas that have to be strengthened in order to steer the Maltese agriculture industry towards sustainability. More information on these sectors is being presented in Chapter 2 above that provides a general overview of agriculture in the Maltese Islands and sector-specific situation analysis. The appraisal of these themes was carried out in view of the issues that are hindering progress as well as in line with strategies that are already in place. In most cases, these themes require intervention that leads towards the transformation of the prevailing agricultural practices that are hindering competitiveness and diversification from coming to fruition.

Figure 13 below provides a summary of the SWOT items that were identified for the fourth strategic policy objective 'competitiveness and diversification'. This is followed by a concise analysis of each theme that was identified for this policy objective in line with these SWOT items, and in the format presented in Table 63 above.

Figure 13: SWOT analysis for Strategic Objective 4 – Competitiveness and diversification

3.04.04.1 Demographics

As already indicated in considerable detail in Section 2.02 above, the farming population in Malta is predominantly ageing but the amount of registered farmers is still very high when compared with the active segment. This creates management and enforcement issues since the goals of recreational farmers hamper the endeavours of active farmers who invest in the sector from which they strive to make a living. Apart from the ageing farming population, most often the conservative mentality of most elder farmers restricts the entrance of new entrants in the sector by denying them the opportunity to transfer land or hand over the production capital. In most cases, young farmers are incentivised to search for more secure jobs to supplement their farming income or replace it completely.

Unfortunately, not much is being done to reverse these worrying demographic trends. The farmer demographic situation is alarming and the statistics show a clear increase in the average age of farmers and an inability to generate new entrants in the agricultural labour market. There are also skill mismatch issues where agriculture students graduating from higher educational institutions are not always being absorbed by entities or sectors that are directly related to agriculture. The prospect of new farmers entering the sector from a non-farming background intending to make a living from it is very remote since the costs associated with capital outlay and land acquisition are prohibitive. With the amount of capital required to set up an agricultural activity, it is considered much more viable to invest in other sectors which promise superior benefits and returns on investment. This, however, does not imply that there are no means with which new entrants can be attracted to invest in the agricultural sector. The answer lies in thinking strategically and investing in innovative start-ups and incubators.

The small size of the Maltese Islands presents an opportunity to invest in concepts such as ‘zero kilometre food’ to increase the attractiveness of local produce. However, the conservative mentality that does not embrace innovative concepts and is reluctant to attract entrepreneurs for capital investment in the sector, needs to be superseded. The problem needs to be tackled strategically, primarily by addressing the main issues for which entry rates into farming in Malta are declining and the sector is predominantly considered a part time activity. These issues include lack of professionalism, inability to bridge demand and supply, lack of adaptations skills and guidance to increase flexibility to face future challenges, amongst others. Policy measures targeting these hurdles are being presented in this policy document to secure those farmers who are already considering to leave the sector for a more stable career, as well as to create an attractive industry for new comers.

A conservative mentality is still embraced by most of the older farming generation, who experienced a totally different scenario with a higher profit margin through less effort and who are generally far less motivated to invest in farm improvements due to a dwindling profit margin. Most young farmers are willing to invest to become more efficient but, in most cases, the diminished profit margins discourage such investments. There are also young farmers who are conditioned by their own parents since early childhood and thus reproduce the same approach and attitude. Financial instruments and land transfer schemes are two (2) tools that could encourage young farmers to improve their operations and become more effective.

Education and training are two (2) other aspects that farmers have to be encouraged to embark on and for which they should get certification that is valid for farmer benchmarking schemes.

The farming population in Malta and the representing authorities do not have an embedded research culture, making the gap between research and agriculture in Malta far more difficult to bridge. This has led to the entrenchment of a traditional approach to farming practices in which young farmers are left with little motivation to expand their operation or tap new markets. Research is the backbone for innovation and the Maltese agricultural sector is suffering the consequences of long years in which agriculture oriented research was missing. The gap between research and agriculture has led farmers to keep practising outdated methods whilst support from advisory and extension services remained negligible. Nevertheless, there are various opportunities in the agricultural sector in Malta that can be tapped through a professional approach including market research and a planned business orientation.

3.04.04.2 Farming skills

As pointed out in section 2.02 above, agriculture has a strong intrinsic social aspect and it is primarily identified as a lifestyle. Young farmers inherit farms or fields together with the means to work in the sector consisting of a gruelling work ethic, a compendium of rural skills and a technical vocabulary that are entirely alien to the non-farming population. Farm skills can be improved and upgraded through education, research and capacity building. Nevertheless, the farming lifestyle does not permit much free time for the farmer or livestock breeder to engage in formal education. Moreover, most adult farmers encourage their children to embark on more stable employment opportunities to give them a chance to improve their standard of living. This is creating a rural skill drain in rural areas and, when coupled with the general traditionalist approach of the elder farming population, it is stifling agricultural progress in Malta.

Various training courses for farmers to acquire new skills and training were carried out mostly through compulsory courses related to pertinent regulatory frameworks as well as through RDP 2007-2013 funded projects. The latter involved courses that included themes such as innovative approaches to farming, IT literacy, cooperation, integrated pest management, animal husbandry skills, health and safety and nitrogen management. The RDP 2014-2020 programme envisages two (2) measures that will specifically target knowledge transfer, information and advisory services.

Farming in Malta has a strong traditional aspect inherent to it with skills and knowledge being primarily acquired through practice. Farmers often speak about the inheritance of their skills to their offspring as a basic means to cultivate the land and do not embrace innovative forms of farming or new comers who would have strong models that could be successful in the Maltese scenario. Unfortunately, most adult farmers dictate the farming chores and discourage their children from carrying on their trade and exhort them to seek better employment opportunities.

This traditionalist approach to farming is a crucial aspect in the promotion of a rural skill drain that is stifling agricultural progress in Malta since the sector is not well equipped to respond to a constantly changing economic scenario.

There are various opportunities through which Maltese products can enhance their market value but more investment is required to highlight and promote those characteristics that make these Maltese products unique. This would rejuvenate the sector by making it more attractive as a career and reverse the current rural skill drain. A major threat that should be tackled to attract entrepreneurs and capital investment in the sector is the conservative mentality that does not embrace innovative concepts that link with the unique characteristics of the Maltese Islands. The agriculture policy is targeting the main issues responsible for the declining entry rates into farming in Malta. Prominent amongst the goals of this policy is safeguarding skills that can be lost with the current farming generation. Various policy measures are intended to target these issues in order to halt those farmers who are already considering to leave the sector for a more reliable career, as well as to create an attractive industry for new comers. As pointed out in the previous two (2) chapters, consolidation of land holdings and resource sustainability are considered as vital aspects in the quest to strengthen the competitiveness of Maltese agriculture. These are essential factors to consolidate the livelihood of young farmers and livestock breeders as well as attract new comers in the sector such as farm entrepreneurs who can employ skilled farmers in the management of their business.

A weakness pointed out during the consultation with stakeholders is that Maltese farmers and livestock breeders depend on imported machinery and tools since the local industrial base lacks the economy of scale to produce them locally. Nevertheless, faced with restrictions to work in small fragmented agricultural land and landless livestock farms, they found means to utilise their skills and adapt to situation-specific agronomic techniques. Maltese farmers adopted micro-cultivation techniques and practices that cater for the geographical conditions and market situation in Malta. In some cases, imported machinery was modified to cater for the local situation but this does not imply that Maltese farmers can compete with direct competition from non-EU and intra-EU imports. The response to competition on an open market should be focused on farmers becoming more effective and trying to compete on a quality-based production through better presentation, traceability, and functionality of their products.

One of the most promising opportunities for farmers is to be incentivised to test their skills with the production of local landraces that are more adaptable to the Maltese geo-climatic conditions and through which a higher premium can be obtained in the form of niche farming. Through the investment in profitable niche markets, young skilled farmers can sustain their farming career or supplement their mainstream operations by investing in product diversification that is conducive to rural tourism. Innovation and adaptability to the market together with creativity should replace conservative aspects. Maltese farming needs to wean itself from its dependency on quantitative food production and should explore synergies with the service industry exploiting the potential offered by rural tourism, petting farm tours, formal education, food literacy, recreation, environmental management and other rural resources that are ripe for the picking.

Another opportunity identified in the SWOT analysis is the need to motivate farmers to apply for EU funds and employ/contract professional people to manage their funds and projects. Generally, farmers are more focused on the production aspect and lack the knowledge of procedures required to apply for EU funds. Since farmers obtain no support or assistance in their planning decisions and in the actual application phase in the form of advisory services, they hire private consultants to draw up planning reports and applications. This creates further costs that in some cases can be recovered through the same EU funds, but even then, most farmers feel intimidated by the bureaucratic hurdles they have to face for reimbursements, claims and filing in relation to the management of such projects. Effective advisory services could be funded through the RDP 2014-2020 to cater for customer care, one to one assistance and follow up with the farming community not just during the application stage or when claims are due.

Farmers and livestock breeders can be up skilled to re-use by-products, utilise alternative water sources, create energy from farm waste and provide opportunities for green employment that can attract more service jobs whilst reducing the impact of farming on the environment. The latter provide various opportunities for members of the rural community, such as farm family members who could be interested to follow a green job career. A circular economy where by-products and wastes are utilised to the maximum potential would be the ideal scenario in all industries, including agriculture.

3.04.04.3 Capital investment

Investments such as in land and labour can often be more productive if capital improvements are made. For example farmland can be upgraded by enhancing soil fertility, inputting organic matter, through cultivation and through improvement of water drainage, whilst the supply of water can be augmented by constructing reservoirs and improved through irrigation systems. These land improvements require capital resources that can vary between durable and working capital. Durable capital is made up of items that last for a long time, such as machinery, equipment and buildings. Working capital consists of the money used to buy stocks of inputs and materials, such as seed and fertilizer that are generally used within a season as well as other items paid in advance of income earned, such as wage bills, maintenance and repairs.

As pointed out in Section 2.02 above, most basic resources such as farmland or animal farms are very difficult to obtain by persons coming from outside the sector. Capital investment in farming is also very high and when one compares the profit margins, a farmer must have a considerable amount of productivity to make a living from the sector. In fact most active farmers argue that it is no longer possible to make a living with small land holdings or small animal farms. Small-scale farmers like the case of Maltese farmers often have very little cash capital and most of it is physical capital found on their farms and thus efficiency on the use of land and resources is essential to reduce costs. Thus, to improve efficiency of the farm, the farmer should consider ways to increase yields to try to obtain higher returns from the produce.

Capital is nearly always in short supply and needs to be used efficiently. If capital is the most limiting factor, the farmer would look for ways to increase production, perhaps by investing in high yielding seeds (instead of ordinary seeds) or by investing in a more efficient technology. However, there is also an opportunity cost of capital. If a farmer allocates scarce financial resources to a particular resource, it might not turn out to be the best way to use that money as s/he could have gained more by investing it elsewhere.

A weakness identified in the SWOT exercise is the absence of sound management structures in agricultural organisations. Leadership, sound administrative setup and planned decision-making are urgently needed in most agricultural sectors in Malta. The general lack of cooperation exacerbates inefficiencies and wastage of capital through duplicate investments on an individual basis. Young farmers are leaving the sector since their production capability and bargaining power are very poor. An effective cooperative approach would alleviate most of the economy of scale issues faced by local farmers, thus providing them with a scope for investing and diversifying their operations. The creation of functional cooperatives or farmer clusters is essential so that the sector can be re-organised to plan the production according to demand, strengthen representation with authorities, process excess production of certain crops, reduce production costs through collaboration, promote best practise, as well as carry out research and targeted information campaigns. All these aspects will facilitate decision-making and farmers will be able to lobby with authorities instead of expecting them to solve all their problems.

EU funds are an essential form of capital injection for the farming community and a driver for innovation. Farmers require professional support for their planning decisions, including for EU funding opportunities. Some farmers who benefitted from the RDP 2007-2013 funds claim that they are reluctant to tap funds from the RDP 2014-2020 programme since the planning and implementation process was cumbersome. Thus, functional advisory services should be funded to cater for 1) customer care, 2) one to one assistance and 3) effective follow up with the farming community. There are various EU funding opportunities that are being missed by young farmers due to lack of time at hand and resources to spare on extra projects that are perceived to go beyond the main farming activity. The RDP 2014-2020 provides ample opportunities for young farmers who are rewarded in all measures through point systems as well as incentivised directly to apply for Measure 6.1 that caters for young farmer projects that are 100% funded and capped at €70,000. Nevertheless, the parameters linked with accessing funds under the Young Farmer measure is being deemed restrictive by most young farmers.

Income, educational research and land ownership are considered critical factors to motivate the younger generation towards investing in a farming career. There is a need to create an environment for people who want to take up farming as a profession but they require good financial returns to thrive. A drive towards securing innovative means to support capital investment in agriculture is present in other countries and best practices should be adapted to the Maltese scenario to make away with conventional methods.

3.04.04.4 Profitability

Lack of profit is keeping young farmers away from the sector and spurring them to search for other jobs. Working conditions and payment terms are not encouraging, whilst the capital investment requirement is prohibitive. The strong backyard industry that sustained the sector up till a couple of years ago collapsed with the introduction of rigorous regulations that have imposed considerable financial burdens on farm operations. At the same time, those resources (e.g. manure) that were previously utilised are being discarded and replaced with expensive imported alternatives. Despite the significant volume of produce Malta has generated over recent years, current practices and limitations are straining natural resources such as soil and water.

Innovative initiatives being taken within the agricultural sector are occasional and driven by the private sector on an individual basis such as in agro-food processing, value added production, market-driven grading and packaging, product transformation and presentation, amongst others. However, since fragmentation and individualism prevail, most farming sectors are not ready to benefit from such innovative initiatives. There are cases where farmers are well placed to exploit such opportunities but there is a networking gap between them and investors that should be addressed through effective policy measures.

A strength identified in the SWOT exercise is the small size of country that makes it ideal for zero kilometres concept. Any opportunity that increases the quality parameters of local produce should be adopted to enhance profitability at the farm level. The concept of producing more and better from less should be applied across the board by emphasizing on quality based production that is consumer-oriented. The small size of the Maltese Islands presents one of these opportunities to invest in concepts such as ‘zero kilometre food’ and reduced carbon dioxide pollution. Such investments require addressing or avoiding the conservative mentality that refutes innovative concepts. Aspects that are reducing farming profitability such as lack of professionalism, inability to bridge demand with supply, lack of adaptations skills and guidance to increase flexibility to face future challenges, should be addressed holistically. Policy measures targeting these hurdles are urgently required to capture those farmers who are already considering to leave the sector for a more stable career, as well as to create an attractive industry for new comers and investors.

Long term direction in any economic sector should be consolidated by targeted research. Unfortunately, agriculture in Malta does not have a sound research-based foundation. This has led to a traditional approach to farming practices in which young farmers are left with little motivation to expand their operation or tap new markets. Most Maltese farmers are still practising outdated methods and finding little support from advisory services to invest in innovative means to become more profitable. This does not imply that there are no opportunities that can be pursued by the agricultural sector in Malta. The latter require a professional approach including market research and a planned business orientation aimed at producing a profitable farming model that is apt for the twenty first century.

An opportunity pointed out during the consultation session is better co-ordination between higher educational institutions and collaboration with the business community. This could lead towards the creation of tailor-made courses that link farming with innovation and adaptability to market demands in order to assist farmers and investors in the agricultural sector. Collaboration with business community to create efficient production systems such as through public private partnerships would also help to steer the future farming community towards reaching sustainability goals. Effective collaboration between higher educational institutions and the business community would imply that agricultural students are provided with the resources and opportunities to incubate their ideas rather than being passively involved throughout the curriculum.

Another opportunity that was identified during the SWOT discussion is the developing agribusiness community and general interest in the sector. This aspect should be exploited both from the producer and consumer perspective. It is a positive element to have a community that is interested in pursuing agriculture and consumers that seek to learn more on the crops that they consume. With the advent of social media, customers are being constantly exposed to marketing campaigns on pre-packed and frozen food products. These challenges have to be targeted by focusing on quality-based production and addressing the main stumbling blocks that are hindering access to farming. An interested agribusiness community could also facilitate innovative means to retail agricultural produce such as through community supported agriculture or through online commerce platforms.

The fact that there are qualified persons not working in the agricultural sector can be viewed as being both the cause and contributing to the effect of lack of profitability in farming activities. Since the agriculture sector is perceived as not providing a secure lifestyle and is predominantly traditionalistic in approach, most qualified persons who own the means to pursue agricultural activities tend to search other opportunities. Such persons hailing from the agricultural community are a major asset for the agricultural community when they serve as Government officials or in various advisory roles. Nevertheless, they are most often attracted by other sectors that offer better conditions. Through directed investment and sectoral upgrades, qualified persons in agriculture can be recovered and others can be motivated to secure a career in farming or an agriculturally related sector.

Embarking in direct sales through the removal of middlemen in the production chain leads to a better profit margin for the producer and reduced costs for the consumer. Investment in grading, packaging and labelling all add up to the creation of a homogenous and functional product that is more profitable for the producer. Farmers and livestock breeders can compete on an open market and remain sustainable through such investments as quantitative strategies need to be challenged with quality and traceability. This aspect also raises the issue of who should set the product price as for example the fruit and vegetable sector is based on the Pitkali prices issued by the Pitkala even when the produce is sold at Farmers' markets.

3.04.04.5 Working conditions

The turnover from farming is not enough to compensate for the expenses and hardship incurred by the sector, especially if farmers calculate the time spent performing their farm chores and evaluate the opportunity cost of investing it in more fruitful initiatives. In most agricultural sectors, there are glaring deficiencies in grading and traceability mechanisms that undermine the effort invested in quality production and processing. The middleman is controlling the profit margin in most sectors and the farmer is being given the least possible price. Thus, effective means to ensure product traceability have to be found for the local scenario to safeguard best practise and consumer needs. Most consumers in Malta still choose local for its intrinsic taste, but they have to be exposed to the health attributes of consuming fresh products, the environmental considerations, social aspects, food security issues and more. Moreover, all this has to be backed by scientific evidence that can be relayed to the consumers.

Hardship on the place of work is being counteracted by investing in innovative machinery that reduces manual work and facilitates the farmer's job. Nevertheless, such investments are not easily recoverable and sometimes are not justified by the real turnover from the farm business. Other investments are simply not possible due to the small (and fragmented) size of farms and fields or since the planning process does not permit such investments. The latter may be related to large scale investments or to a rural policy that does not embrace change and innovation in a sector that is linked with Outside of Development Zones. With a functioning farmer benchmarking system and more enforcement in place, progressive farmers could find the favourable conditions to invest in sustaining their profession.

There is a general lack of farm managers and leaders who can organise farmers in effective operational groups. Thus, most farm cooperatives employ external experts to provide guidance and coordination. Agricultural organisations have various roles, amongst which, ensuring fairness amongst members, reduce replication and resource wastage, represent their members and serve as their lobby group. A cooperative approach alleviates most of the micro-farming issues faced by local farmers and this provides them with a purpose for investing and diversifying their operations to improve their working conditions. Moreover, higher educational institutions can facilitate the working conditions in the agricultural sectors by providing tailor made courses for managers that focus on innovation and adaptability to market demands. The latter can be achieved through effective collaboration with the business community where students are provided with resources for business incubation in order to create efficient systems that can improve their future goals.

A threat identified by stakeholders points at disheartened young farmers not willing to invest in farming. Apart from the profitability issues, the dignity of farmers and their empowerment is being catered for in the new policy. The lifestyle of most active farmers and breeders deteriorated with a less flexible job, more time required on the farm or field, reduced profit margins, lack of free time, and an increase in the amount of paperwork. Extension services for farmers and breeders, even through farm visits, could alleviate time and resource wastage in a sector that does not permit much time away from the farm or the field.

3.04.04.6 Planning permits

A common issue identified by participants involved in the national consultation event as hindering process in the farming sector was the planning process for agricultural development in Outside Development Zones (ODZ). They claimed that the Rural Policy Guidelines issued in 2014 cater for various forms of agricultural developments but seldom address the genuine needs of farmers who aim at operating in an efficient and effective manner. The Agriculture Advisory Committee was set up under the *vires* of the Development Planning Act to assess the agricultural needs of application by farmers to construct ancillary buildings in ODZ.

Agricultural operations take place in farmland which is generally ODZ and sometimes in environmentally sensitive areas. Basic applications for agricultural stores are restricted with footprints that are not adequate for active farmers utilising modern machinery, which in turn either discourages investment in modernisation (limiting access to EU funds) or costly equipment ends up stored in dilapidated structures or left outside to the mercy of natural elements. The rural policy bases the footprint allocation on the amount of farmland registered on the applicant whilst taking into consideration the amount of footprint already available on such land. Nevertheless, innovative applications for development by farmers are being reviewed by the Agriculture Advisory Committee on a case by case basis to assess the value added benefits on the rural economy and the environment. The applicants are being required to submit a business plan or operational plan which justifies the need of the development for the agricultural activity under consideration.

As already pointed out in previous sections, there are various Maltese quality products that have a potential for commercialisation. It is imperative to secure standardization in presentation through grading, marketing standards, traceability and on-the-market controls that can secure a strong link with customers. From a rural planning perspective, proposals for the construction of a multitude of buildings for on-farm grading stations and packaging, particularly on small land holdings or farms, would contribute to the further intensification of buildings in the countryside. Cumulative impacts on undeveloped rural land, the rural character, openness of rural areas and the landscape could be of concern. Thus, small-scale on-farm facilities in a rural context should be linked with a considerable amount of produce that makes the development justifiable such as for a cluster of farmers or an extended family farm unit. In other cases, centralised or regional stations should be considered.

A general lack of published data and research to back agriculture in Malta is a major weakness that may have helped perpetuate the conventional approach to farming operations. There are various opportunities in the agricultural sector in Malta that can be tapped through a professional approach including a planned business orientation, as well as research that targets innovation and market commercialisation. The lack of pertinent data in the agricultural sector also affects planning decisions since it detracts from the quality of business plans, Project Description Statements, Environmental Impact Assessments and other reports.

Most often, prospective young farmers do not have access to land or have no land ownership status and thus it is not within the farmer's remit to select a site for farm improvement or investing in upgrading the operations.

Thus, certain land ownership requirements in the planning process, albeit necessary, may create difficulties for prospective young farmers when starting their operation.

The Rural Policy should be geared to embrace those situations where entrepreneurs invest in innovative rural projects from which the farming community stands to benefit. Nevertheless, there should be mechanisms in place to prevent abuse such as farmers' classification schemes, business plans or operational plans and declarations.

The opportunity of enhanced collaboration between higher educational institutions and the business community can lead to the creation of innovative approaches in agriculture and rural businesses that have to be catered for in the rural planning policy. New developments in the food production sectors such as hydroponics, aquaponics, vermiculture, insect protein farms and snail farming should not be obstructed on the basis that they may have been submitted with the intent to bypass the policy in order to gain structures for recreational purposes. The same applies for situations where entrepreneurs invest in innovative rural projects from which farmers stand to benefit, especially if there is the collaboration of research and educational institutions. The latter can involve research and development of non-conventional crops or the diversified utilisation of existing crops to produce food niches, health products, beauty products, pharmaceuticals and essential oils or investment in rural tourism and eco tourism activities. These and other forms of investments are eligible for funding through the RDP 2014-2020 programme and thus have to be catered for in the planning process.

The rural policy is one of the major issues cited by farmers as being demotivating to reach their goals. The planning approach should evaluate the farmers' status, the needs of the project for the macro perspective and follow a case by case evaluation that is not rigid with the needs of the agricultural sector. There is the need to address pressures for speculative development in the countryside, mainly by adopting the benchmarking system for active farmers and preparing clear guidance by the Directorate of Agriculture and the Environment Resource Authority on the genuine need for certain types of agricultural structures taking also into account the characteristics of Malta's countryside and its environmental qualities.

3.04.04.7 Cooperation

Several cooperatives were formed in the Maltese agricultural sector along the years and some are still operative. However, the set up of most cooperatives does not meet the needs of the current economical scenario and most are not properly organised to face the challenges posed by the open market shock following Malta's accession to the EU. Cooperative structures in Malta are mostly involved in providing basic services to farmers such as through farm shops that supply basic resources (such as seeds, animal feed, vaccines, and consumables), representation with authorities, and training courses. The organisational structure of some cooperatives is minimal and based on a committee composed mostly of farmers or breeders who follow a statute, without the necessary

professional human resources to back long-term decisions, innovative approaches, diversification and strategy formulation. Cooperatives that provide professional services such as technical advice and follow up with their members are the exception and others should follow successful models that already exist in Malta.

Unfortunately, the setting up of Producer Organisations through the RDP 2007-2013 funding regime were not as fruitful as originally desired. The RDP 2014-2020 for Malta has committed a large percentage of funding for cooperation measures that link with various forms of clustering and operational group setup formation based on innovative approaches. Nevertheless, farmers and livestock breeders require technical assistance to be able to develop innovative co operational projects to tap such funds and to manage projects relating to the setting up of operational groups.

Collaboration should not only be limited to the producer level as operational groups should collaborate throughout the whole value chain. The latter is a term used to describe the system of products, organizations, processes and transactions involved in transforming raw materials into products that are sold and consumed. These include primary production, collection, processing, wholesaling and retailing, as well as support functions, such as input supply, financial services, transport, packaging, advertising and the provision of advisory services. The value chain reflects an understanding that value is added at each point in the chain and that all parts of the chain are inter-dependent for the overall functioning of the system.

The essence of a value chain is a market-focused collaboration with different business enterprises working together to produce and market products and services in an effective and efficient manner. Sound collaboration in value chains requires advice and extension services to develop a set of skills required for farm business management that is capable of responding successfully to the rapid changes taking place on the market. Moreover, managers of collaborative structures should comprehend that improving the farmers' business also depends on social factors such as relationships and other personal commitments. Farm advisors should also understand that farmers often feel alone and unsupported in making changes to their farm businesses and because such changes can be very uncertain, they require assistance to overcome fears and reservations.

Since the agriculture sector is perceived as not providing a secure lifestyle and is predominantly traditionalistic in approach, most qualified persons who own the means to pursue agricultural activities tend to search other opportunities. Such persons hailing from the agricultural community are a major asset for the agricultural community and are especially needed in leadership positions of farmer groups. Nevertheless, they are most often attracted by other sectors that offer better working conditions. Farmer cooperatives or producer groups should be incentivised to avail of their services even if on a part-time basis or through sub-contracting. This will increase professionalism and assist farmers to invest in novel technologies by finding the necessary support and guidance. Cooperatives and farmers groups could achieve far more through these services since assistance to a cluster of similar-minded stakeholders is more effective and progress can be achieved more rapidly through a collaborative approach.

Lack of leadership, individualism and unnecessary intra-sectoral competition are stumbling blocks that dishearten young farmers from investing in their future. One of the participants in the national conference event claimed that it is really difficult to work as a team with rural communities and thus networking between farmers and consumers is required so that they can work together for a common good. In other countries, successful rural businesses embarking on innovative methods or processes are usually composed of small clusters of farmers and other interested stakeholders with a role in the investment. This could be the ideal scenario for Malta where such clusters can tackle the production chain issues, engage professional management, verticalize their production and deliver a branded product that suits the market. A farming cluster should aim for equity, consensus, good management, clear goals, innovation, a market-oriented approach, and it should be dynamic and invest in processing as well as production.

3.04.04.8 Production targets

A major issue with lack of profitability in the farming sector in Malta is the lack of vision to match the demand with supply. Production targets are in most sectors non-existent and production is based on trial and error, ad-hoc decisions or even worse on competition with other farmers. Small-scale initiatives to shorten the supply chain and sideline middlemen were successfully undertaken by a limited number of family farm units and by some farmer groups. In the fresh fruit and vegetable sector, experience has shown that direct sales from producers (at farmers' market, the farm gate or from shops) limits the choices for customers who would prefer a one-stop shop for their shopping needs. Customers who are time-restrained tend to prefer doing their shopping in a right-first-time approach where local fruit and vegetables are bought in conjunction with other imported products that are not cultivated locally or are out of season. There are also farmers who supply the hotel and catering sectors directly but most often face the issue of late payments due to lack of organisation and representation. The latter could be mitigated through contractual agreements between the parties, especially if farmers are represented through a producer organisation.

A fragmented supply of agricultural products from small and individualistic producers cannot achieve a homogenous supply of products to the consumer as long as they do not collaborate professionally to ensure the required marketing standards. The degree of product traceability varies considerably amongst agricultural sectors in Malta. Those sectors that have an organised supply chain such as milk producers have strong product traceability.

Other sectors that are fragmented and rely on middlemen for their product retailing or processing such as the fruit and vegetable producers have much more ground to cover to ensure production targets, traceability and the provision of customer-oriented products. As pointed out in the previous section, a cooperative approach would alleviate most of the micro-farming issues faced by local farmers and this provides them with a scope for investing and diversifying their operations.

Existing crop farmer groups do not have an adequate management structure that can embark on production targets, crop planning and ensure a homogenous product placement on the market.
Most farmers claim that misleading advertising with imported produce sold as local produce is a major stumbling block linked with dwindling profit margins. The response to this issue lies within a change in the production model and the *modus operandi* of Maltese agriculture since farmers are competing on an open market with suppliers that have a wider production base that can meet the needs of larger markets more efficiently. Collaboration between Maltese producers should not be based on intuition or trial and error but they need to be backed by sound business planning and market analysis that should either target the local market or niches for the export market. The RDP 2014-2020 addresses these needs and provides funding for innovative practices and processes through collaboration and based on business planning.

3.04.04.9 Niche Markets

Most Maltese farmers are not tapping into quality production, promotion, branding and marketing through niche markets that apart from tapping the local market, could reach the large annual influx of tourists. Most farmers and breeders keep focusing on quantity based production and the local miniscule market that is overwhelmed by local products, let alone with imports. Unfortunately, the mentality of operating as if local producers are still protected by import levies still persists and instead of being innovative and shift the focus on quality niche products or a mix of both, a large segment of farmers and livestock breeders keep on farming as they used to do in the past. Most crop farmers seek to compete with their neighbours (e.g. by planting more of the same vegetables) rather than focus on high-value products or diversify the processing and selling point.

Some innovative value-added production took off lately within family ventures and such initiatives show that they are more lucrative than depending entirely on processors or middlemen to negotiate the farming product. Verticalization is already giving positive results in certain niches but time is not a luxury for farmers and the cost of engaging other employees could not be offset by the low profit margins. Most farmers are not willing to invest into a business turnaround even if they consider it as being a positive move mainly due to 1) the perception that their sector is not lucrative enough to guarantee return on investment, 2) lack of funds to invest professionally, 3) lack of resources or land ownership or permits to carry out certain investments, 4) ageing farming population that is discouraging youths from taking over their business, 5) lack of proper guidance and professional services to back their move, and 6) a combination of these factors.

No industry operates within a vacuum and it is recognised that farming must be sustainable without long term reliance on subsidies and other financial concessions. Specialisation into high value or niche market crops for high end consumers, tourists and specific export markets could assist on the road to agricultural and economic independence for the industry. Exportation of high-end products in a market-oriented approach is a possibility since the Maltese growing season is one of the longest in the EU and out of season products could suit various markets in northern

countries (e.g. garlic, onions and potatoes). This could be achieved through networking, the avoidance of short sightedness and strong collaboration. Other specific factors could also be taken on board to exploit positive elements such as with the case of Malta being a protected zone for the Colorado Potato Beetle.

The geo-climatic circumstances of the Maltese Islands point towards the production of agricultural niches to tap particularities in locally-produced food. Nevertheless, research on production, commercialisation and marketing aspects should precede any investments in niche farming since niches are also subject to fail such as with overproduction of the same niche product. When considering the small size of farms in Malta and the fragmentation aspect, investment in niche products should ideally be undertaken through an operational group setup with a cluster of farmers and other interested stakeholders such as researchers and advisors. This collaboration is an important aspect since such products require alternative forms of grading, packaging, retailing and marketing in order to create a homogenous and traceable product.

It is easier to market and brand local products and niches within a micro state. Farming should be made attractive to new comers through innovative processes and practices. Malta should address the declining interest in the farming profession since awareness amongst the public around food quality is increasing. This can be done by involving the younger generations into the farming world through formal education by integrating farming and food in the curriculum at an early stage. Farming niches are a functional tool to utilise for the promotion of agriculture within a small economy to instil a sense of appreciation towards farming and link it with food security, environmental issues, and healthy eating. Documentaries and ICT media should be incentivised to promote niche products and their link with Maltese agriculture to bridge the gap between the general public and the farming community.

Certain agricultural products in Malta lack product traceability on production and retailing methods. Customers demand higher quality standards and traceable quality production that if not secured on local products, they can opt for imported alternatives. Young farmers need to be incentivised to invest in these basic aspects as they have to secure a future in the sector for themselves and for the agricultural sector in general. There is the risk of having the current active farming population replaced by a large scale farming model that aims at solely feeding the masses or simple substitution by imported products. This would lead to the loss of traditional rural skills and the related particularities of tilling small parcels, maintaining intricate landscapes and producing unique products that have a typical Maltese taste and character.

During the consultation period, various stakeholders identified opportunities in the creation of a seed bank or gene pool preservation of indigenous species that is backed by research on their production and commercialisation in mainstream agriculture. A landrace niche approach backed by farmer and researcher collaboration can be established with aims that go beyond production. Concepts such as preservation, climate change resilience, quality labels, diversification, niche farming, value added production, by products and spin-off industries are some of the opportunities that could be exploited. The scope behind investing in Maltese landraces is that they are more adaptable to the Maltese geo-climatic conditions and a higher premium can be obtained through the marketing of authentic product niches than through intensive farming utilising mainstream

varieties. Through the investment in profitable niches for the local and export markets, young farmers can be further motivated to embark on a farming career or to supplement their economic operations.

The first step towards this direction is being implemented by the Plant Protection Directorate with the establishment of a database and inventory of Maltese plant genetic resources in line with Legal Notice 379 of 2016. This investment was complemented with 1) the upgrading of the laboratories at the Plant Protection Directorate at the Ħal-Lija premises as well as with 2) the setting up of a botanic garden for Maltese plants, 3) a new visitor centre with media facilities and a conference hall in the same site, and 4) the setting up of a new seed laboratory. These developments should be exploited to back projects related with crop and livestock genetic diversity to strengthen the role of agriculture in Malta. The RDP 2014-2020 funds cater for the financing of conservation and research projects related with safeguarding Maltese landraces.

3.04.04.10 Tourism

Current strategies in rural tourism including agro-tourism and eco-tourism are fragmented, lack coordination and do not adopt a multi-sectorial, long term approach. Pressures for rural tourism accommodation, including off-farm accommodation in rural areas, is regarded as any other physical development in the countryside rather than seeking genuine farm diversification by engaging in rural tourism activities that are ancillary to farming. From an environmental perspective, there is the risk of expansion and conversion of agricultural buildings (e.g. livestock farms) into non-legitimate uses in the countryside under the pretext of rural tourism. The latter also increases demand for the take up of rural land for ancillary facilities and thus further reduction of agricultural land.

The lack of effective protection and maintenance of the rural environment, its open natural character, biodiversity and the landscape affect the attractiveness of rural areas for tourism-related rural experiences. In fact, considering its traditional character and fewer buildings in the countryside, Gozo as a whole is a more sought after rural experience destination than Malta. However, there are rural areas in mainland Malta such as the north-west and south-west of the island that contain an active farming population and farm landscape which could be exploited for rural tourism purposes.

Excessive land and property prices in the countryside could limit opportunities for genuine farmers and their households to invest in ancillary rural tourism activities. The pertinent planning and agricultural authorities are aware of the high risk associated with the transfer or rental of agricultural land and properties for other more lucrative activities such as for recreation. This issue can be counteracted through the introduction of a farmer benchmarking system that is linked with innovative farming models so that they are evaluated on a case by case basis backed by a sound

business plan justifying the consolidation of farming activities, that includes training and up skilling of interested parties.

Land ownership is a basic element for farm investment and eventually diversification on value-added opportunities. A farmer or farm entrepreneur would be reluctant to invest on land that is owned by third parties, especially if such investment is aimed for long-term targets. As indicated in the Rural Policy and Design Guidelines, 2014, rural tourism should link with present farming activity as a continuation rather than it being developed in vacuum. This implies that a visitor would be interested to tour existing farm activities and get information on the processes, practices and initiatives which the farmer embarked on to consolidate the operation. Moreover, visitors are also keen to assist in the effective protection and maintenance of the countryside and thus consider environmental qualities of the rural tourism services on offer to reach certain standards. Rural aesthetics ameliorate tourist perception and vernacular architecture such as rubble walls and *giren* (corbelled stone huts) should be protected and displayed. Access routes and signage related to rural tours should be aimed at minimising the confrontation between visitors and other land owners, who should also be taken in consideration when rural tours are being planned.

A policy direction that establishes the rural tourism parameters acceptable for the local scenario is required. Ideally, this would include a mix between agro-tourism investments and rural tourism experiences. The latter implies that the small size of the islands can permit for rural tourism activities with accommodation in nearby villages, thus removing the need for specific agro-tourism accommodation and ancillary structures adhering to a rigid agro-tourism concept. Notwithstanding their potential for hatching diversification initiatives, rural tourism projects need to be decoupled from speculative enterprises targeting opportunities for lucrative physical development in the countryside. Restoration of existing buildings of cultural value and use of land or buildings in traditional rural settlements, urban conservation areas displaying rural characteristics and urban settlements located in a predominantly rural context should be targeted as a priority for rural tourism accommodation. However, parameters still need to be set up and linked with verifiable criteria such as farmer benchmarking system and sound business plans that justify the diversification of farming activities. Opportunities for rural tourism accommodation on most operational livestock farms could be limited in view of the intensive nature of livestock farming in Malta. However, each development proposal has to be considered on a case by case basis to give the opportunity to those farmers who wish to convert part of existing farm buildings for agro-tourism accommodation and related activities.

Individual or group initiatives in rural tourism took off in Malta through organised rural networks or guided tours in the last few years. The RDP 2007-2013 funded some rural tourism projects or rural development projects that assist rural tourism activities. Measure 6.4 in the RDP 2014-2020 intends to further engage rural actors to invest in rural tourism and ancillary activities to farming. However, a policy direction on these forms of investments that reflects the agricultural policy and rural planning policies should be adopted. Adding service provision to the busy farm schedule requires a viable and stable return from such activities that reduce the time working on the farm or field. In most cases, Maltese farmers or farm households suffer from a shortage of manpower and could not support extra activities. Thus farmers have to be organised through collaboration or networking to cope with the customer demand without hindering their production time.

The latter can be improved if there is good planning since production time can be reduced with the introduction of service provision based on the farmer skills and knowledge.

3.04.04.11 Organic farming

Amongst the main inhibiting factors for this sector to gain ground in Malta, one can mention land fragmentation, proximity to conventional farmers and main roads, windy conditions leading to pesticide drift and poor soil conditions. There is a general perception that organic farming production provides lower yields when compared to conventional farming. In fact the production of organic products cannot be marketed on the same quantity-based platform as with the case of conventional products since organic farming demands a shift in all the aspects of production and a customer-oriented approach. It does not merely involve replacing chemical substances with other biological methods but should imply a radical change in farm management that takes time to convert and stabilise a healthy production.

There is currently a control authority for the registration of organic farms, on-farm controls, soil testing and the placing of organic products on the market that is the Malta Competition and Consumer Affairs Authority (MCCAA). The market surveillance and supervision of the control authority falls within the remit of the competent authority, which is the Directorate of Agriculture. With a total of 21 hectares of converted land and 14 farmers registered for the production of organic products, the Maltese Islands have the lowest level of organic farms at EU level (Directorate of Agriculture, 2017). The perceived strict, complex and long process for obtaining permits to attempt alternative ways to farm the land dissuade farmers from experimenting with organic farming.

The Strategic Environmental Assessment (SEA) on the RDP 2014-2020 indicates that organic farming is not being incentivised through the proposed measures. The SEA makes reference to the insufficient budget allocation to pertinent measures where the RDP points out that 'organic farming is extremely difficult to achieve on Malta'. While such difficulties are acknowledged, the RDP should adopt a more pro-active approach and actively encourage and facilitate organic farming through various measures. As some farmers pointed out, embarking on some of the AECM measures would be more economically viable than converting to organic practices, especially when comparing the effort involved (Adi Associates Environmental Consultants Ltd, 2014).

With the availability and easy access to social media, it has become easier to market and brand local products and their characteristics. Organic farming requires particular forms of retailing and marketing where the customer creates a bond with the farmer and even follows on-farm production. Organic product consumers are generally more health conscious and demand proof that what they are consuming at a premium is traceable and genuine. Computer and Internet technology can support these requirements through online ordering, catalogues, retailing and organisation of product delivery.

The younger generations should be exposed to such realities and become involved in organic practices by integrating farming and food in the curriculum at an early stage. Increasing the awareness and supply of Maltese organic products leads towards increased benefits from environmentally-friendly farming and contribute further to climate change resilience and healthy eating. Documentaries and ICT media should be incentivised to promote organic products and practices to instil a sense of priority for action in the younger generation.

Organic products are backed by a regulatory framework that is well monitored and enforced. This aspect places organic farmers and their products on a higher platform than conventional farming. Thus, what is a weakness for conventional farming provides an opportunity for organic farming products. Nevertheless, since the supply falls short of demand, more investment is needed in the form of land identification, product development, research, experimentation and collaboration between investors and organic producers.

Conventional farming methods require large consolidated land holdings to strengthen the competitiveness element of producing the same crop over large land parcels. Organic farming is different as it utilises onsite resources, aims at improving the soil structure, reduces excessive tillage, increases biodiversity, improves soil-water retention and integrates plant companionship. Thus, parcel fragmentation might not in itself hinder organic farming practices as micro crop rotation is applied instead of monocultivation practices. This, however, applies only in cases of fragmentation within a consolidated land holding, in that sources of contamination with third party parcels should be avoided. Rubble walls, plant hedges, and vegetation buffers all assist in creating barriers from conventional farming and other sources of pollution.

The demand for healthy food products is evidently high and customers are asking for a more diversified range of food products. Nevertheless, adequate locations for such practices in Malta and lack of knowledge on production methods might be hindering progress. More support and incentives should be in place to increase organic farming so that more green jobs are created. Organic farming is time-consuming but rewarding and thus good planning and long-term goals are imperative when embarking on new projects. The concept of developing more from less, utilising on-farm resources, reducing costs, embarking on services, tapping new markets are amongst the benefits linked with organic farming that make the time spent on farm more worthwhile.

3.04.04.12 Access to finance

Farm entrepreneurs require access to finance and credit in order to sustain the management of a profitable, market-oriented business. Successful businesses pass through various development stages such as 1) getting established through production and marketing; 2) survive through establishment of income generation that outstrips costs; 3) establish growth by developing a broader product and buyer base while ensuring that the farm business remains profitable, efficient, and cope with the increased production, marketing and management activities;

4) sustain growth either by increasing production to provide more products for sale or by adding value to the product by processing it and/or packaging it; and 5) reaching maturity by halting growth and expansion as the business reaches a balance between the skills and vision of the farmer.

If farm entrepreneurs aspire to create sustainable businesses, they require access to finance as well as technical support that goes beyond the traditional production-led services. Their business will require investment in the upgrading of equipment, in transport to get to the market, to expand production or to add processing. All these interventions require access to finance. Thus, the farmer has to check the available resources, and if s/he does not have sufficient own funds, s/he will require credit. Lack of access to finance could be a major stumbling block for many innovative farmers who target to expand their production or diversify into new high value enterprises. Lack of finance can prevent farmers from expanding the size of their business and exploiting other business opportunities. However, while many farmers think that their main or even their only problem is a shortage of capital, this is often not the case. Most often the problem lies in the management of the capital resources that they have and the lack of training on how to build financial management skills. Although farmers are key role-players, there are other stakeholders involved along the value chain that also require farm management skills and advice. These include input suppliers, traders, farmer associations, processors, other service providers and policy-makers. These people often represent the different stakeholders in value chains, linking production to final consumption. Each of these different stakeholders has a different demand for business management and marketing support. Thus, any farm management support must extend beyond the farm level so that the effort is holistic and coherent.

Access to credit is another major challenge faced by farm entrepreneurs since loans on agricultural investments are not common due to the various risk factors linked with farm production and low incomes. Moreover, most farmers do not have enough assets to obtain credit and thus they do not get favourable interest rates. Maltese farmers are generally more prone to issue their own financing rather than resort to bank loans, as long as there is commitment and security of investment. A typical example is the Measure 121 investment fund issued in the RDP 2007-2013. A large number of farmers and livestock breeders invested through this measure as it secured 50% co-financing. One has to place the value of land in Malta in perspective, since investing on the farm or the land holding constitutes a long-term investment that goes beyond the current value of investment. A farmer can risk a large investment on his land in view of the long term benefits of having such capital assets secured. Lack of cooperation and individualism is predominant in most agricultural sectors in Malta, limiting their production capability and collective investment. A cooperative approach alleviates most of the micro-farming issues faced by local farmers and this provides them with scope and means for investing and diversifying their operations. For example a collective crop planning system can ensure the homogenous product placement on the market. Such a setup would attract investment and increase access to finance through EU funded projects on collaboration as well as through other setups such as consumer supported agriculture, where farmers receive payments from customers early in the season to help with the farm's cash flow and planning to provide the required produce.

Moreover, strong collaborative setups can develop 1) income-deposit schemes to encourage income-saving that can be availed of in lean years to mitigate farm-level risks and linked with the scientific assessment of yield risk, weather forecasting technologies and early warning systems, 2) mutual funds through start-up capital and attracting private expertise, where funds can be used as coverage against specific natural crop failures or livestock disease and technical assistance is provided to improve the financial resilience and portfolio diversification and 3) producer collaboration on sharing risks through product and market diversification strategies with the development of payout regimes to smoothen out fluctuations in returns.

3.04.05 Adaptation to and mitigation of geo-climatic conditions

The fifth strategic policy objective that was identified for the development of the National Agricultural Policy involves the 'adaptation to and mitigation of geo-climatic conditions'. Following the consultation process with various stakeholders, a set of themes relevant to this policy objective was created for the development of an Issues Paper that was debated during the national conference. The working group in charge of this policy objective developed a SWOT analysis and proposed recommendations to include in the upcoming policy measures. Six (6) policy issues were identified for this strategic policy objective and they were grouped in one generic category entitled 'crop production and livestock breeding'. As indicated in Table 64 below, each area is being given a reference number that reflects the order that is followed in this chapter.

Policy Objective 5	Sector	Reference	Policy issue
Adaptation to and mitigation of geo-climatic conditions	Crop production and Livestock breeding	3.04.05.1	Seasonal changes
		3.04.05.2	Severe weather conditions
		3.04.05.3	Adaptation and mitigation strategies
		3.04.05.4	Renewable energy
		3.04.05.5	Carbon sinks
		3.04.05.6	Risk insurance

Table 64: Policy issues identified for Policy Objective 5 with reference number

This strategic policy objective includes six (6) policy issues that are relevant to both the crop production sector and the livestock breeding sector. These policy issues are interlinked since the effects of climate change should be tackled holistically in a joint effort by all agricultural operators.

More information on these sectors is being presented in Chapter 2 above that provides a general overview of agriculture in the Maltese Islands as well as a sector-specific situation analysis. The appraisal of the six (6) themes identified for this strategic policy objective was carried out in line

with the existing climate change strategies that are in place. Moreover, the fact that the RDP 2014-2020 has identified three (3) cross cutting themes consisting of 'environment, climate change mitigation and adaptation and Innovation' was taken into consideration.

Figure 14 below provides a summary of the SWOT items that were identified for the fifth strategic policy objective 'adaptation to and mitigation of geo-climatic conditions'. This is followed by a concise analysis of each theme that was identified for this policy objective in line with these SWOT items, and in the format presented in Table 64 above.

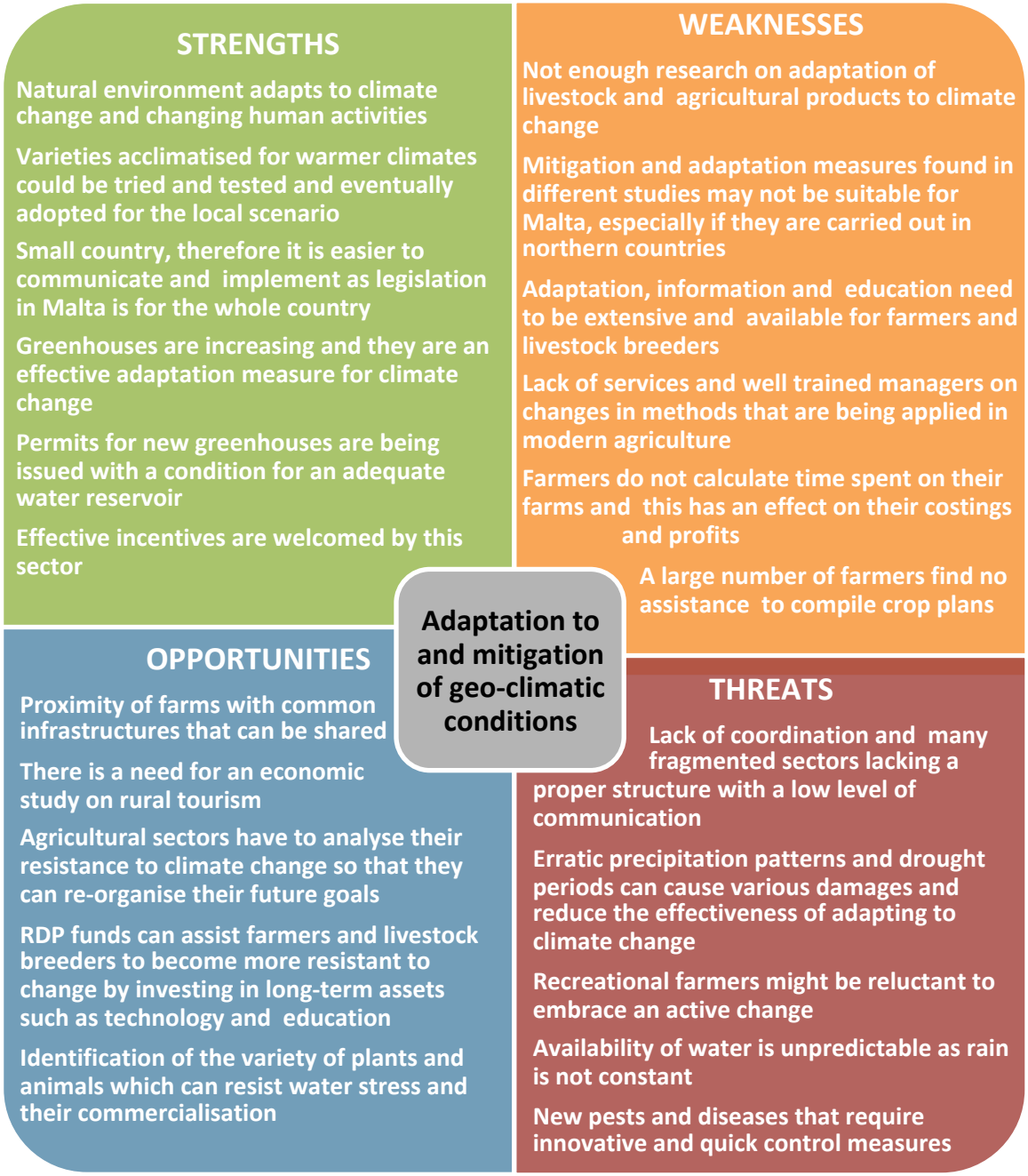


Figure 14: SWOT analysis for Strategic Objective 5 – Adaptation to and mitigation of geo-climatic conditions

3.04.05.1 Seasonal changes

A climate change phenomenon which is causing changes in agricultural patterns and adding climatic vulnerability involves the shifting of seasons as well as unpredictability of weather conditions. Changes in crop growing patterns lead to the need for farmers to adapt to new scenarios, invest in diverse crops and apply more water since rain patterns are becoming more unpredictable. A gradual loss of the Maltese farming able to supply healthy, nutritious and yearlong produce would result in further reliance on external suppliers with pricing subject to fuel price fluctuations, loss of farming skills and knowledge as well as further loss of crop strains that have proven to be effective in the Maltese environment.

Examples of measures taken by farmers to counteract these geo-climatic conditions include storage of rainwater, tapping groundwater for irrigation, use of drip irrigation, building and maintaining rubble walls, augmenting soil quality by adding manure and fertilisers, construction of greenhouses and polystyrene tunnels, creation of wind barriers and livestock farm upgrades to ensure effective climate control. However, with increasing longer summers, severe weather conditions and unpredictable rain patterns, such adaptation measures might turn out to be less effective in addressing climate change. Incentives such as the production of renewable energy from solar panels are welcomed by the agriculture community since they provide added sources of revenue.

During the SWOT exercise, stakeholders argued that the natural environment adapts to climate change and to changing human activities. This aspect can be true but natural adaptation brings more changes and uncertainties in the agricultural sector. A natural cycle is created with reduction in rainfall leading to lack of vegetation and ground cover that cause less evapotranspiration and a drier climate. Thus, every aspect linked with adaptation of the natural environment to climate change and human activities effects the natural cycle which took ages to establish itself.

Agricultural experts should be trained and employed specifically to deliver services related to climate change adaptation and mitigation. A complex subject such as climate change and the effects on agriculture requires professional advisors in the agricultural field who integrate research with processes and practices taking place on the field and farm. Thus, collaboration between research institutions and the business community needs to be incentivised and acted upon urgently. Such research can include monitoring, data gathering, analyses, planning, preparation and implementation of clear action plans to reduce the effects of sudden changes when they occur. Various parameters can be identified and used as indicators to evaluate changes in the quality of life of producers over the years. The data gathered can be linked with climate change patterns to create forecasts and improve future farming trends.

With a changing climate and declining resources, the time is ripe for rediscovering Maltese landraces that are adapted to the local conditions and even experiment with drought tolerant crops that are produced in drier climates. Investment on local landraces such as fruit trees, olive trees, bees, poultry and sheep is increasing since these are more adaptable to the Maltese geo-climatic conditions. Other sectors should follow suit to research the potential of Maltese landraces that were discarded following the introduction of exotic varieties and to create niche markets for their commercialisation.

A major threat linked with climate change is the availability of water. The importance of having a water supply in order to sustain agricultural production and maintain food security on an island state might not be obvious for the layman. In fact, the first decision taken by any person who is interested to cultivate land or breed animals is on the provision of water. Without a reliable supply of water, most farming practices would not be viable and thus investment in this resource should be prioritised in order to secure climate change resilience.

Another direct consequence of climate change and shifting climate patterns is the introduction or the increased resistance of pest infestations and diseases on an unprecedented scale. Maltese organic farmers claim that the range of pest control products available on the market is still limited. Moreover, most certified plant seedlings are brought over from neighbouring countries instead of being produced locally in a certified nursery. The latter provides ample opportunities for the development of employment opportunities, the reduction of input costs for farmers, more control over pests and diseases, stronger traceability and link with territory, apart from more food security and climate change resilience.

The National Climate Change Adaptation Strategy (2012) approved the following set of actions to be implemented by the Directorate of Agriculture to enable the agriculture sector in Malta to cope with changing climatic conditions:

- Embark upon a comprehensive study leading to the design of a National Agricultural Policy (this study served as the basis for this policy document – Dwyer et al, 2014);
- Undertake the appropriate study and action to maintain Maltese agro-ecosystems through the management of agricultural landscapes given the central role they play in contributing to overall resilience to climate change;
- Strive to secure synergy between mitigation and adaptation strategies so as to vitalise agricultural activity since this can contribute to climate change mitigation by 1) reducing its emissions, 2) through the production of renewable energies and bio-products, and 3) by storing and accumulating carbon in soils;
- Strengthen information and advisory support on climate-related matters to farmers and Information and support agricultural workers which is considered as essential for nurturing motivation and preparedness to adapt;
- Establish strong institutional links with the resources authority and higher educational institutions to spur appropriate research on how climate change affects Maltese agriculture and how agriculture can suitably adapt to and mitigate these effects;
- Establish strong institutional links with the resources authority and higher educational institutions as well as other stakeholders to work closely together to design and introduce specific indicators for Maltese agriculture, such as an index for adaptive capacity and vulnerability;
- Work with appropriate stakeholders to study and recommend how local breeds and crop varieties together with new species and hybrids could play an important role in agricultural adaptation;
- Continue to spur through appropriate financing the modification of facilities used for the production of livestock to reduce heat stress on animals while using the best understanding of the chronic and acute stresses that livestock will encounter to determine the optimal modification strategy,
- Work with the rural community to encourage sound land management practices which are essential for soil conservation and which help minimise the impacts of climate change on agricultural soils, as well, encourage long-term management strategies that increase soil organic matter.

3.04.05.2 Severe weather conditions

From the available knowledge on impacts of climate change in Malta based on latest facts and projections until the end of the 21st century, the climate change impact table for agriculture (MRA website) lists the following salient impacts: 1) increased heat, disease, and weather extremes are likely to reduce agriculture productivity; 2) negative effects are greater if extreme climate conditions occur more frequently or persist for longer periods; 3) increased drought conditions will increase soil salinization; 4) projected increase in crop development difficulties due to pollination by insects no longer being synchronous due to early germination/budding and a longer growing season; 5) diseases and insect pests benefit from warming, increasing stress on crop plants and requiring more attention to pest control. Selection of climate-resistant crops will be applied; 6) extreme events such as heavy downpours and droughts are likely to reduce crop yields because excesses or deficits of water have negative impacts on plant growth, and 7) projected increase of heavy rainfall (also with hail) will increase sowing and harvesting problems, including damage to crops and infrastructure.

Apart from shifting of seasons and unpredictable weather, climate change is also being manifested through severe weather conditions. Wind gusts have become more frequent with severe repercussions on crops facing prevailing winds apart from sea spray damage in areas close to the coast. Prolonged drought periods have their toll on semi-arid climates like Malta with a long growing season and increase the dependence on the scarce groundwater resources that in turn deteriorates further due to lack of natural replenishment. Hail storms have intensified and when they hit the Maltese Islands they cause widespread damage on vegetables, permanent crops and greenhouses.

The creation of wind breakers such as prickly pears or cypress trees, reed walls or rubble walls are traditional methods that reduce wind damage. Nevertheless such measures do not always provide enough protection or end up creating other issues such as accessibility to fields, competition with crops or bio-security issues on livestock farms. Innovative means to prevent and combat severe weather conditions have to be studied and applied in the local context. Crops that are weakened by damage from extreme weather conditions become more vulnerable to pest infestations. Yield reduction is in itself a major issue for farmers. Simple on-farm solutions can be more effective than large-scale interventions. One example of on-farm adaptation strategies is strip cropping in which different plants provide wind protection, facilitate nutrient uptake and increase soil stabilisation.

Severe weather conditions disrupt agricultural patterns and can have effects on the seasonal production as well as damage physical assets or natural resources such as through soil erosion. Thus, continuous monitoring of established climate change indicators relevant to the local context should be prioritised and carried out in conjunction with the farming community. The latter could be one of the tasks that could be undertaken through a collaborative approach between higher educational institutions and the business community. Such an approach would be essential to train managers with the sole aim to provide advice in the agricultural sector by integrating research with processes and practices taking place on the field or farm. This service can lead to increased resilience through precautions and prevention measures so that agricultural operators can be equipped to face severe weather conditions.

This could include smart agricultural practices that add to the preparation elements, improved prediction systems, damage repair systems and risk insurance.

3.04.05.3 Adaptation and mitigation strategies

Adaptation and mitigation strategies which include action focused on the agricultural sector in Malta are monitored by the respective entities forming part of the Inter Ministerial Committee on Climate Change (IMCCC). Malta's National Strategy for Climate Change and Adaptation (MRRA, 2012) concluded that even if longer growing seasons and warmer temperatures may bring short-term benefits to the agricultural sector, it is recognised that careful preparation and planning against the range of adverse impacts, is merited, in order to ensure the immediate and long-term sustainability within this sector. The main concerns identified in this strategy include the following: 1) reductions in crop yield and quality as the result of reduced water availability and precipitation variability will have a negative impact on economic players in the agricultural sector; 2) direct financial loss for stakeholders in the agricultural sector is most likely to be further exacerbated by the need for increased spending as a result of damage caused by extreme weather events; 3) reduced crop yields caused by increased summer temperatures and drought risk; and 4) additional problems arising from the introduction of new pests and diseases. The livestock sector is likely to be adversely affected by reduced yields of forage crops and perhaps also heat stress to the animals. Reduced rainfall and consequent changes in drainage of soils may lead to increased soil salinity and damage to soil structure leading to desertification.

A major stumbling block to further develop adaptation and mitigation action in the agricultural sector is the shortage of national data. Other barriers in the planning of such measures include the low mitigation potential of the sector, land use conflicts due to space limitations, and the inadequacy of some areas for afforestation as a result of geological and microclimatic conditions. This is a major difficulty in enhancing sinks in LULUCF, an abbreviated term which stands for 'Land Use, Land Use Change and Forestry'. The latter is one of the sectors under the United Nations Framework on Climate Change that measures and accounts for emissions and removals of CO_2 from land and forests. It is an essential part of the EU climate policy which aims to reduce EU greenhouse gas emissions to at least 40% below 1990 levels by 2030.

More focus should be placed on the creation of a circular economy where by-products and wastes are utilised to the maximum potential in all industries. Agriculture offers various opportunities such as the re-use of by-products, the utilisation of treated sewage effluent, and the creation of energy from farm waste. These aspects create various opportunities for green employment that can attract more service jobs and reduce the impact of farming on the environment. Innovative means to utilise greenhouses to close certain production loops that are currently supplying raw materials through importation, or are non-existent on the Maltese market, should be incentivised.

Planning applications that might seem *avant garde* for farmers or farm entrepreneurs should be considered even if they serve as pilot projects for experimentation (e.g. aquaponics, vermicomposting, protein farms, snail farms, etc). The latter should ideally be backed by a professional business plan in view of their innovative nature. Production units that service other farmers should also be incentivised to produce local raw material such as fresh fodder, composting, by-product production and more.

Other agricultural measures that could prove to be effective to address climate change issues such as planting of indigenous trees on agricultural land and minimisation of soil sealing, lead towards a considerable contribution to climate change adaptation and mitigation. For example, soil sealing reduces water infiltration and recharge of the aquifer, increases surface water runoff and risks of flooding, and could also affect water-dependent ecosystems such as those characterising valleys. These factors and related natural processes are vulnerable to the effects of climate change. However, climate adaptation actions can be perceived as non-concrete by the farming community and thus one cannot assume that such actions will be implemented easily if there is no tangible return linked to them. Since, RDP 2014-2020 measures place climate change as a focal issue, investment in adaptation and mitigation initiatives fall within the scope of this funding instrument, which can be tapped into by the farming community.

Adapting and responding to climate change requires collaboration and communication between stakeholders. Decision makers should consult with a wide target audience and pertinent stakeholders (including agricultural sectors) through a bottom-up approach. The instigation of collaboration between farmers and other rural stakeholders should be prioritised across the board. Farmers and livestock breeders are in the same situation together and resource pooling is one viable option. Teaming up to share infrastructural resources, produce energy, manage farm waste, create by-products, upgrade the marketing aspect and retail products, are amongst some of the opportunities that can be achieved through collaboration.

A cohesive agricultural community is better equipped to succeed in mitigating and adapting to climate change. Sound representation, good communication, and collaborative efforts are amongst the prerequisites to address climate change impacts. Policy instruments to effectively implement adaptation and mitigation measures should be designed to address the island specificities. Strategies on farming should be holistic in nature. For example, farmer benchmarking systems should lead to identify the collaborative farmers and create a point system including climate change indicators in order to reward active farmers with tangible benefits. Moreover, some part-time or recreational farmers tilling small holdings can serve as incubators of climate-adaptable farming practices that could eventually be integrated into mainstream farming. Funding should be made available for such pilot projects and networking created between idea incubators to disseminate best practise. EU funding opportunities are available for innovation, research and development, climate change adaptation and mitigation, as well as information campaigns.

3.04.05.4 Renewable energy

Agricultural measures that link with climate change mitigation include renewable energy initiatives such as the installation of solar photovoltaic panels on farm structures like barns that are more suitable for the Maltese climatic conditions and aim towards meeting future challenges. With most breeders having invested in restructuring of their farms, they did not have the capacity to invest in renewable energy sources, even if such investments increase their farm efficiency. Some opted to hire their farm or barn roof to third parties to install PV panels for a contracted period of time. Nevertheless, through the RDP 2007-2013, funding for photovoltaic panels was issued to thirty eight (38) beneficiaries including farmers and processing companies, who contributed to a total renewable energy production of 435,923 kWh per annum (ARPA, 2016).

An evaluation of the productivity of protected crops in greenhouses utilising integrated photovoltaic panel ceilings is required. This form of investment has just commenced in Malta and more will follow if farm entrepreneurs view an adequate return on investment from such initiatives. Greenhouses are functional multi-purpose units for the production of crops, water collection and energy generation. They have become even more effective and productive per square metre through the integration of hydroponic and aquaponic systems. Albeit, rural entrepreneurship should be promoted and incentivised, farming should always be considered as the main activity in ODZ. Other land use purposes should be complimentary and not take over the productive function of farmland. Farmers and investors should be incentivised to acquire land or collaborate with land owners to create these types of units and involve agribusiness youth and young farmers in the management of the agronomic aspect.

Apart from solar photovoltaic panels, livestock rearing in Malta generates waste that has the potential for energy recovery. With the establishment of the Governance of Agricultural Bioresources (GAB) Agency in line with Legal Notice 149 of 2017, MESDC set up an agency in charge of updating, co-ordinating and implementing the Agricultural Waste Management Plan for Malta. This agency will have the responsibility to manage agricultural bioresources such as manure, slurries and other by-products in a manner that supports the Maltese agricultural sector. GAB will address issues such as making the best use of animal waste as a resource as well as the institutional conditions which producers and operators will require to know in order to plan and optimise their investments and activities.

A case study based on the Maltese Islands entitled 'The Potential Production of Renewable Energy Sources (RES) from Livestock Wastes in Mediterranean Islands' evaluated the potential production of RES from livestock wastes produced in Malta (Attard, G. et al, 2017). The results of this study indicate that the Maltese potential production of biogas is 17,942,115m³, from which 10,092,230m³ of biomethane could be extracted or 1,974 MWh circa of electric energy and 2072 MWh circa of thermal energy could be generated. This case study demonstrates that the production of RES from organic wastes can also have a significant added value, since the potential additional income would include that derived from the sale of biomethane or electric and thermal energy. Furthermore, the study concludes that one should also quantify the income from the savings obtained by replacing chemical fertilisers with digestate (Attard, G. et al, 2017).

Agricultural activities should have a primary role in providing for CO_2 absorption in soil and vegetation. Moreover, there are various opportunities for agricultural activities to embark on since actors in this sector are dependent on the natural environment and the climate, and should thus be incentivised to protect them. Innovative initiatives such as the generation of energy and heat from manure or crop residues still have to be launched in Malta. The RDP 2014-2020 caters for such investments, especially when they are engaged in the form of collaborations between farmers, livestock breeders and other business, researchers, and investors.

Tree pruning material, crop residues, and wood chippings from landscaping activities could also be integrated in the bio-digestion process. However, professional management and trained staff are a must for the successful implementation of bio-gas plants. Large plants may not be suitable for the local scenario since farms are small and rarely concentrated in a particular area. Farm clusters should be incentivised to join forces and invest in small scale biogas units or integrate with businesses to invest on their farms. Maltese farms are generally very small to effectively supply a biomass plant and thus clustering of farm wastes into small biogas plants would be more effective and fit-for-purpose in the local scenario. Small-scale biogas plants are available in other countries and such technology can be replicated and adapted to the local scenario.

Research and data gathering is required to plan investments in renewable energy sources such as biogas. The formation of public-private partnerships and collaborations between higher educational institutions and private enterprises to research and develop such products or related services should be incentivised and supported. Notwithstanding the essential need for the farming community to collaborate, renewable energy initiatives can be driven by the energy industry or investors in collaboration with individual farmers or farmer clusters. The installation of PV panels and wind turbines on farms and the utilisation of stand-alone PV systems in remote fields should be promoted as long as they are not intrusive onto the surrounding landscape. Larger scale PV panel installations in rural areas should only be considered on the roof of permitted agricultural buildings and in disused quarries, where the impact on the surrounding environmental context is determined to be low.

3.04.05.5 Carbon sinks

Agriculture has an important role to play in mitigating climate change through the creation of carbon sinks that absorb carbon dioxide from the atmosphere such as through the increase of the vegetation cover. Malta, when compared to other Mediterranean islands, lacks permanent tree crops and woodland cover. Tree planting requires maintenance especially in the first years when they are still saplings in need of constant watering and nutrients to survive the dry summer months. Thus, without access to water most trees do not survive as by time that their roots start penetrating into the surrounding soil, they are desiccated.

Various afforestation projects took place in various parts of the Maltese Islands in the last decade, especially through the involvement of the PARKS Unit at MESDC. Over the past five (5) years, this unit managed to plant around 12,000 indigenous trees and shrubs in the Maltese Islands, consisting of cypress trees, pine trees, olive trees, tamarisk trees and sixteen (16) other different species. The PARKS Directorate has embarked on a number of habitat restoration projects that shall be implemented in the year 2017. These include five (5) major projects that will result in the planting of around 5,000 trees and shrubs, all native to the Mediterranean basin and the Maltese Islands. Apart from the PARKS Directorate, farmers and land owners also planted more trees, mostly provided from the San Vincenz de Paule Nursery (SVDPN) and other private nurseries. The amount of fruit trees sold in the year 2016 from SVDPN included 1,720 stone fruit trees, 1,023 olive trees, 756 citrus trees, 282 pear trees, 135 apple trees, 2,560 vine rootstock, 1,096 other rootstocks and 1,065 other fruit trees.

The olive tree is one example of a permanent crop that could be further augmented since it has been successfully expanding in the last decades and Maltese olive oil is considered to be of a very high quality. However, in order to extend olive tree production, a solution for the olive waste problem should be found soon. There could be three alternatives for the disposal of olive mill waste, either 1) through composting in a structure that is lined with concrete so that the waste can be spread over a large area whilst exposed to sunlight for drying and is rotated using machinery, 2) deposited in a biogas plant to use it for energy generation, or 3) integrated into farmland to add soil organic matter and increase its water retention capacity.

International research is showing that wet olive cake can be earmarked as a fertilising agent to increase crop yields following a composting treatment. Nevertheless, in the absence of a composting facility in Malta, Maltese olive oil processors cannot compost olive mill waste prior to its integration in soil. Deposition in a biogas plant is not an ideal solution for this small cottage industry in Malta, especially since this waste is seasonal and not continuously supplied for the biogas mix. Thus, the only remaining option at present is to integrate wet olive cake into farmland.

Research and commercialisation on permanent crops that could be up taken by the farming community is required to embark on dual-purpose initiatives for the creation of carbon sinks. Other agro-biodiversity and afforestation initiatives might turn out to be more difficult to introduce amongst the farming community since non-fruiting trees are generally planted on farmland for recreational purposes.

More research work and convincing is required to address the need for tree planting in marginal areas in order to create a cooling effect to the micro-climate and facilitate precipitation. These aspects lead to valorisation of the territory in ecosystem and biodiversity terms, reduce the effects of climate change and improve agro-ecology aspects such as an increase in natural predators.

A strength pointed out during the SWOT exercise is that varieties created in warmer climates could be adopted for the local scenario. This aspect can be effectively applied to carbon sink creation. A range of permanent fruit trees or fodder crops which are adapted to warmer climates could be tested in Maltese conditions to identify areas of intervention for the coming decade. Trees that are considered permanent crops for their ability to provide a commercial viability to farmers should be promoted amongst the agricultural community (e.g. olive trees, figs, stone fruit trees, etc). A mixture of fruit trees with seasonal crops is a beneficial alternative to monocultivation and should be promoted in recreational farms and along margins of commercial farms.

Idle farmland and field boundaries should be incentivised to create carbon sinks that do not cause pressure on natural resources such as soil nutrients and water. Good planning backed by management plans is essential in this regard. Afforestation and tree planting should be considered as an activity that links with agriculture since tree cover sustains farmland. Trees are known to act as sinks for Carbon dioxide (CO_2) and can counterbalance emissions from agriculture in rural areas. The RDP 2014-2020 dedicates an investment measure for afforestation purposes at an advantageous financing rate of 100%. Such opportunities should be availed of to intervene and re-create habitats that are adequately managed through collaboration between interested stakeholders. Beneficial biodiversity is also attracted to trees and shrubs and such organisms can better control pests and diseases. Open farmland with lack of vegetation cover coupled with human pressures such as excessive chemical applications reduce the resilience to pests and diseases. Thus interventions that integrate trees, shrubs and hedges in the landscape should be incentivised.

Afforestation projects and tree planting on field margins should be incentivised on a large scale, as long as resources such as water are not strained. The RDP 2014-2020 could serve as a driving factor to financially assist such initiatives. Farmers usually demand to plant crop-producing species such as olives and fruit trees. However, fruiting shrubs and other shrubs that boost agro-biodiversity should be evaluated and proposed for planting. Education and awareness on non-conventional fruiting species that could be used to create new products such as jams and by-products such as fodder is required. Another aspect that should be considered when planting trees in small and fragmented parcels is the effect on neighbouring parcels. Trees with large root systems cannot be planted next to a field boundary that is adjacent to other fields since they will uptake nutrients from neighbouring fields. There are distances considered for small fruit trees to be planted far from a field boundary but with the financial aid in the RDP 2014-2020 for the maintenance of mulberries and carob trees, such distances should be extended and made clear to all applicants.

3.04.05.6 Risk insurance

Risk insurance related with agriculture requires an extensive supply of information so that insurance providers can analyse various risk elements and cause of market failure. Efforts to improve agricultural risk insurance should thus focus on sound information databases. Moreover, information sharing arrangements with the farming community can increase efficiency and create possibilities for public-private partnerships. The latter could focus on the development of databases and facilitate information sharing as well as access to risk data, insurance coverage and indemnities to increase competition among insurers.

Apart from developing adequate intelligence, insurance subsidies can be created to address market failures that could cover the initial costs of insurance or to help respond to catastrophic disasters for which insurance is not available. The latter can be achieved by creating criteria on which risk insurance can be activated and defined in terms of types and degree of assistance. Such instruments reflect the climate change context where severe weather conditions lead to increased risk exposure.

There is a shortage of similar initiatives in Malta as the agricultural sector is not geared to provide information that would be required to establish risk insurance. Large capital investments in the agricultural sector such as livestock farms and multi-purpose greenhouse structures require financial and insurance mechanisms to mitigate for risks. Moreover, the high risk factors related with weather conditions and a changing climate further demotivate risk insurance initiatives.

The RDP 2014-2020 caters for voluntary risk insurance on crops and livestock with the intention of providing access to insurance against economic losses arising from damage to livestock or crops caused by weather events, pests, diseases or some other form of environmental impact. The pertinent measure will be granting insurance contracts, which cover for loss caused by 1) an adverse climatic event, 2) an animal or plant disease, 3) a pest infestation, 4) an environmental incident, and 5) a protective measure against the introduction into the European Community of organisms harmful to plants or plant products. This measure is thus intended to provide a degree of financial stability to farmers against unforeseen events and make farming more financially sustainable and marginally more attractive to new entrants. In the context of climate change and anticipated increase in extreme weather events in Malta, this measure could prove valuable in helping to sustain the farm sector. In order to benefit from such risk insurance, the crisis must destroy more than 30% of the average annual production of the farmer, assessed by reference to the annual production in the preceding three-year period.

Functioning extension services can provide collective risk management advice to farmer groups or co-operatives. Farmers are most often capable to deal with normal risks but they require assistance to embark on collective risk management strategies and instruments. Co-operatives can be trained to pool risks over time and through diverse market mechanisms so that they can develop payout regimes to smooth out fluctuations in returns. They can also collectively engage in input and output price hedging and diversify risks through product and market diversification strategies. Moreover, co-operatives can directly address farmer risks by imposing certain production practices or marketing requirements on their members as well as by developing and managing shared funds to

provide for risk management. Farmer groups can also serve as a single representative agent when contracting commercial insurance for their members. They are also in a position to develop quality assurance schemes, promote certification schemes, facilitate the uptake of sustainable farming practices and provide technical assistance to develop risk management skills for their members.

Most often farmers do not include the time spent on the farm or field in their costings. If such workings are carried out accurately, preparation for risks can be more accurate leading to less disruption of the agricultural production activity. With all the efforts and capital investment depending mostly on external factors such as the weather, farming is a high risk business that is severely underpaid. A professional approach to agriculture that evaluates the time spent on the farm or field together with other valuable parameters should be used as indicators to evaluate risks. The data gathered can also be linked with climate change patterns to create forecasts and improve future farming trends.

Farmers have to be trained to embrace a professional approach to gather useful data sets that can be utilised for risk management and planning. Unfortunately, basic record keeping is still missing in most farming setups in Malta. Instead of trying to remember every aspect of their setup, farmers can be trained to keep records of basic agronomic data. This leads to 1) better understanding of the processes by the producer, 2) assists scientists to find readily-available data from their target audience, and 3) facilitates policy implementation. Smart technology should be introduced through Smartphone apps that cater for various agronomic aspects such as accurate water application, soil-water retention, fertiliser use, pesticide application, humidity levels, weather conditions and more. Such technologies are already being developed for small farm setups and have been identified as a basic element for the development in agriculture in the upcoming decade. Interested farmers should be guided on how to utilise such technologies as well as on which data to keep and which to discard. These systems are also valuable for transmitting data and collating it into one system, where it can be analysed and utilised for risk insurance, amongst other useful applications.

3.04.06 Research and development

The sixth and final strategic policy objective that was identified for the development of the National Agricultural Policy involves 'research and development'. Although this theme was not presented in the Issues Paper, it was discussed thoroughly in the consultation process as it spanned across all the other policy objectives. For this reason, research and development was identified as a strategic objective on its own and in view that it has a major role to play in steering Maltese agriculture towards innovation and specialisation. The SWOT analysis developed by the five (5) working groups participating in the National conference event proposed various recommendations that link with research and development. These recommendations were identified and grouped into Strengths, Weaknesses, Opportunities and Threats to include in this strategic policy objective. Six (6) policy issues were identified for 'research and development' and they were grouped in one generic category entitled 'crop production and livestock breeding'. As indicated in Table 65 below, each area is being given a reference number that reflects the order that is followed in this chapter.

Policy Objective 6	Sector	Reference	Policy issue
Research and development	Crop production and Livestock breeding	3.04.06.1	Higher educational institutions
		3.04.06.2	Research and innovation
		3.04.06.3	Idea incubators and product development
		3.04.06.4	Smart agriculture and IT development
		3.04.06.5	Internationalisation
		3.04.06.6	Extension services

Table 65: Policy issues identified for Policy Objective 6 with reference number

This strategic policy objective includes six (6) policy issues that are relevant to both the crop production sector and the livestock breeding sector. These policy issues are all relevant to the future development of the agricultural sector in Malta that should aim at becoming more research-oriented and focusing on innovation and specialisation. The appraisal of the six (6) themes identified for this strategic policy objective was carried out in line with the existing European strategies on innovation, IT development and smart farming, as well as keeping into perspective the available funding mechanisms for research and innovation in programmes such as Horizon 2020, cross-border programmes and the RDP 2014-2020.

Figure 15 below provides a summary of the SWOT items that are pertinent for the sixth strategic policy objective 'research and development'. This is followed by a concise analysis of each theme that was identified for this policy objective in line with these SWOT items, and in the format presented in Table 65 above.

Figure 15: SWOT analysis for Strategic Objective 6 – Research and Development

3.04.06.1 Higher educational institutions

Higher educational institutions (HEI) in Malta, which cater for agri-business courses, include the University of Malta and MCAST. From feedback received during the stakeholder meeting, the main issues hindering progress related to HEI in Malta included 1) lack of funding in a subject that requires a large amount of resources to achieve the desired pedagogical levels, 2) skills mismatch where the recruitment of students is not easy as the sector is perceived as not being attractive and does not offer secure future opportunities, 3) lack of collaboration with the business community to develop a differentiated job spectrum that links with the educational level achieved, and 4) a limited pool of experts who keep up with international agriculture developments thus risking outdated or Malta-centred teaching that does not include innovation elements.

Through the appreciation of the various aspects linked with agriculture that go beyond food production, this sector can become a national priority that requires the adequate investment in educational resources, in up skilling and increasing the expert pool, as well as in research and development concerns that are being identified within this policy document. Moreover, agri-business students have to be guided on the comparability of their educational level with particular job descriptions so that they are motivated to achieve higher levels. So far, there is no such framework that links a diploma or a degree with a particular agribusiness employment.

HEI should be incentivised to tap funding opportunities that lead to improvements in the agricultural sector with ripple effects on the consumers and the environment. More should be done by HEI to empower graduates in having a participatory role within their learning experience. They should be trained on how to choose products, identify market mechanisms, provide services and deal with risk management. Students should also be geared towards developing and implementing business planning on niche markets and innovative products. There are various funding opportunities for these types of educational activities.

HEI have various roles to play in the development of a stronger agricultural community in the Maltese Islands. These include: 1) expertise dissemination with stakeholders and consumer training, 2) lifelong learning and part-time courses on re-skilling for managers, farmers, and technical persons, 3) training and up skilling of researchers throughout all the value chain, 4) provision for applied research to allow technology advancements and innovation, 5) lecturing staff serve as think-tank of the focal issues and new ideas, 6) provision of multi-skilling to agricultural students since specialisation is not an option in a micro-state (including support skills), 7) cooperate with the farming community to employ graduates, and 8) embark on applied research on innovative technology to make farming more economically viable and create benefits.

Tailor-made courses that link farming with innovation and adaptability to market demands are required to assist farmers and investors in the agricultural sector. Experiments in innovative approaches in agriculture and rural businesses have to be backed by the rural planning policy. New developments in the food production sectors such as hydroponics, aquaponics, vermiculture, insect protein farms and snail farming should not be halted on the basis that they could be submitted with the intent to bypass the policy in order to gain permits for structures for recreational purposes.

There should be mechanisms in place to assist entrepreneurs who intend to invest in innovative rural projects from which farmers stand to benefit, especially if there is collaboration with research and educational institutions. The latter can involve research and development of non-conventional crops or the diversified utilisation of existing crops to produce food niches, health products, beauty products, pharmaceuticals and essential oils or investment in rural tourism and eco tourism activities. These and other forms of investments are eligible for funding through the RDP 2014-2020 programme and thus have to be catered for in planning process.

Customers require assistance and information on Maltese products which they purchase such as on the production method and related culinary aspects. Although some aspects such as nutritional information, recipes, authenticity of produce, the farmer's way of life and the effort placed on the production of fruit and vegetables are promoted on mass media and social media, the promotional intensity is limited. Such concepts should be promoted through facts in information brochures, and through organised campaigns on media that link the benefits of buying local with other notions such as zero-kilometre, land stewardship and the local economy. HEI should be assisted to carry on the research being performed on certain typical Maltese products such as honey, sheep cheeselets and the Maltese Black poultry and promote it with the farming community and interested stakeholders.

HEI have the means to carry out research both on the Maltese products as well as on the consumer needs. Such research is essential to identify market trends and niches that can be commercialised by the farming community. Ideally, research is always carried out in collaboration with businesses and the farming community. Farmers can be considered as the technical experts on the field or the farm whilst HEI can focus on meeting their needs through scientific instruments. Thus, HEI should continuously consult with, train, educate and inform farmers in order to establish innovative means to cater for threats such as water related issues. Research should ideally be business-oriented and target the main farming needs so that results can be fed into the system to improve farming operations. Moreover, HEI in other countries are teaming up with public and private entities to provide advisory and research services. Collaborations of this kind are needed in Malta so that the expertise and resources of HEI team up with other entities to deliver professional services which are until now missing.

An improved and meaningful access to education and research could prove to be an effective solution to the drawbacks of micro-farming. This aspect can be improved through the involvement of farmers in data gathering and targeted research that is instigated by HEI to collaborate with the farming community and businesses along the production chain. Such coordination is essential to attract working capital and motivate farmers or new comers to follow up on successful pilot projects. Effective collaboration with the business community implies that students are provided with the necessary resources for business incubation rather than being mere passive observers. Thus, students should be incentivised to participate through the allocation of credits from HEI for practical outcomes such as the development of new processes, practices or products.

When considering the importance of research for the development of agriculture in Malta, even at a level of obtaining data for a clear understanding of the situation, funds should be sourced for this purpose.

HEI can join forces through the formation of public-private partnerships and collaborations with private enterprises to carry out research and development, training, advisory services and a range of other professional services required by the farming community. Agriculture should be given its due importance for it provides food security, land stewardship, safeguards culinary traditions, resists further urbanisation, preserves rural skills and local agricultural species. Food security is not just related to what we consume today but it entails having an active farming population with the capacity to produce food for the local population in case that the current situation is disrupted. Such an active farming population might be producing cash crops for export or fodder to supply local farms but as long as it is kept employed in agriculture, the skills and active farmland are kept intact.

Agribusiness students should be trained on innovative means to decouple from land ownership and manage capital investments in order to create start-ups in the agricultural sector. Since the profit margin of conventional farming models in Malta is dwindling, most farmers and livestock breeders do not afford employing an agricultural student. Faced with such a situation, HEI should consider a priority to train the persons already involved in the sector so that they upgrade the sector with a view to employ graduates in innovative agriculture related careers. Moreover, policy measures should be in place to incentivise means to assist the integration of skilled graduates in apposite employment opportunities. The creation of innovative opportunities and farming niches is a must to secure the employment of young farmers and rural entrepreneurs. Employment in agriculture should not only be linked with production since there are various other opportunities that are not being catered for such as adding-value to primary products, processing, culinary activities, tourism, and other forms of service provision to farmers or to the general public such as gardening.

3.04.06.2 Research and innovation

Research and innovation (R&I) in agriculture is critical in creating and promoting improved agricultural methods that promote an increased agricultural productivity or tapping international markets. R&I also leads to develop new practices, processes and technologies that address new challenges faced by the agricultural sector such as climate change and exploit various opportunities. Research and development (R&D) in agriculture requires a consistent budget allocation to fund research over several years as well as highly qualified staff that is able to develop research and create innovative technologies. Moreover, farmers should have a participatory role in defining priorities for R&D by identifying the main issues that require research, existing constraints to innovation and to the adoption of new methods.

Generally, R&I in Malta, and even more in agriculture, is limited since the benefits of research are not understood by most economical operators. Apart from a lacking research culture in Malta, most business are small and do not afford to fund R&I projects. Most often research applied in other countries is adapted to the local scenario when the process or technology has been on the

market for a long time. The general lack of research in Malta within the Maltese agricultural sector is evident with data gaps being present across the board.

One cannot evaluate progress in an agricultural sector in Malta due to this lack of data and thus the basics for R&I have to start from scratch. In fact, most decisions taken by the agricultural community are based on traditions, trial and error and very often do not embrace advice or change leading towards long-term benefits. A positive development in this aspect is a number of research trials that are currently being carried out by the Diversification and Competitiveness Directorate at the Għammieri Experimental Farm with a view of disseminating results to farmers through the extension services that were established in 2017.

Research related with Maltese agriculture is mostly limited to the University of Malta and MCAST through dissertations presented by agricultural students, EU funded projects and occasionally by farmers themselves on a small (non-scientific) scale. Exchange and dissemination of such research is limited and the positive results do not cascade on the farming community. Most of the students pursuing such studies do not find the means to implement their studies or widen their knowledge through further studies on the field after graduation. Some random examples of studies carried out by agricultural students graduating from the University of Malta and MCAST in recent years include:

- Valuable Constituents from Extra Virgin Olive Oil and Wastewater after Cold-Pressing;
- The Development of Phytochemical Constituents in Girgentina: A Study in Relation to Local Oenology and Viticulture;
- An Economic and Structural Analysis of Horticultural Industry in the Maltese Islands;
- A Comprehensive Study on the Potential of Snail Farming in Malta;
- The Re-introduction of Bambinella: Market Strategies;
- An Investigation on the Level of Organic Matter of Soils from Organically Manages and Conventionally Managed Fields;
- The Impact of Malta EU Accession on the Sourcing Patterns of the Vegetable Sector;
- The relationship between the size of the scratching area and its use as a dust bathing substrate by laying hens in enriched cages;
- Investigating the effect of eggshell meal as a feed additive on the strength of eggshells laid by hens over 65 weeks of age;
- The effect of stocking density on the incidence of ear tip necrosis in weaner piglets between four to seven weeks of age;
- Analysing the use of NPK fertilizers in potato production;
- A preliminary study of woods borer colonization on pomes fruits in Malta;
- Incidence of the Olive Knot Disease Agribacterium tumenfaciens & crown Gall disease Pseudomonas savastanoi pv. Savastanoi throughout the Maltese Archipelago;
- The effect of commercial fertilisers on Fava Bean (*Vicia faba)* production and plant root-nodule development within the context of typical Maltese Mediterranean climatic conditions,
- Investigating the use of crop rotation in the cultivation of spring crop potatoes (variety alpha) and how this affects its nutrition, pests and diseases and yield.

Notwithstanding the small size of the islands, there is a prevailing culture of fragmentation and individualism. There is the need for mechanisms that link research with farm operations and facilitates the integration of agri-business graduates within the agricultural sector. If small farms or family farms do not afford to engage farm managers or advisors to assist them on adding value to their production, there should be the creation of a setup that provides such services either through a functional extension services or a public-private partnership that provides such services through EU Funding mechanisms. The RDP 2014-2020 provides funds for the creation of such setups and for the provision of related services.

R&I aimed at increasing on-farm and off-farm efficiency as well as identifying best practices to implement the policy measures developed in this policy is urgently needed. These will accelerate the rate through which the various stakeholders targeted by this policy will achieve policy goals. With the necessary data in hand, effective incentives can be put forward and linked with the assignment of point systems that motivate and reinforce change in the desired direction. However, there are various data gaps and lack of scientific research on basic issues that are causing weak planning and limit goal setting both on the macro and micro level. This policy document identifies various needs for research that should be followed up by pertinent entities and operators to provide the sector with the desired change. Target-oriented farm censuses, tourism surveys and on-the-field data gathering are urgently required to be commissioned and keep on being collected to generate reliable trends on which sound decisions can be taken. The latter are not only required for the production sectors but also for processing, marketing, diversification as well as for resource management such as water, soil and biodiversity.

More emphasis should be placed in HEI on agricultural sciences since they provide added benefits on society and the environment. A thriving agricultural community safeguards the Maltese environment and it can be directed to protect the scarce natural resources if more funds and resources are allocated for education, training and research. The latter can also be augmented through various EU funding opportunities that consider aspects such as education, employment, climate change, environmental sustainability, R&I and quality of life as basic targets for improvement.

Research should always be conducted on the Maltese conditions so that decisions and policy directions are not based on foreign standards. For example, crop research through pilot testing and financial assistance for testing is required to identify a range of products that could be developed into lucrative niches for the local consumption and, where appropriate, for export. Nevertheless, protocols with foreign research institutions and guidance from their part on established methodologies should lead to consolidate research undertaken in the Maltese Islands. Researchers would need to adapt to the local situation but they do not have to reinvent the wheel. Moreover, research could focus on identifying particular geographical areas that are more appropriate to grow certain crops and farmers in these areas could produce and process specialised crops with an identified geographical indication. The latter can be achieved through active cooperation, the setting up of targets and the provision of seeds and plants for the purpose.

Another limiting factor that requires improvement is basic record keeping by the farming community. Instead of trying to remember every aspect of their farming setup, farmers can be trained to keep records of basic agronomic data.

This leads to 1) better understanding of the processes by the producer, 2) assisting scientists to find readily-available data from their target audience, and 3) facilitating policy implementation. Smart technology should be introduced through Smartphone apps that cater for various agronomic aspects such as accurate water application, soil-water retention, fertiliser use, pesticide application, humidity levels, weather conditions and more. Such technologies are already being developed for small farm setups and have been identified as a basic element for the development in agriculture in the upcoming decade. Interested farmers should be guided on how to utilise such technologies as well as on which data to keep and which to discard.

Various stakeholders involved in the consultation process argued that farmers should be incentivised to follow educational courses both through educational institutions as well as through the provision of dynamic extension services. Formal courses delivered through higher educational institutions (HEI) need to be more vocational and hands-on oriented so that agricultural students spend an established minimum number of weeks working continually on commercial agricultural enterprises. This will improve their level of expertise so that they are capable to deliver professional advice by integrating their knowledge with research and the real life situation. Thus, collaboration between research institutions and the business community should be incentivised and acted upon urgently.

A range of opportunities lie in researching innovative and tailor-made approaches, for example, in rural tourism which would be essential to preserve the rural environment through soft investments and by linking various methods such as rural trails, investments in processing, the creation of value-added products, new production chains, showcase activities, rural museums, and more. Investment in rural tourism could be strategic by merging various interventions with improved infrastructure, maintained landscape, an active agricultural backdrop and genuine Maltese products. Initiatives in this sector should aim for sustainability on their own as well as in wider rural networks since the setting up and management of rural tourism activities is not an easy task for the producer by himself. Through proper guidance and networking, product and service branding as well as marketing can be linked with the hotel, catering and accommodation industries. However, primary producers might lack the necessary time to carry out other activities or the contacts required to promote their product and manage orders.

Another research opportunity involves the identification of the variety of plants and animals which can resist water stress and landraces that are not yet being exploited. Plant and livestock varieties that are drought tolerant, heat tolerant as well as those that withstand severe wind conditions should be identified and studied in the Maltese context. With a changing climate and declining resources, there is an urgency to rediscover Maltese landraces that are adapted to local conditions and even experiment with drought-tolerant crops that are produced in drier climates. Investment on local landraces such as fruit trees, olive trees, bees, poultry and sheep is increasing since these are more adaptable to the Maltese geo-climatic conditions.

Other sectors should follow suit to research the peculiarities of Maltese landraces that were discarded through the introduction of exotic varieties and create niche markets for their commercialisation.

The increasing general interest in the agricultural sector is a positive aspect which should be exploited both from the producer and the consumer perspective. Having a community that is interested in pursuing agriculture as a hobby and consumers who seek to learn more on the crops that they consume makes the drive towards innovation more plausible. With the advent of social media, consumers are being constantly exposed to marketing campaigns on various food products as well as to a range of eating habits, health and nutritional benefits of food, issues related to antimicrobial resistance and other trends.

This presents fertile ground for the development of niche products that can be launched with an interested audience and facilitate retailing through innovative means such as through community supported agriculture or through online commerce platforms. It also creates opportunities for collaborations in R&I between interested actors that learn from each other's needs and by sharing knowledge.

3.04.06.3 Idea incubators and product development

In order to succeed, new agricultural enterprises require the right environment where to operate backed by a sound policy direction. Invariably, there are barriers outside the control of the farmer that limit the success of idea incubation and product development, thus making the environment hard for new business ventures. The creation and maintenance of an environment that encourages profitable, market-oriented farm businesses, entails tackling barriers such as:

1) lack of access to finance which is a major stumbling block for many innovative farmers who intend to expand their production or diversify into new high value enterprises. This is attributed to the small scale of operations, lack of credit history, dependence on natural conditions and the high average age of farmers.

2) lack of training facilities to support idea incubation by providing relevant education and training at the right time, in the right place, and with the right balance of technical knowledge and practical skills;

3) lack of advisory services such as information, advice and support to back idea incubation and product development by farmers and farm entrepreneurs. Services are needed to advice, and support farmers in identifying, preparing, designing and implementing efficient farm businesses. Advice and support to farmers must go beyond the traditional production-led services as innovative ideas require high-end services covering various aspects linked with managing a profitable, market-oriented farm business;

4) access to and interaction with markets which are often constrained by a number of factors such as poor communications, infrastructure and marketing facilities, lack of reliable and timely market information, limited purchasing power as well as negative attitudes of buyers;

5) social restrictions to entrepreneurship linked with the farming culture and the society in general. The fear of failure can be a major barrier amongst the farming community and creativity and innovation are not always valued traits. Traditional agricultural sectors in Malta have developed a degree of dependence on the Government that leads to helplessness. The integration of youths and women in business, cooperation in farming enterprises and farm clustering are most often not supported or are even discouraged.

The agriculture policy is targeting to address these barriers and create an environment in the upcoming ten (10) years that supports idea incubation and product development. Notwithstanding policy measures that will target these barriers, farmers should be incentivised to take the lead by recognising their qualities, pursue training and start thinking and acting as entrepreneurs. Through this policy document, extension service workers and agriculture advisors will be provided with a set of guiding principles on which to help farmers deal with the above-mentioned barriers.

Investing in young farmers and new comers in the agricultural sector should not merely entail the provision of the necessary resources so that they can keep on farming using the same practices as the current farming population. In order to guarantee a future for agriculture in the Maltese Islands, the policy should aim at empowering the remaining farming population and new comers to embrace idea incubation and innovation. The farmers and livestock breeders who will still be active in the coming decade should aim at becoming more competitive and improve their quality of life for their benefit as well as to attract new entrants in the sector.

The Maltese farming community can serve as incubator of innovative ideas through pilot projects, experimentation, link with scientific research and integration with SMEs and rural entrepreneurs. Farmers and farm entrepreneurs should be incentivised to open up and embrace novel concepts as well as environmental-friendly farming practices for the benefit of all stakeholders. Various policy measures are being proposed in this policy document in order to reach this aim, ranging from 1) investment in the production, presentation and marketing of quality products, 2) investments in the rural environment, 3) investments in nutrition aspects of food and pharmaceuticals, 4) development of health and beauty products, and more. All these instruments are essential to place farming on a higher platform in the national agenda so that resources are secured for research and development in this sector.

A strength identified during the consultation period is the unique climate that provides high quality products. The research carried out so far on Maltese products should be collated and new research areas that have so far remained untapped should be identified to create a register with Maltese varieties and their characteristics. Such an exercise can bear fruit once that it is followed by a media and branding exercise including TV programmes and popular concepts such as 'eat parade', 'slow food' and 'zero kilometres' that make a big difference in the consumers' choices. Education from the sector itself and the involvement of media even in cooking session on TV creates a better appreciation of the farming trade. Moreover, product development that merges food production with the environment would be ideal since the latter is high on the media's agenda.

The consultation period predated the setting up Legal Notice 379 of 2016 - Access to Genetic Resources and the Fair and Equitable Sharing of Benefits arising from their Utilisation Regulations – which caters for the quest to safeguard Maltese varieties. Moreover, in 2015, the Plant Protection Directorate completed a project entitled "Study and Sustainable Conservation of varieties of local plants" with the aim to minimize further degradation as well as the promotion of various landraces of local plant genetic resources.

This included investments in upgrading of the diagnostic and micro-propagation laboratories, the setting up of a botanic garden for Maltese plants, a new visitor centre with media facilities and a conference hall, the setting up of a new seed laboratory, sanitation of local citrus varieties and the creation of a database to establish an inventory of Maltese plant genetic resources.

Consumer perception on Maltese products was strengthened via the promotion of local products through festivals and themed activities. Even if the latter are localised and not frequent, they have helped with the valorisation of certain products such as strawberries, olive oil, milk, pork, wine and others. Business ideas that target these initiatives on more organised and intensive promotional campaigns will lead to obtain far-reaching benefits for the producer and the consumer. A holistic educational campaign on the benefits of eating local should be aimed at improving the competitive element of local products and attract more consumers through sound traceability. Moreover, such business ideas should be backed by research on Maltese products and on consumer needs in order to identify market trends and niches that can be commercialised by the farming community. Ideally, research is always carried out in collaboration with businesses and the farming community.

One of the weaknesses that was identified in the SWOT discussion is the fact that services need to be improved and well trained managers are a must in order to explain the need of change in methods that are being applied in modern agriculture. Business incubation passes through various stages that require professional advice, information and support. Farm businesses have to 1) get established through production and marketing; 2) survive through establishment of income generation that outstrips costs; 3) establish growth by developing a broader product and buyer base while ensuring that the farm business remains profitable, efficient, cope with the increased production, marketing and management activities; 4) sustain growth either by increasing production to provide more products for sale or by adding value to the product by processing it and/or packaging it; and 5) reaching maturity by halting growth and expansion as the business reaches a balance between the skills and vision of the farmer. Thus, services are needed to advice, and support farmers in identifying, preparing, designing and implementing efficient farm businesses. Advice and support to farmers must cover areas beyond the traditional production-led services by covering all aspects of running a profitable, market-oriented farm business.

Idea incubation can be successful when the private sector is incentivised to participate in conducting research and development on agricultural methods or solutions. Although the Government should generally provide policy direction, assistance and enforcement, it has its limitations on the degree of involvement to address R&D. In most business approaches, the private sector is better suited to carry out certain initiatives such as research, development and innovation that are aimed at increasing productivity or developing new concepts, which could then be incorporated as mainstream policy if proven to be effective.

Public-private partnerships between higher educational institutions and businesses involving human resources and knowledge exchange should also be incentivised in order to develop novelty products and services, as well as new knowledge and thinking that can facilitate idea incubation.

3.04.06.4 Smart agriculture and IT development

Rapid changes are taking place globally in the use of Information Technology (IT) to support farming practices as well as through extension services and advisory services. The ease of access to personal computers, Smartphones, and the Internet provides great potential for the integration of IT in farming practices and service provision. These powerful tools have to be harnessed by policy makers, advisory services and farmer organizations for the benefit of farmers and agriculture entrepreneurs.

Information and Communication Technology (ICT) is being integrated with farming to develop smart agricultural practices and precision farming that increase access of information to farmers related with farm management and marketing issues. ICT also contributes to strengthening agricultural value chains by enabling investors to communicate rapidly and cheaply with distant suppliers and customers. Furthermore, ICT can provide a means of communication between all interested parties about matters related to agriculture in general and on farm management in particular.

Farmers have the possibility to use ICT to share information among themselves and to make contacts along the value chain, including for export markets. ICT facilitates access to information from many sources anywhere in the world, which in turn facilitates data collection and the creation of knowledge networks. The latter comprises groups of people, who are geographically separated, but who communicate regularly and share knowledge about matters of interest such as a particular form of farming. Over time, this information can be stored and made available to all interested parties via websites and databases.

The potential for the use of ICT is very high but it needs to be harnessed in the most appropriate manner and must be used with relevance to the farmers' needs. ICT has to be considered in the wider spectrum of the role of farm management and fully integrated into this role. Government has to enhance the access of ICT to agricultural investors such as the provision of timely and accurate information on markets. Smartphones can be utilised to support marketing by 1) allowing access to regular and reliable market information, notably on prices; 2) conduct negotiations with suppliers and buyers without travelling long distances; 3) make cashless transactions through mobile banking; and 4) strengthen the farmers' bargaining position vis-à-vis buyers. Furthermore, ICT can underpin many service sectors, such as finance, insurance and transportation, which are all critical to attract investors.

In most developed countries, the Smartphone is being considered as the new agricultural tool since there is a fast growing access to communication services that offers a range of benefits to farmers. Better weather and climate data help planning which crops to plant, when to harvest and effectively use farm inputs. Moreover, with a phone in hand, even small-scale farmers can connect to new customers who were previously unreachable giving them greater power in the marketplace. This kind of knowledge was previously the reserve of farmers on modernised agricultural production units but can now be available to a much wider group. Precision agriculture is an effective incentive that is being incorporated with farming techniques ranging from relatively simple and affordable drip watering to advanced hydroponics, which allows farmers to target water and fertilizer precisely when and where plants need it. Rising prices for agricultural inputs like water and fertilizers are fuelling the development of smart farming technologies and techniques to produce more with less. As an added environmental benefit, targeting fertilizer to where it is most needed can significantly reduce greenhouse gas emissions from farming.

With the advent of wireless ICT technologies and investment in infrastructure and services, access to mobile phone technology is now available in almost all rural areas in Malta. This calls for policy measures that encourage private participation in ICT services related with Smart agriculture initiatives. In the coming decade, farmers should be trained to access ICT technologies that provide tools for smart farming and marketing opportunities for small-scale farmers. Smart technology should be introduced through Smartphone apps that cater for various agronomic aspects such as accurate water application, soil-water retention, fertiliser use, pesticide application, humidity levels, weather conditions and more. Such technologies are already being developed for small farm setups and have been identified as a basic element for the development in agriculture in the upcoming decade. Interested farmers should be guided on how to utilise such technologies as well as on which data to keep and which to discard. These systems are also valuable for transmitting data and collating it into one system, where it can be analysed and utilised for risk insurance, amongst other useful applications.

Maltese products and their organoleptic properties including the nutritional value should be integrated in promotional campaigns that link food production, environmental sustainability and the utilisation of ICT. The creation of Smartphone Apps which promote such characteristics and educate the consumer on Maltese products, their transformation and various uses, should be incentivised. However, this approach requires careful planning, training and a long-term perspective that focuses on data gathering by public and private advisory service providers, as well as with the involvement of managers that act as intermediaries with the farming community. In the context of scarce financial resources for research purposes, the private sector should be incentivised to take an active participatory role in smart agriculture and IT technologies to increase funding and opportunities as well as to ensure that research programmes meet the private sector demand. For example, private companies could be encouraged to distribute and market agricultural seeds or new products through smart technology such as e-platforms.

Through the use of ICT, farmers and farm managers can more easily maintain contact with extension workers and other organizations working on particular projects. There is also great potential to train extension workers and keep them updated on the latest information. In turn, extension workers can train farmers to use ICT thus widening a two-way access.

Project managers and ICT specialists can support these programmes, monitor and evaluate them. Moreover, the latter can be in regular contact with various levels of administration at project level and the national level. This can help in sharing important information between the various administrators and specialists to back policy measures and decision-taking. Since this sector is still novel, operational groups can be supported for projects that test and develop new products, practices, processes and technologies in the agriculture and food sectors in view of fostering more productive and sustainable sectors.

The creation and dissemination of smart IT technology within the Maltese farming community in the upcoming decade requires functioning advisory and extension services that permit a participatory role from the producers. The latter should ideally involve qualified persons who understand the agricultural acumen and are conscious of the various barriers pertinent to the Maltese agricultural community so that they can help farmers deal with them. As pointed out above, financial resources for research purposes and the development of IT technologies should be incentivised through the involvement of the private sector. If everyone has a role and a tangible outcome that is directly or indirectly dependant on investing into agricultural systems, such technological transformations can be made possible.

3.04.06.5 Internationalisation

Small-scale farmers face various risks and have to cater for alternative plans if the original plan fails. Most often they have to decide 1) which market they should tap with their products, 2) the range of products that they will be producing, and 3) whether they should target international market or not. For many small-scale farmers, producing for a local market, rather than producing riskier export crops, is a rational and entrepreneurial choice. However, production for the local market also has its risks since most often local markets are over-supplied resulting in low prices and consequently low profitability.

International export markets and local markets represent a range of choices for the farmer who may decide to sell 1) all his produce in local markets, 2) all of it in international export markets or 3) sell some on both markets. The farmer must weigh up the opportunities and risks before deciding which combination of markets to use. This is a key challenge for farmers as whichever markets they use, they have to face substantial risks to reach them. Markets do not always function well as they are dynamic, diverse and are not completely predictable. Moreover, apart from production decisions there are other issues that have to be evaluated by the farm entrepreneur or the export manager that include the type, quantity, value and price of exports; the cost insurance and freight prices; the marketing cost of exports, as well as export and collection arrangements.

Most often exportation involves contractual agreements between buyers and traders or between agro-processors and exporters. These enter into agreements with farmers to buy specified quantities of produce at specified prices and quality.

Contractual agreements provide various benefits for farmers such as inputs provided by the trader, extension advice to meet the quality standards, confirmed markets and prices, as well as a means to access international markets. Contracting relieves the producer of a great deal of uncertainty with respect to marketing, on both the input and output sides. Some traders will provide support services, such as technical and business advice, in addition to inputs and some contracting agreements may also include mechanization services to secure a homogenous production. Notwithstanding that contracting is appealing for small-scale farmers as it is a way to reduce marketing risks, contracts over a long period of time may create lack of flexibility.

No industry operates within a vacuum and the agriculture policy aims at creating farming sectors that are sustainable without long-term reliance on subsidies or other financial concessions. Specialisation into high-value or niche market crops for high end consumers, tourists and specific export markets could assist in the achievement of economic independence for various agricultural sectors. Exportation of high-end products in a market-oriented approach is a possibility since the Maltese growing season is one of the longest in the EU and out of season products could suit various markets in northern countries (e.g. garlic, onions and potatoes). This could be achieved through strong networking, collaboration and avoiding short sightedness when entering into production contracts. The latter implies that a farmer should stick to a contract even when the product fetches a better price on the local market, since the long-term benefits exceed the short-term gains.

Farmers and livestock breeders require guidance and incentives to invest in the peculiarities found within Maltese products to benefit from market demands for such attributes. However, there are various weaknesses that have to be addressed such as lack of professionalism, inability to bridge demand and supply, and effective farmer collaboration. Such investments require a change in the production model and the modus operandi since local farmers are competing on an open market with suppliers that have a wider production base that satisfies the needs of larger markets. Collaboration between Maltese producers and other stakeholders is essential for the creation of critical marketable mass and homogenous products. Moreover, these efforts should be backed by sound business planning and market analysis that should target the local high-end market, tourists visiting Malta as well as the export market.

Examples of quality products that are already tapping the export market include tomato products and the Maltese spring potatoes. Other agricultural products that have the potential for export should be identified and research carried out on potential export markets that would be viable for commercialisation. Such market expansion creates spill-over effects on the farming community, who can be assisted through training on producing particular crops through methods intended towards export. Commercialisation of high-end products through a market-oriented approach is a possibility for a variety of other agricultural products since the Maltese growing season is one of the longest in the EU. This implies that out of season products can be exported as they could suit various markets in northern countries. Staple food products such as garlic and onions could follow the example set by spring potatoes to supply high-end export markets.

It is evident that there is a need for more intermediaries in the agricultural sector with a role in brokering access to internationalisation agreements. They can be essential to provide contacts, initiate agreements, match market requirements with farmers' products; assist in identifying reputable buyers and farmers' groups; help monitor and enforce agreements, and help clarify the positions of both sides. Farmer advisors can also assist in ensuring that agreements are fair, realistic and enforceable; mechanisms and consequences are in place to settle disputes should they arise, and alternative markets have been organized in case of buyer default. Successful contract negotiations imply that farmers have reliable information and the know-how to use it. This includes knowledge of their production costs and break-even prices through record keeping, business planning and the necessary information that can enable negotiation. These aspects are vital since farmers will have to be able to synchronize production as pointed out in the contractual agreement in order to ensure that the product is available when the trader requires it.

An opportunity that emerged during the SWOT discussions is that agricultural sectors have to analyse their resistance to climate change so that they can re-organise their future goals. This aspect requires ongoing data collection to create trends and assist in the application of innovative approaches to resist climate change. Individualism and fragmentation of resources should be sidelined when agriculture faces difficult times such as through the effects of climate change. Resources and knowledge sharing through a collective approach improves agriculture resilience, leads to healthy communication and provides scope for operational improvements such as internationalisation. The Maltese Islands have climate advantages over other countries with an abundance of sun and a longer growing season. Maltese farmers should aim at producing high value crops either by upgrading their presentation, marketing, promotion or introduce niche crops related with market demand even for export purposes.

3.04.06.6 Extension Services

A recurrent criticism by the agricultural community is related to the existent organisational and managerial structures responsible for agriculture that lack direct exposure of good practise on the field or farm and are thus not geared towards innovation. The agricultural community, being at the receiving end, complains that most of the trained staff working within representative authorities move to other sectors and are not replaced by trained or practised staff. This occurs all over the civil servant spectrum but since the agronomic acumen is very technical, it is not assimilated easily and the farmer's plight is most often not understood. Since Malta's EU accession, a major focus in the agricultural department was shifted from purely agricultural extension services towards the management of the EAFRD (not any more); a paying agency managing the agricultural funds and a directorate function dealing with regulation and enforcement.

The Directorate for Diversification and Competitiveness at MESDC has set up an extension service for farmers to assist them on salient issues such as production, nutrition, fertiliser application and overall efficiency.

Such a service is being backed by research at the Għammieri Experimental Farm to set out standards, as well as recover and conserve Maltese genetic plant and animal resources. Through the recuperation of plants and trees that were replaced with more competitive market products, this Directorate aims to study their valorisation and commercial viability in view of their integration within Maltese farming. This process is aimed at creating agricultural niches that are not yet being exploited or properly marketed. Moreover, an extension service stakeholder workshop will be carried out twice a year to assess the services being provided and prioritise efforts accordingly.

The Farm Advisory Services Consortium was set up to provides assistance to farmers on cross compliance and the production of fertiliser plans but is no longer operational. Most farmers and livestock breeders participating in the national consultation event argued that this service took long to set up and there were issues with lack of funds to cater for fertiliser plan costs for farmers who have multiple parcels.

Farm advisory services should be complimentary with extension services since the farming community demands a one-stop shop that apart from basic services, can assist them in the creation of projects from ideas. Both services are catered for through RDP 2014-2020 funds and can serve to provide various employment opportunities such as managers, administrators, advisors, technical experts, trainers and field experts.

The agricultural policy is geared towards providing the right working environment for the farming community so that effective incentives can be up taken and opportunities exploited. Most often, there are barriers outside the control of the farmer that limit the success of new product development, thus making the environment hard for new business ventures. The creation and maintenance of functioning extension services is a principle aspect proposed in the agricultural policy aimed at reducing such barriers to create an environment that encourages profitable, market-oriented farm businesses. Extension services are essential to provide information, advice and support to back idea incubation and product development by farmers and farm entrepreneurs. Such services are required to support farmers in identifying, preparing, designing and implementing efficient farm businesses that go beyond the traditional production-centred services since innovative ideas cover wider aspects.

Agricultural advisors and extension services experts should be trained to provide assistance that goes beyond production and basic agronomics. They will be requested to provide business direction to farmers and farm entrepreneurs so that they can establish contacts, match with market requirements, develop new products and enter into business agreements. Thus, an extension service should have up-to-date experts with the necessary business and legal acumen to provide a one-stop-shop service to producers and investors. This factor implies that training and up-skilling on issues that go beyond farming are a necessity to provide a comprehensive service. If the latter is not provided by extension service providers, sub-contracting or agreements with advisory services could be necessary to secure the provision of a complete service.

It is essential to have competent advisors who fully understand the needs of the sector, even from a business-oriented point of view. Thus, collaboration between research institutions and the business community should be incentivised and acted upon urgently. Functioning extension services in the form of public-private partnerships or collaborations between research institutions and private enterprises should be set up to provide access to knowledge of innovative methods applied in modern agriculture. Avant garde extension services should also provide collective advice to farmer groups or co-operatives such as for collective risk management strategies and instruments.

Farm advisory services and extension services should not be exclusive since they can be merged to offer a one-stop-shop service for agriculture entrepreneurs. Basic farm advisory services and the development of ideas into fruitful projects through extension services are both important and should be linked to avoid duplication of resources and reduce bureaucracy. These services require the creation of a train-the-trainer programme for agriculture graduates and professionals to qualify as agri-advisors in order to serve as experts within extension services. Hands-on training with experts, training on the ground with farmers and applied teaching on experimental farms could be included in such a programme. Agricultural acumen can be built through proper training coupled with experience on the farm or on the field to assimilate the real farming lifestyle and problems encountered by the sector on a daily basis. Farmers participating in the consultation process claimed that there is a huge gap to be bridged between the agricultural community and farm advisors, with the latter lacking hands-on experience and comprehension of basic farming knowledge, reducing their ability to adopt innovative aspects within the Maltese scenario.

A threat identified during the stakeholder meetings was that recreational farmers might be reluctant to embrace an active change. In fact, the number of land holdings that are owned by persons who do not have the background and means to put them to good use is increasing. Most often, these persons are willing to spend time and resources on their land holdings and thus they seek professional guidance on how to utilise their land effectively. In most cases, they find little or no guidance on how to pursue their goals since technical experts and authorities are geared to support conventional land-use and farming activities through the existing policy frameworks. Thus, extension services should not only be limited to the active farming population, since many land users are recreational and require various forms of assistance. Through comprehensive services, they could also be incentivised to upgrade their farming operation and become more professional. This provides scope for networking, pilot projects, and service provision that can start on a recreational basis and gets integrated into mainstream farming. There are various barriers that can be overcome through the participation of recreational farmers such as the 1) lack of technology use, 2) lack of innovation in processing methods, 3) need for the marketing and branding of primary produce, 4) lack of administrative and organisational structures, 5) prevalence of micro-enterprises and individualistic approach, 6) conventional methods and processes adopted, 7) lack of service jobs in rural areas, 8) fragmentation of resources and duplication of efforts, 9) lack of applied research, and 10) support for innovation.

4

4. Operational Objectives and Policy Measures

4.01 Way forward

This policy document presents a total of seventy (70) policy measures organised in four (4) groups of operational objectives, namely a) Economic objectives, b) Social regeneration, c) Resources and d) Governance. Each group of operational objectives builds upon the strategic objectives that were identified at the onset of the policy formulation. Whilst strategic objectives are generic and do not provide the level of detail required for policy implementation, the set of policy measures being presented in this section are intended to indicate the point of interventions required to deliver the policy objectives. Table 66 below lists the four (4) sets of operational objectives and the respective policy measures, providing a corresponding reference number that reflects the order followed in this section.

Operational Objective	Reference	Objective title	Measures
Economic	E1	Develop and/or adopt (a) new practices, (b) business processes and (c) smart technologies to address current and upcoming challenges faced by the agricultural sector with special focus on competitiveness, increasing average age of farmers and climate change.	1-2
Economic	E2	Promote and support a migration, especially by young farmers, towards the cultivation and supply of high quality and value added market-oriented products to increase farm-based earnings.	3-4
Economic	E3	Promote and support innovation to assist the sector to migrate towards a more circular approach by transforming wastes into resources.	5-7
Economic	E4	Assist and incentivize farmer cooperation and clustering to improve economies of scale in the collective acquisition and provision of goods and services as well as other key issues.	8-9
Economic	E5	Diversify the agricultural product through a holistic rationalization of field crops, both traditional and underutilized, horticultural, floricultural and herbal crops, bee keeping and other activities to optimize the resource use including land and soil. This will complement a move towards premium product agriculture, secure further the local food supply, enhance earnings and employment opportunities and increase agricultural exports.	10-12
Economic	E6	Incentivize the transition of Maltese farmers from their dependence on quantitative production to reap the economic value of the rural environment generated from rural tourism, the associated complementary employment and diversified income opportunities.	13-16
Economic	E7	Redirect further efforts towards the development and promotion of enhanced harvesting, processing and	17-19

		storage methods to reduce product losses, to increase product value added and to identify new export markets.	
Economic	E8	Facilitate the capacity of agricultural stakeholders to exploit international markets.	20
Social regeneration	S1	Introduce customer relationship management frameworks to better understand consumer demands for agricultural products, their quality, origin and other differentiating features.	21
Social regeneration	S2	Mainstream social and cultural activities to raise awareness on the local product offered, its nutritional benefits and the opportunities emanating from the sector.	22
Social regeneration	S3	Invest in flexible career pathways and educational services for current and prospective rural entrepreneurs to offer an array of essential information, exchange of ideas, networking and training opportunities for product upgrading and diversification.	23
Social regeneration	S4	Develop curricula that combine agricultural science with business development to enhance the capacity of future agricultural operators.	24-26
Social regeneration	S5	Early stage exposure to agricultural issues and practices.	27
Social regeneration	S6	Safeguard the Maltese agricultural heritage by fostering and disseminating traditional rural skills, knowledge and technology that prevail in the farming of small parcels, the maintenance of intricate landscapes and the production of those unique products that preserve typically Maltese flavours.	28
Resources	R1	Increase capacity to implement effective actions that promote sustainable agricultural products and services with added value throughout the value chain whilst maximising the value of natural resources.	29-31
Resources	R2	Enhance the resilience of the agricultural sector by increasing its adaptive capacity and identifying appropriate measures to reduce Greenhouse Gas emissions.	32-36
Resources	R3	Enhance the utilisation of land and farm resources by applying sustainable cultivation practices.	37-39
Resources	R4	Valorise farmland for its agricultural value and non arable land for its ecological, scenic and eco-touristic potential.	40
Resources	R5	Encourage measures for farmers to reduce their dependence on groundwater.	41-43
Resources	R6	Assist farmers in the integrated management of water resources through financial and knowledge based instruments.	44-46
Resources	R7	Facilitate sustainable agricultural production through environmentally sound agricultural practices including integrated pest management and plant nutrition.	47-49
Resources	R8	Develop a soil action plan in relation to agricultural use.	50

Resources	R9	Include within a sector-oriented educational and communication campaign, sustainable soil utilisation practices to increase awareness of soil as a living organism in order to promote a holistic approach to the soil's productive capacity.	51
Resources	R10	Secure the legacy of indigenous plant species to preserve them for research and propagation purposes including on a commercial scale so as to conserve them as a genetic insurance in the face of environmental and climate risks as well as for food security in line with access and benefit sharing legislation.	52-54
Governance	G1	Encourage the setting up of stakeholder networks.	55-57
Governance	G2	Provide the necessary capacity to develop a Management Information System to cover the agricultural sector.	58-59
Governance	G3	Consolidated information on the land tenure of farm holdings.	60
Governance	G4	Create and manage a structured framework that addresses issues of farmland tenure and consolidation with due regard to state aid implications.	61-62
Governance	G5	Facilitation of the process to utilise accredited laboratories for various requirements.	63
Governance	G6	Optimize the agricultural water mix.	64
Governance	G7	Develop farmer and livestock benchmarking systems.	65
Governance	G8	Establish the financing of the various initiatives included in the agricultural policy.	66
Governance	G9	Maintaining coherence and consistency between different policies that are intended to positively impact on the agricultural sector.	67-68
Governance	G10	Ensuring effective communication.	69
Governance	G11	External evaluation.	70

Table 66: Operational objectives and policy measures with respective reference number

4.01.01 Economic Objectives

E1 Develop and/or adopt (a) new practices, (b) business processes and (c) smart technologies to address current and upcoming challenges faced by the agricultural sector with special focus on competitiveness, increasing average age of farmers and climate change.

The agricultural sector has undergone a major transformation as a result of Malta's accession to the European Union, one which has been a reality check for the sector and its stakeholders. Retaining the *status quo* is not an option and the sector needs to re-engineer itself to respond to the challenges of today and tomorrow.

In order to secure the sector's competitiveness and increase the value added generated, a suitable environment promoting sustainable operating conditions needs to prevail. Increasingly, the sector's mindset should shift to an agribusiness setup where economic and financial considerations are given their due importance and underpin operations on the farm.

Innovation and development of smart technologies is essential in order to improve upon existing efficiency levels. This will mean promoting farm based income through a more efficient use of available resources. It may also provide real time data of the commodity markets enabling farmers to plan ahead their market strategies. Moreover, the adoption of new technologies may encourage young farmers to view the agricultural sector as an appealing career in itself especially when the labour intensity is facilitated with a resultant minimisation of production costs.

The onset of climate change is unequivocal and therefore it is important to adapt for impending scenarios by seeking to adopt those climate smart technologies and innovations that can help in adapting to, and mitigating against, the negative effects of severe droughts, whilst increasing their euro per hectare value.

Measures:

Measure 01. Encourage the use of EU funds which should complement national and private funding and initiatives for the adoption of technologies that can increase farm competitiveness whilst responding to the climate change challenge. Furthermore, innovation, research and development in agriculture should feature more prominently in Malta's R&I and other funding programmes.

Measure 02. Ensure effective and appropriate training for the users of state of the art or innovative technologies for identified priorities such as:

a. train farmers on record keeping with a view to assess the productivity of their land parcels as well as new methodologies used to facilitate more output from their land and

b. develop models that take into account the specific economic and environmental parameters which can be utilised to assess agronomic situations on a case by case basis and provide adequate farmer advice through extension services.

E2 Promote and support a migration, especially by young farmers, towards the cultivation and supply of high quality and value added market-oriented products to increase farm-based earnings.

Malta's limited size leads to a lack of economies of scale in its agricultural activity. Consequently, local farmers are at a disadvantage when they have to compete with European producers particularly when one considers the price per unit of crop produced. Lack of natural resources is an added disadvantage to our agricultural producers as they need to import most of their required inputs, particularly feed, and therefore this leads to further lack of price competitiveness of Malta's local produce. Thus local agriculture needs to focus on the cultivation of niche products which could have a premium price on the market and thus increase farm-based earnings.

The supply of high quality and value added products is critical to the sustainability of the agricultural sector. Farmers, preferably collectively, should pursue the identification of such niche markets as well as explore the viability of tapping into the export market. In this manner, the agricultural sector can increase competitiveness, boost employment and enhance income stabilisation. Such endeavours would attract new and young farmers. Therefore it is important that the farming sector focuses more on quality and value added rather than on volume of agricultural produce.

Measures:

Measure 03. Facilitate the creation of agricultural business incubators that encourage farmers to join forces and plan their operations together, identifying the niche markets to exploit, the products required to serve such markets and any agri-business components intended to add value between the farm and the consumer.

Measure 04. Enhance Farm Support Services structures to provide the necessary advice to farmers in developing business scenarios and disseminate knowledge to farmers to embark on the cultivation of alternative crops for better return.

E3 Promote and support innovation to assist the sector to migrate towards a more circular approach by transforming wastes into resources.

Sustainability in the agricultural sector is essential for its prosperity. Natural resources are limited and as such it is important for farmers to optimally exploit such resources through the adoption of circular approaches that would maximise existing resources and the economic value of goods and assets through the extension of their lifecycle. Investments in new technology and innovation should be redirected to encourage a more circular approach and reduce agricultural waste. In particular due consideration will be given to:

- Increased use of treated sewage effluent in particular New Water *in lieu* of diminishing groundwater supplies;
- Increased use of manure and locally derived fertilisers from animal waste;
- Better management of green waste.

Measures:

Measure 05. The creation of demonstration sites in agricultural setups to ensure circularity in all agricultural resources at a cost effective scale.

Measure 06. The creation of sustainable alternative strategies related to livestock waste management including treatment of by-products. This includes the effective implementation of the Agricultural Farm Waste Management Plan and the identification of possible solutions to turn farm waste into a resource for use by local farmers.

Measure 07. Establish a new legal framework for the utilisation of spent mushroom substrate.

E4 Assist and incentivize farmer cooperation and clustering to improve economies of scale in the collective acquisition and provision of goods and services as well as other key issues.

The small and micro farm holdings typical of the Maltese agricultural sector preclude the achievement of economies of scales and hence increased competitiveness. Increased economies of scale can be effectively generated through collaboration amongst farmers. This increases their bargaining power which should lead to lower overheads and enhance profits. In the long run, greater economies of scale can be achieved which will enlarge the scope of greater technological investment through the pooling of resources, reducing the cost per unit of production and enhance the farmers' price negotiations leverage.

Measures:

Measure 08. Support initiatives aimed at setting up and promoting collaboration between primary producers.

Measure 09. Support and promote collaboration between farmers and other stakeholders in the value chain particularly aiming at optimizing investment and reducing costs.

E5 Diversify the agricultural product through a holistic rationalization of field crops, both traditional and underutilized, horticultural, floricultural and herbal crops, bee keeping and other activities to optimize the resource use including land and soil. This will complement a move towards premium product agriculture, secure further the local food supply, enhance earnings and employment opportunities and increase agricultural exports.

Crop diversification is conducive to the efficient use of land resources in the farming industry particularly given Malta's territorial limitations. Crop diversification may provide for steadier employment for farmers whilst the negative implications of crop failure can be better mitigated. Diversification initiatives should be consonant with the overall objective of producing premium products that appeal to specific consumer niches. Diversification of agricultural production can also increase natural biodiversity and strengthen the ability of the agro-ecosystems to respond to stresses, such as emergencies of pests and drought.

Measures:

Measure 010. Establish measures that enable the identification of distinctive characteristics along the agricultural value chain.

Measure 011. Promote bee keeping in agricultural holdings.

Measure 012. Research on the potential of innovative and niche market opportunities for Maltese agricultural products

E6 Incentivize the transition of Maltese farmers from their dependence on quantitative production to reap the economic value of the rural environment generated from rural tourism, the associated complementary employment and diversified income opportunities.

In addition to a migration towards high value agricultural products, rural tourism may provide another niche market for farmers to diversify from their current quantitative production. The Rural Policy and Design Guidance, 2014, currently in force, provide the parameters regarding exploitation of rural tourism. Such initiatives could also attract new workers into the agricultural workforce who may, currently, be discouraged by the difficult working conditions associated with the agricultural sector.

Measures:

Measure 013. Develop guidelines specific to rural tourism that complement the Rural Policy and Design Guidance, 2014, including the necessary feasibility studies reflecting pertinent legislative provisions that are required for the effective operation of such an industry.

Measure 014. Support collaborations between rural stakeholders and the tourism market on the upgrading of rural aesthetics, the creation of access routes and signage, and the sensitive upgrading of rural and village cores.

Measure 015. Strengthen the link between farming and gastronomy, food, health and the environment through assistance schemes with due regard to state aid rules.

Measure 016. Encourage farm developments and services that create new job opportunities with particular focus on local cultivars and breeds to promote rural tourism.

E7 Redirect further efforts towards the development and promotion of enhanced harvesting, processing and storage methods to reduce product losses, to increase product value added and to identify new export markets.

The promotion of enhanced harvesting, processing and storage methods will enable farmers to match demand with supply in an efficient manner, reduce waste and stabilize the current volatility in the prices of agricultural goods especially for seasonal and perishable goods. Aid packages are essential in this context since enhanced storage facilities, harvesting and processing methods will require considerable investments and innovation. In the long run, the effective use of innovative technology through aid packages will incentivize young farmers to seek new careers in the agricultural sector.

Measures:

Measure 017. Carry out pilot projects integrated with extension services and media promotion.

Measure 018. Increase awareness on marketing standards and provide technical assistance to operators who invest in standardized packaging, processing, branding and marketing of consumer-oriented products, whilst assessing of the role of authorities in the implementation of marketing standards for agricultural products.

Measure 019. Provide assistance for pilot projects in small holdings cultivated by recreational farmers.

E8 Facilitate the capacity of agricultural stakeholders to exploit international markets.

The exploitation of international trade will help farmers diversify their markets and seek new sources of income. The move towards technological innovation will secure a competitive edge for farmers who seek to focus on high value added products due to the rising demand for quality goods. Quality marks such as the Protected Geographical Indication and Protected Designation of Origin are equally important to brand Maltese produce and provide a competitive edge within the free trade agreements which are in place between EU and various third countries as well as Intra EU partners that are competitive from the supply side.

Measures:

Measure 020. Encourage partnerships to identify and evaluate export niche markets with the aim of tapping such markets for Maltese products. Such a networking effort would ideally involve all the key players of the food supply chain.

4.01.02 Social Regeneration

S1 Introduce customer relationship management frameworks to better understand consumer demands for agricultural products, their quality, origin and other differentiating features.

The lack of information on consumer trends does not allow farmers to plan the correct supply levels. This leads to unnecessary price volatility which can be better prevented with a more professional customer relationship management system. The latter approach assists farm operators to gauge consumer trends and behaviours. This will enhance farm operators' planning to focus on the appropriate production amounts and types of quality and product differentiation on the basis of market demand. Such data gathering is also useful for farm businesses to adopt the best marketing strategies for their goods.

Measures:

Measure 021. Ensure availability of market research including the commissioning of consumer surveys and comparative analysis on a selection of agricultural products identified within such a process, including those that can achieve a quality label, as well as perceptions on chemicals in food, antimicrobial resistance and consumer categorisation exercises.

S2 Mainstream social and cultural activities to raise awareness on the local product offered, its nutritional benefits and the opportunities emanating from the sector.

Social and cultural activities can serve as platforms to raise awareness on the available products in the market. Therefore these activities are a means to market the products on offer by the farmers especially for those goods that have certain distinctive features unknown to the public. To date, rural festivities of this type have more or less adopted an 'outing' or 'festa' semblance. Even in this aspect there is the need to pitch such events at a higher level, one which raises further awareness on different types of agricultural products as well as their derivatives, both commercial as well as culinary but also with a view to promoting the nutritional value of such products and market the employment opportunities that result there from.

Such publicity would be aimed at attracting new and existing customers, especially those whose trends and behaviours indicate that they prefer quality and value added products. In the long run, the policy aspires for farm businesses that invest in value added goods to get a return from their investment in terms of higher demand for locally produced goods.

Measures:

Measure 022. Streamline the organisation of rural festivals as to ensure that all fairs showcasing agricultural produce follow established guidelines and embark on a marketing campaign that promotes Malta's premium agricultural produce with locals and visitors alike to create awareness and appreciation of local products. This could also be coupled with nutritional and health related information and benefits.

S3 Invest in flexible career pathways and educational services for current and prospective rural entrepreneurs to offer an array of essential information, exchange of ideas, networking and training opportunities for product upgrading and diversification.

The agricultural sector needs to become more business-oriented in its approach whilst retaining its traditional aspects. A career in the agricultural sector needs to combine formal knowledge acquisition together with technology and business enterprise. This should be done with a view to attract young and new farmers who might be otherwise reluctant to take up long term employment in the agricultural sector. At the same time this would provide an opportunity to existing farmers to transform themselves into rural entrepreneurs. Educational services are important to increase technical expertise and tap into new complementary employment for rural entrepreneurs who are interested in making a quantum leap and add value to their products. Additional assistance to micro farmers who wish to upgrade their products will be essential due to their vulnerability in a volatile agricultural sector. Such assistance and dissemination of information can also be provided through community based projects and social media. This approach is intended to bring positive ripple effects on the sustainability and competitiveness of Malta's agricultural sector.

Measures:

Measure 023. Consolidate the Farm Extension Services that were established in May 2017 with the scope of providing regular farm visits and stakeholder seminars, whilst properly training extension service officers. This can be done with the collaboration of pertinent stakeholders who can offer a range of aspects such as business organization, collaboration, professional development, networking, market strategies, risk analysis and agronomic aspects.

S4 Develop curricula that combine agricultural science with business development to enhance the capacity of future agricultural operators.

Traditional rural skills need to be complemented with business and technological development to incorporate such skills within functioning agri-business models. This requires an upgrade on the quality of learning and formation that should be made available for the needs of young and new farmers in the agricultural sector. Flexible learning pathways need to be explored with a view to providing the necessary learning content complemented with work experience as well as to address any skills mismatch that threaten the livelihood of agricultural operators.

Measures:

Measure 024. Conduct a skills audit of existing farmers and provide the necessary feedback.

Measure 025. Develop flexible learning pathways to address the identified skills gaps. This may include hands-on training with experts, including farmers, applied teaching on experimental farms, as well as the integration of communication, marketing and business management.

Measure 026. Review and develop further flexible, yet formal, learning pathways that set upcoming farmers on to an agribusiness pathway.

S5 Early stage exposure to agricultural issues and practices.

Early stage exposure to the agricultural sector can inculcate a sense of attraction to the younger workforce who may opt to operate within the sector. This can form the first step of a flexible learning pathway especially for aspiring rural entrepreneurs. Education programmes to promote the various stages of food production will increase awareness and appreciation of value added agricultural goods. The new secondary schooling system envisages the elimination of a 'one size fits all' approach to expand into applied learning. There are a number of applied subjects being taught in both the Alternative Learning Programme schools for fifteen (15) year olds and in a number of secondary state schools for low-performing students. The new secondary school system shall provide applied quality learning programmes to all secondary school students, that may include Engineering, Science, Hospitality, Information Technology, Agribusiness and Gardening, Retail, Artisanship and Business all of which could be of valid input towards the first steps taken by students wishing to start their career pathway in agriculture at compulsory school level. This is complemented by a number of MCAST courses in the agricultural sciences which could be a follow-on for post secondary education.

Measures:

Measure 027. Support the national educational platform on agribusiness at a compulsory level of education. The outcome of such a platform could be a preamble to post-secondary and higher education degree programmes. Government shall offer all the necessary support to challenge youths with the practice of hands-on farming; integrating the scientific and management aspects related with agriculture and inform students on traditional farming practices, food products, food tasting, grading and traceability. All this within the context of a business environment which can be their future livelihood.

S6	**Safeguard the Maltese agricultural heritage by fostering and disseminating traditional rural skills, knowledge and technology that prevail in the farming of small parcels, the maintenance of intricate landscapes and the production of those unique products that preserve typically Maltese flavours.**

Safeguarding the Maltese agricultural heritage is instrumental to avoid loss of the valuable knowledge acquired and which has been passed on through generations. The successful preservation of traditional skills and knowledge as well as intricate landscapes encourages customers to appreciate the efforts required to produce value added products. This can attract new customers and would also enhance the viability of rural tourism.

Measures:

Measure 028. Incentivize and assist farmers and rural stakeholders to preserve and regenerate rural skills through education, research, media coverage and capacity building.

4.01.03 Resources

R1	**Increase capacity to implement effective actions that promote sustainable agricultural products and services with added value throughout the value chain whilst maximising the value of natural resources.**

Sustainable agriculture in Malta will increasingly depend on the production of quality niche goods and services. Quality and branding will therefore be crucial towards securing an added value embedded within local agricultural products and services. Therefore, controls for the identification of, and remedial actions in respect of, fraudulent activities at the retailing, production and wholesale stage of quality products should be sufficiently robust in order to ensure a level playing field protecting and valorising premium products generated by operators who are complying with sustainable agricultural production practices.

Measures:

Measure 029. Implementation of the Maltese quality mark coupled with targeted information campaigns with producers, processors, traders and consumers.

Measure 030. Encourage collaboration between authorities to ensure effective product traceability throughout the value chain.

Measure 031. Provide better guidance and a pro-active approach through effective extension services as well as through promotional campaigns to strengthen the farmers' role in the food supply chain

R2 Enhance the resilience of the agricultural sector by increasing its adaptive capacity and identifying appropriate measures to reduce Greenhouse Gas emissions.

Building resilience to climate change is also necessary to secure the sustainability of the sector. Adaptation measures need to be identified in order to mitigate the negative implications of climate change on agriculture and its dependencies. Resilience in the sector is required to adapt to the realities of severe drought, heat stress and water shortages which may compromise the production of agricultural goods. The current crop mix is known to exert an unsustainable demand on groundwater resources. Whilst New Water has been recently introduced, a revision of the current crop mix, the use of smart irrigation systems, measures to improve soil productivity and other sustainable agricultural practices will strengthen the sector's adaptation. Such a strategy needs to be economically beneficial in order to demonstrate that climate smart practices and technology can represent an economic opportunity. Information campaigns may also be relevant in this case in order to create awareness amongst farmers regarding the linkages between climate change and the agricultural sector and, in particular, the shift towards crops which have a lower crop water requirement but a higher market return.

Measures:

Measure 032. Draw up actions that emanate from adaptation and mitigation strategies through the direct involvement of public and private stakeholders including farmers and livestock breeders.

Measure 033. Research on local livestock breeds to assist their climate adaptability which may result in more efficient production.

Measure 034. Research and experiment with wind curbing and soil conservation techniques that are suitable for localised climatic conditions as well as with new crops that require less water and fertilizer requirements, which have a higher economic return.

Measure 035. Identify and experiment with multipurpose trees that provide crops, shelter from wind, soil stabilisation, protection from sea spray, increase moisture and increase ecological corridors between fragmented areas. Trees that provide yield should be prioritized.

Measure 036. Promote and back the restoration of rubble walls utilising traditional methods. This will enhance connectivity while providing refuge for fauna and allow excess rainwater to drain from the fields, both benefiting agriculture production and minimising soil erosion

R3 Enhance the utilisation of land and farm resources by applying sustainable cultivation practices.

The sustainable use of the limited agricultural land resources through optimal cultivation practices assists in safeguarding the environment, enhancing biodiversity and preserving soil fertility. This is relevant not only for the development of the agricultural sector, but also to dovetail the increase in consumer awareness on healthy lifestyles. Farmers should be guided to focus on sustainable methods and practices with regards to pest control and fertilisation practices. The holistic utilisation of land resources is especially important given Malta's small and fragmented agricultural holdings which are not conducive to the adoption of large scale technologies.

Measures:

Measure 037. Provide for more effective use of Malta's and Gozo's experimental research centres to carry out experiments and pilot projects on various crops in order to identify the most effective and sustainable cultivation practices as well as experiment with and promote successful intercropping methods in crop farming.

Measure 038. Incentivize the consolidation of land parcels to improve their sustainability.

Measure 039. Assess appropriately the feasibility and the potential of increasing organic production of Maltese agricultural products.

R4 Valorise farmland for its agricultural value and non arable land for its ecological, scenic and eco-touristic potential.

Abandoned farmland has multiple implications such as encouraging desertification and diminishing the capacity of Malta's agricultural sector. Therefore, it is worth studying in more depth abandoned and/or unproductive farmland with a view to determining the possibility for it to be reactivated. This will enhance the availability of land resources for existing, new or young farmers. Moreover, measures to convert non arable land and marginal areas to ecological and scenic sites will boost the eco-tourism potential of Malta and henceforth an increase in complementary employment in the rural tourism sector. This can be achieved by giving an economic value to previously cultivated parcels.

Measures:

Measure 040. Create a farmland categorisation scheme to be linked with the introduction of land consolidation schemes which will increase resources and scope for profit to ambitious farmers who are willing to consolidate and/or enlarge their business. This scheme is to be integrated with a Geographic Data Information System that will be developed to include the lease status and livestock breeding activity of the site or farmland.

R5 Encourage measures for farmers to reduce their dependence on groundwater.

The demand for water by agriculture has been estimated by both the National Statistics Office and Malta's Second Water Catchment Management Plan. This unsustainable groundwater demand needs to be reined in through policies and measures aimed at conserving our groundwater quantitative and qualitative status as well as increasing the utilisation of New Water. Groundwater recharge times are considerably long, especially for the mean sea level aquifer, and farmers should thus be incentivised to migrate towards more water efficient, higher value crops whilst maximising alternative sources of non-conventional water. The Water Framework Directive requires that groundwater bodies are of good qualitative and quantitative status and therefore positive change is required.

Measures:

Measure 041. Farmers are to be consulted, trained, educated and informed on a set of instruments aimed at improving crop selection, water use and its conservation and non-conventional sources of water.

Measure 042. Promote water-crop assessment in order to enable planning for the demand there from through conservation of water and the use of non-conventional sources.

Measure 043. Develop a national research programme, in conjunction with stakeholders, to be tasked with exploring new methods of optimizing water usage without compromising the farmers' economic return, including: a. research on local crops and livestock breeds to assess their water demands in order to optimize on-farm water use planning, including demonstration projects on irrigation management, fertilizer application, crop cultivars and crop production utilising New Water; b. identify crop cultivars that minimise water demand but provide a good economic return; c. promote cultivation practices, materials and technologies that effectively improve soil moisture retention properties.

R6 Assist farmers in the integrated management of water resources through financial and knowledge based instruments.

In view of Malta's water scarcity, agricultural production is incurring large input costs. The Second Water Catchment Management Plan is aimed at improving the ecological conditions of Malta's waters, long term protection of available water resources, removal of hazardous pollutants, reduction of pollution in groundwater and the mitigation of the effects of floods and droughts. Given such ambitious plans, significant investments are needed for better moisture collection, rainwater collection and prevention of soil water loss. The introduction of new instruments that are able to meet these challenges should be considered. This system has multiple benefits including greater economic efficiency whereby it is assumed that Integrated Management of Water Resources brings the greatest benefit to the greatest number of users possible with the available water resources. It also promotes ecological sustainability which requires adequate allocation of water resources. Cooperation should be extended through the creation of properly structured Water Users Associations to manage groundwater bodies. This will increase responsibility and, through extension, awareness on farmers to conduct sustainable uses of water management.

Measures:

Measure 044. Conduct an economic and financial feasibility study on the introduction of irrigation systems that minimise evaporation and collect dew moisture through deficit irrigation strategies.

Measure 045. Incentivize roof utilisation of farm structures and rainwater runoff collection in arable agriculture for the effective collection of rainwater and in accordance with agricultural planning policies.

Measure 046. Promote the development and financing of smart irrigation systems.

R7 Facilitate sustainable agricultural production through environmentally sound agricultural practices including integrated pest management and plant nutrition.

Integrated Pest Management should be further encouraged for a number of reasons including the reduction of the environmental and health associated risks whilst minimising the potential for air, groundwater and product contamination. Such measures will correspondingly encourage a more environmentally friendly agricultural production. This may require the expansion of agricultural services especially when it comes to pesticide management and fertiliser application to enhance technical capacity and knowledge gathering for farmers who are interested in employment new practices in their farm business.

Measures:

Measure 047. Increase effectiveness and coordination in the enforcement of plant protection product utilisation including the placing on the market as well as applicability on crops.

Measure 048. Promote the establishment of agricultural services such as pesticide management and fertiliser application by service providers to achieve uniformity in production and secure professional advice. This should potentially also extend to facilitate organic and environmentally sustainable farming.

Measure 049. Collect data on integrated pest management practices with a view to plan strategic means with which the farming community can effectively reduce the application of pesticides without reducing economic returns.

R8 Develop a soil action plan in relation to agricultural use.

A soil action plan for the agricultural sector would ensure maximization of the full potential of Maltese soils in terms of their cultivation potential. Such an action plan should also consider the link between soils and climate change particularly how this relationship can attain climate-smart farming. Policy makers would thus need a strategy to underline the main tasks required to reach these desired goals. This action plan will also present policy makers with time bound objectives that will help monitor progress and demonstrate the full productivity of Maltese solid for the benefit of the agricultural sector.

Measures:

Measure 050. Develop a Soil Action Plan by involving all the pertinent stakeholders covering, but not limited to, measures that:

a. support initiatives at the field level which contribute towards improved soil quality thereby improving its moisture retention ability as well as its nutrient content;

b. promote the use of steam soil sterilizers for the sterilization of farmland that could assist in the reduction of soil born diseases and nematodes;

c. improve knowledge on Maltese soils by updating the available pedological data;

d. incentivize processes and practices on the build up and maintenance of soil organic matter, the enhancement of soil biodiversity, the reduction of soil erosion, compaction and contamination;

e. assess the impact of the correct application of manure and other organic matter in Malta's soils particularly on the level of nitrates in order to ensure effective implementation of the Nitrates Directive and align the plan with the farm waste management plan.

R9 Include within a sector-oriented educational and communication campaign, sustainable soil utilisation practices to increase awareness of soil as a living organism in order to promote a holistic approach to the soil's productive capacity.

A sector-oriented educational and communication campaign on soil should aim, amongst others, at creating awareness on the soil's productive capacity as an essential component of sustainable agricultural practices. For example, the way crops are planted can prevent soil erosion and enhance its quality. Such measures of soil enrichment can increase yields as well as create more robust crops thereby reducing risks to agricultural production.

Measures:

Measure 051. Integrate the soil-related aspects of the soil action plan into a nationwide educational and communication campaign on soil management conducted by the extension services team.

R10 Secure the legacy of indigenous plant species to preserve them for research and propagation purposes including on a commercial scale so as to conserve them as a genetic insurance in the face of environmental and climate risks as well as for food security in line with access and benefit sharing legislation.

Indigenous plant species play an important role in the agricultural sector. It is important to safeguard them in order to be able to sustain their cultivation for the nourishment of the Maltese society. Therefore, the production of such species enhances sustainability in agricultural production. It is necessary that these resources are safeguarded against being supplanted by exotic species.

Measures:

Measure 052. Update and better equip the seed bank launched in 2016 with a programme of continuous cultivation and preservation of indigenous species.

Measure 053. Finance research on permanent crop species and rootstocks aimed at commercialization even on the export market within the parameters permitted in state aid rules.

Measure 054. Make effective use of the register on legally protected Maltese varieties and their characteristics and research on their reintroduction in mainstream agriculture, backed by idea incubators.

4.01.04 Governance

G1 Encourage the setting up of stakeholder networks.

Stakeholder networks are an essential part of the policy making and implementation process as indeed such stakeholders would be directly impacted by any decisions being taken. The Agricultural Consultative Council could encompass a more focused role and serve as the platform whereby the public and the private sector meet to exchange views on policy matters and relevant actions as well as be the focal point for matters of exchange of information between the two sectors including the transmission of data.

Measures:

Measure 055. Strengthen or recast the role of the Agricultural Consultative Council to transform it into a rural partnership geared towards rural diversification, social integration and landscape management. This council will focus on the monitoring of key priorities set out in this Agricultural Policy.

Measure 056. The Extension Services launched in 2017 should be geared to focus on the wider involvement of stakeholders and liaise with the Agricultural Consultative Council on the feedback received.

Measure 057. Study the feasibility of setting up a pilot Water Users Association to better manage groundwater bodies used for irrigation as well as to manage water demand.

G2 Provide the necessary capacity to develop a Management Information System to cover the agricultural sector.

A comprehensive Management Information System is required to cover all existing data gaps. This will help policy makers take the best informed decisions when devising policies for the future of the agricultural sector. Moreover, such a system would prove to be user friendly since it coordinates all available data into one platform that helps policy makers to deduce trends and consequently plan strategies based on centralized and reliable data.

Measures:

Measure 058. Identify any possible data gaps and create a dynamic database on parameters that can be utilised for analysis, decision making, education, training and the development of innovative methods in agriculture. These gaps should also include data required to back existing policies and regulations.

Measure 059. Provide a platform for a formal collaborative mechanism between research and data collecting institutions and various agricultural stakeholders to ensure the ongoing availability of, and access to, data and analysis required to implement the various official policy instruments.

G3 Consolidated information on the land tenure of farm holdings.

The consolidation of land tenure particularly those on Government property will provide farmers with stronger economic security and facilitate long term planning in terms of investments in new smart technology, improvement in soil productivity and adoption of climate smart practices. This will have a multiplier effect in terms of the creation of complementary employment in the agricultural sector. From an administrative point of view, such consolidation schemes will help clarify tenureship rights and ensure better management of land conflicts.

Measures:

Measure 060. Develop a consolidated Geographic Data Information System including lease status and livestock breeding activity.

G4 Create and manage a structured framework that addresses issues of farmland tenure and consolidation with due regard to state aid implications.

Access to land is very important to the competitiveness and the economic development of the agricultural sector. Therefore it is important that policy makers facilitate land tenureship which will provide a sense of long term economic security for active farmers and attract younger farmers to the agricultural sector through a number of initiatives. However, since this exercise may have broader legal implications including EU law, it stands to reason that any initiative taken in this regard should take into account the pertinent state aid rules.

Measures:

Measure 061. Ensuring clear guidance to farmers on the parameters of land ownership and farmland consolidation issues.

Measure 062. Ensure effective design in relation to farm land Government tenure for better legal title for farmers of Government property and facilitate transfer of land to farmers. It is important that young farmers and agricultural students are provided further incentives which facilitate their entry into the sector.

G5 Facilitation of the process to utilise accredited laboratories for various requirements.

Laboratory analysis for the agricultural sector can assist with various needs such as analysis of agricultural products for quality labelling, chemical tests in food, water testing, soil testing, plant and rootstock analysis and more. Moreover, certification and quarantine provisions are required to maintain a minimum of administrative burden for the benefit of farmers who opt to import seeds and planting materials from other markets. All the required certification approvals should thus be made in a timely manner. This will help farmers plan better their production targets and match the demand for agricultural produce.

Measures:

Measure 063. Conduct a market assessment study in order to determine the likely volume of tests required by the sector, their cost and the existence or otherwise of the viability for conducting tests locally as well as facilitate access to accredited laboratories for various requirements such as those identified in Measures 21 and 43.

G6 Optimize the agricultural water mix.

The optimization of agricultural water mix has great environmental benefits in terms of reducing the dependency on groundwater abstraction and secures the sustainability of the agricultural sector.

Measures:

Measure 064. An adequate governance system on water consumption is to be designed and developed involving the key Ministries in accordance with the provisions of the Second Water Catchment Management Plan.

G7 Develop farmer and livestock benchmarking systems.

This could be an important step to assign different priorities to different categories of farmers especially in the context of the current efforts to attract young farmers to the agricultural sector through appropriate incentives. Therefore, a benchmarking system should be sought in order to assist policymakers in determining the strengths of certain agricultural practices and one which tries to emulate the good practices to other agricultural farm businesses that are struggling to remain competitive.

Benchmarking systems will be linked with other instruments such as planning permitting and subsidy schemes so as to incentivize *bona fide* farmers to increase their turnover. Young farmers and newcomers should be incentivized to enter the classification system through a concession that gives them a period of settling time to reach their desired turnover. The policy maker would thus be able to distinguish between the different agricultural practices and set specific policy objectives accordingly.

Measures:

Measure 065. Design and develop a farmer benchmarking system with a categorisation scheme for farmers and livestock breeders based on their economic activity and contribution towards the agricultural sector.

G8 Establish the financing of the various initiatives included in the agricultural policy.

Proper governance requires the appropriate level of financing and a financing model which ensures the sustainability of the initiatives as well as of the agricultural sector. A mixture of national and EU funds needs to be put in place to support the measures outlined in this policy document.

Measures:

Measure 066. Coordinate and ensure the appropriate financial tools for implementing the various measures outlined in this agricultural policy in line with the appropriate financing regulations.

G9 Maintaining coherence and consistency between different policies that are intended to positively impact on the agricultural sector.

Different policies intended to steer government action can have a bearing on the agricultural sector. It is essential that the government ensures coherence between different policy instruments that have an impact on the agricultural sector. These may include policies which relate to water and agriculture, agriculture and tourism as well as agriculture and land use to cite a few examples. Existing loopholes should be identified and addressed to ensure coherency whilst new policy instruments should be sent for the opinion of the Ministry responsible for agriculture prior to adoption. This will instil further confidence amongst the main stakeholders who stand to benefit from such coherency.

Measures:

Measure 067. Ensure coherence in existing policies and remove any ambiguities which may be in conflict with this policy document.

Measure 068. Government ministries developing new policy or regulatory instruments are to ensure consultation with the Ministry responsible for agriculture to avoid conflict between new instruments and this policy.

G10 Ensuring effective communication.

Given the number of incentives and initiatives underlined in this Agricultural policy, it is important for the Government to have an effective line of communication with the sector. A communication strategy needs to recognise its different audiences and the different media by which they can be reached.

Measures:

Measure 069. Develop an effective communications structure to provide timely information to all stakeholders in the agricultural sector. Identify the varied target audience and the different media by which they can be reached in order to communicate the policies outlined in this document as well as to provide a first level of support when and where required.

G11 External evaluation.

The concluding phase of the agricultural policy implementation process should include an in-depth evaluation of all the policy measures to gauge their success or otherwise. This policy evaluation will be carried out by an independent external evaluator who will be analysing the effect of the policy measures as delivered vis-à-vis their original context. Moreover, this exercise should lead to the development of a set of recommendations for improvement as a follow up to this policy.

Measures:

Measure 070. Carry out an in depth evaluation of the measures within this policy in order to maximise their contribution to economic, social and environmental goals as a matter of rationale and modus operandi for the sector.

5

5. Implementation

5.01 Action Plan

As pointed out in the previous chapter, the agricultural Policy for the Maltese Islands for 2018-2028 is based on seventy (70) policy measures organised in four (4) sets of operational objectives, namely a) Economic objectives, b) Social regeneration, c) Resources and d) Governance. This chapter presents the implementation schedule to be followed in terms of timeframes, responsible entities and justification for such an action plan. This schedule will serve as reference to the policy maker to implement the policy measures in line with the rationale presented in this policy document and the prioritisation of certain measures due to urgency, importance to the agricultural sector or a particular sequence to be followed. Table 67 below illustrates the action plan to be followed in terms of timeframes over a period of ten (10) years including the operational objectives and the respective policy measures.

				Year									
Reference	**Objective title**	**Reference**	**Measure description**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**
Economic 1	Develop and/or adopt (a) new practices, (b) business processes and (c) smart technologies to address current and upcoming challenges faced by the agricultural sector with special focus on competitiveness, increasing average age of farmers and climate change.	1	Encourage the use of EU funds which should complement national and private funding and initiatives for the adoption of technologies that can increase farm competitiveness whilst responding to the climate change challenge. Furthermore, innovation, research and development in agriculture should feature more prominently in Malta's R&I and other funding programmes.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Economic 1		2	Ensure effective and appropriate training for the users of state of the art or innovative technologies for identified priorities such as: a. train farmers on record keeping with a view to assess the productivity of their land parcels as well as new methodologies used to facilitate more output from their land and b. develop models that take into account the specific economic and environmental parameters which can be utilised to assess agronomic situations on a case by case basis and provide adequate farmer advice through extension services.			✓	✓	✓	✓	✓	✓	✓	✓
Economic 2	Promote and support a migration, especially by young farmers, towards the cultivation and supply of high quality and value added market-oriented products to increase farm-based earnings.	3	Facilitate the creation of agricultural business incubators that encourage farmers to join forces and plan their operations together, identifying the niche markets to exploit, the products required to serve such markets and any agri-business components intended to add value between the farm and the consumer.				✓	✓	✓	✓	✓	✓	✓
Economic 2		4	Enhance Farm Support Services structures to provide the necessary advice to farmers in developing business scenarios and disseminate knowledge to farmers to embark on the cultivation of alternative crops for better return.			✓	✓	✓	✓	✓	✓	✓	✓
Economic 3	Promote and support innovation to assist the sector to migrate towards a more circular approach	5	The creation of demonstration sites in agricultural setups to ensure circularity in all agricultural resources at a cost effective scale.		✓	✓	✓	✓	✓	✓	✓	✓	✓

Economic 3	by transforming wastes into resources.	6	The creation of sustainable alternative strategies related to livestock waste management including treatment of by-products. This includes effective implementation of the Agricultural Farm Waste Management Plan and the identification of possible solutions to turn farm waste into a resource for use by local farmers.	✓		✓	✓	✓	✓	✓	✓	✓	✓
Economic 3		7	Establish a new legal framework for the utilisation of spent mushroom substrate.	✓		✓	✓	✓	✓	✓	✓	✓	✓
Economic 4	Assist and incentivize farmer cooperation and clustering to improve economies of scale in the collective acquisition and provision of goods and services as well as other key issues.	8	Support initiatives aimed at setting up and promoting collaboration between primary producers.			✓	✓	✓	✓	✓	✓	✓	✓
Economic 4		9	Support and promote collaboration between farmers and other stakeholders in the value chain particularly aiming at optimizing investment and reducing costs.			✓	✓	✓	✓	✓	✓	✓	✓
Economic 5	Diversify the agricultural product through a holistic rationalization of field crops, both traditional and underutilized, horticultural, floricultural and herbal crops, bee keeping and other activities to optimize the resource use including land and soil. This will complement a move towards premium product agriculture, secure further the local food supply, enhance earnings and employment opportunities and increase agricultural exports.	10	Establish measures that enable the identification of distinctive characteristics along the agricultural value chain.			✓	✓	✓	✓	✓	✓	✓	✓
Economic 5		11	Promote bee keeping in agricultural holdings.			✓	✓	✓	✓	✓	✓	✓	✓
Economic 5		12	Research on the potential of innovative and niche market opportunities for Maltese agricultural products.	✓		✓	✓	✓	✓	✓	✓	✓	✓
Economic 6	Incentivize the transition of Maltese farmers from their dependence on quantitative production to reap the economic value of the rural environment generated from rural tourism, the associated complementary employment and diversified income opportunities.	13	Develop guidelines specific to rural tourism that complements the Rural Policy and Design Guidance, 2014, including the necessary feasibility studies reflecting pertinent legislative provisions that are required for the effective operation of such an industry.			✓	✓	✓	✓	✓	✓	✓	✓
Economic 6		14	Support collaborations between rural stakeholders and the tourism market on the upgrading of rural aesthetics, the creation of access routes and signage, and the sensitive upgrading of rural and village cores.				✓	✓	✓	✓	✓	✓	✓

Economic 6		15	Strengthen the link between farming and gastronomy, food, health and the environment through assistance schemes with due regard to state aid rules.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Economic 6		16	Encourage farm developments and services that create new job opportunities with particular focus on local cultivars and breeds to promote rural tourism.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Economic 7	Redirect further efforts towards the development and promotion of enhanced harvesting, processing and storage methods to reduce product losses, to increase product value added and to identify new export markets.	17	Carry out pilot projects integrated with extension services and media promotion.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Economic 7		18	Increase awareness on marketing standards and provide technical assistance to operators who invest in standardized packaging, processing, branding and marketing of consumer-oriented products, whilst assessing of the role of authorities in the implementation of marketing standards for agricultural products.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Economic 7		19	Provide assistance for pilot projects in small holdings cultivated by recreational farmers.				✓	✓	✓	✓	✓	✓	✓
Economic 8	Facilitate the capacity of agricultural stakeholders to exploit international markets.	20	Encourage partnerships to identify and evaluate international niche markets with the aim of tapping such markets for Maltese products. Such a networking effort would ideally involve all the key players of the food supply chain.					✓	✓	✓	✓	✓	✓
Social Regeneration 1	Introduce customer relationship management frameworks to better understand consumer demands for agricultural products, their quality, origin and other differentiating features.	21	Ensure availability of market research including the commissioning of consumer surveys and comparative analysis on a selection of agricultural products identified within such a process, including those that can achieve a quality label, as well as perceptions on chemicals in food, antimicrobial resistance and consumer categorisation exercises.	✓	✓	✓							
Social Regeneration 2	Mainstream social and cultural activities to raise awareness on the local product offered, its nutritional benefits and the opportunities emanating from the sector.	22	Streamline the organisation of rural festivals to ensure that all fairs showcasing agricultural produce follow established guidelines and embark on a marketing campaign that promotes Malta's premium agricultural produce with locals and visitors alike to create awareness and appreciation of local products. This could also be coupled with nutritional and health related information and benefits.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Social Regeneration 3	Invest in flexible career pathways and educational services for current and prospective rural entrepreneurs to offer an array of essential information, exchange of ideas, networking and training opportunities for product upgrading and diversification.	23	Consolidate the Farm Extension Services that were established in May 2017 with the scope of providing regular farm visits and stakeholder seminars, whilst properly training extension service officers. This can be done with the collaboration of pertinent stakeholders who can offer a range of aspects such as business organization, collaboration, professional development, networking, market strategies, risk analysis and agronomic aspects.	✓	✓	✓							
Social Regeneration 4	Develop curricula that combine agricultural science with business development to enhance the capacity of future agricultural operators.	24	Conduct a skills audit of existing farmers and provide the necessary feedback.				✓	✓	✓				
Social Regeneration 4		25	Develop flexible learning pathways to address the identified skills gaps. This may include hands-on training with experts, including farmers, applied teaching on experimental farms, as well as the integration of communication, marketing and business management.			✓	✓	✓	✓	✓	✓	✓	✓
Social Regeneration 4		26	Review and develop further flexible, yet formal, learning pathways that guide upcoming farmers on to an agribusiness pathway.				✓	✓	✓	✓	✓	✓	✓
Social Regeneration 5	Early stage exposure to agricultural issues and practices.	27	Support the national educational platform on agribusiness at a compulsory level of education. The outcome of such a platform could be a preamble to post-secondary and higher education degree programmes. Government shall offer all the necessary support to challenge youths with the practice of hands-on farming; integrating the scientific and management aspects related to agriculture and inform students on traditional farming practices, food products, food tasting, grading and traceability. All this within the context of a business environment which can be their future livelihood.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Social Regeneration 6	Safeguard the Maltese agricultural heritage by fostering and disseminating traditional rural skills, knowledge and technology that prevail in the farming of small parcels, the maintenance of intricate landscapes and the production of those unique products that preserve typically Maltese flavours.	28	Incentivize and assist farmers and rural stakeholders to preserve and regenerate rural skills through education, research, media coverage and capacity building.			✓	✓	✓	✓	✓	✓	✓	✓
Resources 1	Increase capacity to implement effective actions that promote sustainable agricultural products and services with added value throughout the value chain whilst maximising the value of natural resources.	29	Implementation of the Maltese quality mark coupled with targeted information campaigns with producers, processors, traders and consumers.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Resources 1		30	Encourage collaboration between authorities to ensure effective product traceability throughout the value chain.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Resources 1		31	Provide better guidance and a pro-active approach through effective extension services as well as through promotional campaigns to strengthen the farmers' role in the food supply chain.		✓	✓	✓	✓	✓	✓	✓	✓	✓
Resources 2	Enhance the resilience of the agricultural sector by increasing its adaptive capacity and identifying appropriate measures to reduce Greenhouse Gas emissions.	32	Draw up actions that emanate from adaptation and mitigation strategies through the direct involvement of public and private stakeholders including farmers and livestock breeders.			✓	✓	✓	✓	✓	✓	✓	✓
Resources 2		33	Research on local livestock breeds to investigate and assess their climate adaptability which may result in more efficient production.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Resources 2		34	Research and experiment with wind curbing and soil conservation techniques that are suitable for local climatic conditions as well as with new crops that require less water and fertilizer requirements, which have a higher economic return.				✓	✓	✓	✓	✓	✓	✓
Resources 2		35	Identify and experiment with multipurpose trees that provide crops, shelter from wind, soil stabilisation, protection from sea spray, increase moisture and increase ecological corridors between fragmented areas. Trees that provide yield should be prioritized.					✓	✓	✓	✓	✓	✓

Resources 2		36	Promote and support the restoration of rubble walls utilising traditional methods. In order to enhance connectivity while providing refuge for fauna and allow excess rainwater to drain from the fields, both benefiting agriculture production and minimising soil erosion.			✓	✓	✓	✓	✓	✓	✓	✓
Resources 3	Enhance the utilisation of land and farm resources by applying sustainable cultivation practices.	37	Provide for more effective use of Malta's and Gozo's experimental research centres to carry out experiments and pilot projects on various crops in order to identify the most effective and sustainable cultivation practices as well as experiment with and promote successful intercropping methods in crop farming.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Resources 3		38	Incentivize the consolidation of land parcels to improve their sustainability.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Resources 3		39	Assess appropriately the feasibility and the potential of increasing organic production of Maltese agricultural products.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Resources 4	Valorise farmland for its agricultural value and non arable land for its ecological, scenic and eco-touristic potential.	40	Create a farmland categorisation scheme to be linked with the introduction of land consolidation schemes which will increase resources and scope for profit to ambitious farmers who are willing to consolidate and/or enlarge their business. This scheme should be integrated with a Geographic Data Information System that will be developed to include the lease status and livestock breeding activity of the site or farmland.				✓	✓	✓	✓	✓	✓	✓
Resources 5	Encourage measures for farmers to reduce their dependence on groundwater.	41	Farmers are to be consulted, trained, educated and informed on a set of instruments aimed at improving crop selection, water use and its conservation and non-conventional sources of water.		✓	✓	✓	✓	✓	✓	✓	✓	✓
Resources 5		42	Promote water-crop assessment in order to enable planning for the demand there from through conservation of water and the use of non-conventional sources.		✓	✓	✓	✓	✓	✓	✓	✓	✓

Resources 5		43	Develop a national research programme, in conjunction with stakeholders, to be tasked with exploring new methods of optimizing water usage without compromising the farmers' economic return, including a. research on local crops and livestock breeds to assess their water demands in order to optimize on-farm water use planning, including demonstration projects on irrigation management, fertilizer application, crop cultivars and crop production utilising New Water; b. identify crop cultivars or livestock breeds that minimise water demand but provide a good economic return; c. promote cultivation practices, materials and technologies that effectively improve soil moisture retention properties.				✓	✓	✓	✓	✓	✓	✓
Resources 6	Assist farmers in the integrated management of water resources through financial and knowledge based instruments.	44	Conduct an economic and financial feasibility study on the introduction of irrigation systems that minimise evaporation and collect dew moisture through deficit irrigation strategies.				✓	✓	✓				
Resources 6		45	Incentivize roof utilisation of farm structures and rainwater runoff collection in arable agriculture for the effective collection of rainwater and in accordance with agricultural planning policies.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Resources 6		46	Promote the development and financing of smart irrigation systems.		✓	✓	✓	✓	✓	✓	✓	✓	✓
Resources 7	Facilitate sustainable agricultural production through environmentally sound agricultural practices including integrated pest management and plant nutrition.	47	Increase effectiveness and coordination in the enforcement of plant protection product utilisation including the placing on the market as well as applicability on crops.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Resources 7		48	Promote the establishment of agricultural services such as pesticide management and fertiliser application by service providers to achieve uniformity in production and secure professional advice. This should potentially also extend to facilitate organic and environmentally sustainable farming.			✓	✓	✓	✓	✓	✓	✓	✓
Resources 7		49	Collect data on integrated pest management practices with a view to plan strategic means with which the farming community can effectively reduce the application of pesticides without reducing economic returns.		✓	✓	✓	✓	✓	✓	✓	✓	✓

Resources 8	Develop a soil action plan in relation to agricultural use.	50	Develop a Soil Action Plan by involving all the pertinent stakeholders including, but not limited to, measures that: a. support initiatives at the field level which contribute towards improved soil quality thereby improving its moisture retention ability as well as its nutrient content; b. promote the use of steam soil sterilizers for the sterilization of farmland that could assist in the reduction of soil born diseases and nematodes; c. improve knowledge on Maltese soils by updating the available pedological data.; d. incentivize processes and practices on the build up and maintenance of soil organic matter, the enhancement of soil biodiversity, the reduction of soil erosion, compaction and contamination; e. assess the impact of the correct application of manure and other organic matter in Malta's soils particularly on the level of nitrates in order to ensure effective implementation of the Nitrates Directive and align the plan with the farm waste management plan.			✓	✓	✓						
Resources 9	Include within a sector-oriented educational and communication campaign, sustainable soil utilisation practices to increase awareness of soil as a living organism in order to promote a holistic approach to the soil's productive capacity.	51	Integrate the soil-related aspects into a nationwide educational and communication campaign on soil management conducted by the extension services team.					✓	✓	✓				
Resources 10	Secure the legacy of indigenous plant species to preserve them for research and propagation purposes including on a commercial scale so as to conserve them as a genetic insurance in the face of environmental and climate risks as well as for food security in line with access and benefit sharing legislation.	52	Update and better equip the seed bank launched in 2016 with a programme of continuous cultivation and preservation of indigenous species.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Resources 10		53	Finance research on permanent crop species and rootstocks aimed at commercialization even on the export market within the parameters permitted in state aid rules.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Resources 10		54	Make effective use of the register of legally protected Maltese varieties and their characteristics and research on their reintroduction in mainstream agriculture, supported by idea incubators.				✓	✓	✓	✓	✓	✓	✓

Governance 1	Encourage the setting up of stakeholder networks.	55	Strengthen or recast the role of the Agricultural Consultative Council to transform it into a rural partnership geared towards rural diversification, social integration and landscape management. This council will focus on the monitoring of key priorities set out in this Agricultural Policy.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Governance 1		56	The Extension Services launched in 2017 should be geared to focus on the wider involvement of stakeholders and liaise with the Agricultural Consultative Council on the feedback received.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Governance 1		57	Study the feasibility of setting up a pilot Water Users Association to better manage groundwater bodies used for irrigation as well as to manage water demand.			✓	✓	✓	✓	✓	✓	✓	✓
Governance 2	Provide the necessary capacity to develop a Management Information System to cover the agricultural sector.	58	Identify any possible data gaps and create a dynamic database on parameters that can be utilised for analysis, decision making, education, training and the development of innovative methods in agriculture. These gaps should also include data required to back existing policies and regulations.					✓	✓	✓	✓	✓	✓
Governance 2		59	Provide a platform for a formal collaborative mechanism between research and data collecting institutions and various agricultural stakeholders to ensure the ongoing availability of, and access to, data and analysis required to implement the various official policy instruments.		✓	✓	✓	✓	✓	✓	✓	✓	✓
Governance 3	Consolidated information on the land tenure of farm holdings.	60	Develop a consolidated Geographic Data Information System including lease status and livestock breeding activity.					✓	✓				
Governance 4	Create and manage a structured framework that addresses issues of farmland tenure and consolidation with due regard to state aid implications.	61	Establish clear guidance to farmers on the parameters of land ownership and farmland consolidation issues.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Governance 4		62	Establish effective frameworks and procedures in relation to farm land Government tenure for better legal title for farmers of Government property and facilitate transfer of land to farmers. It is important that young farmers and agricultural students are provided further incentives which facilitate their entry into the sector.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Governance 5	Facilitate and streamline procedures required to utilise accredited laboratories for various requirements.	63	Conduct a market assessment study in order to determine the likely volume of tests required by the sector, their cost and the existence or otherwise of the viability for conducting tests locally as well as facilitate access to accredited laboratories for various requirements such as those identified in Measures 21 and 43.			✓	✓	✓	✓	✓	✓	✓	✓

Governance 6	Optimize the agricultural water mix.	64	An adequate governance system on water consumption is to be designed and developed involving the key Ministries in accordance with the provisions of the Second Water Catchment Management Plan.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Governance 7	Develop farmer and livestock breeder benchmarking systems.	65	Design and develop a farmer benchmarking system with a categorisation scheme for farmers and livestock breeders based on their economic activity and contribution towards the agricultural sector.	✓									
Governance 8	Establish the financing of the various initiatives included in the agricultural policy.	66	Coordinate and ensure the appropriate financial tools for implementing the various measures outlined in this agricultural policy in line with the appropriate financing regulations.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Governance 9	Maintain coherence and consistency between different policies that are intended to positively impact on the agricultural sector.	67	Ensure coherence in existing policies and remove any ambiguities which may be in conflict with this policy document.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Governance 9		68	Government ministries developing new policy or regulatory instruments are to ensure consultation with the Ministry responsible for agriculture to avoid conflict between new instruments and this policy.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Governance 10	Ensuring effective communication.	69	Develop an effective communications structure to provide timely information to all stakeholders in the agricultural sector. Identify the varied target audience and the different media by which they can be reached in order to communicate the policies outlined in this document as well as to provide a first level of support when and where required.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Governance 11	External evaluation.	70	Carry out an in depth evaluation of measures within this policy in order to maximise their contribution to economic, social and environmental goals as a matter of rationale and modus operandi for the sector.										✓

Table 67: Operational objectives and policy measures with the ten-year implementation schedule

5.02 Responsible entities

This section lists the entities responsible for the implementation of the seventy (70) policy measures including the lead entity as well as other entities that could be involved to secure their effective implementation. Moreover, the status of each policy measure and the respective justification are also being provided in Table 68 below to build up on the ten-year implementation schedule presented in the previous section. The categories under the heading 'status' in Table 68 are being defined below:

- STARTED: Measure already launched
- ONGOING: Measure already partly implemented
- PRIORITY: Priority measure required to be launched in the short term
- SHORT TERM: Measure required to be launched in the short term
- LONG TERM: Measure that has to be launched in the longer term

Measure reference	Measure description	Responsible entity	Other entities	Status	Justification Status
1	Encourage the use of EU funds which should complement national and private funding and initiatives for the adoption of technologies that can increase farm competitiveness whilst responding to the climate change challenge. Furthermore, innovation, research and development in agriculture should feature more prominently in Malta's R&I and other funding programmes.	Diversification and Competitiveness (MESDC)	Managing Authority of RDP funds should assist in establishing the right mechanisms that will enable the implementation of such research findings at a commercially feasible level.	ONGOING	RDP 2014-2020 is ongoing and measures for productive investments linked with technology, farm competitiveness, climate change, innovation, R&D are already accessible to potential farmers/applicants. DCD can assist by leading applicants to such funds and integrate the research being carried out with such funding opportunities. Moreover, this policy document is intended to provide direction for the drafting of the new RDP programme post 2020.
2	Ensure effective and appropriate training for the users of state of the art or innovative technologies for identified priorities such as: a. train farmers on record keeping with a view to assess the productivity of their land parcels as well as new methodologies used to facilitate more output from their land and b. develop models that take into account the specific economic and environmental parameters which can be utilised to assess agronomic situations on a case by case basis and provide adequate farmer advice through extension services.	Diversification and Competitiveness (MESDC)	Should a new Farm Advisory Services be set up, it would fit as another valid entity involved in the implementation of this measure.	LONG TERM	The provision of training on innovative technologies should follow a lengthy consolidation process for the extension services team who need to be trained to assimilate knowledge on innovative strategies being applied in other countries or by the private sector (linked with Measure 23).

3	Facilitate the creation of agricultural business incubators that encourage farmers to join forces and plan their operations together, identifying the niche markets to exploit, the products required to serve such markets and any agri-business components intended to add value between the farm and the consumer.	Diversification and Competitiveness (MESDC)	Should a new Farm Advisory Services be set up, it would fit as another valid entity involved in the implementation of this measure.	LONG TERM	The creation of business incubators in farming should build on basic pre requisites such as research and data sets for market needs and consumer strategies that link with Measure 21 and Measure 59. Extension services providers should cater for bridging data gaps since without research there would be no extension and no public-sector support and without extension, research does not reach the target audience. Thus, synergies between research, extension services and farmers are critical for the creation of business incubators and effective collaboration between rural actors.
4	Enhance Farm Support Services structures to provide the necessary advice to farmers in developing business scenarios and disseminate knowledge to farmers to embark on the cultivation of alternative crops for better return.	Diversification and Competitiveness (MESDC)	Should a new Farm Advisory Services be set up, it would fit as another valid entity involved in the implementation of this measure.	ONGOING	Even if these services have already been launched, the team of extension services officers, composed mostly of civil servants with limited business management acumen, need to be properly trained (Measure 23) to grasp business management concepts related to developing niche markets and exploiting business scenarios.
5	The creation of demonstration sites in agricultural setups to ensure circularity in all agricultural resources at a cost effective scale.	Governance of Agricultural Bio-Resources (MESDC)	MCAST could also be involved in this measure.	SHORT TERM	Agricultural waste is considered a priority that needs to be tackled in the short term and thus a strategic approach would be to lead by example through collaboration with the various sectors on the creation of demonstration sites that are fit-for-purpose in the Maltese context.

6	The creation of sustainable alternative strategies related to livestock waste management including treatment of by-products. This includes effective implementation of the Agricultural Farm Waste Management Plan and the identification of possible solutions to turn farm waste into a resource for use by local farmers.	Governance of Agricultural Bio-Resources (MESDC)		STARTED	GAB was set up in 2017 and is currently undergoing a recruitment process in line with Legal Notice 149 of 2017. It will be in charge of updating, co-ordinating and implementing the Agricultural Waste Management Plan for Malta.
7	Establish a new legal framework for the utilisation of spent mushroom substrate.	Agriculture Directorate (MESDC)		STARTED	In 2017, the Agriculture Directorate started formulating the legal framework through which spent mushroom substrate should be tested and the parameters within which it could be categorised as soil conditioner with a view to applying it on soil thus closing the circularity loop.
8	Support initiatives aimed at setting up and promoting collaboration between primary producers.	Diversification and Competitiveness (MESDC)	Managing Authority of RDP funds should assist in establishing the right mechanisms to fund farmer collaboration.	PRIORITY	Farmer collaboration is of utmost importance so that the proposed measures in the agricultural policy can come to fruition. Farmer collaboration, even through clustering in small effective groups is also earmarked for funding through the RDP 2014-2020 Programme.
9	Support and promote collaboration between farmers and other stakeholders in the value chain particularly aiming at optimizing investment and reducing costs.	Diversification and Competitiveness (MESDC)	Managing Authority of RDP funds should assist in establishing the right mechanisms to fund farmer collaboration with other entities.	SHORT TERM	Apart from intra-farming collaborations that are addressed in Measure 8, the agricultural sectors in Malta should be directed to collaborate with processors, service providers, researchers, market managers, etc. This is also catered for in the RDP 2014-2020 Programme and a clear direction to interested parties along the value chain should be provided.

10	Establish measures that enable the identification of distinctive characteristics along the agricultural value chain.	Agriculture Directorate (MESDC)		STARTED	Apart from the Agriculture Directorate's effort to establish the Quality Mark and the funds made available for its implementation to groups of interested farmers, this measure is aimed at promoting the materialisation of private initiatives. The latter should follow on the setting up of functional clusters between farmers and other stakeholders in the value chain (Measure 9).
11	Promote bee keeping in agricultural holdings.	Agriculture Directorate (MESDC)		LONG TERM	The Agriculture Directorate intends to establish the Promotion of Bee Keeping Task Force that is envisaged to be set up in 2018 and is expected to be composed of stakeholders consisting of relevant public authorities such as ARPA, VPRD and DCD as well as bee keepers and bee keeping associations. The purpose would be to gather information and formulate SWOT analyses to identify challenges and opportunities to strengthen this sector. It will be managed by a Board within the Directorate of Agriculture or appointed officials.
12	Research on the potential of innovative and niche market opportunities for Maltese agricultural products.	Diversification and Competitiveness (MESDC)		ONGOING	DCD is already set up and functioning. This measure represents one of the central roles of this unit and work on identifying niche markets has already kicked off.

13	Develop guidelines specific to rural tourism that complements the Rural Policy and Design Guidance, 2014, including the necessary feasibility studies reflecting pertinent legislative provisions that are required for the effective operation of such an industry.	Rural Development Department (RDD)	Agriculture Consultative Council can be involved in this measure.	SHORT TERM	This is a much-needed measure since farm diversification into rural tourism activities is recommended in the policy document to secure added farm income. Such guidelines should follow feasibility studies that can be launched in the short term. Measure 6.4 in the RDP 2014-2020 is intended to fund initiatives in rural tourism activities and other service creation in rural areas and thus clear guidelines have to be established prior to the implementation of such projects. Rural tourism activities do not necessarily comprise accommodation in rural areas and thus the term *agro-tourism* being avoided.
14	Support collaborations between rural stakeholders and the tourism market on the upgrading of rural aesthetics, the creation of access routes and signage, and the sensitive upgrading of rural and village cores.	Diversification and Competitiveness (MESDC)	Local Action Groups can be involved in this measure.	LONG TERM	These collaborations can be implemented following the setting up of the rural tourism guidelines (Measure 13), and thus require a long-term approach to succeed. The Local Development Strategies of the three Local Action Groups in Malta cater for these forms of development and thus these entities have to be involved in the implementation of this measure.
15	Strengthen the link between farming and gastronomy, food, health and the environment through assistance schemes with due regard to state aid rules.	Agriculture Directorate (MESDC)	Diversification and Competitiveness Directorate to be involved in outreaching stakeholders.	ONGOING	This measure links with promotion of such schemes in rural festivities, particularly with Measure 22 and Measure 31, where visitors can be exposed to available schemes and the role of pertinent departments.

16	Encourage farm developments and services that create new job opportunities with particular focus on local cultivars and breeds to promote rural tourism.	Diversification and Competitiveness (MESDC)		STARTED	DCD is already set up and functioning. This measure represents one of the central roles of this unit and work on identifying local cultivars and breeds took off in 2017.
17	Carry out pilot projects integrated with extension services and media promotion.	Diversification and Competitiveness (MESDC)	MCAST could also be involved in this measure by involving students on pilot projects.	ONGOING	This measure is currently being carried out in the form of advice to farmers but it has to be stepped up in terms of establishing pilot projects on enhanced harvesting, processing and storage methods that are beneficial to all those involved in the value chain (Measures 5, 37 and 43). Extension services officers should assimilate skills and knowledge that will be transferred to their farming audience, whilst media promotion will help reach out a wider audience, thus also targeting public opinion on Maltese farming.
18	Increase awareness on marketing standards and provide technical assistance to operators who invest in standardized packaging, processing, branding and marketing of consumer-oriented products, whilst assessing the role of authorities in the implementation of marketing standards for agricultural products.	Diversification and Competitiveness (MESDC) in collaboration with respective regulators, in particular the Agricultural Directorate	Directorate of Agriculture, MCCAA and the Plant Protection Directorate.	PRIORITY	This measure is of utmost importance since not all farmers are following established standards and their organisations are not providing effective guidance to follow such standards. Farmers need to understand the importance of Marketing Standards for their sector to thrive in a competitive market scenario, where consumers have a wide choice of more convenient, better packaged, better presented and better marketed products. This measure will be backed by Measure 30.

19	Provide assistance for pilot projects in small holdings cultivated by recreational farmers.	Diversification and Competitiveness (MESDC) in collaboration with Agriculture Consultative Council	Higher Educational Institutions could also be involved in this measure by involving students on pilot projects.	LONG TERM	Recreational farmers are increasing and since they have more time and resources to spend on their recreational activities, they can have a pivotal role in experimentation and pilot projects within the Maltese scenario. Nevertheless this has to follow the identification of R&D priorities (such as in Measures 12, 21, 33, 34 and 53) prior to provide a direction on such projects. The agricultural policy's short term target is to safeguard and consolidate the active farming population as indicated in Measure 65.
20	Encourage partnerships to identify and evaluate international niche markets with the aim of tapping such markets for Maltese products. Such a networking effort would ideally involve all the key players of the food supply chain.	Agriculture Directorate (AD) / Diversification and Competitiveness (MESDC)	Managing Authority of RDP funds should assist in establishing the right mechanisms to fund farmer collaboration with other entities.	LONG TERM	This measure, albeit being important in terms of securing new markets for local produce that goes beyond the limitations of operating in a micro-state, requires a solid framework to thrive. Thus, other measures should precede it in the short term including Measures 4, 17, 23, 31, 41 and 56 for the consolidation of the extension services as well as farmer collaboration and networking in Measures 8 and 9.
21	Ensure availability of market research including the commissioning of consumer surveys and comparative analysis on a selection of agricultural products identified within such a process, including those that can achieve a quality label, as well as perceptions on chemicals in food, antimicrobial resistance and consumer categorisation exercises.	Diversification and Competitiveness (MESDC)	Higher Educational Institutions could also be involved in this measure by involving students on surveys and data gathering.	SHORT TERM	One of the priorities identified throughout the consultation process was the need to gather relevant data to bridge agricultural production and processing with consumer needs. Market research and consumer surveys can serve as the first step to plan forward and steer the policy measures related to adding value to Maltese produce (Measures 3 and 4), identifying niche sectors (Measures 12, 20, 33 and

					53), drawing up marketing campaigns (Measure 22) and addressing the most salient issues which concern consumers (Measure 18 and 21).
22	Streamline the organisation of rural festivals to ensure that all fairs showcasing agricultural produce follow established guidelines and embark on a marketing campaign that promotes Malta's premium agricultural produce with locals and visitors alike to create awareness and appreciation of local products. This could also be coupled with nutritional and health related information and benefits.	Rural Festivities Unit (MESDC)	Local Councils and other entities organising such festivals.	SHORT TERM	A more professional and organised setup for rural festivities through a set of guidelines for organisers and participants/exhibitors can be achieved in the short term aimed at placing the local produce on a higher platform with the consumers and visitors to these festivities. This should be followed with other efforts within the policy that intend to secure the provision of high quality produce (Measures 18 and 29) backed by scientific research (Measures 12, 21, 28, 33, 34, 37, 43, 53 and 59) and collaboration between producers and with other stakeholders along the production chain (Measures 8 and 9). Hence this measure will be promoting Maltese produce and all the indirect benefits of safeguarding agriculture in Malta, whilst the other measures will be ensuring that such quality is being safeguarded all along the chain, from farm to fork.
23	Consolidate the Farm Extension Services that were established in May 2017 to provide regular farm visits and stakeholder seminars, whilst properly training extension service officers. This can be done with the collaboration of	Diversification and Competitiveness (MESDC)	Should a new Farm Advisory Services be set up, it would fit as another valid entity involved in the implementation	STARTED	In order to provide rural entrepreneurs with valid knowledge, information, assistance and support, the trainer has to be properly trained and skilled. Agricultural acumen can be built through proper training coupled with

	pertinent stakeholders who can offer experience and expertise on a range of aspects such as business organization, collaboration, professional development, networking, market strategies, risk analysis and agronomic aspects.		of this measure.		experience on the farm or on the field to assimilate the real farming lifestyle and problems encountered by the sector on a daily basis. The Extension Services and other potential Farm Advisory Services that could be set up have to be composed of highly-skilled personnel that are trained and tried on the themes at hand with a view of providing research-based solutions and innovative ideas to their target audience. These services require the creation of a train-the-trainer programme for agriculture graduates and professionals to qualify as agri-advisors in order to serve as experts within extension services structures. Hands-on training with experts, training on the ground with farmers and applied teaching on experimental farms could be included in such a programme.
24	Conduct a skills audit of existing farmers and provide the necessary feedback.	Diversification and Competitiveness (MESDC)	Front Office at ARPA can assist through a skill survey with farmers.	LONG TERM	In order to address the policy measures in an effective manner, the target audience (farmers and livestock breeders) has to be evaluated and identified in terms of skills. Notwithstanding the importance of such data, this measure has to be preceded with the creation of a sound networking

					forum through which the target audience is actively involved and can be prepared to comprehend and participate in such an audit. Networking fora, collaborative setups and functioning extension services (Measures 8, 9, 23, 55 and 56) provide the groundwork for such an exercise to be successful in terms of active participation. This measure can build upon the farmer benchmarking system by adding value to farmer classification and providing for tailor-made extension / advisory services on a case by case basis (Measure 65).
25	Develop flexible learning pathways to address the identified skills gaps. This may include hands-on training with experts, including farmers, applied teaching on experimental farms, as well as the integration of communication, marketing and business management.	Diversification and Competitiveness (MESDC)	Training institutions in the private sector and/or MCAST in collaboration with private operators in the agricultural spectrum.	LONG TERM	This measure should follow on the identified skills and skill gaps emanating from Measure 24. Nevertheless, short-term courses organised through RDP funds for knowledge transfer address a large target audience and can still target training on various skills before Measure 24 is implemented.
26	Review and develop further flexible, yet formal, learning pathways that guide upcoming farmers on to an agribusiness pathway.	Diversification and Competitiveness (MESDC)	MCAST could also be involved by upgrading the quality of learning and formation that is made available to young and new farmers in the agricultural sector.	LONG TERM	This measure is intended to build upon the skills gaps identified in Measure 24 by upgrading the learning and formation of young farmers to address those gaps as well as formulate short and long term courses to address those already engaged in the agricultural sector.

27	Support the national educational platform on agribusiness at a compulsory level of education. The outcome of such a platform could be a preamble to post-secondary and higher education degree programmes. Government shall offer all the necessary support to challenge youths with the practice of hands-on farming; integrating the scientific and management aspects related to agriculture and inform students on traditional farming practices, food products, food tasting, grading and traceability. All this within the context of a business environment which can be their future livelihood.	Diversification and Competitiveness (MESDC)	MCAST should be involved in this measure.	ONGOING	This measure has already started being implemented in a number of secondary schools with the introduction of agri-business subjects. The curriculum should be linked with the rationale of the agricultural policy with a view of leading students towards a post-secondary or higher education degree on agribusiness aimed at developing a successful career in this sector.
28	Incentivize and assist farmers and rural stakeholders to preserve and regenerate rural skills through education, research, media coverage and capacity building.	Diversification and Competitiveness (MESDC)	MCAST should be involved in this measure.	LONG TERM	Short term courses organised through RDP funds under the 'knowledge transfer' measure and targeted training such as Measure 25 and 26 should be oriented towards the objective of this measure. Moreover, existing and potential research should be disseminated through media and promoted on various platforms to stimulate public interest on these aspects (Measures 22 and 31).
29	Implementation of the Maltese quality mark coupled with targeted information campaigns with producers, processors, traders and consumers.	Agriculture Directorate (MESDC)		STARTED	The Legal Notice for the voluntary national quality mark has already been accepted by the European Commission and the generic standards have been published. Stakeholders within various sectors can apply and benefit from such a scheme by developing guidelines, control procedures and quality standards that are within the quality scheme parameters. Moreover, farmers

					participating in this scheme can benefit from RDP 2014-2020 funding through Measure 3 – Support for new participation in quality schemes, which was launched in 2017.
30	Encourage collaboration between authorities to ensure effective product traceability throughout the value chain.	Agriculture Directorate (MESDC)	MCCAA	ONGOING	Although this measure is ongoing in terms of communication between authorities, a formalisation exercise is required whereby these authorities join forces through a committee which oversees market chain issues with a view to inspect and promote grading, marketing standards, traceability and on-the-market controls that can consolidate the link between producers and customers.
31	Provide better guidance and a pro-active approach through effective extension services as well as through promotional campaigns to strengthen the farmers' role in the food supply chain.	Diversification and Competitiveness (MESDC)	Rural Festivities Unit under the Rural Development Department should be assisting this measure by establishing a set of guidelines that need to be followed by organisers of rural festivals and fairs.	SHORT TERM	This measure is intended to be tackled through the Extension Services setup as per measures 23 and 56, as well as through the set of guidelines provided by the RFU through Measure 22.
32	Draw up actions that emanate from adaptation and mitigation strategies through the direct involvement of public and private stakeholders including farmers and livestock breeders.	Rural Development Department (RDD)	reaching out of stakeholders.	ONGOING	Adapting and responding to climate change requires collaboration and communication between stakeholders. A joint effort between RDD, SDECC and AD will be required for this measure with a view to consult with a wide target

			reaching out of stakeholders.		audience through a bottom-up approach. A focal point will be the instigation of collaboration between farmers and other rural stakeholders who are in the same situation together (Measure 9). Teaming up to share infrastructural resources, produce energy, manage farm waste, create by-products, upgrade the marketing aspect and retail products, are amongst some of the opportunities that can be achieved through collaboration.
33	Research on local livestock breeds to investigate and assess their climate adaptability which may result in more efficient production.	Diversification and Competitiveness (MESDC)		SHORT TERM	There is a research gap on the adaptability of local livestock breeds to the local climatic conditions and to climate change scenarios. This has to be tackled since the application of mitigation and adaptation measures found in different studies may not be suitable for Malta, especially if they were carried out in northern countries. Information and education need to be extensive and made available to farmers and livestock breeders to serve as a driver for investment into such breeds to incorporate into niche businesses (Measure 3).
34	Research and experiment with wind curbing and soil conservation techniques that are suitable for local climatic conditions as well as with new crops that require less water and fertilizer requirements, which have a higher economic return.	Diversification and Competitiveness (MESDC)		LONG TERM	Notwithstanding the importance of such measure for climate resilience of Maltese farming, the argument in Measure 23 is also relevant for this measure. In order to provide rural entrepreneurs with valid knowledge, information, assistance and support, the

					trainer has to be properly trained and skilled, including hands-on with experimental sites from where effective data is collected and where demonstrations can be carried out with the target audience (Measures 5, 37 and 43).
35	Identify and experiment with multipurpose trees that provide crops, shelter from wind, soil stabilisation, protection from sea spray, increase moisture and increase ecological corridors between fragmented areas. Trees that provide yield should be prioritized.	Diversification and Competitiveness (MESDC)		LONG TERM	This measure requires a level of experimentation and research on a range of indigenous trees as well as the incorporation of existing research with the aim of developing a set of guidelines for the creation and management of woodlands (Measures 43 and 53). Thus, new tree planting activities in the short-term should cater for this objective and follow an established format in terms of creating 'experimental sites' for long-term utilisation.
36	Promote and support the restoration of rubble walls utilising traditional methods, In order to enhance connectivity while providing refuge for fauna and allow excess rainwater to drain from the fields, both benefiting agriculture production and minimising soil erosion.	Diversification and Competitiveness (MESDC)	MCAST can be involved through courses.	SHORT TERM	This can be partly achieved through the delivery of short term courses organised through RDP funds under the 'knowledge transfer' measure and targeted training such as that intended to be provided in Measure 25 and 26. Moreover, existing and potential research should be disseminated through media and promoted on various platforms to increase stakeholder interest on these aspects (Measures 22 and 31).

37	Provide for more effective use of Malta's and Gozo's experimental research centres to carry out experiments and pilot projects on various crops in order to identify the most effective and sustainable cultivation practices as well as experiment with and promote successful intercropping methods in crop farming.	Diversification and Competitiveness (MESDC) and Experimental Farm in Gozo		ONGOING	The experimental farm at Għammieri should be utilised as a point of reference where farmers and interested stakeholders can assimilate skills through demonstration activities. It should also serve as the basis for research-based experiments envisaged through Measure 43 and assist extension service expert to back the advice provided with relevant data.
38	Incentivize the consolidation of land parcels to improve their sustainability.	Lands Authority		STARTED	An update to land transfer regulations was carried out in 2017 with the introduction of Legal Notice 159 of 2017, referred to as the Agricultural Land Regulations. The latter permits land transfers of agricultural land to *bona fide* farmers subject to the approval of the Board of Governors of the Lands Authority. This legal notice also caters for agricultural students by providing land on lease at a favourable rate for the first five (5) years. This measure is intended to partly address the consolidation of land parcels on land with Government agricultural lease where there is consent for lease transfer.
39	Assess appropriately the feasibility and the potential of increasing organic production of Maltese agricultural products.	Diversification and Competitiveness (MESDC)	Malta Organic Agriculture Organisation and other organic producers.	SHORT TERM	The demand for healthy food products is evidently high and customers are asking for a more diversified range of food products. Nevertheless, adequate locations for such practices in Malta and lack of knowledge on production methods might be hindering progress. This measure is intended to increase support and incentives for those

					interested in embarking on organic farming practices so that more green jobs are created.
40	Create a farmland categorisation scheme to be linked with the introduction of land consolidation schemes which will increase resources and scope for profit to ambitious farmers who are willing to consolidate and/or enlarge their business. This scheme should be integrated with a Geographic Data Information System that will be developed to include the lease status and livestock breeding activity of the site or farmland.	Agriculture Directorate (MESDC) / Diversification and Competitiveness (MESDC)		LONG TERM	This measure should follow the completion of Measure 60 since the farmland categorisation scheme has to be integrated with the geographical information system created by the Agricultural Directorate.
41	Farmers are to be consulted, trained, educated and informed on a set of instruments aimed at improving crop selection, water use and its conservation and non-conventional sources of water.	Diversification and Competitiveness (MESDC)	Energy and Water Agency can be involved in this measure.	SHORT TERM	The content of this measure will form part of the consolidated extension services provided through Measure 23 as well as integrated in the short term courses organised through RDP funds under the 'knowledge transfer' measure.
42	Promote water-crop assessment in order to enable planning for the demand there from through conservation of water and the use of non-conventional sources.	Diversification and Competitiveness (MESDC)	Energy and Water Agency can be involved in this measure.	SHORT TERM	The water-crop assessment developed through this measure will be delivered through the extension services setup (Measure 23) as well as integrated in the short term courses organised through RDP funds under the 'knowledge transfer' measure.

43	Develop a national research programme, in conjunction with stakeholders, to be tasked with exploring new methods of optimizing water usage without compromising the farmers' economic return, including a. research on local crops and livestock breeds to assess their water demands in order to optimize on-farm water use planning, including demonstration projects on irrigation management, fertilizer application, crop cultivars and crop production utilising New Water; b. identify crop cultivars or livestock breeds that minimise water demand but provide a good economic return; c. promote cultivation practices, materials and technologies that effectively improve soil moisture retention properties.	Diversification and Competitiveness (MESDC)	Energy and Water Agency, University of Malta and MCAST can be involved in this measure.	LONG TERM	The priorities within this research programme will be disseminated with pertinent research institutions such as the UoM and MCAST as well as incorporated with research carried out by DCD on the Għammieri Experimental Farm (Measure 37). However, this measure should build upon the completion of short term measures related to bridging data gaps (Measures 58 and 59). This measure shall also sustain Measure 27 by developing curricula based on the needs of the national research programme.
44	Conduct an economic and financial feasibility study on the introduction of irrigation systems that minimise evaporation and collect dew moisture through deficit irrigation strategies.	Diversification and Competitiveness (MESDC)	Private research entities and MCAST could also be involved in this measure.	LONG TERM	This measure intends to integrate international research with Maltese scenarios with a view of developing economic and financial feasibility parameters that could be incorporated by Maltese farmers to improve their irrigation methodologies in terms of resource sustainability and improved return on investment.
45	Incentivize roof utilisation of farm structures and rainwater runoff collection in arable agriculture for the effective collection of rainwater and in accordance with agricultural planning policies.	Diversification and Competitiveness (MESDC)	Managing Authority of the RDP can assist through technical support on RDP Measures.	STARTED	The content of this measure will form part of the consolidated extension services provided through Measure 23 as well as integrated in RDP measures on infrastructural investments and in short term courses organised through RDP funds under the 'knowledge transfer' measure.

46	Promote the development and financing of smart irrigation systems.	Diversification and Competitiveness (MESDC)	Managing Authority of the RDP can assist through technical support on RDP Measures.	SHORT TERM	The content of this measure will form part of the consolidated extension services provided through Measure 23 as well as integrated in the short term courses organised through RDP funds under the 'knowledge transfer' measure. It should build on the research carried out through Measure 43.
47	Increase effectiveness and coordination in the enforcement of plant protection product utilisation including the placing on the market as well as applicability on crops.	MCCAA	Pitkali administration and Agriculture Directorate to be involved.	ONGOING	Although this measure is ongoing in terms of discussions between authorities within the Pesticide Control Board, a more effective approach with regards to enforcement and action is required to deter abuse of PPP at source not when products enter the market, because at this stage, they will end up being sold and consumed by time that pesticide test results become available.
48	Promote the establishment of agricultural services such as pesticide management and fertiliser application by service providers to achieve uniformity in production and secure professional advice. This should potentially also extend to facilitate organic and environmentally sustainable farming.	Diversification and Competitiveness (MESDC)	Managing Authority of RDP funds should assist in establishing the right mechanisms to fund farmer collaboration.	PRIORITY	The content of this measure will form part of the consolidated extension services provided through Measure 23 as well as integrated in the short term courses organised through RDP funds under the 'knowledge transfer' measure. It could also fit within the rationale of Measure 3 where the service providers form a business incubator strategy to outreach the farming community.
49	economic returns.	Agriculture Directorate (AD) / Plant Protection Directorate (PPD)	ARPA Front office and DCD to be involved in the data gathering exercise with farmers.	SHORT TERM	This measure will be based on a data gathering initiative with farmers who apply for various services at the ARPA Front office. This will ensure implementing the horizontal priority of

	economic returns.			involving the target audience in retrieving information to improve policy implementation. By doing so, the policy maker will utilise an existing IT administrative system to organise the retrieved data as well as pool such information with other authorities, thus reducing policy implementation costs and strengthen inter-ministerial data sharing.

50	Develop a Soil Action Plan by involving all the pertinent stakeholders including, but not limited to, measures that: a. support initiatives at the field level which contribute towards improved soil quality thereby improving its moisture retention ability as well as its nutrient content; b. promote the use of steam soil sterilizers for the sterilization of farmland that could assist in the reduction of soil born diseases and nematodes; c. improve knowledge on Maltese soils by updating the available pedological data.; d. incentivize processes and practices on the build up and maintenance of soil organic matter, the enhancement of soil biodiversity, the reduction of soil erosion, compaction and contamination; e. assess the impact of the correct application of manure and other organic matter in Malta's soils particularly on the level of nitrates in order to ensure effective implementation of the Nitrates Directive and align the plan with the farm waste management plan.	SDECC Environmental Directorate (MESDC) / Rural Development Directorate (RDD)/ Veterinary Phytosanitary Regulation Department (VPRD) / Environmental Resource Authority (ERA) / Governance of Agricultural Bio-Resources (MESDC)	Governance of Agricultural Bio-Resources (MESDC) to assess the impact of the correct application of manure and other organic matter in Malta's soils and PPD to align the Soil Action Plan with the Farm Waste Management Plan which is already in place. Higher Educational Institutions could also be involved in this measure through student-conducted experimentation.	LONG TERM	Various soil conservation measures identified in the Agricultural Policy and in the National Biodiversity Strategy and Action Plan will be incorporated in a Soil Action Plan that is required to address these goals in terms of how to mitigate the threats to Maltese soils and adopt measures aimed at integrated soil conservation. The soil action plan together with other national relevant policies shall contribute towards the requirements of the Convention to Combat Desertification (UNCCD) to develop desertification national action programmes.
51	Integrate the soil-related aspects of the soil action plan into a nationwide educational and communication campaign on soil management conducted by the extension services team.	Diversification and Competitiveness (MESDC)	ARPA Front Office, LAGs and Local Councils should also assist through dissemination of promotional materials with farmers and the general public.	LONG TERM	This measure should serve as a nationwide dissemination strategy of the soil action plan to outreach and involve farmers and the general public. Thus, it should follow on the completion of Measure 50.

52	Update and better equip the seed bank launched in 2016 with a programme of continuous cultivation and preservation of indigenous species.	Plant Protection Directorate (MESDC)		STARTED	The maintenance of a seed bank for indigenous species preservation should be backed by dynamic research on production and commercialisation of such species in mainstream agriculture. This measure aims at establishing a landrace niche approach backed by farmers and researchers for production purposes as well as for preservation, climate change resilience, diversification, niche farming, value added production, by-product creation and spin-off industries. Maltese landraces are more adaptable to the geo-climatic conditions and a higher premium can be obtained through their marketing, thus further incentivising young farmers to embark on a farming career or to supplement their economic operations.
53	Finance research on permanent crop species and rootstocks aimed at commercialization even on the export market within the parameters permitted in state aid rules.	Diversification and Competitiveness (MESDC)		ONGOING	In addition to Measure 4 aimed at developing niche markets and exploiting business scenarios, this measure is envisaging the financing of research on permanent crop species (fruit trees) and rootstocks that could be successfully commercialised when considering the geo-climatic conditions of the Maltese Islands. Investment in the Government plant nursery to develop healthy and productive primary materials should be enhanced through research and follow up with the target audience on results on their farmland.

54	Make effective use of the register of legally protected Maltese varieties and their characteristics and research on their reintroduction in mainstream agriculture, supported by idea incubators.	Diversification and Competitiveness (MESDC)		LONG TERM	In addition to Measure 4 aimed at developing niche markets and exploiting business scenarios, this measure entails the tangible utilisation of the register of legally protected Maltese varieties by developing research aimed at commercialisation of products from such varieties.
55	Strengthen or recast the role of the Agricultural Consultative Council to transform it into a rural partnership geared towards rural diversification, social integration and landscape management. This council will focus on the monitoring of key priorities set out in this Agricultural Policy.	Agricultural Consultative Council (MESDC)		ONGOING	Stakeholders who will be directly impacted by decisions taken in line with the agricultural policy should be represented in a consolidated network within the Agricultural Consultative Council. The latter should encompass a more focused role and serve as the platform whereby the public and the private sector meet to exchange views on policy matters and relevant actions, information and the transmission of data.
56	The Extension Services launched in 2017 should be geared to focus on the wider involvement of stakeholders and liaise with the Agricultural Consultative Council on the feedback received.	Diversification and Competitiveness (MESDC)	Agricultural Consultative Council to be involved in this measure.	ONGOING	Apart from the role of extension services provider (Measure 23), this setup has to be utilised to reach out by informing and involving pertinent stakeholders with a view to provide feedback to the ACC (Measure 55).
57	Study the feasibility of setting up a pilot Water Users Association to better manage groundwater bodies used for irrigation as well as to manage water demand.	Environment and Resources Authority (MESDC)	EWA should be involved in this measure.	LONG TERM	In order to ensure an integrated management of water resources including ecological sustainability and the adequate allocation of water resources, cooperation should be tested through the creation of properly structured Water Users Associations to manage groundwater bodies (in line with Measure 9). This measure is intended to increase responsibility of

					farmers and enhance their awareness regarding sustainable uses and management of water.
58	Identify any possible data gaps and create a dynamic database on parameters that can be utilised for analysis, decision making, education, training and the development of innovative methods in agriculture. These gaps should also include data required to back existing policies and regulations.	Agriculture Directorate (MESDC)		LONG TERM	A comprehensive Management Information System is required to identify and cover all existing data gaps. This will help policy makers take informed decisions when planning and implementing policy measures. Moreover, such a system should consolidate all available data into one platform that rapidly provides trends to back strategies with ready-available and reliable data. This measure should build upon data collection and research on the short-term (Measure 59).
59	Provide a platform for a formal collaborative mechanism between research and data collecting institutions and various agricultural stakeholders to ensure the ongoing availability of, and access to, data and analysis required to implement the various official policy instruments.	Agriculture Directorate (MESDC)	Various research institutions to be involved in this measure.	SHORT TERM	This measure is of utmost importance since agriculture data is missing or fragmented, thus hindering basic sectoral evaluation required launching most policy measures. Moreover, decision making by the agricultural community is based on traditions, trial and error and on short-term gains. Extension services providers should cater for bridging data gaps since without research there would be no extension and no public-sector support and without extension, research has little to offer. Without the feedback of information from farmers and extension

					workers to researchers, the content of research efforts have little relevance. Thus, synergies between research, extension services and farmers are critical for effective technology innovation, development and transfer (in line with Measures 4, 9, and 23).
60	Develop a consolidated Geographic Data Information System including lease status and livestock breeding activity.	Agriculture Directorate (MESDC)		LONG TERM	Along with the Agriculture information system to be implemented by the Agricultural Directorate (Measure 58), a geographical data system incorporating the lease status and type of livestock breeding activity on farms will be included. This will lead to facilitate the creation of a farmland categorisation scheme aimed at developing land consolidation schemes which will increase resources and scope for profit to ambitious farmers who are willing to consolidate and/or enlarge their business (Measure 40).
61	Establish clear guidance to farmers on the parameters of land ownership and farmland consolidation issues.	Diversification and Competitiveness (MESDC)	Lands Authority to be involved in this measure.	PRIORITY	The extension services unit will be guided to provide customer care to its target audience so as to guide accordingly on parameters of land ownership on a case by case basis. Where the remit is not within DCD, the client will be referred to the Lands Authority. This measure is intended to

					counteract the issue of fragmentation of information related with land ownership issues.
62	Establish effective frameworks and procedures in relation to farm land Government tenure for better legal title for farmers of Government property and facilitate transfer of land to farmers. It is important that young farmers and agricultural students are provided further incentives which facilitate their entry into the sector.	Lands Authority		STARTED	An update to land transfer regulations was carried out in 2017 with the introduction of Legal Notice 159 of 2017, referred to as the Agricultural Land Regulations. The latter permits land transfers of agricultural land to *bona fide* farmers subject to the approval of the Board of Governors of the Lands Authority. This legal notice also caters for agricultural students by providing land on lease at a favourable rate for the first five (5) years.
63	Facilitate and streamline procedures required to utilise accredited laboratories for various requirements.	Veterinary Phytosanitary Regulation Department (VPRD)		LONG TERM	In the absence of accredited laboratories in Malta for various purposes associated with agricultural needs, the Government intends to facilitate the access to diagnostic services in equipped laboratories so that farmers can benefit from such services with ease. This measure requires the setting up of strategic partnerships between the VPRD and accredited laboratories in the short-term.

64	An adequate governance system on water consumption is to be designed and developed involving the key Ministries in accordance with the provisions of the Second Water Catchment Management Plan.	Energy and Water Agency	Agriculture Directorate to assist in this measure implementation.	ONGOING	The optimization of the agricultural water mix is intended to target a reduced dependency on groundwater abstraction and secure the sustainability of the agricultural sector. In this regard, Government legislation may be the most effective means to enforce optimization of water consumption taking into account the economic implications on the agricultural sector. The monitoring of the quantities of water extracted is a first step in identifying the farmers' real responsibility in the current water abstraction practices.
65	Design and develop a farmer benchmarking system with a categorisation scheme for farmers and livestock breeders based on their economic activity and contribution towards the agricultural sector.	Agriculture Directorate	Agriculture Consultative Council (MESDC)	ONGOING	This important measure is intended to ensure the implementation of a horizontal goal within the agriculture policy by targeting the active farming community within all the suggested policy measures in order to sustain the livelihood of genuine farmers and livestock breeders and to safeguard a future in the sector for their offspring. The limited financial and land resources should be utilised wisely to target active farmers who are willing to invest and improve the sector. Thus, the creation of a fair farmer benchmarking system where every stakeholder can benefit from the respective farmer classification standards should be considered as the backbone for various other measures.

66	Coordinate and ensure the appropriate financial tools for implementing the various measures outlined in this agricultural policy in line with the appropriate financing regulations.	PDPID (MESDC)		PRIORITY	This is a monitoring measure intended to provide the proper governance of measures and a financing model which ensures the sustainability of the initiatives as well as of the agricultural sector. A mixture of national and EU funds needs to be identified and geared to support the measures outlined in this policy document.
67	Maintain coherence in existing policies and remove any ambiguities which may be in conflict with this policy document.	PDPID (MESDC)		PRIORITY	Evaluation of the implementation process of policy measures should be a continuous process to ensure coherence between different policy instruments, identify and address any loopholes, as well as involve the Ministry responsible for agriculture prior to adoption. This will instil further confidence amongst the main stakeholders who stand to benefit from such coherence. This measure will involve a dynamic process that follows the implementation of the agricultural policy measures.
68	Government ministries developing new policy or regulatory instruments are to ensure consultation with the Ministry responsible for agriculture to avoid conflict between new instruments and this policy.	PDPID (MESDC)		LONG TERM	In addition to Measure 67, coherence should also be ensured when new policy or regulatory instruments are proposed or developed.

69	Develop an effective communications structure to provide timely information to all stakeholders in the agricultural sector. Identify the varied target audience and the different media by which they can be reached in order to communicate the policies outlined in this document as well as to provide a first level of support when and where required.	Diversification and Competitiveness (MESDC)		SHORT TERM	Effective communication and strategy dissemination with the target audience as well as the provision of the necessary support is required from the onset of the agricultural policy implementation. Given the number of incentives and initiatives underlined in this policy, it is essential to provide an effective line of communication with the sector through a strategy that recognizes the different audiences and the different media by which they can be reached (even through Measure 22).
70	Carry out an in depth evaluation of measures within this policy in order to maximise their contribution to economic, social and environmental goals as a matter of rationale and *modus operandi* for the sector.	Diversification and Competitiveness (MESDC)	External evaluation team commissioned to implement this measure.	LONG TERM	This measure will be the concluding measure that will ensure an in-depth evaluation of all the policy measures as initially intended and as actually delivered. This evaluation will be carried out by an independent external evaluator who will be suggesting improvements for the subsequent timeframes following this policy.

Table 68: Policy measures with responsible entities and prioritisation

6

6. Conclusion

The formulation of the Agricultural Policy for the Maltese Islands 2018-2028 adopted a procedure based on targeting the needs of various stakeholders who agreed on a vision for the Maltese agriculture sector at the onset of this project. As explained in Chapter 1 of this document, this vision was developed through the identification of policy issues that were discussed in a wide consultation process with the agricultural community and other relevant stakeholders. This process led to an evaluation of the *status quo* through a SWOT analysis including various recommendations for policy formulation. The outcome of this consultation process was appraised by the Agricultural Directorate and the consultants who developed a set of operational objectives and policy measures which are implementable in the Maltese Islands, equitable for the target audience and within the parameters of the Common Agricultural Policy.

This policy document provides a ten-year framework intended to be followed by the pertinent Government entities that have the responsibility to steer the agricultural sector in the Maltese Islands towards a more sustainable route by providing the means and direction along which it can develop and flourish. The seventy (70) policy measures presented in this document are intended to place sustainability as the cornerstone of this policy with a view to addressing economic, social and environmental impacts as part of the upgrading process. Whether it is the enhancement of the gross value added of the sector, the increase in employment sustained by the sector or the correct use of water and fertilisers, it is essential to maximise the net benefit of such measures across the three pillars of sustainability.

From a macro perspective, policymakers should strive to maintain sustainability as the benchmark of agricultural policy by improving the quality of water, soil and climate change mitigation efforts. This policy is intended to improve the quality of Malta's agricultural goods and explore new niches which will bring economic returns with minimal impact on the environment. The better management of resources will in turn cut environmental costs which enable the Government and farmers to provide for new financial instruments that boost investment in new technologies and innovation. This is important to obtain a competitive edge on other agricultural markets that in contrast with Malta have greater scope to produce agricultural goods in larger quantities relying on cheaper inputs and a wider selection of natural resources. It is government's priority to move towards a more sustainable agriculture as this would ensure its stability for future generations whilst preserving an attractive countryside through an agricultural economy that stimulates employment opportunities and attracts income in rural areas.

A translated version in Maltese of this document is available. However, in the event of divergences in the meaning between the English and the Maltese versions, the English version shall prevail.

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