

Empowering Food Security in Mauritius: advancing crop and livestock production

An overview with recommendations
to policymakers



August 2024



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FOREWORD

Food security remains a paramount concern in the global landscape, intertwining multi-faceted aspects, at the core of which is quintessentially human well-being. The Republic of Mauritius, a Small Island Developing State (SIDS) has a vibrant agricultural history. It faces unique challenges and opportunities in ensuring food availability, access, stability, and utilisation for its population, in line with the very definition of food security. The contents of this report seek to provide an overview of the current state of food security in the country, its dynamics, and the potential pathways for improvement.

From a broader perspective, by examining the status of food security across Africa, we have drawn valuable comparisons and insights relevant to the Republic of Mauritius. A review of crops and livestock production highlights the strengths and limitations of our agricultural sector and provides insight into our food production systems. Analyzing the constraints and challenges bring to the forefront the realities faced by stakeholders, and farmers in particular, with issues such as climate change, limited arable land, water availability, and labour. These challenges, along with the need for enabling the provision of nutritious food for a healthy population, are significant. Confronting them head-on, we can better strategize our responses and earmark concrete solutions.

Consolidating the food systems in the Republic of Mauritius must be a focal point of our collective effort in an endeavour of fostering resilience and sustainability. Opportunities for technological advancements, policy reforms, and consumer awareness can transform our approach to food security and laying the foundation for creating a holistic, integrated, adaptive, robust food system.

The objective of this discourse on food security is to put forward a set of recommendations to policymakers. These recommendations are actionable and impactful, addressing both immediate needs and long-term goals, and are the outcome of informed insights gained through discussions. They aim at fostering a supportive environment for all stakeholders involved in the food security landscape.

As we deliberate on the complexities of food security, it is essential to remember that this is not simply an agricultural issue—it is equally a societal one. A review of our food systems from the standpoint of food security requires collaboration, innovation, and unwavering commitment. The contribution of the Mauritius Academy of Science and Technology in that direction is a call for action to all those dedicated to securing a food-secure future for Mauritius.

Dr. Salem Saumtally
President, Mauritius Academy of Science and Technology

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ACRONYMS AND ABBREVIATIONS

AUC	African Union Commission
AMB	Agricultural Marketing Board
ASSAf	Academy of Science of South Africa
COMESA	Common Market for Eastern and Southern Africa
CAADP	Comprehensive Africa Agriculture Development Programme
EAC	East African Community
ECOWAS	Economic Community of West African States
EDB	Economic Development Board
ECA	United Nations Economic Commission for Africa
FAO	Food and Agriculture Organization
FAREI	Food and Agricultural Research and Extension Institute
GDP	Gross Domestic Product
GYA SAWG	Global Young Academy Science Advice Working Group
IGAD	Inter-Governmental Authority on Development
IAP	Inter-Academy Partnership
ICT	Information and Communication Technologies
IOC	Indian Ocean Commission
MAIFS	Ministry of Agro Industry and Food Security
MAST	Mauritius Academy of Science and Technology
MCA	Mauritius Chamber of Agriculture
MIBL	Mauritius Institute of Biotechnology Limited
MYAI	Mauritius Young Academy Initiative
NASAC	Network of African Science Academies
NCDs	Non-Communicable Diseases
NGOs	Non-Governmental Organisations
RTC	Regional Training Centre
SAYAS	South African Young Academy of Science
SADC	Southern Africa Development Community
SIDS	Small Island Developing States
UN SDG	United Nations Sustainable Development Goal
UoM	University of Mauritius
USAID	United States Agency for International Development
WFP	World Food Programme

EXECUTIVE SUMMARY

Food security is a critical issue in Mauritius, requiring a comprehensive and collaborative approach involving the concerted input of stakeholders spanning from the government, the private sector, farmers, researchers, and consumers. This report examines the status of food security in the crop and livestock sectors and outlines strategies and recommendations to enhance food security in Mauritius.

Mauritius faces significant challenges in achieving food security. The country imports a highly significant quantity of its food requirements, making it vulnerable to global market fluctuations and disruptions. The agricultural sector, though crucial, has seen a decline in its contribution to the GDP, exacerbated by factors such as climate change, loss of agricultural land, labour shortages, and water scarcity.

Understanding the local crop production capacity highlights areas where production could potentially be increased to reduce import dependency. Land suitable for agriculture has declined both in Rodrigues and Mauritius. Costs of production are high due to the economies of scale and labour is in acute shortage leading to abandonment of production. Climate change and water availability for irrigation, despite very high rainfall, strongly impact cultivation.

Data from Statistics Mauritius underscores trends in the production and consumption of animal-source food (ASF), including red meat, pig meat, poultry, eggs, and dairy products. The analysis identified several risks and challenges affecting food security in this sector, such as fluctuations in production levels and consumption patterns, influenced by both domestic and global factors. These trends necessitate targeted interventions to stabilize and enhance the livestock sector's contribution to food security.

Food security also encompasses health and the availability of safe and nutritious food. Mauritius has a high prevalence of non-communicable diseases affecting half of the population. They bring to the forefront the necessity to create awareness and the consumption of nutritious food.

In such an ecosystem, the consumers are at the core. They have to be involved and exposed to a diverse range of quality food and educated to make the right choices and have an understanding of the endeavour to increase local food production and reduce imports.

Addressing food security in Mauritius requires a multi-faceted and integrated approach. The following key recommendations are proposed to policymakers:

1. Resource optimisation: Conduct an inventory of suitable agricultural land and ensure its optimal use, coupled with efficient water management and irrigation systems to increase productivity and reduce costs.

2. Climate-smart agriculture: Promote the adoption of climate-resilient crops and technologies, such as hydroponics and agri-voltaic systems, to mitigate the impacts of climate change and enhance food production.
3. Modernizing production: Invest in modern farming techniques, including sheltered farming and controlled environment agriculture, to improve yields, reduce pesticide use, and attract young entrepreneurs through ICT integration.
4. Mechanisation and Labour: Encourage mechanization and the importation of labour, supported by appropriate small-scale equipment to enhance efficiency in agricultural practices.
5. Support systems: Establish agri-processing and storage facilities to reduce post-harvest losses and improve market access for local produce.
6. Data and policy integration: Develop robust data systems and evidence-based policies to address food security comprehensively. This includes enhancing governance structures and fostering collaborations among stakeholders.

Mauritius's food security challenges are complex and multifaceted, requiring a transformative approach to agriculture. By optimising resources, embracing modern technologies, and implementing strategic policies, the country can enhance its food production capabilities and reduce its dependency on imports. The focus should be on creating a resilient, sustainable, and inclusive food system that can adapt to changing environmental and economic conditions.

All stakeholders must collaborate and take decisive action to secure the future of Mauritius's food system. Policymakers, farmers, researchers, and consumers must work together to implement the recommended strategies, ensuring a sustainable and secure food future for all Mauritians.

1. INTRODUCTION

Agricultural landscape

The agricultural sector's contribution to the GDP of the Republic of Mauritius, consisting primarily of the two main islands of Mauritius and Rodrigues has declined over the years. While it was an average of 30% in the 1960s, it is currently at 4.1% (Statistics Mauritius, 2024). Agriculture remains, however, the most important activity in contributing to food security, employment creation, and bringing export earnings through sugar and tea exports.

Mauritius has a total of 186,500 ha, out of which agriculture occupies around 44% of the arable land area. Land under agricultural production has declined drastically. In 2002, it was estimated that approximately 80,000 ha were under sugarcane, crops, and orchards. In 2024, around 42000 ha are under sugarcane cultivation, and 8000 ha are under crops and orchards (MCIA, 2024, MAIFS, 2024)

Rodrigues, with a total area of 10,800 ha, has experienced a severe loss of its 3000 ha of agricultural land over the years. Only 175 ha remain under cultivation. However, its livestock capacity greater than that of Mauritius.

Food security concerns

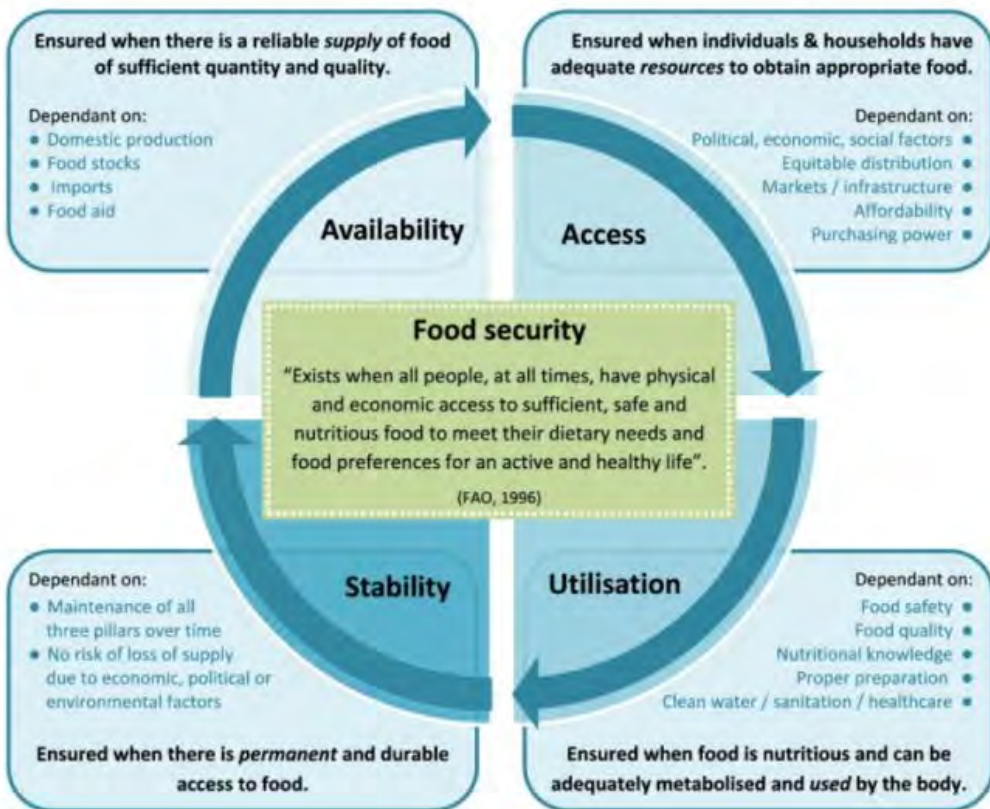
The Republic of Mauritius has a population of 1.26 million and attracts some 1.3 million of tourists annually. Consequently, food is required by some 1.4 million people at any one time. Agriculture is considered by the government as an important sector and supportive measures are provided because of its key contribution to rural employment, and the provision of fresh produce. Almost 100% of the country's requirement for fresh vegetables, fruits, venison, poultry meat, and eggs, and where, 60% in potatoes, and 40% in onion production are achieved.

The agricultural sector in Mauritius has experienced several constraints over the past years whereby it has not been able to increase its domestic food production significantly. Its net food requirements, including meat, milk and essential food commodities such as rice, wheat flour, pulses, onion, potato, and garlic, as well as processed food are imported. It remains vulnerable to food shortages and rising global food prices.

In the wake of the COVID-19 pandemic, the Mauritius Academy of Science and Technology (MAST) strongly felt that coordinated national initiatives were warranted to address the country's food requirements. It accordingly issued a position paper in 2020 focusing on food crop security, of relevance to alleviate the immediate situation and for future action. Although the paper was widely disseminated, the implementation of the recommendations formulated herein has lagged behind. MAST subsequently held a forum debate for awareness of the situation to its members and the public. MAST is unflinchingly committed to the endeavour of advocating evidence-based science advice-driven recommendations/guidelines, aiming at shaping food security policies.

Definition of food security

According to the FAO, food security lives up to its very definition when 'all people have physical, social, and economic access to sufficient, safe, and nutritious food that meets their dietary needs and preferences'. This definition rests on four pillars: availability, accessibility, utilization, and stability (Figure 1), which are essential for human well-being and achieving the United Nations Sustainable Development Goal (UN SDG) Goal 2: Zero Hunger.



<https://www.publichealthnotes.com/food-security-determinants-and-urbanization/>

Figure 1. The four pillars of food security

A major transformation of the agriculture sector in Mauritius is necessary to produce more food and reduce imports. The challenge is even more daunting since increasing food production must go hand in hand with environmental sustainability.

Context of this booklet

This booklet focuses on the agricultural sector, specifically crops and livestock. The aim is to highlight the need for a transformative approach to agriculture in the Republic of Mauritius to enhance food production and reduce dependency on imports. The marine sector, while relevant and significant, is not covered in this booklet for the lack

of sufficient information. Artisanal fisheries contribute 1%-2% of GDP, although the contribution of the entire fisheries value chain, comprising processing and marketing, is about 4% of GDP. Artisanal fisheries, lagoons, and off-reef are an important source of employment to provide for the domestic market, while industrial fishing is mainly done by foreign fleets.

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2. OVERVIEW OF FOOD SECURITY IN AFRICA - INSIGHTS FOR THE REPUBLIC OF MAURITIUS

Demographics concerning food security

Africa faces an unprecedented food crisis where millions are at increasing risk of hunger. The continent is not on track to meet the UN SDG Goal 2 on Zero Hunger by 2030 (FAO, 2023). The main challenges include the ripple effects of the war in Ukraine, climate variability and extremes, conflicts, economic slowdowns, the COVID-19 pandemic and its aftereffects, as well as social and gender inequalities that disproportionately impact women and girls.

Africa has a population of 1.3 billion people, and its annual population growth rate of 2.42% strains food systems with 78% unable to afford a healthy diet, compared to 42% globally. GDP varies widely from USD 500 billion in Nigeria to USD 3 billion in Burundi, and approximately 40% of the population lives on less than USD 1.90 per day. Although there was improvement in the 2000s, hunger has resurged, with 868 million people being moderately to severely food insecure in 2022, and 342 million (24%) experiencing severe food insecurity (FAO, 2023).

In 2022, nearly 20% of the population (282 million) was undernourished, peaking at 29% in Central and Eastern Africa. The prevalence of stunting among children under five reached 30% while wasting stood at 5.8%. Anaemia among women aged 15 to 49 years was nearly 39% and the number of people unable to afford a healthy diet rose to 1.04 billion in 2021.

Africa's top 10 more advanced countries are Tunisia, Mauritius, Morocco, Algeria, Egypt, Gabon, South Africa, Ghana, Senegal and Namibia. Their Africa Country Benchmark Report Food Security Scores range from 68.20 to 51.42. These countries tend to be politically stable with democratic governance, perform better economically, and are proactive in bolstering food production. For example, Namibia at 10th place, has succeeded in reaching this position through initiatives encouraging agricultural mechanisation and seed improvement. The Republic of Mauritius ranks second in terms of political stability, with a literacy rate of more than 92%.

These 10 countries are democracies, are at peace, have historic trade routes with foreign markets, and are not geographically landlocked. They can focus national spending efforts on food security and their export-driven trading economies ensure the availability of food, even when local crops are affected by natural disasters. However, in general, rising food prices and climate-related impacts have been the other side of the coin in exacerbating the situation.

Causes of food insecurity and remedial measures

- Climate change: Unpredictable weather patterns and extreme climates, such as more frequent and severe droughts, floods, and storms, are becoming

increasingly frequent and severe, leading to crop failures, the emergence of new pests and diseases, and consequently reduced food production.

- **Poverty:** High poverty rates limit access to food resources, and the lack of job opportunities adversely impairs purchasing power.
- **Political Factors:** Conflicts trigger measurable degrees of population displacement, disruption of agricultural activities, and infrastructure-related destruction.
- **Poor Policy Implementation:** Lack of investment in agriculture slows down development and adversely impacts upon output levels/rates/ratio. Without proper infrastructure and storage facilities, agricultural commodities cannot reach the market swiftly, resulting in increased post-harvest losses.
- **Health Impacts:** Malnutrition and undernourishment lead to health issues, hindering economic growth and fostering poverty. Weakened conditions result in higher disease incidence and lower labour productivity, creating a cycle of poverty and food insecurity.

Table 1 lists the causes of deteriorating food security in different African regions and the measures being implemented for enabling a number of alleviations.

Moving forward in addressing food insecurity

Improving the efficiency of agriculture and food systems are crucial for increasing productivity and sustainability. For example, Rwanda has made progress through increased agricultural productivity and better policy implementation, while Ghana's Food and Jobs Program and Kenya's Climate Smart Agriculture Strategy aim to build resilient agriculture systems.

Africa's leaders are committed to improving food security and nutrition through various policies and declarations. The African Regional Nutrition Strategy sets specific targets and interventions to address malnutrition. The Comprehensive African Agricultural Development Programme (CAADP) is the Agenda 2063 continental initiative to eliminate hunger and reduce poverty through agriculture-led development, with goals to allocate at least 10% of national budgets to agriculture and achieve agricultural growth rates of at least 6% per annum. Underlying these investment commitments are targets for reducing poverty and malnutrition, increasing productivity and farm incomes, and improving the sustainability of agricultural production and use of natural resources. CAADP also supports countries to enhance resilience to climate variability through the development of disaster preparedness policies and strategies, early warning response systems, and social safety nets.

Key takeaways for Mauritius

Mauritius is in a privileged position compared to a number of African countries. It is politically stable, has democratic governance, no displaced population, and minimal infrastructural issues. However, Mauritius faces challenges like extreme climatic events, labour shortage, and dependence on imports, which are exacerbated by rising food prices and currency parity issues.

As a Small Island Developing State (SIDS), Mauritius shares unique challenges with other SIDS, including vulnerability to climate change and natural disasters. To be realistic, Mauritius will not be able to achieve self-sufficiency on all fronts. However, it also has opportunities, such as an exclusive economic zone (EEZ) of 2.3 million km² that could be used sustainably for marine food resources, and which is not currently fully exploited.

An important message is that Mauritius must aim to allocate at least 10% of national budget to agriculture development and achieve an agricultural growth rate of at least 6% per annum, as envisioned for Africa.

Table 1. Causes of food insecurity and remedial measures		
Region	Causes of insecurity	Remedial measures
Northern Africa	<ul style="list-style-type: none"> • Economic instability: currency devaluation and inflation • Political instability: conflict and governance issues 	<ul style="list-style-type: none"> • Government initiatives: subsidies and social safety nets • International support: Aid and development projects by UN and NGOs
Western Africa	<ul style="list-style-type: none"> • Conflict and economic challenges • Climatic shocks impacting agriculture 	<ul style="list-style-type: none"> • Regional initiatives: ECOWAS policies on food security • International Aid: Emergency food assistance by World Food Programme
Central Africa	<ul style="list-style-type: none"> • Long-standing conflicts causing displacement and acute food insecurity • Economic instability • Lack of infrastructure affecting food distribution 	<ul style="list-style-type: none"> • Humanitarian aid: on-going relief efforts by NGOs, WFP, FAO, USAID • Development programs: rebuilding agriculture and infrastructure
Eastern Africa	<ul style="list-style-type: none"> • Climate change: unpredictable rainfall and prolonged droughts • Population growth straining resources • Regional conflicts: regional conflicts affecting food production and distribution 	<ul style="list-style-type: none"> • Government Initiatives: BETA and fertilizer subsidy program in Kenya; Productive Safety Net Program in Ethiopia • International support: Aid from WFP, FAO, and other NGOs
Southern Africa	<ul style="list-style-type: none"> • Economic instability: hyperinflation and crises • Climate change: droughts and floods • Low agricultural productivity due to traditional methods 	<ul style="list-style-type: none"> • Government policies: efforts to stabilize the economy and support agriculture • International Aid: Food assistance and development projects

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3. FOOD CROP PRODUCTION AND IMPORTS

Introduction

The Republic of Mauritius is a net food and fruit importer of its total food requirements. In 2022, such imports accounted for nearly MUR 47 billion (USD 1 billion), representing around 20% of the total country imports. The main imports are wheat, rice, maize, potatoes, cane sugar, pulses, oil and fats, onions, and temperate fruits, primarily as basic foods. Local agriculture can contribute to reducing this dependency.

Imported commodities

Table 2 depicts the main imported commodities for 2022. The commodities can be divided into three categories:

- (i) Production could be increased as the crops can be cultivated locally;
- (ii) Crops and commodities that are unlikely to be produced on an industrial scale; and,
- (iii) Crops and commodities that are not economically viable.

To reduce dependency on imported foods in category (i) production can be increased locally.

Table 2. Food imports for 2022					
CEREALS	TONNES	OILS AND FATS	TONNES		TONNES
Wheat	138,296	<i>Vegetable oils:</i>		Other citrus fruits	661
Rice	89,555	Margarine	4,327	Apples	4,744
Maize	118,812	Crude oil	33,715	Bananas	-
Oats	74	Refined oil (edible)	8,109	Grapes	1,655
Malt	7,004	<i>Animal fats:</i>		Pineapples	-
Other cereals/preparations	8,367	Butter and ghee	958	Other fresh fruits	4,721
ROOTS, TUBERS, PRODUCTS		VEGETABLES AND PRODUCTS <i>Fresh:</i>		Other:	
Potatoes	13,270	Brinjal	-	Raisins	291
Sweet potatoes		Cabbage	88	Other dried fruits	1,275
Cassava (Manioc)		Carrots	161	Preserved fruits	136
Tapioca and Sago	135	Cauliflower	51	Fruit & vegetable juices	5,797
Taro (curry/violette)		Cucumbers	-	STIMULANTS	
SUGARS AND SYRUBS		Lettuce	-	Tea	533
Cane sugar	136,668	Onions, dry	10,691	Coffee	1,337

Other sugars	482	Tomatoes	-	Cocoa beans, chocolate	455
Sugar preparations	1,816	Other fresh vegetables	413	SPICES	
Honey	521	<i>Prepared/preserved vegetables</i>		Chillies	15
PULSES		Asparagus	27	Garlic	1,967
Beans, dry	1,365	Mushroom	1,133	Ginger	54
Broad beans, dry	1,194	Potatoes	6,251	Pimento (dried chillies)	499
Lentils	3,502	Sweet corn	1,304	Other spices ¹	1,559
Peas, dry	4,433	Tomatoes	7,696	ALCOHOLIC BEVERAGES	
Other pulses	2,425	Other veg preparations	9,720	(Hectolitres)	
TREE NUTS		Frozen vegetables	3,097	Beer	825
Tree nuts	572	FRUITS AND PRODUCTS		Wine	3,968
OIL CROPS		<i>Fresh:</i>		Beverages, fermented	327
Coconuts	1,067	Oranges	5,581	Beverages, alcoholic	804
Groundnuts (in shell or not)	1,358	Lemons	1,800	MISCELLANEOUS	
Other oil crops	751	Mandarins	3,384	Infant food	1,066
Source: Statistics Mauritius, 2024					
 Production could be increased Unlikely to produce Not economically viable					

Given the heavy reliance on imports, it is crucial to understand the local production capacity and highlight areas where local production could contribute to reducing dependency.

Food crops and fruit production

In 2022 and 2023, the multiple-cropped area of 7,787 ha and 9122 ha respectively harvested under vegetables, produced 107,878 tonnes in 2022 and 143,884 tonnes in 2023 (Statistics Mauritius, 2024). The increase in 2023 is attributed to the inclusion of minor crops in the statistics and additional harvests per unit area in some instances. Some 40 different types of vegetables are produced. Table 3 lists the major food crops and their production in 2022.

Food crops are cultivated all over the island by both corporate and some 8770 small growers and produce the bulk of the food crops. This sector is mainly rain-fed, producing a wide range of vegetables, in which the Republic of Mauritius is self-sufficient in fresh food crops. Among them are tomato, potatoes and onion, referred to as strategic crops. However, for the latter two crops importation still stands to about 50% while for tomato processed and canned products are also on the high side, with 8517 tonnes imported in 2021.

Table 3. Major food crops production in 2022	
Product	Production (tonnes)
Brinjal	3,186
Cabbage	5,957
Carrots	4,547
Cauliflower	1,013
Cucumber	5,938
Lettuce	1,441
Onion	7,958
Potato	15,027
Tomato	14,348
TOTAL	59,415
<i>Source: Statistics Mauritius, 2022</i>	

Furthermore, some 1,300 orchard farmers cultivate an area covering an area of 721 ha. Production of the major fruits is shown in Table 4.

Table 4. Production of major fruits from 2019 to 2023					
	2019	2020	2021	2022	2023
Banana	7266	7952	9638	9829	10609
Pineapple	8459	9674	6547	5579	5918
Melon	51	22	18	41	200
Pawpaw	19	23	55	69	216
Watermelon	857	917	1337	3051	4152*
Litchi	2900	3000	2500	6000	750**
Longan	15	80	80	90	20**
Mango	1200	1300	1200	1300	1100**
Avocado	25	25	25	30	25
TOTAL	20,792	22,993	21,400	25,989	22,990
<i>*Increase in production due to additional cultivation under shelter</i>					
<i>**Lower production caused by climatic conditions</i>					
<i>Source: FAREI, 2023</i>					

It is to be noted that the corporate sector has diversified into agri-food, including venison, poultry, animal feed, and milk products. Agro-processing enterprises have started to take off, though on a limited scale by micro-enterprises, particularly managed by women. Transforming conserving, and commercializing vegetables, fruits, and milk products in the context of value-addition, overproduction, and waste reduction are undertaken. Agricultural value chain development and promoting entrepreneurship are areas to be strengthened for their roles in enhancing food security.

Sheltered farming/hydroponics

Over the last two decades, the government through the Food and Agricultural Research and Extension Institute (FAREI) provided incentives and support for sheltered farming production, including aquaponics and hydroponics. Undercover production does not only provide better quality end products but also gives higher yield.

Table 5 provides data on the field and sheltered production of some crops. Cucumber, lettuce, sweet pepper, and tomato are favoured in such a setup. It is of significance to note that almost as much tomato is produced under shelter than in open fields and the area has jumped from 53 ha to 78 ha from 2021 to 2022, with a corresponding increase from 6,111 tonnes to 9,239 tonnes (FAREI, 2022). The data illustrate the potential of sheltered production compared to open fields. Cucumber, lettuce, sweet pepper, and tomato from sheltered farming occupy a significant share of the market.

Crop	Field (tonnes)	Sheltered (tonnes)
Bean	1538	20.6
Brinjal	3100	65.4
Broccoli	98	0.3
Cabbage	5901	27
Cauliflower	100	5.8
Chillies	333	2.4
Cucumber	4882	1056
Courgette	148	14.3
Echalotte	1751	3.4
Greens	2010	17.1
Ladies finger	1320	5
Lettuce	1153	288
Chinese cabbage	475	18
Pipengaille	12	2.6
Squash	52	18.3
Sweet pepper	4	786
Tomato	7365	6904
Voehm	1051	5.1
Melon	41.2	49.2
Strawberry	-	0.52
TOTAL	31,293	9,239

Source: FAREI, 2023

Declining potato and onion production

Self-sufficiency in fresh potato was reached in 1986 and 2010, with annual production of 23,000 tonnes and 21,709 tonnes respectively. However, production has been dwindling with time and the obstacles to production are gaining the upper hand. As a result, traditional producers are no longer incentivized to continue, compromising food

security. The general downward trend in production from 2010 to 2023 is shown in Figure 2. Production now oscillates between 14,000 and 16,500 tonnes.

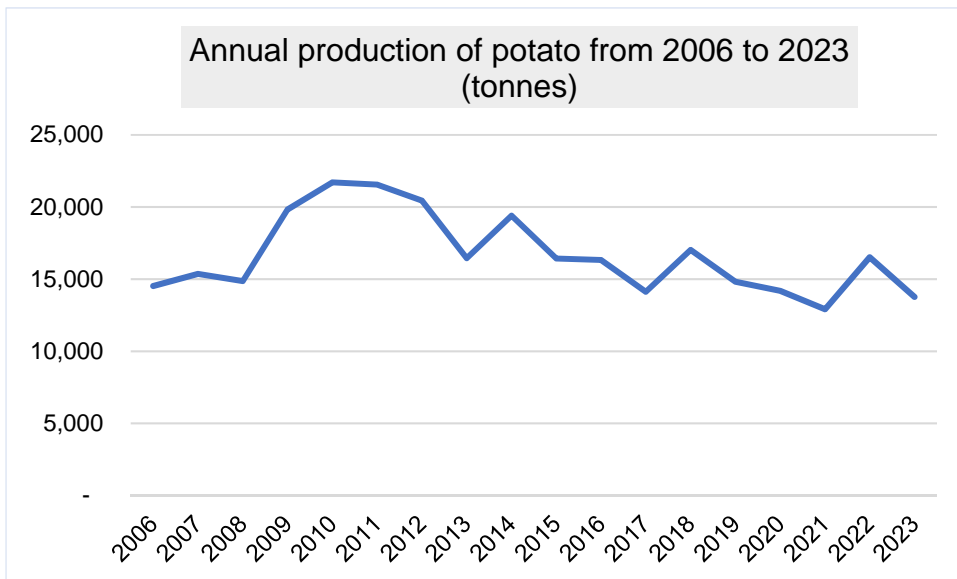


Figure 2. Potato production from 2006 to 2023 shows a general downward trend as from 2010

While potato production by the corporate sector has increased to 80%, small growers' production has decreased, when they used to account for 70% of production. In 2022, Mauritius imported nearly MUR 875 million (USD 19 million) worth of fresh, chilled, and frozen derivatives of potato.

The national requirement of onion amounts to 17,500 tonnes annually. Onion production is undertaken by both the corporate and small growers. However, the same trend has been noted for onion as for potato, where the small growers who were the main producers, are now producing 2000 tonnes compared to the corporate growers, producing around 3000 to 5000 tonnes. Overall, local onion annual output is becoming erratic and falling short by more than 50% of the national demand. In 2022, the Republic of Mauritius imported around USD 7 million (MUR 313 million) worth of onion and derivatives.

Potato and onion, as well as garlic, are termed strategic crops. Currently, production costs potato is estimated at MUR 528,000 (USD 11,500) per hectare, posing high risks with uncertain returns. The decline in potato and onion production over the years is symptomatic of the inherent challenges facing the crop sector to maintain production.

Rodrigues has around 3500 farmers, and approximately 2000 operate in the crop sector. Due to the loss of agricultural land and cultivation of some 175 ha only, local production is therefore in short supply for the population of 48,000 and its growing tourist industry.

While the Republic of Mauritius currently relies heavily on food imports, there is significant potential to enhance local production. By addressing structural constraints and investing in modern agricultural practices, the country can improve its food security and resilience. Policymakers play a crucial role in supporting these efforts through targeted subsidies, grants, and infrastructural improvements. By unlocking the full potential, an opportunity will be beckoning to increase crop exports.

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4. LIVESTOCK

Data coverage and data sources

This section provides an analysis of the status of food security in the livestock sector over the period 2014/15-2022/23. It provides evidence-based data on the 'food availability' dimension as well as the 'food stability' dimension of food security aggregation at national level for the livestock sector. It examines the physical availability, and the stability of availability of animal-source food (ASF) over the period, supplied through domestic production and imports ('supply side'), and consumption ('demand side'). The trends in supply and demand of ASF from the four livestock commodity groupings have been analysed, namely (i) red meat (beef, venison, goat meat, and mutton), (ii) pigmeat, (iii) poultry meat and eggs, and (iv) milk and dairy products.

Trends in production, consumption, and the self-sufficiency ratio of animal-source food (ASF) for 2014/15 to 2022/23

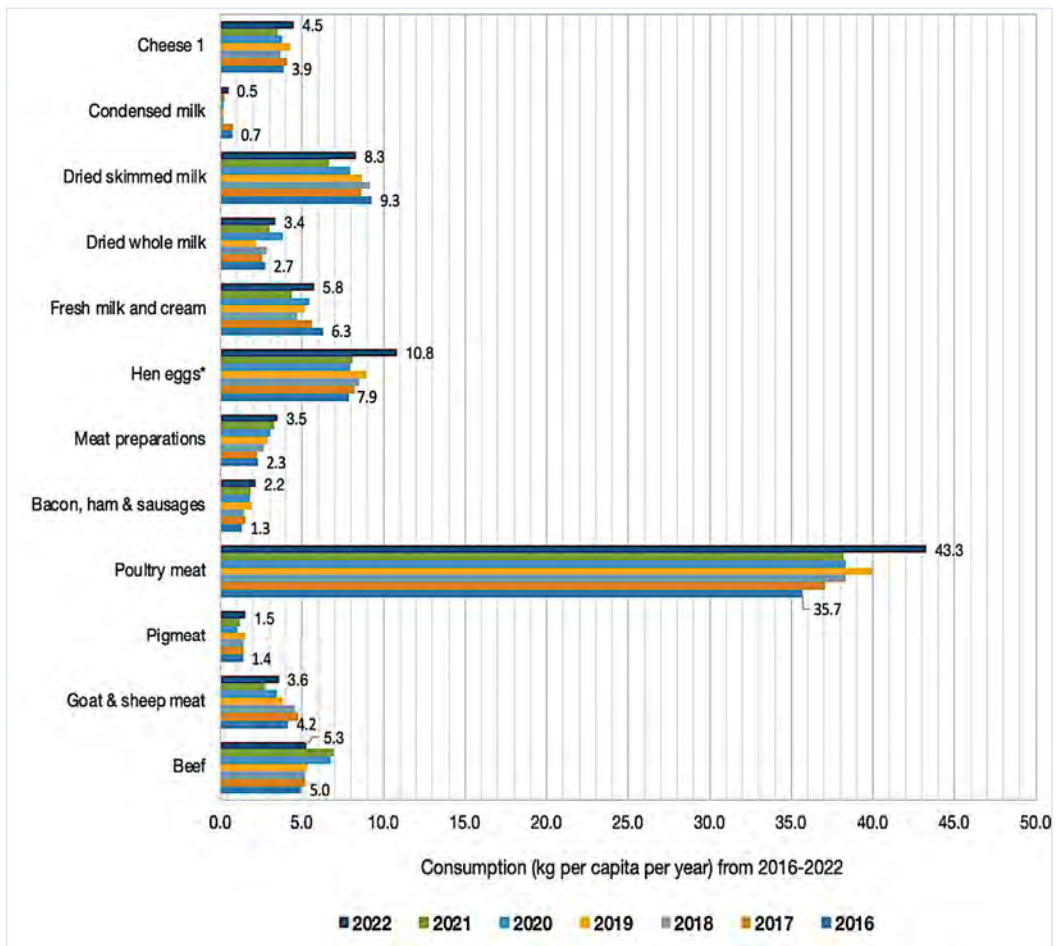
Table 6 shows the trends in production (t) of red meat (beef, goat meat, mutton, game including venison), pigmeat, poultry meat and eggs, and milk (,000 L) for the period 2015-2023.

Table 6. Trends in production of livestock commodities for 2015-2023							
	¹ Beef (t)	Goat meat & mutton (t)	² Game meat (t)	Pigmeat (t)	Poultry meat (t)	³ Eggs (t)	Milk (,000 L)
2015	85	39	625	560	46,400	10,080	4,000
2016	54	38	625	632	45,800	9,912	3,600
2017	86	48	625	606	47,500	10,416	2,500
2018	78	35	625	543	49,000	10,752	2,500
2019	72	18	625	596	51,000	11,340	2,500
2020	18	14	625	598	47,500	10,080	2,500
2021	11	7	625	574	49,100	10,248	2,600
2022	123	45	625	583	55,700	13,692	2,200
2023	53	25	625	572	59,200	NA	2,800
% Change	- 38 %	- 36 %	-	+ 2 %	+ 28 %	+ 36 %	- 30 %
¹ Includes slaughter of animals from Rodrigues; ² Includes venison; ³ Average egg weight = 55 g Source: Statistics Mauritius 2015-2023							

The trends and shifting patterns in supply and demand of ASF, and the stability in the availability, have been examined to identify 'risk' factors, at the national, regional, and global levels that may impact on the status of food security in the livestock sector. An analysis of the factors and the challenges facing the livestock sector has been used

to inform recommended intervention strategies to support the sector and policy priorities. The economic and physical ‘access to food’ and ‘food utilisation’, and the stability of ‘food access’ and ‘food utilisation’ have not been determined. The two dimensions have a major impact on the household food and nutrition security, in particular, of vulnerable groups. This caveat has been taken into account when formulating policy recommendations for the sector.

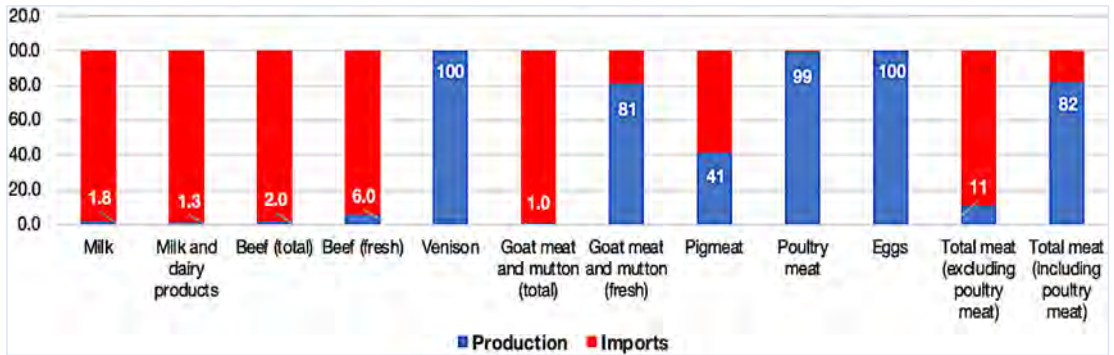
Figure 3 shows the trends in per capita consumption p.a. of livestock commodities for the period 2015-2022. The consumption of livestock commodities come from domestic production and imports. An analysis of the trend in consumption is given in the sections which follow.



Source: Statistics Mauritius 2016-2022

Figure 3. Trends in per capita consumption (kg per capita p.a.) of livestock commodities for 2016-2022

Figure 4 shows the self-sufficiency ratio of ASF for the year 2022. The data illustrate the supply gap for milk (whereby we produce 1.8 % of what we consume), dairy products (1.3 %), pig meat (41 %), and total beef (2 %), goat and mutton (1 %). We are almost self-sufficient in the production of poultry meat, and self-sufficient in eggs and venison.



Source: Statistics Mauritius 2022

Figure 4. Self-sufficiency ratio (SSR) for animal-source food for 2022

Red meat (beef, venison, goat meat and mutton)

- **Production:** In 2015, the production of red meat from venison, beef, goat meat, and mutton (based on slaughter statistics) and venison, was 574 t. It declined to 528 t in 2023 (- 8 %), with an *estimated* input of 450 t from venison.
- The decline is attributed to a decrease in the production of beef, from 85 tonnes in 2015 to 53 t in 2023 (- 4.8 % p.a.), and a low input of 11 t in 2021. The production of goat meat and mutton was 39 t in 2015 and increased to 45 t in 2022.
- The major source of production of red meat comes from venison, with an *estimated* stable production of 450 t p.a. For 2022, the share of venison in total red meat production is estimated at 73 %.
- There are opportunities for increasing the production of venison into a high-value premium niche market, by leveraging the exceptional nutritional value of the meat (red meat with low fat and low saturated fat contents) and a 'green grass-fed' label, that is increasingly appealing to health-conscious consumers.
- **Livestock populations:** The decline in beef production is associated with a drastic decrease in the population of cattle from 7302 heads in 2012 to 3512 heads in 2022 (- 52 %). Following the incursion of Foot and Mouth Disease (FMD) in 2016, the population of goats, sheep and cattle showed a decrease over the 3-year period (2016-2019).
- The population of cattle, goats, and sheep before the FMD incursion (average number of heads for the period 2012-2015) was: 6,620 heads, 26,625 heads,

and 2,549 heads, respectively. After the incursion of FMD (period 2016-2018), the average population number was: for cattle: 3,952 heads (- 40 %); goats: 25,605 heads (- 4 %) and sheep: 3,261 heads (+ 28 %).

- **Per capita consumption:** The per capita consumption of red meat is relatively stable, with 10.5 kg in 2016 and 10.4 kg in 2022. A significant proportion of the supply of red meat for consumption arose from imports given the low production of beef, goat meat, and mutton.

Pig meat

- **Production:** Pig meat production (based on slaughter statistics), has been stable over the period 2015-2023, with an average production of 585 t p.a.
- **Livestock populations:** the population of pigs (period 2015-2022) also showed a stable number of heads, and averaged 20,863 heads. In 2016, the population of pigs was 24,133 and decreased to 21,445 and 19,662 heads in 2017 and 2018, respectively. The population increased to 21,484 in 2022 indicating the stability of production on the farms.
- **Per capita consumption:** The average consumption of pig meat for 2015-2022 was 1.36 kg per capita p.a. The consumption was stable for the period. For the year 2022, the self-sufficiency ratio (SSR) for pig meat was 41 %, compared to 43 % for the year 2015. For the same period, the imports of bacon, ham, and sausages were 2,781 t. Comparative values for 2015 were 2,026 t (+ 37 %; +5 % increase p.a.).

Poultry meat and eggs

- **Production:** By far, the largest proportion of the livestock growth sector from 2015 to 2023, is attributable to the poultry sector.
- Poultry meat production has shown a consistent growth from 2015 to 2022, increasing from 46,400 t in 2015 to 55,700 t in 2022 (+ 20 %). The sector has witnessed a sustained growth of + 3.0 % per year, for the period 2017 to 2022. The production trend indicates that poultry meat will continue to be the primary driver of meat production growth. Poultry meat production accounts for more than 95 % of the total meat produced in Mauritius.
- The production of eggs has increased from 10,080 t in 2015 to 13,692 t in 2022 (+ 36 %).
- Poultry meat and eggs are produced by large integrated producers, contract growers and small and medium-sized farms.
- From 2015-2016, the production of poultry meat decreased by 600 t. The production of eggs decreased from 10,080 t to 9,912 t for the same period. The decrease is associated with an incursion of Salmonella on the small-sized farms. The data reflect the impact of disease incursions on production and the importance of implementing and monitoring effective biosecurity programmes.

- Productivity gains are the main factor contributing to increased poultry meat and egg production over the years. Improvements to the feed conversion ratio (FCR) have sustained growth. Increased productivity gains have been achieved through improved management practices (breeding, feeds and feeding management, housing, animal welfare, and health).
- **Per capita consumption:** The consumption of poultry meat has increased from 35.7 to 43.3 kg per capita p.a., for the period 2015 to 2022 (+ 21 %). For the same period, the share of poultry meat in the total meat and meat preparations consumed showed a significant increase, from 68 % in 2015 to 82 % in 2022.
- Most of the poultry meat consumed is produced locally. The level of poultry meat imports was 513 tonnes in 2022, compared to 437 tonnes in 2015. The average per capita consumption p.a. of eggs was 8.63 kg for the period 2016-2022. In 2022, the average consumption was 10.81 kg.
- We have achieved self-sufficiency (SSR = 100 %) for the production of eggs. The trend has been maintained from 2015-2022. For the same period, the SSR for poultry meat was stable at 99 %.
- However, the reliance on imported feed ingredients represents a threat to the stability of supply of poultry meat and eggs, and highlights the vulnerability of the commodities to reliance on imported inputs. We rely for more than 90 % on imported feed ingredients.
- The increase in per capita consumption of poultry meat stems from a combination of factors. The major determinants of poultry meat consumption include rising incomes (GDP per capita), market-driven consumption of a convenience, readily-available food and eating-out. As income increases, the per capita consumption of chicken meat shows a similar trend.
- In the years to come, however, it can be expected that quality and animal welfare will become increasingly important for consumers and influence their choices.

Milk and dairy products

- The production of raw milk was 4 x 10⁶ L in 2015. Over the period 2015-2023, there has been a sharp decline in production (- 30 %).
- **Consumption:** the value of imports to meet the consumption of milk and dairy products has relied heavily on imports. Milk powder featured in the top 10 products of import for Mauritius in 2022 (Mauritius Chamber of Commerce and Industry 2022).
- The value of import costs (MUR million) for milk powder increased by 30 % for the 3-year period 2020-2022 (MUR million: 2,512 in 2020; 2,373 in 2021 and 3,389 in 2022, respectively). The products were imported from New Zealand (77 %) and France (6 %).

- A comparative analysis of the per capita consumption of milk and dairy products for year 2022 compared with baseline data for 2016 indicate that there was a decrease in the consumption of fresh milk and cream (- 8.4 %), dried skimmed milk (10.5 %) and condensed milk (- 33 %). The per capita consumption of dried whole milk increased by 10.5 %.
- The SSR for fresh milk dropped from 4.3 % in 2015 to 1.8 % in 2022.

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5. CONSTRAINTS AND CHALLENGES

Introduction

The Republic of Mauritius needs to grow inclusively and efficiently, especially in the face of economic crises that disproportionately impact the weakest segments of society. As a small open economy, the Republic of Mauritius has been significantly affected by global downturns, including COVID-19, the war in Ukraine, and the resulting inflation in food, fuel, and fertilizer prices, as well as the collapse of global tourism. The heavy reliance on imported food heightens the risk of such disruptions. Recent price hikes in staple items like rice, cereals, meat, fish, and milk have fueled rising inflation. Most of the challenges for Mauritius are also encountered in Rodrigues with the lack of water and agricultural equipment being more acute.

Land availability and suitability for agriculture

In the 1970s and 1980s, potato was cultivated on prime land in Mauritius but later expanded to less productive areas. Over the past three decades, much of the central island's suitable land, including regions like Ebène, Côte d'Or, and Highlands, has been converted for other economic uses and residential development. This shift highlights the irreversible loss of agricultural land. Monoculture practices and heavy use of synthetic inputs further degrade the land. In Rodrigues, 3000 ha of agricultural land are reduced to 175 ha due to invasive species, unfavourable climatic conditions, water availability, erosion, labour and agricultural equipment shortage.

High cost of production

The profitability of crop cultivation has declined due to rising input costs and stagnant yields. High costs of seeds, pesticides, fertilizers, and labour impact on crop production. The livestock sector is heavily dependent on imported feed ingredients for the local manufacture of livestock feeds. More than 90 % of the feed ingredients is imported. The value of maize imports for feed manufacturing increased from 74,422 t in 2012 to 118,812 t in 2022 (+ 60 %).

The volatility in the prices of the feed ingredients, the unfavourable rate of exchange of the USD to the MUR and the increase in freight prices (following the Covid-19 pandemic), have fuelled increases in the prices of livestock feeds. From 2020 to 2024, the price of feeds for livestock have shown a significant increase with impact on profitability, as the cost of feeds represents almost 60 % of the total cost of production.

Impact of climate change

The Republic of Mauritius is highly vulnerable to climate change, threatening its agro-industrial productivity. The Ministry of Environment's statement at COP 28 underscores this critical challenge, with key concerns including:

- A temperature rise of 1.39°C since 1950.

- An 8% decrease in annual rainfall.
- Accelerated sea level rise by 4.7 mm/year compared to a global 3.7 mm/year and increased beach erosion.
- Coral bleaching and a decline in marine fish capture by 11%.
- Increased pests and diseases in crops, along with saltwater intrusion affecting groundwater quality, and the increased emergence of livestock diseases and pests, as higher temperatures and changed rainfall patterns can alter the epidemiology of diseases.
- Heat stress, calling for more investment in irrigation and water conservation.
- More extreme climatic events, such as flash floods and rapid intensification of cyclones.
- Serious threats to livestock production under grazing systems (beef cattle, deer, small ruminants) due to increased heat stress and reduced water availability, and more limited in non-grazing systems and for poultry and pig production (mostly because the housing of the animals indoors allows for greater control of production conditions, but the initial investment costs are high).
- Indirect impacts of droughts and floods impacting on lower crop yields, limited forage production and lack of diversity in the types of forages available specifically legume forages, with impact on overgrazing.
- On the other hand, livestock rearing is also a contributor to climate change and contributes to the anthropogenic greenhouse gas emissions (GHG). Green strategies have to be promoted along with good management practices to reduce the emissions.

Projections indicate a 1-2°C rise in air temperature, a 30% decrease in utilizable water, and a 30% decline in agricultural production by 2050. Significant economic losses in the crop sector in 2021 and 2022 underscore the urgent need for resilience and sustainable practices. COP 28 commitments include a USD 2.6 billion investment in food system transformation, regenerative agriculture, and climate-food innovation.

Water availability

Irrigation is critical for productivity, especially in the northern and western regions and coastal belts. Climate change has disrupted rainfall patterns, increasing the need for reliable irrigation to avoid crop failure, particularly from August to December. In 2018, agriculture used 30.6% of the 994 million m³ of water extracted (Statistics Mauritius, 2020). However, water availability during the dry season is restricted, and irrigation costs have risen significantly, emphasizing the need for efficient irrigation systems. Access to clean, potable drinking water is the most important nutritional factor for optimum performance of livestock. Water of improved quality will reduce pathogen pressure on the animals and support optimum feed intake, and productivity.

Breeding stock

Animal breeding plays an important part in progressing animal production systems. The effectiveness of domestic breeding stock production has to rely on the use of imported improved breeding animals to ensure a reliable source of high-quality breeding animals. However, in the absence of a national breeding policy and the introduction of high yielding exotic breeding animals, there is risk of erosion of local genetic resources, if not properly managed. This leaves room for potential loss of important breeds of livestock that would play a fundamental role in building climate resilience. It is recommended to establish a long-term agreement with Rodrigues that would guarantee a minimum price and pre-determined quantity of cattle to be supplied to Mauritius, providing stability and predictability for both parties.

Labour scarcity and ageing farmers

Agricultural practices in Mauritius are labour-intensive, and the sector faces a human resource crisis due to labor shortages, high costs, and an aging farmer population. Young people show little interest in traditional agriculture, exacerbating the problem. Automation and the use of small equipment (e.g. forage harvesters, milking machine, automatic egg collection systems) contribute to saving time and require less labour.

Security and thefts

Thefts of crops, livestock and farming equipment are on the rise, increasing production costs due to the need for security measures like watchmen and CCTV surveillance. Livestock production systems are located in isolated and remote areas for reasons of biosecurity, and this situation increases their vulnerabilities to thefts. These issues are compounded by broader social challenges.

Health issues associated with food security

Mauritius has experienced socio-economic improvements, including better life expectancy, reduced infant mortality, and universal healthcare. However, non-communicable diseases (NCDs) like Type II diabetes (19.9%), obesity (36.2%), overweight (36%), and hypertension (27.2%), cholesterol (34.8%) are prevalent, affecting the population (Ministry of Health and Wellness, 2022). These health issues are linked to nutrition and highlight the need for accessible, nutritious, and safe food. Poor health leads to lower productivity and perpetuates poverty, food insecurity, and cost impact on the health system.

Government assistance

The government, with the Ministry of Agro-Industry and Food Security (MAIFS) as the key player has been assisting small growers through the implementation of various schemes. These have been instrumental in allowing in equipping and supporting them as well as modernizing production methods. In the 2024-2025 national budget, the following assistance has been earmarked:

- Grant for sheltered farms to establish and maintain sheltered farms to protect crops from adverse weather and enhance productivity.
- Subsidy for the purchase of fertilisers to reduce the cost of purchasing fertilizers, aiding in soil fertility and crop yield.
- Subsidy for seeds for potatoes, onions, carrots, beans, garlic and tomatoes to reduce cost of production.
- Grant for the purchase of equipment by small farmers and agro-processors to purchase essential farming and processing equipment to increase efficiency and productivity and modernise farming operations.
- Financial support for cooperatives to acquire equipment that will boost local production capabilities and benefit from economies of scale.
- Grant for planters purchasing fully equipped container farming facilities promoting modern and efficient farming techniques and adapt to adverse climatic conditions.
- Funds for upgrading of track roads and drains to improve farm accessibility and prevent waterlogging, and investment in sheltered farms within organic zones to promote organic farming practices.
- Funds for setting up of a cold storage facility to extend the shelf-life of fruits and vegetables, reducing post-harvest losses and maintain cold chain for agro processors.
- Cash compensation for planters affected by adverse weather conditions, covering the 1st and 2nd crop cycles annually to mitigate losses and ensure continuity of farming activities.
- Grant for the purchase of fencing and security equipment to protect crops/livestock from theft and damage.
- Financial support for the acquisition of mechanized farming equipment to enhance productivity and reduce manual labour.
- Subsidies for the installation of solar-powered CCTV cameras to monitor and secure farming areas.
- Subsidy for beekeepers to purchase queen bees, enhancing hive productivity and honey production.
- Grants for purchase of high-quality imported breeding animals (cattle, goat, sheep and pigs) to improve livestock genetics and productivity.
- Financial support for the establishment of fodder plantations to ensure a steady supply of animal feed.
- Grants for the construction and renovation of farm buildings, providing better shelter and facilities for livestock.

- Subsidies to reduce the cost of animal feed, ensuring better nutrition and health for livestock.
- Grant for cattle breeding to support dairy farming for increased calving and milk production.

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6. PROSPECTS FOR CONSOLIDATING THE FOOD SYSTEMS FOR FOOD SECURITY

Introduction

There are interconnected challenges as food security is multifaceted, involving agricultural productivity, resource management, climate resilience, and socio-economic factors. Climate change, land scarcity, and water management issues necessitate a comprehensive strategy that integrates technological advancements, policy reforms, and efficient resource utilization. Consumers must be implicated in the process through education, awareness of the challenges to food security for the country, support for sustainable practices, and the options available for nutritious foods. The Republic of Mauritius faces many constraints and challenges to improve its food security status and they need to be addressed as an integrative vision of the agro-food system. Government policies and financial inputs would be crucial in implementing the measures.

Resource optimisation

Apart from sugarcane cultivation, occupying an area of nearly 40,000 ha, some 8000 ha are currently under food crops and orchards. Land availability and suitability for agriculture are scarce and precious in Mauritius and Rodrigues. Before this is further encroached upon by other activities and purposes that would lead to irremediable loss, a land audit should be conducted, and suitable sites for agricultural purposes earmarked and capped for agriculture. The zones of production should be accessible and secured, and also endowed with the necessary infrastructure for production, processing, and storage. Current zones of production could be upgraded with such facilities. Finding new land should focus on State-owned land in the first instance with the monitoring of land utilisation. It is of note that the corporate producers have the opportunity to plan and rotate land use and need to be part of the strategy to address food security.

It is unrealistic to expect that the costs of inputs to production could be reduced, but can, however, have a lesser impact through higher productivity. Technological advancements need to be advocated to increase productivity using climate-resilient crops, climate-smart technologies for the efficient use of resources, and precision agriculture.

Agriculture has always suffered from the vagaries of the weather. With climate change, the vulnerability has become more acute, and promoting agriculture will be of no avail without a water supply that should be efficiently used through appropriate irrigation systems. It is of note that the Government is currently reviewing water rights.

With extreme weather events, it is becoming increasingly obvious that open-field production has limitations. Though the notion is not to do without it, an approach towards modernizing production, making efficient use of resources, and ensuring

partial protection from weather, pests, and diseases is the way forward. This can be achieved through sheltered farming which should be expanded. Some crops such as lettuce, cucumber, sweet pepper, tomato, and greens adapt well to this system and in fact, any crop can be grown using an appropriate hydroponic system. Hydroponics provides greater market opportunities, better control of climatic parameters, more efficient use of water (less than 2%), and higher returns. Yields are considerably higher per m² by at least twice. Thus, by expanding tomato production under hydroponics from 40 ha to 80 ha, production would leap from 7,000 tonnes to 14,000 tonnes, satisfying the annual demand. Being protected, lower pesticide applications will be required, contributing to food safety. The hydroponic system can be further enhanced into more advanced forms such as Controlled Environment Agriculture. Such food production systems would be attractive to young entrepreneurs where ICT would be a driving force.

Initial and appreciably high investments are required but can be recouped in the medium to long term. Energy-saving devices and solar panels to generate electricity for the shade houses are the best approach. Climate-smart technologies, such as agri-voltaic energy systems can combine the delivery of solar electricity, crop production, and rainwater harvesting on the same land area. Instead of being mounted close to the ground like traditional solar power arrays, agri-voltaic systems are constructed several meters high, with gaps between the arrays, enabling crops to be grown underneath.

The inclusion of climate-resilient crops is also part of strengthening food systems. They are crops and crop varieties that have enhanced tolerance to biotic and abiotic stresses and provide a means of adapting to diminishing crop yields in the face of climate change. Such crops may be traditional crops or newly developed ones that are gradually becoming available.

The adoption of climate-smart resilient management practices (CSA), is part of the transformation of the food system for sustainable production of red meat (goat, sheep, beef, and venison), pigmeat, and milk. The objective is to achieve targeted levels of self-sufficiency ratios for the commodities.

The adoption of silvopastoral systems integrating legume and non-legume trees, and forage crops will impact positively on productivity, by decreasing the costs of feeds, and with significant environmental benefits by enhancing C sequestration. Applying circular economy principles for improved manure management (e.g. composting for value-addition to wastes) on poultry and pig farms.

The farmers need access to key inputs to keep the farms viable and profitable: feeds, veterinary services, housing, land, and labour. Profitability allows the farmers to have access to credit, and to have confidence in investing in sustainable and climate-smart management practices.

Labour and mechanisation

The solution to the acute labour shortage can only be resolved by importing foreign labour, which is however, not without its legal, administrative, and practical constraints. Mauritius has already started importing labour for the agricultural sector. Such employment requires careful planning, skilling, and safeguards to obtain the desired results in the short, medium, and long term. Reinforcing the workforce with mechanization facilities is necessary to undertake agronomic practices and harvest. Small equipment that would be adaptable to our context needs to be investigated and imported. The constitution of a regional pool of such equipment would be preferable to ease access and avoid delays in meeting the imperatives of agricultural practices.

Automation, and the use of small machinery are strategies that will have an impact on addressing labour shortages, with improved efficiencies of operations and processes. Poultry farms have already adopted automation to control, monitor and regulate processes on the farms. The efficiency of use and application will have to be strengthened for increased efficiency. The use of small machinery for the harvesting of fodder will have an impact on production

Research and Development

Mauritius is vested with more than 125 years of agricultural research and has a wealth of information on its agriculture systems and data. Research and development in this area is a continuous process for the development of the sector and to bring innovative solutions to challenges as they appear. The issue of food security brings R&D to the forefront. The emphasis is on sustainable breeding of new crop varieties and livestock, and practices to be able to produce more with less. Varieties that can be cultivated in marginal land should be identified. R&D institutions have a major responsibility in promoting the best practices and in supporting farmers to boost productivity. New technologies need to be investigated and where appropriate, deployed for adoption. For more impact, the constraints affecting the main and strategic crops and livestock production such as fodder, should be given more attention. Field practices should keep in mind the provision of nutritious food that is safe for the consumers.

Increased livestock productivity will be achieved through research and innovation for impact on improved feeding, health, breeding and biosecurity. Enhanced availability of veterinary services, availability of vaccines, and access to diagnostic tools to reduce the risk of disease outbreaks and improve productivity.

There is also a need to develop a National Animal Breeding Strategy and Policy which will provide broad-based direction in the livestock sector development and pave ways for protection of the existing genetic resources as well as enhance the resilience of the livestock sector to climate change.

The incursions of FMD and of Salmonella (in 2016), and of the African Swine Fever (ASF) (in 2008), reiterate the real and significant biosecurity threats to our food security. It is an absolute priority for the country to build and implement effective collaborative partnerships for the implementation of 'One Health' strategies and capacities. The veterinary services will play a major role in coordinating the

implementation of the plan, and in creating the required synergy among all stakeholders.

Empowering farmers and entrepreneurs

Agriculture is complex due to interacting disciplines and know-how. Close support to all groups of farmers alike in capacity building and support incentives, including insurance, are key ingredients to the success and sustainability of the food systems. The agricultural sector has to emerge from low-skilled actors to professionals. The youth today are to a large extent university graduates or have a range of short courses under their belt. They need to be attracted to the sector and trained or re-skilled with an entrepreneurial angle to the activities. Marketing of the products, one of the objectives of the National Wholesale Market, is essential to facilitate business. In that vein the establishment of a Market Information System to provide national figures will foster better production planning, avoiding glut and consequently unharvested produce because of low prices or the opposite effect, leading high prices. Capability in value-addition and branding to agricultural produce, beyond the current transformation, would provide incentives beyond the realm of direct marketing from the farm. Facilitating investments from foreign entrepreneurs in agricultural production is an option to be considered in the quest for food security.

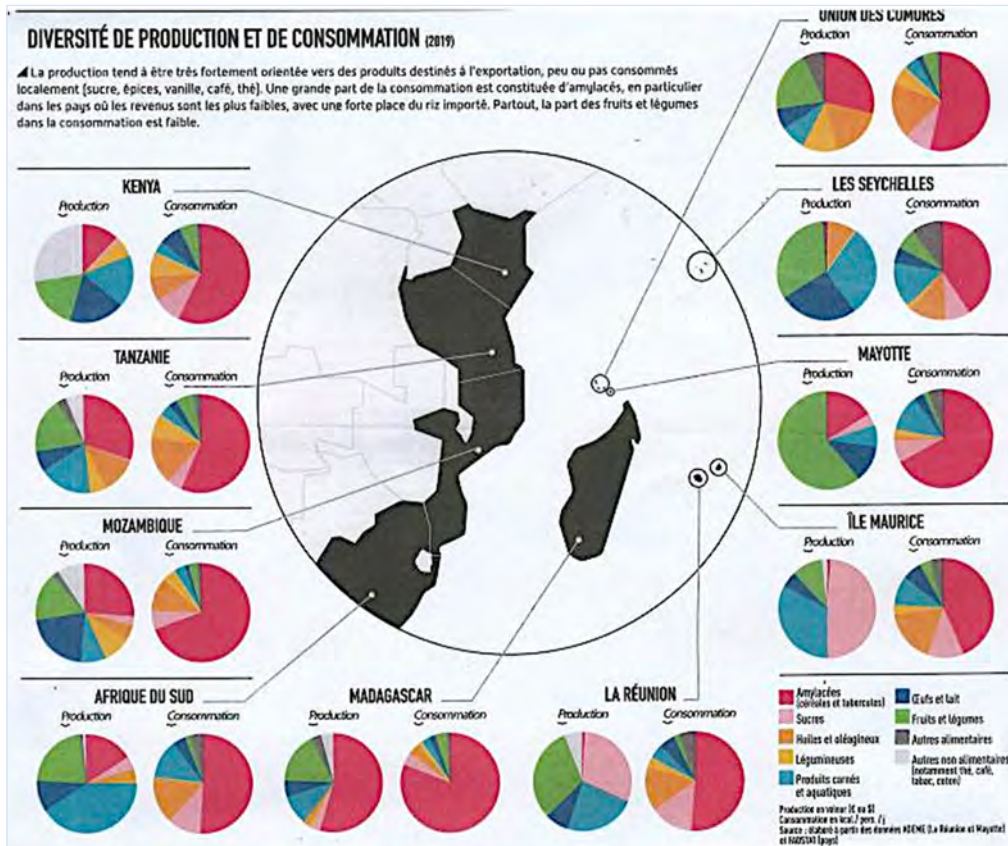
Consumer involvement

The very definition adopted for food security has the consumer as the focus of attention. Consumers are at the end of the chain in the food systems. They have the ability to dictate their needs on one hand but at times are left with little choice but to bear the brunt of what is made available to them. For example, they can be subject to the dumping of low-quality imported foods, a screening of which is necessary before entry. They are very important stakeholders to reckon with and have to be given the correct information and messages in the understanding and endeavor to increase food production and reduce imports.

Consumers need to be exposed to product diversification by promoting the production and consumption of a diverse range of nutritious foods. This can improve the efficiency and sustainability of our food systems and can be achieved through the development of processing and packaging technologies, as well as the promotion of underutilized local crops and livestock. Institutions and enterprises in Mauritius need to pursue research into fortification, biofortification, and enrichment of foods, including indigenous foods, to enhance the nutritional value of commonly consumed foods. Technologies such as extending the shelf life of food, and improving processing and packaging enhance the food system efficiency and directly impact human health. Backyard gardening needs to be promoted to supplement production and the inclusivity of women.

Regional integration in food security alleviation

Figure 5 shows food consumption and production patterns in the region. The consumption pattern in the different countries is relatively similar in that cereals and tuber root crops dominate while production patterns are however dissimilar. Leveraging regional production and consumption patterns can reduce dependency on distant imports and enhance food security through closer market integration. This can be particularly effective for commodities like maize, which is essential for animal feed. Reforms may be necessary to increase air transport and cargo handling.



Source: CIRAD, 2023

Figure 5. Regional production (left pie chart) and consumption (right pie chart) pattern diversity in different countries, highlighting opportunities in sourcing commodities regionally

Government and policy support

Underlying the above challenges are policy issues to be addressed by policymakers, without which, transformative changes in the sector will not happen. The government should enhance the curriculum in agriculture at all levels to ensure that this vital sector is given the necessary attention for youth engagement as agri-entrepreneurs. Building

a stronger and more equitable food system requires the fresh outlook, talents, and skills of youth. The involvement of women in agriculture needs to be encouraged for inclusivity.

The government has been supportive in providing incentives to the agricultural sector to boost food security. The measures have had a positive effect on maintaining production. However, structural changes are required, such as earmarking land for agricultural purposes endowed with the necessary facilities, and providing the infrastructure for access and irrigation water. Another key Government intervention would be the provision of a pool of agricultural equipment. Facilitating the hiring of foreign labour skilled in agriculture is essential.

The direct policymaker of the Government is the MAIFS. It has the mandate to boost local production for food security and to review policies and strategies for increasing productivity and ensuring the sustainability of the sector. A National Strategic Plan 2024-2030 has been worked out by the Ministry, following the roadmap worked out during the stakeholders' meetings held in the context of *Les Assises de l'Agriculture* and organised jointly by the MAIFS and Economic Development Board (EDB). Except in its formulation, the proposals put forth need are aligned with this Strategic Plan.

As referred to in the Introduction, Africa's leaders are committed to improving food security and nutrition through various policies and declarations. The CAADP aim in Agenda 2063 is to eliminate hunger and reduce poverty through agriculture-led development. It is proposed to allocate at least 10% of national budgets to agriculture to achieve agricultural growth rates of at least 6% per annum. The current budget allocation to MAIFS is only 2.5%. A gradual and sustained increase to reach this target is essential to strengthen the food systems to achieve food security.

The MAIFS should tap funding from the COP 28 commitments where a USD 2.6 billion investment in food system transformation, regenerative agriculture, and climate-food innovation has been pledged.

Achieving food security as a global challenge requires a collective effort from the government, farmers/entrepreneurs, researchers/extension, institutions, and consumers. By acknowledging the constraints and proposing solutions, these can be used as a springboard for developing a comprehensive strategy that strengthens the food system, we can work towards a more secure and sustainable future.

References

1. CIRAD. 2023. Souveraineté alimentaire dans l'Océan Indien.

7. CONCLUSION

This report provides an overview of the food security situation in the Republic of Mauritius. The agricultural sector remains crucial for food security and export earnings from sugar despite a decline in its contribution to GDP. Mauritius currently imports a significant portion of its food requirements, making it vulnerable to food shortages and rising global prices. The COVID-19 pandemic has emphasized the need for coordinated national initiatives to address food requirements and highlights the importance of evidence-based science advice in shaping food security policies.

Mauritius, however, faces challenges such as extreme climatic events, an irreversible loss of agricultural land, acute labour shortage, water availability, and a rise in NCDs linked to nutrition. To achieve food security, a major transformation of the agriculture sector in Mauritius is necessary, while also ensuring environmental sustainability. Key measures to address food insecurity in Mauritius, include optimising resources, mechanization, enhancing the resilience of farming systems, developing technologies to increase productivity, empowering youth with agricultural skills, diversifying food production, and advancing ICT. Effective policies, governance structures, and data systems are also crucial in addressing food security challenges.

Mauritius needs to prioritise agricultural development and reduce dependency on imports to enhance food security. The government should allocate a significant portion of the national budget to agriculture, aiming for agricultural growth rates of at least 6% per annum. Collaboration between researchers and policymakers, along with the implementation of effective policies and governance structures, will be crucial in achieving food security goals.

The measures proposed to enhance Mauritian agriculture are outlined in this report in a condensed manner. These descriptions provide an overview, but the strategies and actions must be expanded and developed further for comprehensive implementation.

8. RECOMMENDATIONS TO POLICYMAKERS

Based on its findings on food security, MAST has formulated some key messages in that respect to policymakers. They focus on the necessity for sustainable agricultural practices, the importance of enhancing local food production, the need for innovative research, and the urgency of climate resilience strategies. The goal is to provide actionable insights that will help shape effective policies for a robust and secure food system in Mauritius.

The government has been supportive in providing incentives to the agricultural sector to boost food security. The MAIFS has the mandate to boost local production for food security and to review policies and strategies for increasing productivity and ensuring the sustainability of the sector. It has developed a National Strategic Plan 2024-2030 to transform agriculture. Except in its formulation, the proposals put forward by MAST are aligned with this Strategic Plan.

1. Agriculture is a driver of development and in the Republic of Mauritius, it is critically important both economically and socially. As a Small Island Developing State (SIDS), the Republic of Mauritius shares unique challenges including vulnerability to climate change and natural disasters affecting its agriculture. Concurrently, owing to its characteristic as a small open economy, it is significantly impacted by global downturns.
2. Its other challenges comprise loss of land under agriculture, increasing costs of production, unavailability of water for irrigation, labour scarcity and aging farmers, thefts, and an increasing number of its population affected by non-communicable diseases (NCDs). Though the lifestyle is associated with NCDs, it is also linked to access to nutritious food.
3. The Republic of Mauritius is a net food importer. In 2022, imports accounted for nearly MUR 47 billion (USD 1 billion), representing close to 20% of the total country imports. This situation is a major concern and impinges on our food security. The Republic of Mauritius will not be able to achieve self-sufficiency on all fronts. However, local agriculture can contribute to reducing this dependency.
4. Addressing food security requires a holistic approach to the food systems. It refers to not only the basic elements of how we get our food from farm to fork but also all of the processes and infrastructure involved in feeding a population. As opposed to fragmentary measures, inclusivity is required.
5. Resource optimisation is to be addressed, particularly land and water. An inventory of suitable land is fundamental in the planning and expansion of our agricultural. Areas for open-field cultivation and livestock rearing

should be identified, made accessible and secured because of thefts, and endowed with agri-processing and storage facilities.

6. The availability of water to the zones of production is an essential condition to combat climate change, using efficient irrigation systems and technology, leading to an increased productivity, mitigating the cost of production.
7. The impact of climate change on our agriculture is a very serious threat. Solutions exist to alleviate its effect through climate-resilient crops such as millets and legumes, and local fruits.
8. An approach to modernizing production, making efficient use of resources, and ensuring partial protection from weather is adopting sheltered farming. Hydroponics provide greater market opportunities, better control of climatic parameters, and more efficient use of water. Yields are considerably higher per m² by at least twice. By expanding tomato production under hydroponics from 40 ha to 80 ha, production would leap from 7,000 tonnes to 14,000 tonnes, satisfying the annual demand. Lower pesticide applications contribute to food safety. Such food production systems would be attractive to young entrepreneurs where ICT would be a driving force. The system can be further enhanced into more advanced forms such as Controlled Environment Agriculture in warehouses developed by government or private entities.
9. Climate-smart technologies, such as agri-voltaic energy systems are favoured for combining the delivery of solar electricity, crop production, and rainwater harvesting on the same land area.
10. Importing labour is to be further encouraged and reinforced with mechanization facilities to undertake agronomic practices and harvesting. Small equipment adaptable to our context is to be identified and imported. The constitution of regional pools of such equipment would be preferable to ease access and avoid delays in meeting the imperatives of agricultural practices.

Research and Development is at the forefront of addressing food security. The emphasis is on promoting sustainable practices to be able to produce more with less and supporting farmers to boost productivity. New technologies need to be investigated and where appropriate, deployed for adoption. For more impact, the constraints affecting strategic crops and livestock production are to be given more attention.

11. Youth must be given adequate incentives to join and vivify the sector and trained or re-skilled from an entrepreneurial angle. Facilitating investments from foreign entrepreneurs in agricultural production is an option to be considered in the endeavour for enhanced food security. Eligible young entrepreneurs can be supported in the preparation of enterprise development plans and produce bankable business plans. Initiatives in the dairy sector, goats and sheep, and specialized forage production can be envisaged.

- 12.** To support the capacity of farmers to implement CSA, incentives should be provided to facilitate the demonstration and adoption of climate-smart and strategic investments for improved productivity, e.g. improved dairy sheds with improved waste management, rainwater capture, forage choppers etc. Production outputs should be incentivised.
- 13.** The Market Information System in place will foster better production planning, avoiding glut and price stabilization. Initiatives in value-addition and branding are to be promoted.
- 14.** Consumers are very important stakeholders in food security. They must be on board in the endeavor to increase local food production and reduce imports. Consumers need to be exposed to product diversification of nutritious foods. Backyard gardening needs to be promoted to supplement production and the inclusivity of women.
- 15.** Leveraging regional production and consumption patterns can reduce dependency on distant imports and enhance food security through closer market integration. Initiatives should be taken to strengthen collaborations within the countries of the region encompassing the COMESA, the IOC, IGAD, SADC and the Small States Network to formulate and implement regional economic development strategies within the countries of the region, with focus on food security. Specifically, action should be taken to ensure an important supply contingency of feed ingredients produced regionally that can help to stabilise domestic feed prices. Promoting investment in that sector should be encouraged for the production of high-yielding, drought-tolerant maize varieties (including rotation of soybean within the production of maize), the setting up of a factory to process and store the feed ingredients for poultry feeds. An initial short-term production of 25,000 t of maize increasing to 200,000 t (representing x 1.7 maize imports for year 2022) could be envisaged over the years.
- 16.** As per the Malabo Declaration, the Comprehensive Africa Agriculture Development Programme (CAADP) aim in Agenda 2063, is to eliminate hunger and reduce poverty through agriculture-led development and proposes to allocate at least 10% of national budgets to agriculture to achieve agricultural growth rates of at least 6% per annum. A gradual and sustained increase to reach this target is essential to strengthen our food systems towards achieving food security.
- 17.** The MAIFS could seek funding from the COP 28 commitments which pledged a USD 2.6 billion investment in food system transformation, regenerative agriculture, and climate-food innovation has been pledged.
- 18.** Achieving food security requires a collective effort from the government, farmers/entrepreneurs, researchers/extension, institutions, and consumers. We need to acknowledge the challenges facing agriculture and use them as a springboard for developing a comprehensive strategy that strengthens the food system to become food secure.

- 19.** It is essential to review the current system of crops and livestock data and analysis, to improve the quality, accuracy and timely dissemination of the data to the stakeholders. Capacity building in methods of improved data collection, analysis and use must be strengthened.
- 20.** As we develop a more robust agriculture and food system, export opportunities will blossom, with a multiplier effect on the Mauritian economy.

ANNEX 1

Resources used in the formulation of the booklet

MAST acknowledges the insightful presentations delivered by scientists during two events which provided valuable information in the formulation of this booklet.

Webinar on Strengthening Science Advice Capacity of the MAST: Focusing on Food Security, 28 May 2024

- *An Overview of Science Advice: Exploring the role and process of policymaking*, by Dr. Justine Geramo Nzweundji, Researcher Scientist Institute of Medical Research and Medicinal Plants Studies, Cameroon; Member of Science Advice Working Group, GYA.
- *Advancing Inclusion in Science Advice*, by Dr. Justine Geramo Nzweundji.
- *Science Advisory Role of National Science: Scholarly Publishing as a Case Study*, by Mrs Susan Veldsman, Director: Scholarly Publishing Programme, ASSAf.
- *Science Advice: the ASSAf Approach*, by Dr. Melusi Thwala, Manager: Science Advisory Programme and Strategic Partnerships, ASSAf

Hybrid Workshop on Science Advice: The Case of Food Security in Mauritius, 19 June 2024

- *Food Security Situation in Africa*, by Dr. Calleb Olweny Ochia, Jaramogi Oginga Odinga University of Science and Technology
- *Food Security in Mauritius*, by Dr. Asha Dookun-Saumtally, MAST Fellow
- *Science Advice on Food Security* by Prof (Dr.) Chibuikwe Udenigwe, University Research Chair, School of Nutrition Sciences, University of Ottawa, Ontario, Canada.
- *Strategies on Formulating the Science Advice on Food Security in the Context of Mauritius* by Prof (Dr.) Olubukola Oluranti Babalola, Director: Food Security and Safety Focus Area, North-West University, South Africa; Vice-President The World Academy of Sciences.

Feedback received from Group Discussions during the Hybrid Workshop was included to consolidate the contents of this report.

For more information, please visit:

www.mastmu.org

Or contact MAST Secretariat on email address:

mast.mauritius@gmail.com

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