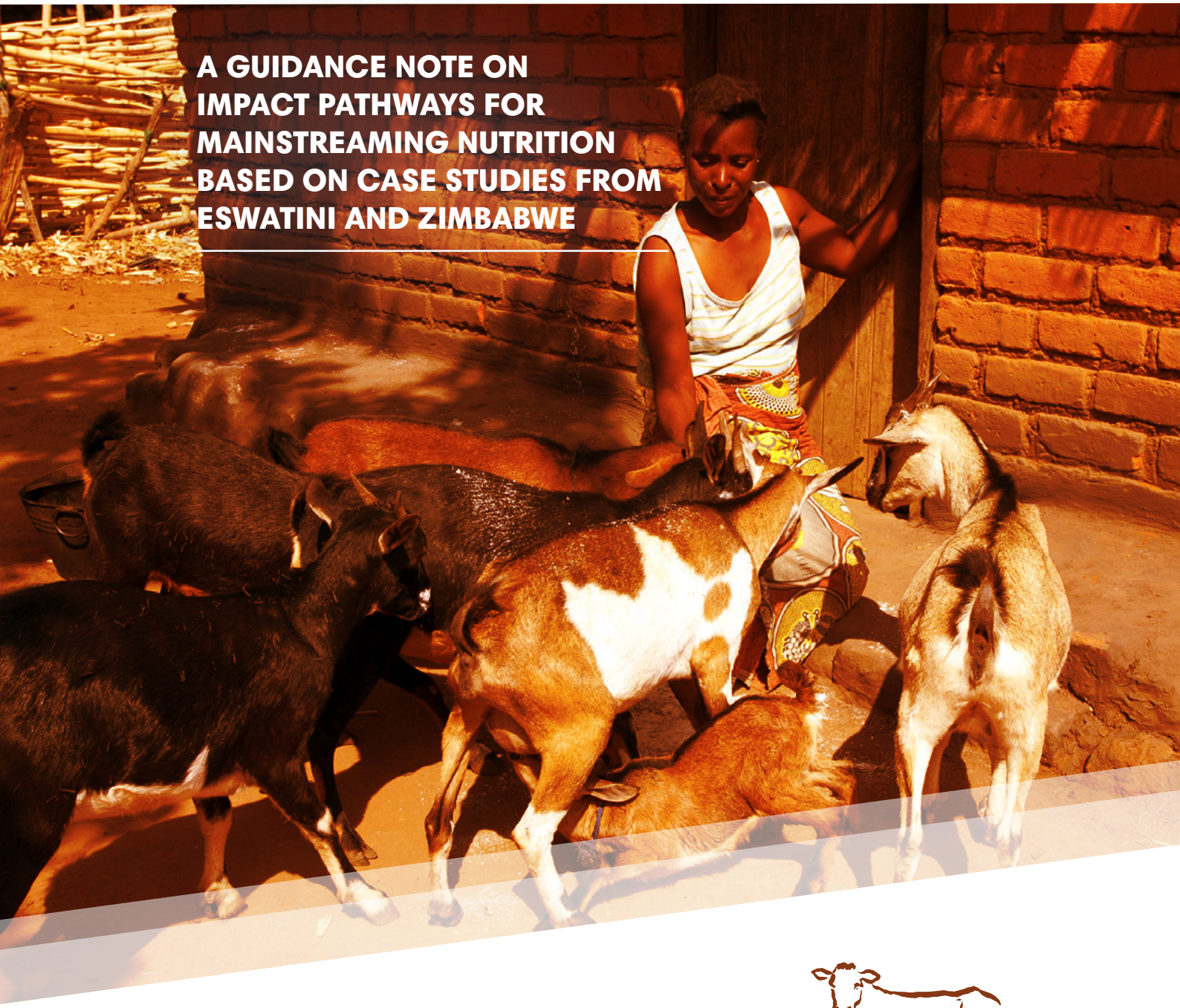
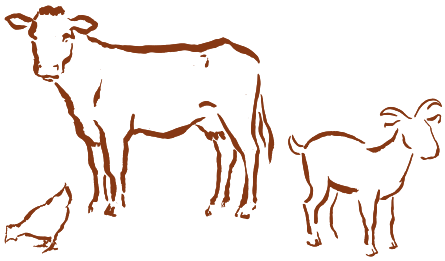
Food and Agriculture Organization
of the United Nations

MAXIMIZING NUTRITION
IN LIVESTOCK

A GUIDANCE NOTE ON IMPACT PATHWAYS FOR MAINSTREAMING NUTRITION BASED ON CASE STUDIES FROM ESWATINI AND ZIMBABWE



World Vision



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Contents

Figures

Table

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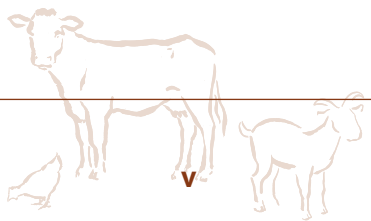
Abbreviations and acronyms

ASF	Animal source food
COVID-19	Coronavirus Disease 2019
CFS	Committee on World Food Security
FAO	Food and Agriculture Organization of the United Nations
FNC	Food and Nutrition Security Committee
FSN	Food security and nutrition
GDP	Gross domestic product
GloPan	Global Panel on Agriculture and Food Systems for Nutrition
HLPE	High-Level Panel of Experts
HH	Household
LFSP	Livelihood and food security programmes
TOC	Theory of change
SSA	sub-Saharan Africa
SBC	Social and behaviour change
SPS	Sanitary and phytosanitary
USDA	United States Department of Agriculture
USAID	United States Agency for International Development
WHO	World Health Organization
WV	World Vision



Executive summary

Livestock accounts for some 40 percent of worldwide income from agriculture (Nabarro and Wannous, 2014), and according to the World Economic Forum 2019 white paper "Meat: The Future Series", some 821 million people are malnourished and 151 million under the age of five are stunted. This is largely due to a lack of essential nutrients and proteins, which are readily available in nutrient-dense animal source foods (ASFs) such as meat, milk/dairy, fish and eggs. Transforming food systems to meet this demand for ASFs is one of the biggest challenges the world faces today. Livestock's contribution to global food production, food security, nutrition and land use is well recognised, with the various different livestock systems (extensive, semi-intensive and intensive) playing different roles in supporting food production and the management of natural resources and contributing to nutritional diversity.

To that end, the Food and Agriculture Organization of the United Nations (FAO) and World Vision (WV) have developed a guidance note for the livestock sub-sectors in Eswatini and Zimbabwe as part of a series focusing on mainstreaming nutrition within four food sectors, across five sub-Saharan African countries. These guidance notes apply a food systems approach (FSA) that places equal emphasis on factors of supply and demand, both of which are critical for ensuring healthier diets and better nutrition.

The guidance notes are based on the development of a theory of change (TOC) designed to help policymakers and programme managers identify key transformative interventions for the food system that will promote sustainable healthy diets and improved nutrition. In addition to TOCs, the guidance notes also describe impact pathways that show in practical terms which entry points for food system interventions should be prioritised. The aim of these guidance notes is to provide practical suggestions on how to formulate programmes and policies that promote healthy diets and nutrition.

Using the food system framework developed by the High-Level Panel of Experts on Food Security and Nutrition (HLPE), and its constituent elements (food supply chain, food environment and consumer behaviour), this guidance note identifies a number of critical challenges to improving and optimising nutritional outcomes through ASFs. These largely relate to food supply chains (from initial production to final marketing) and the enabling environment for food production, and to a lesser degree, consumer awareness and behaviour with regard to nutrition and the accessibility and affordability of food. In the case of Eswatini, the agricultural sector – and within it, the livestock sector, particularly the small ruminant (goat), poultry and beef sub-sectors – is considered one of the main drivers of economic development, as identified in the government's economic revival strategy.

Following a grey literature review and in-country consultations with stakeholders, the following key prioritised outcomes were identified for Eswatini and Zimbabwe: better management and greater productivity of communal grazing lands; improved livestock nutrition, marketing and processing; improved breeding programmes and general support for actors within the sector; and the adoption of climate-resilience training programmes and technology.

Additionally, on the post-production side, investment in cold storage, greater private sector investment and access to finance, and a reliable and accessible input system could solve some of the problems in the system. Post-farm gate interventions to improve storage and distribution would contribute to food security and nutrition diversity. Key elements of this support would be improving livestock nutrition, livestock traceability, disease control and surveillance, food quality, management information systems, the supply of inputs and the development of market offtake systems (producer-purchaser agreement/ market futures). Finally, added value and processing could be improved through investment in and the development of appropriate slaughter

and abattoir facilities to handle and process different livestock slaughter lines, compliance with sanitary and phytosanitary (SPS) standards, and the decentralisation of processing facilities.

Livestock sub-sector hypotheses

The **hypothesis of intervention in the swine sector** is that there is a need to further develop the sector through a more sophisticated and market-led approach that streamlines the swine production value chain. A key means of achieving this is by meeting both sanitary and phytosanitary standards and improving product diversity through added value and processing. Key obstacles to this are the lack of availability and limited use of recognised slaughter facilities (abattoirs) equipped to apply SPS measures and address health issues, and the lack of new product development (primary and secondary processing) streams that can meet international standards and encourage development of the formal market sector.

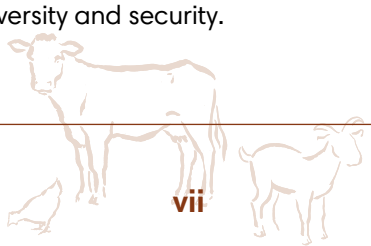
The **hypothesis for the small ruminant sector** is that improved productivity, greater access to commercially orientated production, improved awareness and consumption of goat meat, and enhanced links to more diverse diets will help and empower actors to increase both their income and productivity and offtake, leading to greater own-consumption of produce and increased sales, resulting in greater opportunities for diet diversification through the purchase of more nutritious foods.

The **hypothesis for the poultry sector** is based on the knowledge that poultry production, whether this involves extensive semi-scavenging methods or more intensive layer and broiler systems, is an enterprise that is readily accessible to households (HHs), especially those with women and young people playing major roles. Such enterprises provide households with readily available access to animal source foods. Increasing HHs' ability to acquire poultry and engage in either layer or broiler production can contribute to both on-farm income and dietary diversity through the sale and/or consumption of eggs and/or meat.

The **hypothesis for the cattle sector** is that production capacity can increase and become more sustainable through adequate planning and long term-investment in improving the production base by improving the productivity of pasture- and rangeland and their respective management systems. Improvements would include targeting the feed and fodder base (as part of input supply services), including supplementary feed production, and improved access to water at all times. This would help improve livestock nutrition and access to improved breeds, increase productivity at the farm and HH levels, increase offtake/sales to markets, and improve market access, resulting in higher incomes and the increased availability of animal source foods for dietary diversity.

Theory of change for the livestock sector

This guidance note's overarching theory of change for mainstreaming nutrition within the livestock sectors in Eswatini and Zimbabwe is that **if** the availability, accessibility, quantity and quality of ASFs is increased for both marginal rural HHs and the wider public by a) improving livestock production systems and b) increasing accessibility to and use of inputs and services; **if** c) market linkages are strengthened, farmers are made more aware of and gain better access to technology, and information is provided on all aspects of livestock management, husbandry and animal health; and **if** d) consumers are made more aware of the importance of ASFs to dietary diversity and e) there is greater acknowledgement of and engagement with women in order to address the social and gender issues surrounding livestock production and the consumption of animal source foods; **then** the use and consumption of ASFs will play a greater role both in households' social and economic development and in their nutritional diversity and security.



Expected results

Potential short- and long-term results are largely dependent on the entry point and target of interventions, whether this is production, market linkages, retail or changes in consumer behaviour. The country-level stakeholder consultations have identified the following non-exhaustive list of key food system domains that would benefit from intervention: i) the food supply chain, comprising a) production, b) storage and distribution, c) processing and packaging, and d) retail and markets; ii) the food environment, comprising a) food availability and accessibility, b) accessibility, affordability and market linkages, and c) food quality and safety; and finally, iii) consumer behaviour and awareness of the dietary benefits of ASFs.

The availability of ASFs can be improved through interventions that target the core areas of production, storage, processing and market access. Examples of indicators that could be used to monitor these interventions include the number of women and young people with access to livestock products and involved in livestock enterprises and increases in sales and income from livestock enterprises.

Increased availability of higher quality healthy ASFs can be achieved through interventions targeting broader access to financing and retail markets for produce sale, the promotion of ASFs and food safety. Examples of indicators that reflect increased market access and improved food safety include a higher percentage of sales in retail markets and a higher proportion of markets made up of small-scale livestock retailers.

The result of increased consumption of ASFs and improved dietary diversity is also driven by the availability and accessibility of ASFs, and changes in consumer behaviour towards ASF consumption. In addition to improving their availability and accessibility via consumer markets, higher ASF consumption can be achieved by increasing consumer awareness of the importance of ASFs for dietary diversity, through public- and private-sector public education and awareness campaigns that target key households and vulnerable groups.

Key drivers and trade-offs

At the time of writing, the COVID-19 pandemic is a substantial external driver of change within the livestock sectors in Zimbabwe and Eswatini. The marketing of produce has been affected due to limitations on movement (shortage of transport services), a rise in transactional costs under lockdown conditions and farmers' limited access to markets to sell produce (livestock and crops). At the policy level, there is a need for increased funding for food and nutrition activities and the refocusing of projects on vulnerable populations. While food insecure HHs in most districts continue to receive support, both in kind and in cash transfers, the number of food insecure HHs is increasing and in need of additional support. Support from the private sector will also be crucial to supporting efforts to mitigate the socio-economic impact of the COVID-19 pandemic on food insecurity and malnutrition.

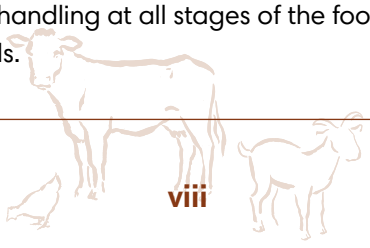
Recommendations

This report's key recommendations are the following:

1) Focus programme and policy responses on production and market linkages;

2) Create demand for animal source foods through a combination of social and behavioural change, public campaigns and the marketing of ASF products; and

3) Increase commitment to safe food handling at all stages of the food system, from the production to consumption of animal source foods.



1. Introduction

Mainstreaming nutrition: from theory to practice

The Food and Agriculture Organization of the United Nations (FAO), together with World Vision (WV), is providing support to produce a series of guidance notes focusing on mainstreaming nutrition within four food sub-sectors in five sub-Saharan African countries. For the livestock sector, both Eswatini and Zimbabwe will be analysed. These guidance notes take a food system approach that places equal emphasis on factors of supply and demand, both of which are critical to ensuring healthier diets and better nutrition. On the supply side, this involves looking at the entire food supply chain – from production, processing and storage to the transport of food – and making efforts to diversify food production, enhance the availability and affordability of nutritious foods and improve post-harvest management. On the demand side, this involves shaping consumer behaviour by promoting nutrition education, raising consumer awareness and influencing food and nutrition labelling regulations, policies and programmes.

The guidance notes are based on the development of a theory of change (TOC) that can help policymakers and programme managers identify key transformative interventions for the food system that will promote sustainable healthy diets and improved nutrition. In addition to TOCs, they also describe impact pathways that show in practical terms which entry points for food system interventions should be prioritised. For this guidance note, a TOC and five impact pathways were developed for the cattle, dairy, poultry, small ruminant and swine livestock sub-sectors in Eswatini and Zimbabwe, with the aim of providing practical suggestions on how to formulate programmes and policies that promote healthy diets and nutrition.

Food systems approach. Concepts and definitions

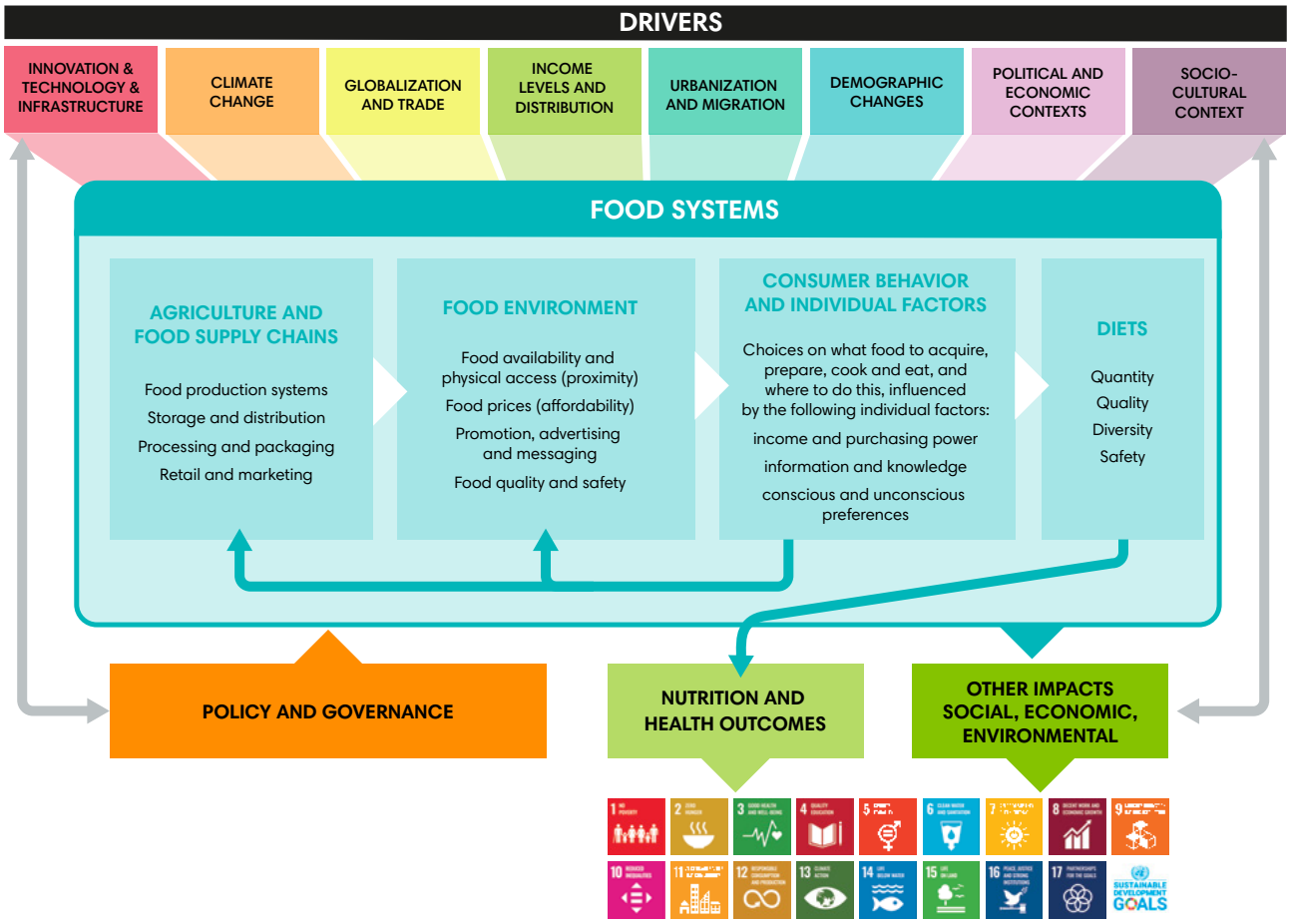
A food system encompasses the entire range of actors and their interlinked value-adding activities involved in the production, aggregation, processing, distribution, consumption and disposal of food products that originate from agriculture, forestry or fisheries, as well as parts of the broader economic, societal and natural environments in which they are embedded (FAO, 2018). The emergence of a broad range of factors and processes that affect existing food systems (e.g. population growth, urbanisation, changes in consumption patterns, climate change and the depletion of natural resources) has required changes to these food systems. These factors have also resulted in a growing number of challenges, with potentially wide-reaching consequences for the state of food security and nutrition (FSN). To achieve a better understanding of how a diverse range of food systems function, a framework to assess different food systems was developed to ensure that that they develop in such a way that minimises their negative impacts and maximises their positive contributions.

Building on the international political momentum created around nutrition by the 2030 Agenda, the 2014 Rome Declaration on Nutrition and the subsequent UN Decade of Action on Nutrition (2016–2025), the UN's Committee on World Food Security (CFS), at its 42nd plenary session in October 2015, requested that the High-Level Panel of Experts for Food Security and Nutrition (HLPE)[1] prepare a report on nutrition and food systems,

[1] The HLPE is the science–policy interface of the Committee on World Food Security (CFS), which is, at the global level, the foremost inclusive and evidence-based international and intergovernmental platform for food security and nutrition (FSN).

to be presented at CFS 44 in October 2017. The conceptual framework[2] developed by the HLPE identified three interacting components of food systems: (i) food supply chains, (ii) food environments and (iii) consumer behaviour (HLPE, 2017). In particular, the framework highlighted the central role of the food environment in which the consumer engages with the food system in facilitating healthy and sustainable consumer food choices.

Figure 1. Food systems for healthy diets



Source: Adapted from the High-Level Panel of Experts on Food Security and Nutrition of the Committee on World Food Security (FAO, Rome, 2017).

The conceptual framework proposed for this report was based on the following constituent elements and definitions:

Food supply chain. The food supply chain consists of the activities and actors involved in the production and consumption of food and the disposal of its waste (Hawkes and Ruel, 2012). Food supply chains commonly consist of the following stages from a nutrition and diet perspective: (i) production, (ii) storage and distribution, (iii) processing and packaging, and (iv) retail and markets.

[2] The framework was adapted from previous reports: Global Panel on Agriculture and Food Systems for Nutrition (GloPan), 2016a; Ingram, 2011; Lawrence, Friel, Wingrove, James and Candy, 2015; Pinstrup-Andersen and Watson, 2011; and Sobal, Khan and Bisogni, 1998a.

Food environment. The food environment refers to the physical, economic, political and socio-cultural context in which consumers engage with the food system to make their decisions about acquiring, preparing and consuming food. Specifically, it consists of (i) "food entry points", or the physical spaces where food is purchased or obtained; (ii) features and infrastructure of the built environment that allow consumers to access these spaces; (iii) personal determinants of consumer food choices (including income, education, values, skills, etc.); and (iv) the political, social and cultural norms that underlie these interactions. The key elements of the food environment that influence consumer food choices, food acceptability and diets are (i) physical and economic access to food (proximity and affordability); (ii) food promotion, advertising and information; and (iii) food quality and safety (Caspi, Sorensen, Subramanian and Kawachi, 2012; Swinburn and Moore, 2014; Hawkes, 2015).

Consumer behaviour. Consumer behaviour reflects all the choices and decisions made by consumers, at the household or individual level, on what food to acquire, store, prepare, cook and eat, and on the allocation of food within the household (including gender repartition and the feeding of children). Behaviour is largely shaped by the existing food environment, which includes personal and collective determinants of consumer food choices (including food prices, income, knowledge and skills, time and equipment, and social and cultural norms).

Diets. Diets comprise the individual foods that a person consumes. Dietary patterns are the quantities, proportions and combinations of different foods and beverages in diets, and the frequency at which they are habitually consumed (Hu, 2002). Dietary patterns interact with food systems, not only as an outcome of existing food systems but also as a driver of change for future food systems. Sustainable diets are those characterised by a low environmental impact which contribute to food and nutrition security and a healthy life for present and future generations. Sustainable diets are "protective and respectful of biodiversity and ecosystems, culturally acceptable, accessible, economically fair and affordable; nutritionally adequate, safe and healthy, while optimising natural and human resources" (FAO, 2012). Food systems, through diets, give rise to a variety of outcomes. These relate not only to nutrition and health, but also to all aspects of sustainability, which in turn link back to the food system drivers (see below).

Drivers. A driver is an external pressure that effects change. The conceptual food systems framework developed by the HLPE identified five main categories of drivers of food system changes. These were: (i) biophysical and environmental; (ii) innovation, technology and infrastructure; (iii) political and economic; (iv) socio-cultural; and (v) demographic (Ingram, 2011). In recognition of the emerging, covariate effects that COVID-19 has had on each food system domain, we have also included discussion of COVID-19 as a 'sixth driver' of food system change while producing this series of guidance notes.

Gender and social inclusion. Taking gender and social inclusion into consideration is of critical importance when it comes to more fully understanding the local context and shaping practical policy and programme guidance for mainstreaming nutrition within food sub-sectors. As such, the World Vision Gender and Social Inclusion domains of inquiry were used for the stakeholder consultation process and each food system domain (see Table 1). These ideas are reflected in this report's situational analysis, impact pathway descriptions and recommendations.

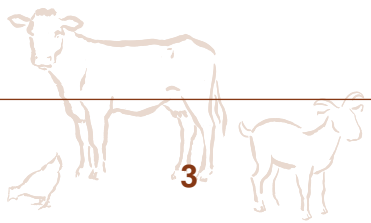
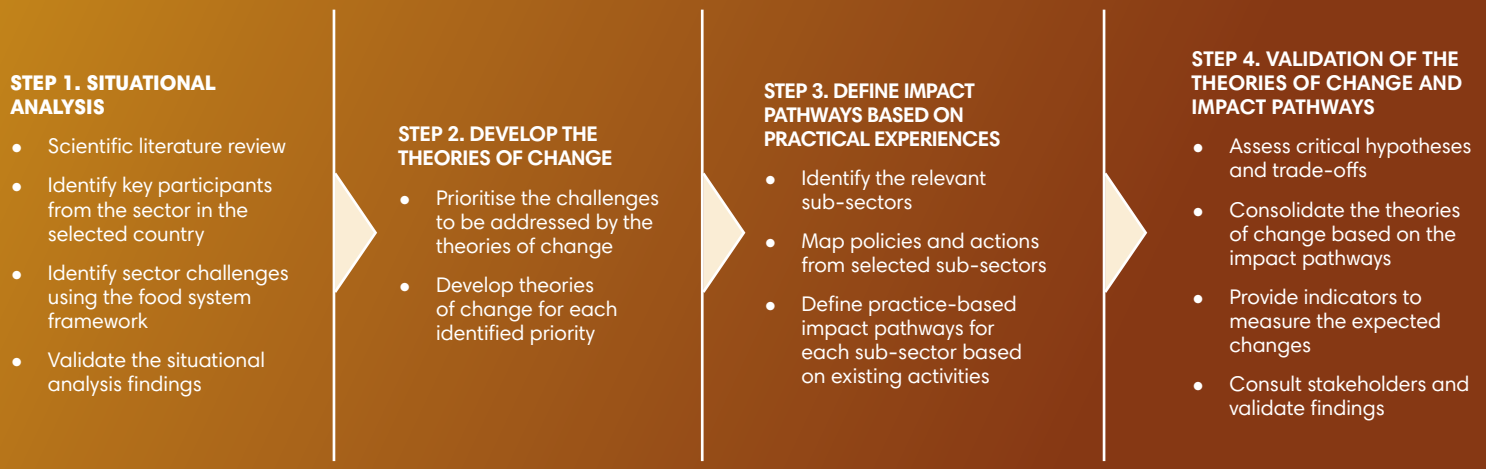


Table 1. Gender equity and social inclusion (GESI) within the stakeholder consultation process

GESI domain and guiding question	Key food system domains	Additional questions
Is there equitable and inclusive **access**?	• Food supply chains • Food environments • Consumer behavior	What policy and program recommendations will support: • Equitable access • Equitable and inclusive decision-making • Participation • That systems are GESI responsive • Well-being of the most vulnerable … to improve dietary, social norm and food security outcomes?
Are **decisions** equitable and inclusive?	• Food supply chains • Consumer behavior	
Who is **participating**?	• Food supply chains (roles) • Food environments (representation)	
Are **systems** GESI -responsive?	• Food supply chains • Political, program & institutional actions	
How do we ensure the **well-being** of the most vulnerable?	• Food environments • Political, program & institutional actions	

Source: Adapted from World Vision's gender equity and social inclusion approach and theory of change.

FIGURE 2. THE KEY STEPS OF THE METHODOLOGICAL PROCESS



Source: the authors.

2. Stepwise approach

This guidance note focuses on two Anglophone countries in sub-Saharan Africa with significant livestock sectors: Eswatini and Zimbabwe. It aims to provide a situational context of country-level nutrition interventions for animal source foods (ASFs) and their related challenges and opportunities. As shown in Figure 2, this situational analysis is followed by the development of a theory of change (TOC) that can help focal points leverage the role and contribution of ASFs to improved nutritional diversity and food security, particularly among vulnerable populations, households and marginal groups.

The process of producing this guidance note began with a global literature review followed by in-country consultations with a core group of stakeholders focusing on a series of questions. This group included a broad range of representatives from the private and public sectors, as well as institutions that engage with each country's livestock sector on a regular basis, such as producers, policymakers, service providers and food processors. The following section describes the process followed while conducting the situational analysis.

In order to provide a good situational analysis of the livestock sectors in Eswatini and Zimbabwe and their role in furthering household nutritional diversity and food security, it was deemed important to identify, consult and establish contact with key industry-level stakeholders (henceforth referred to as the stakeholder group). Forming a working group of key stakeholders was a first priority to ensure local engagement from critical contributors to the livestock sector. The stakeholder consultation included representatives from the private sector (involved in production and processing), the public sector (involved in policy and strategy formulation and service delivery, i.e. the relevant government ministries), and civil society (producers and producer organizations, providers of rural business support, the finance and microfinance sector, consumer representatives, and business and trade organizations).

A small number of stakeholders made up the core stakeholder group – a maximum of six in the case of Eswatini (see Annex 2) and ten in the case of Zimbabwe (see Annex 2) – with other stakeholders brought into meetings and consultations as needed.

This stakeholder group provided expert in-country knowledge and supported and contributed to the situational analysis of the livestock sector by using its extensive knowledge and experience of this sector in their respective countries to respond to a core set of guiding questions. It also included a grey literature and incidental information review following a template of guiding questions).

The stakeholder group was selected to provide a wide range of industry representation and local knowledge as part of the process of identifying the key challenges and opportunities and livestock pathways best able to help increase ASF consumption and nutritional diversity. The group began meeting in June–July 2020, initially on a weekly basis, and subsequently less frequently in order to allow time to draft this guidance note and acquire all the relevant information. In this process, the group was guided by the overarching framework questions used in the drafting of this guidance note.

Step 1. Situational analysis

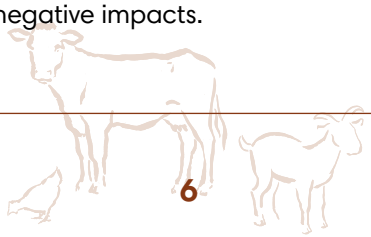
The food security and nutrition profiles of Eswatini and Zimbabwe

One of the key food challenges being faced today is the question of how to meet the world's growing protein needs. Animal source foods (ASFs) can play a key role in this, particularly in low- and middle-income countries where the livestock sector plays a major role. The literature review carried out for this report focuses on emerging economies, primarily within Africa. Livestock accounts for some 40 percent of worldwide income from agriculture (Nabarro and Wannous, 2014) and according to a World Economic Forum white paper published in January 2019 entitled "Meat: The Future", some 821 million people are malnourished and 151 million under the age of five are stunted (World Economic Forum, 2018). This is largely due to a lack of essential nutrients and proteins which are readily available in nutrient-dense animal source foods such as meat, milk/dairy, fish and eggs. Transforming food systems to meet this demand is one of the biggest challenges the world faces today. Livestock's contribution to global food production, food security, nutrition and landscape use is recognised around the world, with various different livestock systems (extensive, semi-intensive and intensive) playing varying roles in supporting food and nutrition security and, natural resource management.

The food system approach taken by these guidance notes recognises the role played by those involved in all stages of the food chain – from production, processing and retail to the consumption of food – while keeping a focus on the most vulnerable communities to ensure that their food security and dietary needs are met. Through multi-platform stakeholder consultations, the theories of change (TOCs) were developed in order to identify key transformative interventions in the food system that would promote sustainable healthy diets and improved nutrition. The resulting stakeholder-agreed TOCs, are supported by impact pathways that show in practical terms which food system entry points should be prioritised in order to implement these interventions. For this report, TOCs and impact pathways were developed for Eswatini and Zimbabwe's swine, cattle (beef and dairy), small ruminant and poultry livestock sub-sectors.

Overview of the livestock sectors in Eswatini and Zimbabwe

The demand for ASFs and animal products is growing, as is the market price for such products. Livestock are important to both low- and middle-income economies, as well as to smallholder farmers within these economies. More than half of the world's population depends on smallholder producers for their food, and livestock are an integral part of smallholder systems. In many countries, particularly in sub-Saharan Africa, livestock contribute up to 40 percent of GDP. Livestock systems play an important role in providing smallholders with resilient livelihoods and preventing food insecurity and poverty, as livestock can contribute up to 33 percent of household income (Nabarro and Wannous, 2014). The global livestock sector, with some 17 billion animals, contributes to the feeding of around eight billion people worldwide (Herrero *et al.* 2013). Both the livestock population and the human population, along with the effects of climate change, exert pressure on the world's natural resources and food systems. In the context of the low- and middle-income countries, livestock play an important role, with both positive and negative impacts.



Demand for ASFs in Africa is projected to increase by 80 percent in the space of two decades (2010–2030), primarily due to a projected increase in population growth. This larger population is expected to consume 125 percent more beef, 65 percent more poultry, 46 percent more milk and 77 percent more eggs than in 2010 (World Economic Forum, 2018). Similarly, both India and China will experience significant increases in ASF consumption over this same period, largely due to income growth and increased demand. This projected growth creates both opportunities and challenges for those involved in the livestock sector and smallholder households.

Within the context of food systems and livestock-related pathways out of poverty and towards improved livelihoods for households (see Annex 1), livestock can and does play a pivotal role. The critical pathways involved are a) the building, strengthening and management of household (HH) assets, including improved use of common and private land, such as pastures, rangelands and fodder-producing areas; b) specialisation in livestock enterprises to increase the productivity of both land and livestock; and c) improved access to inputs, services, financing and markets.

Prioritising the challenges for the livestock sector based on an analysis of the political context, knowledge, resources and capacity

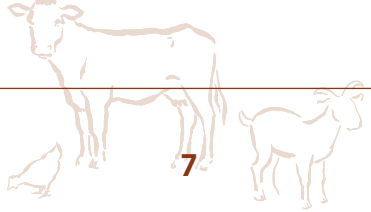
Following the grey literature review and in-country stakeholder consultations, the stakeholder group arrived at the following solutions to the key priorities in Eswatini and Zimbabwe which they believed would lead to improved productivity: better management and greater productivity of communal grazing lands; improved livestock nutrition, marketing and processing; improved breeding programmes and access to advice and support services; and the adoption of climate-resilient interventions and technology. On the post-production side, investment in cold storage, greater private sector investment and access to finance, and a reliable and accessible input system could address sticking points in the system. Post-farmgate interventions to improve storage and distribution, would contribute to food security and nutrition diversity. Key elements of this support would be improving livestock nutrition, livestock traceability, disease control and surveillance, food quality, management information systems, the supply of inputs and the development of market offtake systems (producer-purchaser agreement/ market futures). Lastly, with regard to added value and processing, investment in and development of appropriate slaughter and abattoir facilities to address different livestock value chains, compliance with sanitary and phytosanitary (SPS) standards, and the decentralisation of processing facilities could improve nutrient retention, food safety and product sales.

It should be noted that in the case of Eswatini, the agricultural sector – and within it, the livestock sector, particularly the small ruminant (goat), poultry and beef sub-sectors – is considered one of the main drivers of economic development, as identified in the government's economic revival strategy.

Defining the scope for each prioritised problem

The following paragraphs describe the key priorities that, if addressed, could lead to greater consumption and diversity of ASFs. These can be broken down into those affecting food supply, food environment, or consumer behaviour and diets (livestock food system challenges) and those affecting large ruminants, small ruminants, poultry or swine (livestock sector challenges). For each of these sub-sectors, a summary of the scope of the problems has been provided.

In the **swine sub-sector**, the key problems identified were the lack of capacity and facilities for appropriate processing, primarily in relation to the slaughter process: it was determined that there is inadequate infrastructure for slaughter, a lack of abattoir accreditation and standardisation, and a lack of capacity to introduce and enforce health standards and carry out inspections at slaughter facilities. As these issues are common, formal markets only accept carcasses that have been properly slaughtered (i.e. by licensed and inspected abattoirs). Unfortunately, there is a lack of registered abattoirs and processing capacity that meets



international standards. This lack of capacity has meant a) there are fewer animals being processed through formal markets, especially export markets and b) the high cost of production and the poor housing facilities impact productivity. The scale of this issue means that gaining access to the swine sector is very difficult for the average farmer. This, coupled with high financing/ startup costs and difficulty obtaining it, deters investors.

In the **small ruminant sub-sector**, key problems were identified for the following parts of the food system: a) food supply (i.e. the production system) and b) market accessibility. In relation to food production, the key constraints are a) low productivity, b) poor husbandry and management practices, c) high input costs, d) a lack of access to genetically superior breeds, e) high cost of launching commercial startups, f) the remoteness of small farmers, and g) retailers' preference for bulk buying. Due to supply chain issues and lack of market access, most households that own small ruminants primarily do so for own-consumption rather than commerce. Local indigenous breeds are not well suited to commercial production, and improved breeds are usually beyond the reach of the average farmer. The fact that there is a lack of access to formal markets, and that the small ruminant sub-sector is not yet well organised, further compounds the issue of low ASF supply nationally.

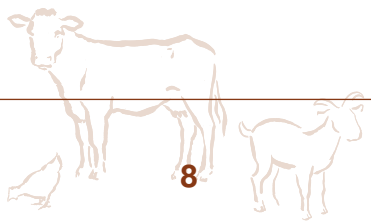
In the **poultry sub-sector,** the two main areas which present challenges are a) production and management and b) market accessibility. In relation to production, key issues include a lack of breed diversity, poor poultry housing and infrastructure, and the high cost of feedstuffs. The means that a wide range of breeds are not readily available to small farmers, particularly at the rural household level, and the production of other fowl breeds such as ducks, quail and turkeys is not widespread.

In the **cattle sub-sector**, the key challenges relate to management, both of the natural resource base (i.e. grasslands, rangeland, feed supply, etc.) and husbandry and other practices, resulting in poor pasture management, poor nutritional status of animals, poor adoption of breeding practices, additional expenses to maintain animal health, poor access to animal health services and vaccinations, poor access to water, additional expenses in the form of supplementary feed, a lack of adequate market infrastructure, and a lack of SPS standards in both the supply chain and market environment. While the cattle sector is relatively well supported by the Eswatini government and the private sector, there is room for further improvement and development, particularly in terms of providing greater access to domestic, regional and international markets.

Step 2. Develop a theory of change

The results of the literature review and situational analysis suggest that ASF production, accessibility, affordability and consumption by households and consumers is a highly complex system affected by a wide range of factors. This guidance note's theory of change for mainstreaming nutrition into the livestock sector attempts to identify areas within this system that can realistically be influenced.

Based on the case studies in Eswatini and Zimbabwe, **if** the availability, accessibility, quantity and quality of ASFs is increased for both marginal rural HHs and the wider public by a) improving livestock production systems and b) increasing accessibility to and use of inputs and services; if c) livestock sector market linkages are strengthened, farmers are made more aware of and gain better access to technology, and information is provided on all aspects of livestock management, husbandry and animal health; and **if** d) consumers are made more aware of the importance of ASFs to dietary diversity and e) there is greater acknowledgement of and engagement with women in order to address the social and gender issues surrounding livestock production and the consumption of ASFs; **then** the use and consumption of ASFs will play a greater role both in households' social and economic development and in their nutritional diversity and security.



Step 3. Define the impact pathways

Swine sub-sector impact pathway

Swine production in Eswatini covers only 15 percent of the country's demand, with the remainder coming from imports, most notably from South Africa. Hence, there is an opportunity for import substitution and growth of the domestic supply to meet domestic demand. Approximately 7 000 families are engaged in swine production in Eswatini, using semi-intensive and free-range systems. The Eswatini government is currently working to increase the accessibility of improved swine breeds through the government swine breeding centre, from which swine farmers can buy the improved breeds at a subsidised price. Encouraging producers to adopt more semi-intensive and intensive methods of production, along with investment in infrastructure, such as dedicated abattoirs and improved housing (more intensive systems), could develop the domestic industry.

Developing Eswatini's swine production system and investing in appropriate infrastructure aimed at capturing a bigger share of domestic demand could generate higher income and would increase dietary diversity among the wider population (from both own-consumption and consumption through market purchases). Both small backyard swine producers and those involved in semi-intensive or intensive production would have the opportunity to participate at different levels of the swine value chain.

Hypothesis: there is a need to further develop the sector by adopting a more sophisticated and market-led approach that better supports the swine sub-sector in order to meet sanitary and phytosanitary standards and improve product diversity through added value and processing. Key obstacles to this are the lack of availability and limited use of recognised slaughter facilities (abattoirs) equipped to apply SPS measures and address health issues, and the lack of new product development (primary and secondary processing) streams that can meet international standards and encourage development of the formal market sector.

Swine sub-sector theory of change: **if** the quality and accessibility of slaughter facilities are improved leading to their wider use, **and** health standards and phytosanitary regulations are adopted, **and** producers are organised into producer groups or cooperatives allowing for improved throughput to recognised slaughter facilities, bulk input procurement, improved marketing and greater access to finance, **then** market demand for swine and swine products will increase, HH income will increase, and feed accessibility and affordability will improve, resulting in more people becoming involved in commercial pig production, export market channels and local retail.

DRAFTING OF SECTOR THEORIES OF CHANGE

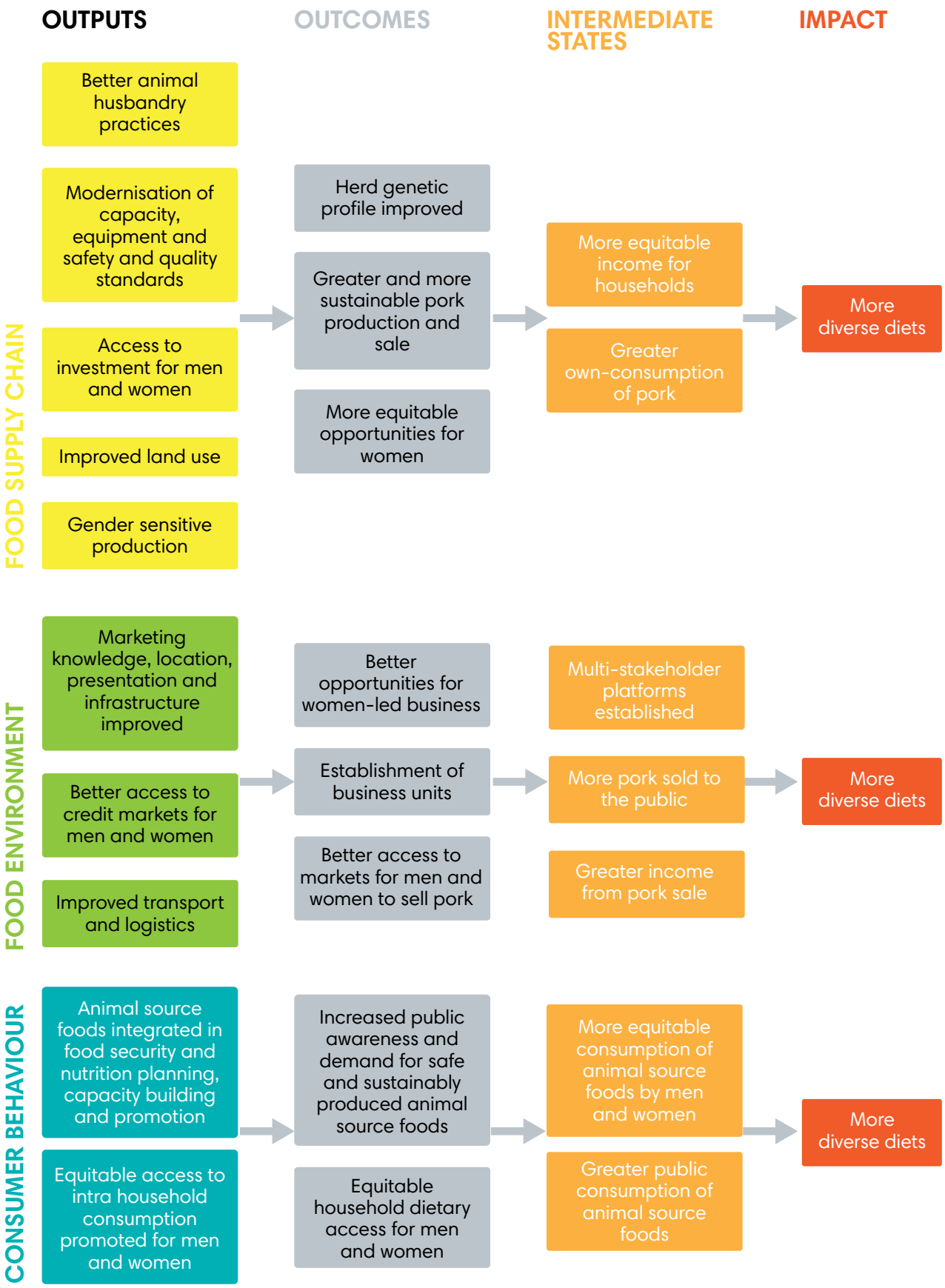
Country-level stakeholders define in a consensual manner the main priorities for the sector in order to achieve healthy and diversified diets. This prioritization process is carried out based on both the literature reviews and the country contextual analyses. The project team explains to country partners how to apply the TOC to the sector using a food systems approach.

In collaboration with partners, in order to address the problem statement(s), nutrition changes are mapped on a theory of change. Ultimately, the TOC makes it possible to identify all the outputs that are needed to achieve the short, medium, and long-term changes.

1. **Identify and classify priorities by component**
2. **Develop theories of change for each targeted priority**
3. **Complete and finalize each TOC using working groups composed of country stakeholders**

Annex 2: Theory of change graphic

Figure 3. **Eswatini swine sub-sector impact pathways**



The Eswatini swine sub-sector impact pathway (Figure 3) is characterised by a small number of producers and relatively less intensive systems of production. Eswatini can only meet around 15 percent of its demand for swine products. Critical links in the pathway centre around the level of productivity, access to inputs and services, and access to and the improvement of slaughter facilities that meet adequate regulations and food safety standards, which could have an effect on the types and quality of meats produced and provide the "pull effect" needed to encourage greater production and specialization in the sector. For the most part, markets are not well organised in the swine sector; there is poor access to finance and set-up costs are high. This is compounded by a generally poor level of housing, a lack of management and husbandry practices, and poor access to and formulation of feed. The development of a more commercially oriented sector is seen as an opportunity to encourage farmers to enter the sector by reducing some of the barriers to entry (namely finance, housing, procurement of good genetic stock, knowledge and training). Organising smallholder producers into cooperatives through which both input procurement and sales could be aggregated may provide smallholders with a relative advantage in the market. Lastly, investment in regional abattoirs and processing capacity, and upgrades to existing facilities, could help stimulate sector development and create improved income streams for producers.

Small ruminant sub-sector impact pathway

Small ruminants – typically goats in Eswatini – are a mainstream of rural households and serve a multipurpose role. The breeding of livestock, particularly small and large ruminants, is often a cultural and social tradition and contributes significantly to social standing within the community: as both a wealth indicator and a risk-mitigating factor during periods of shock and stress at both HH and community level. Small ruminants also play a major role in positive cultural events, weddings, school fee payments and funerals, and it is therefore important to understand the rationale behind the keeping of livestock (cattle and small ruminants), particularly when it comes to socio-cultural practices.

Hypothesis: support for the small ruminant sub-sector in the form of greater productivity, access to commercially orientated production, awareness and consumption of goat meat, and nutritional diversity will allow producers to increase their income, productivity and offtake, leading to greater own-consumption of produce and increased sales, resulting in turn in greater opportunities for diet diversification through the purchase of more nutritious foodstuffs.

Small ruminant sub-sector theory of change: if farmers' husbandry and management capabilities are further developed; there is greater promotion, awareness and consumption of goat meat as a viable ASF; and greater access to improved breeds and start-up kits are made available, particularly for the most vulnerable HHs (including more engagement with women), **then** productivity will increase, a more diverse range of higher quality goats will become available, and the production capacity per HH will rise, leading to improved HH nutrition, particularly for women and children, as a result of a) effective social and behavioural changes caused by an awareness of the importance of ASFs in the human diet, and b) greater on-farm consumption and higher sales due to greater productivity.

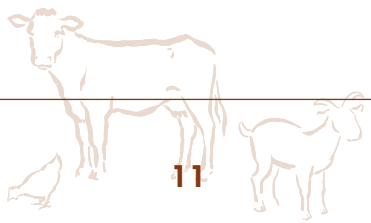
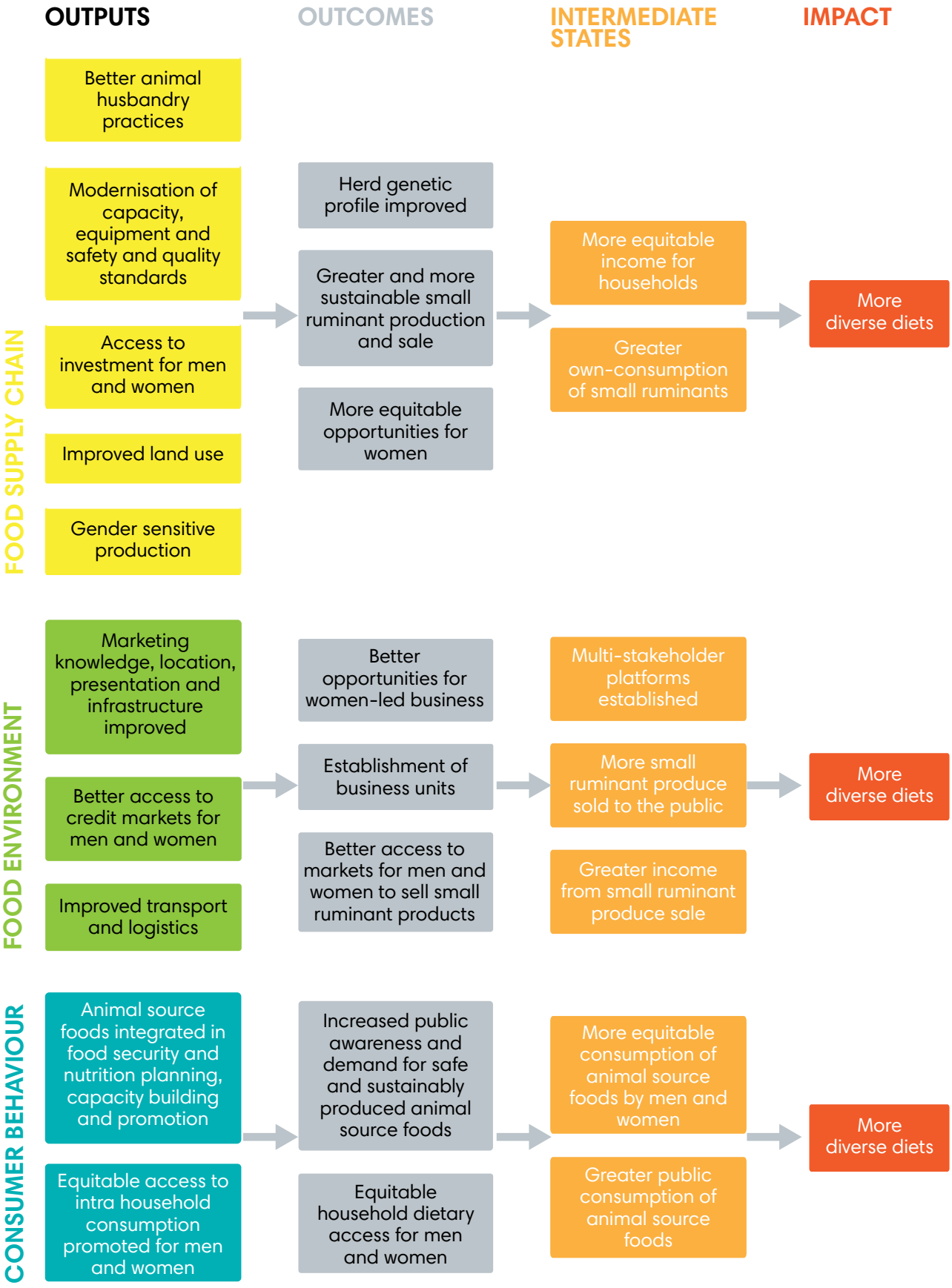


Figure 4. **Small ruminant sub-sector impact pathways**

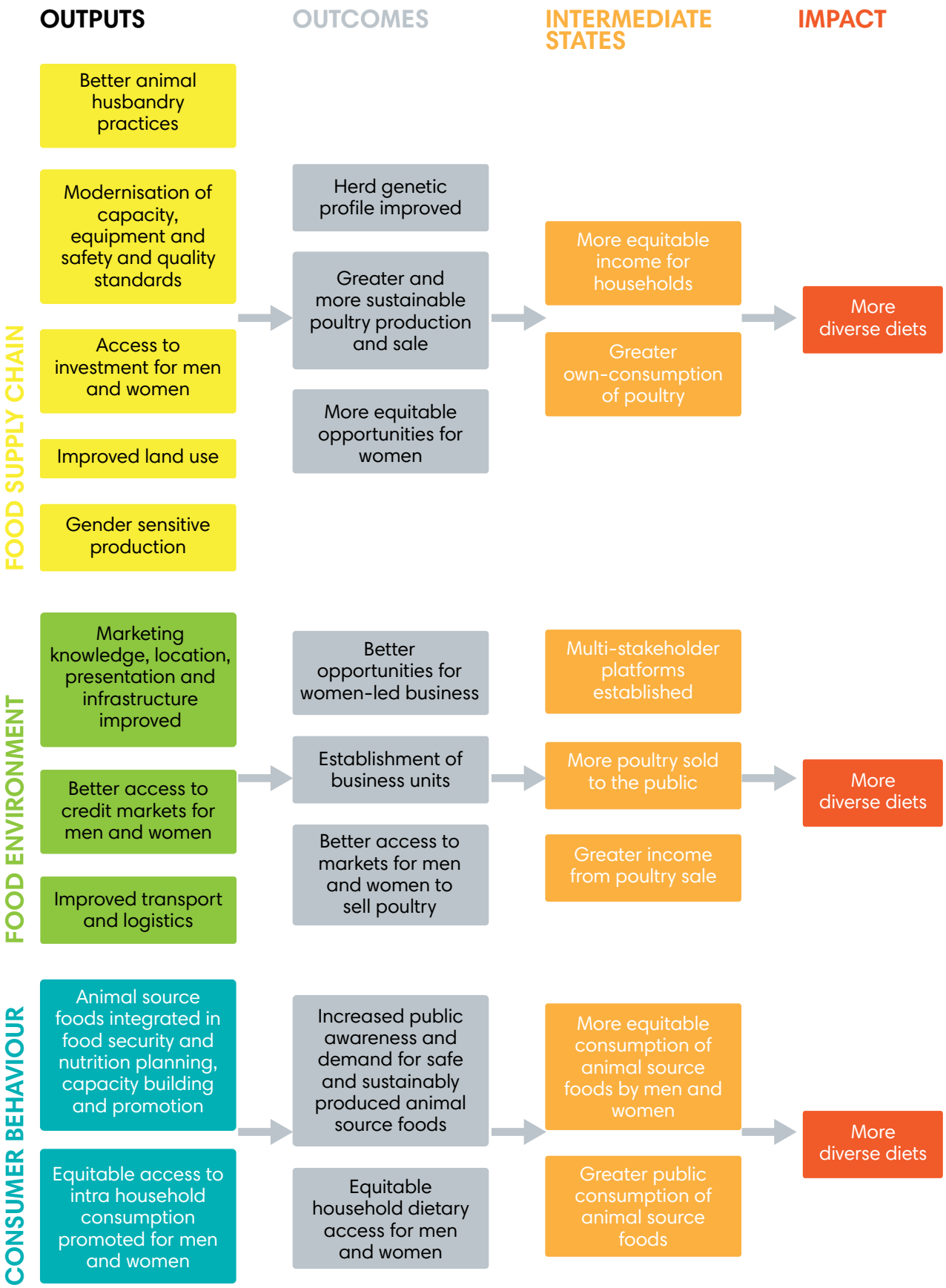


The impact pathway for Eswatini's small ruminant sub-sector (Figure 4) identifies livestock nutrition and health as key entry points. Addressing these factors should lead to greater productivity and increased offtake, and thus greater on-farm consumption of goat meat, and higher sales and income. Additional income in turn may encourage the purchase and equitable consumption of foods for dietary diversity, which benefits children and women in particular. In order to arrive at these critical outcomes, a number of key outputs, as indicated on the left of the diagram, need to be achieved: improved community pasture and rangelands, improved management and husbandry practices, access to inputs and service delivery, improved production and market infrastructure, effective social and behavioural change caused by an awareness of the importance of ASFs for children and pregnant and lactating women, greater access to finance and credit, and a more enabling environment for businesses.

Poultry sub-sector impact pathway

Hypothesis: the poultry sub-sector hypothesis is based on the knowledge that women and young people can play major roles in poultry production, whether through extensive semi-scavenging methods or more intensive layer and broiler systems. Increasing HHs' access to poultry and their involvement in either layer or broiler production can contribute to both on-farm income and diet diversity through the sale and consumption of eggs and meat. Although 91 percent of rural HHs raise indigenous chickens, national poultry productivity remains low. Increasing productivity by encouraging the use of semi-intensive production systems with greater feed accessibility, improved poultry housing, better husbandry and management practices and access to improved genetics for both layers and broilers, can contribute, alongside awareness-raising programmes that promote the importance of poultry consumption, to dietary diversity, greater direct consumption of ASFs by farmers and higher incomes.

Figure 5. Poultry sub-sector impact pathways



Poultry sub-sector theory of change: **if** the productivity of the sector is improved through access to better nutrition for poultry, farmers' producing their own feed ingredients, and improvements to the husbandry and management aspects of poultry housing, and an increased awareness, particularly among women and young people, of the nutritional benefits of eggs and poultry meat, **then** this will lead to a more diverse range of ASF produce, increased ASF consumption, higher incomes and improved dietary diversity.

The poultry sub-sector in Eswatini (see Figure 5) is dominated by smallholders using extensive scavenging methods. Lack of access to improved breeds and poor poultry nutrition impact productivity levels. This is compounded by poor poultry housing, a lack of access to both affordable and balanced feed and poor margins from sales. Smallholder HHs' limited access to quality inputs, services, finance and markets acts as a significant headwind. Improving feed production and knowledge of poultry nutrition, and encouraging the local use of common feed ingredients (sunflower, maize, sorghum) and high protein feed, can contribute to improved animal performance and productivity. Moreover, increased production, coupled with reduced losses, greater awareness of the nutritional benefits of poultry products, especially for children and lactating mothers, and higher sales from diversified income streams would increase household poultry sale and on-farm consumption, improve access to markets and provide opportunities to access more diverse diets The poultry sub-sector impact pathway aims to improve animal nutritional status and achieve greater productivity (outputs), leading to increased poultry sales, better market linkages, including primary and secondary processing, and increased awareness of the nutritional value of poultry and poultry products.

Cattle (beef and dairy) sub-sector impact pathway

The key issues in the cattle sub-sector are poor pasture and rangeland management contributing to poor nutrition for cattle, poor husbandry practices, limited access to high quality breeds and constraints affecting access to water and feed. These issues can be addressed in a number of ways, including by combining infrastructure support and investment, both from the public and private sectors, and offering technical support and capacity building to those operating in the sector (private- and public-sector extension services and input suppliers). These interventions aim to improve productivity at the farm level, align with market needs, increase offtake for both consumers and retailers, and reduce production costs.

Hypothesis: food systems should aim for adequate planning and long-term investment in the productivity of pasture and rangeland and their respective management systems; feed and fodder bases (as part of input supply services) and supplementary feed production; and improve access to water. This should contribute to improved livestock nutrition, improved breeding practices and capacity, greater offtake (for both on-farm and off-farm consumption) and improved market access, resulting in increased incomes and increased availability of ASF for dietary diversity.

Focusing on improving communal land management and grazing systems, access to improved breeds, livestock husbandry and nutrition, and access to markets will help create a production system that is more responsive to the food security and dietary diversity needs of rural households (see Figure 5). In addition, more specific interventions focused on water supply; the construction of check dams, waster points and boreholes; improvements to fodder production technology, rotational grazing and pasture spelling[3] practices, and the use of fodder banks[4] for the dry season and/or winter; and improved breeding practices could help increase productivity and offtake.

[3] A pasture and rangeland management practice allowing for periods of rest and rejuvenation between use, including rotation practices.

[4] Storage of fodder for use in the off-season and dry season either as conserved fodder (hay, haylage, silage, etc.) or field stands (uncut/unharvested fodder).

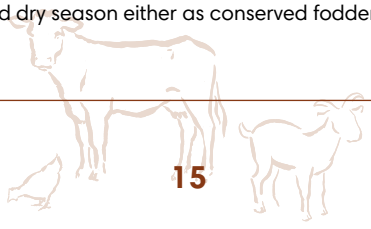
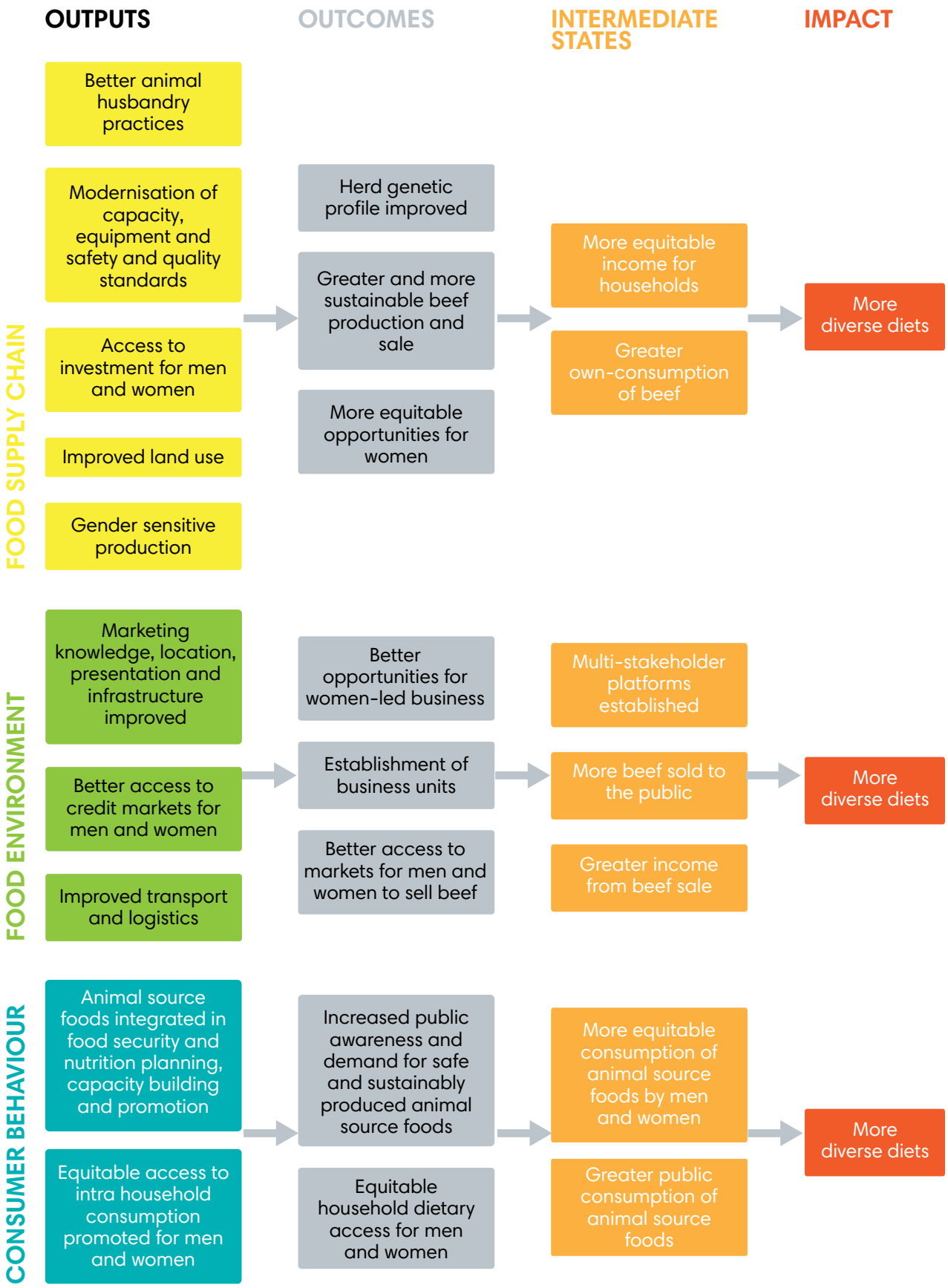


Figure 6. **Cattle (beef) sub-sector impact pathways**



Cattle (beef and dairy) sub-sector theory of change: if there are improvements in the management of the natural resource base, husbandry practices, and access to improved breeds and feed, **then** livestock nutrition and productivity will increase, resulting in greater offtake for both sales and farmers' own consumption, which will in turn lead to higher incomes and greater dietary diversity due to either purchasing or consuming more meat directly, or a combination of the two.

In both Eswatini and Zimbabwe, smallholder dairy production can be an entry point towards) poverty reduction and improved dietary diversity. Addressing dairy production issues at the HH level by focusing on improving water access, livestock nutrition, dairy herd management, and the management of communal and private resources is critical. In addition, establishing a system of milk collection and/or setting up dairy producer cooperatives to help improve economies of scale in production and create links with primary collection and processing centres will lead to a) improved productivity, b) improved quality of products and c) better access to local and regional markets, making it more attractive for dairy processors and microenterprises and SMEs to operate in the sector, and streamlining cattle value chain.

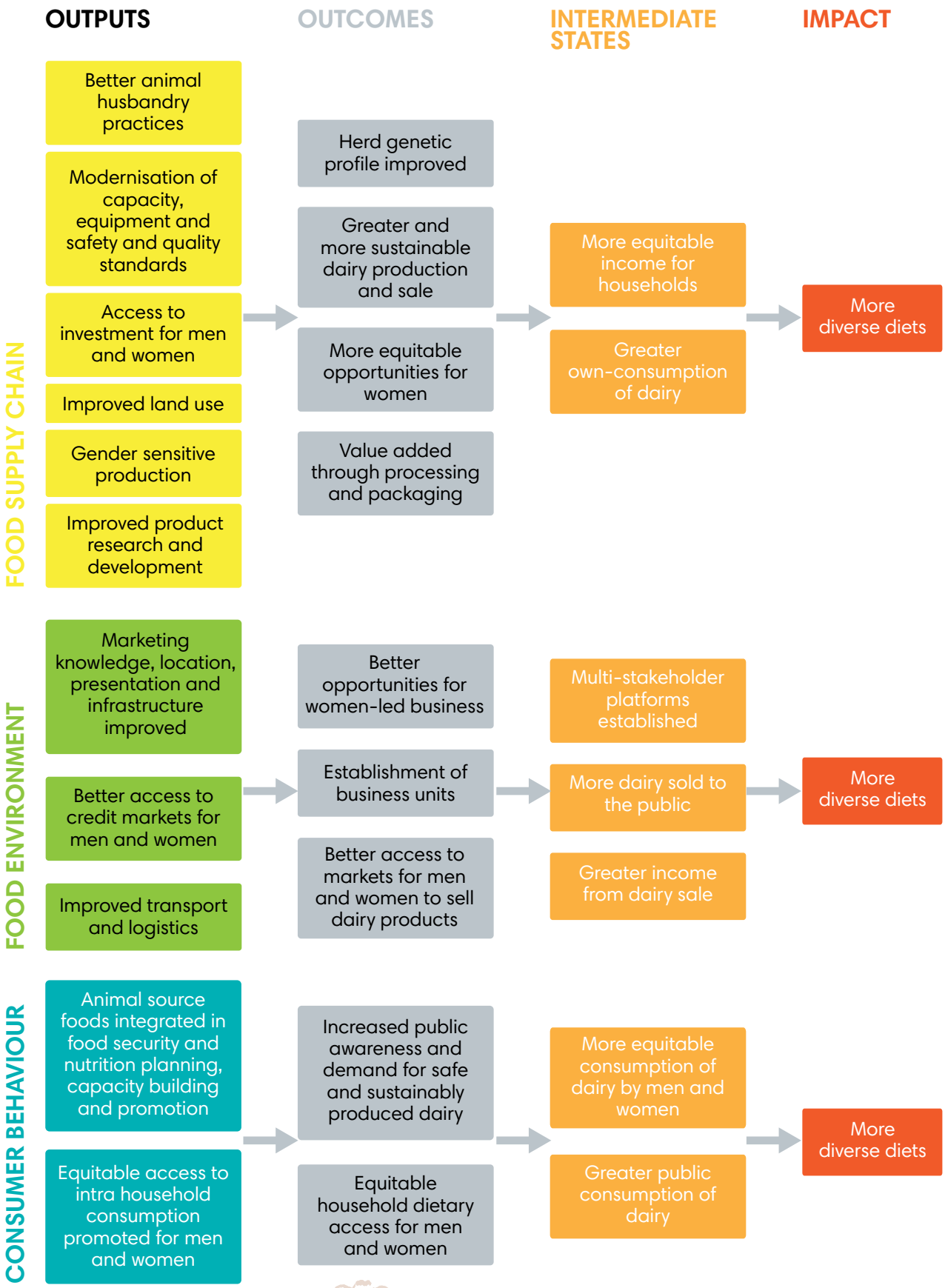
The cattle sub-sector impact pathway illustrates the importance of the food supply chain for the improvement of for beef availability and affordability, particularly in the context of Zimbabwe. Animal nutrition has been identified as a key priority for production. If the factors affecting animal nutrition are addressed, this could lead to the improved nutritional status of livestock, and thus, increases in productivity and offtake (Figure 6). Other priority areas identified include improvement of the herd's genetic profile and of the efficacy of disease and animal health management (still all largely within the production systems). These three priority issues, if addressed, could contribute significantly to performance and productivity within the sector, and have the potential to steer marginal and semi-commercial HHs operating in the beef sector towards a more commercially orientated production focus.

The limited accessibility of markets caused by storage and distribution issues (road infrastructure and cold chain facilities; is another critical factor affecting food supply. Addressing these issues will greatly increase farmers' ability to access markets and storage systems. Processing and packaging are also areas hampered by substantial barriers, particularly in rural areas that lack slaughter facilities. This has an impact on both food safety and sanitary and phytosanitary issues, as well as the potential for added value. At the retail level, the challenges faced include the poor quality of meat and meat products, and the high entry costs into beef processing for small businesses.

In the context of both Eswatini and Zimbabwe, the food environment for the cattle sub-sector affects both socioeconomic and cultural aspects of people's lives, where keeping cattle is largely seen as a risk-mitigating measure (they provide food during times of drought, can be sold for emergency funds) and also as a form of investment that provides social standing, playing a role at events such as weddings and funerals, with "dollars on the hoof"/'cattle as an asset' seen as an important parameter in owning cattle. Small HHs thus do not consume much beef themselves, but rather keep cattle for social and emergency needs. This means that quality beef is often not readily available for the majority of the population or regular consumption, but rather only for HHs with more disposable income.

The impact pathway for the dairy sub-sector shows that greater emphasis needs to be placed on addressing food supply chain issues (from production through to marketing). It is believed that interventions at this level will provide maximum benefit for the dairy sub-sector, particularly for Zimbabwe, although supply chain challenges are present in both countries. A critical entry point in the food supply chain is increased productivity, which is closely linked to the improved nutritional status of livestock better service and input delivery, greater access to improved breeds, improved fodder and communal grazing land management, and stronger links with milk collection centres. A critical bottleneck is the limited use of milk collection centres, which allow extra produce resulting from increased productivity to reach the market, particularly semi-urban and urban areas. Milk collection centres can also double up as research and development facilities, quality control centres,

Figure 7. **Cattle (dairy) sub-sector impact pathways**



resource centres, and the links between the production base and processors. In addition to supply chain interventions, measures aimed at increasing awareness of the benefits of milk and milk products for diets and providing nutrition education through schools, extension services and consumer awareness campaigns are also suggested to increase consumption of milk and milk products. A road map for the development of the dairy sector in Zimbabwe in the form of, for example, a dairy strategy plan could serve as a guide allowing all actors and policymakers to identify measures to address challenges and bottlenecks along the sub-sector.

Key external drivers affecting the livestock sub-sector

The impact of COVID-19 on the food system is highlighted in the Food and Nutrition Security report "Lessons Learnt During the Covid-19 Era: Summation from District Food and Nutrition Security Committees (FNC)" (2020), which states that "to mitigate adverse nutrition effects, multi-sectoral actions that protect the most vulnerable are essential." In this regard, the engagement of the private sector, particularly socio-economic issues, is crucial.

At the policy level, there is a need for increased funding for food and nutrition interventions and to reorient the focus of projects towards vulnerable populations. Although food-insecure HHs in most districts are receiving support, both in kind and as cash transfers, the number of these HHs is increasing and therefore additional support is needed. Communities across the country are being targeted by programmes to raise awareness of the pandemic through a number of community-based activities carried out by national Food and Nutrition Security Committees. A study carried out by livelihood and food security programmes (LFSP, 2020) in Zimbabwe found that women and children's animal protein consumption was higher when they belonged in households that rear small livestock. Consequently, community-based activities aimed at improving the production of small livestock, particularly goats and indigenous and Boschveld chickens, would contribute significantly to better household nutrition security.

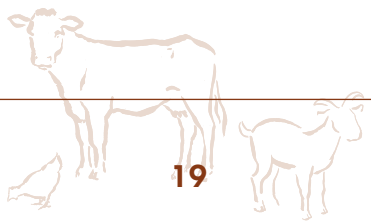
A 2020 report by AGRITEX (Zimbabwe) indicates farmer training has been greatly affected by the pandemic, as people are less able to travel due to a shortage of transport services. There is a lack of ICT based extension methods (e-extension) to compensate for the reduced mobility and physical contact, largely resulting from a lack of knowledge and limited resources. The marketing of produce has also been affected by the shortage of transport and rising transactional costs under lockdown conditions, which have led to limited physical access to retail markets for farmers to sell produce (livestock and crop). The stakeholders suggest that efforts to mitigate the impact of the pandemic could include improving and increasing women's access to livestock and increasing their income and decision-making capacity, ultimately, improving household nutrition.

Step 4. Validation of theory of change and impact pathways

The impact of the suggested interventions will largely depend on the entry points selected along the impact pathways and the domain of intervention. A broader approach that is supported by more resources will lead to a greater overall impact on dietary diversity.

The following are key entry points:

The availability of ASFs at the HH level, should be addressed through targeting of core areas of production, storage, processing and market access. Possible monitoring and evaluation indicators include the number of women and young people with access to livestock products and engaged in livestock-related businesses and increases in sales and income from livestock enterprises.



The ability to purchase ASFs should be increased through interventions targeting economic stability and physical market access, promotion of ASFs and better food safety regulations. Possible indicators might measure nutritional status, life expectancy and decreases in the occurrence of malnutrition at the HH level among women, young people and pregnant and lactating mothers.

Greater consumption of ASFs by HHs will also depend not only on the availability and accessibility of ASFs, but also changes in both consumer behaviour in terms of HH expenditure and culinary habits, leading to more ASFs being purchased, and livestock production practices. A major gap and challenge is the task of increasing consumer awareness of the importance of ASFs for dietary diversity, through public- and private-sector education and awareness campaigns.

Underlying assumptions and trade-offs

Underlying assumptions

Some key considerations and assumptions are listed below:

- An increased awareness of the importance of ASFs and protein in diets in the first 1 000 days of conception. The level of daily protein consumption in Africa is 15 g/day, while in North Africa it is 70g/day. WHO recommends 50 g/day.
- The government will support the livestock sector by enacting policies that focus on production technology, production systems (mixed crop/livestock, small- and medium-scale/intensive/extensive and pastoralist), marketing, processing, consumer awareness and climate-resilient adaptation.
- Many of the food system pathways are not wholly operational broken, are not established or are weak, creating challenges and bottlenecks for producers and consumers alike, and ultimately impacting the availability and accessibility of ASFs.
- Ensure better access to inputs and producer-retailer linkages, improving access to markets and cold chains, and increasing the availability of processing capacity are critical outcomes that, if achieved, will have a positive impact on ASF sale and consumption.
- The ability to raise awareness of the importance of ASFs for dietary diversity and nutrition among policymakers and key investors. The availability and accessibility of ASFs depends to a large extent on the development of the value chain in any given country, as well as smallholders' access to assets for livestock production.
- Public health statutes on ASF safety and quality will be implemented. Coordination with the responsible ministries will be key.
- Changes in consumer behaviour and increased consumer awareness resulting from government public education and awareness campaigns will have a positive impact on ASF uptake by the general public.

Trade-offs

The expected increase in the availability and consumption of ASFs will likely result in certain trade-offs for those operating within the food system. Producers may need to specialise in order to meet the demand for ASFs; this will require investment in the production system with the anticipated extra revenue realized through such specialisation, but may also mean a loss of diversification of enterprises for producers who choose to

move from multi-sectoral farming operations to specialising in ASF production, which might pose a risk should markets change and/or fluctuate widely.

In the majority of cases, the trade-offs are likely to be of benefit overall, as they will allow for growth in the ASF chain and permit additional and different services and enterprises to develop, such as primary processing, feed supply, animal health and veterinary services. They will likely also create investment opportunities, particularly if a country wishes to develop an ASF supply chain in which consumers can be confident that the products being offered have a consistent level of quality and safety. It is essential that higher ASF quality and safety standards can be achieved domestically and that the threat from more competitive international markets will be minimal, hence the need to empower small domestic producers to improve production capacity, while also assuring consumers that products meet food safety standards and investing in the facilities (abattoirs) and services (veterinary services, animal health, extension support) required to do so.

Key findings

The number of similarities between each sub-sector is variable. Most of these similarities can be found in the ruminant and small ruminant pathways, while there are greater differences in the swine and the poultry pathways. The discovery of common trends between each sub-sector is encouraging and was expected in most cases.

Improved nutritional status at the HH level can be achieved through a combination of increased production capacity and greater availability and accessibility of ASFs for consumers. These targets are driven by increased on-farm ASF consumption at the HH level, higher offtake (ASF sales/income) and greater access to the value chain at post-farmgate level.

3. Conclusions and recommendations

Recommendation 1. Focus programme and policy responses on production and market linkages across the value chain

The availability, accessibility and affordability of ASFs for households, and their consumption by households, is dependent on and influenced by the individual features of each of the livestock sub-sector pathway and affected by a broad range of drivers along any given pathway. The supply chain and its constituent elements (production, storage and distribution, processing and packaging, and retail and marketing) are of primary importance. Within the livestock food system, production is the most critical entry point and is a common concern in all the sub-sector pathways examined and reflects the level of sophistication of the food system in the country in question. Also of significant importance is the market accessibility of ASFs. Interventions focusing on production and market linkages and accessibility are highly likely to increase ASF consumption for all sub-sector pathways.

Recommendation 2. Create demand for ASFs through a combination of social and behavioural change, public campaigns and the marketing of ASF products

Consumption of ASFs among the general public is highly dependent on the level of consumer awareness of the importance of ASFs in diets, which is in turn dependent to varying degrees on both public sector policy (nutrition education and awareness) and an enabling business environment that facilitates access to ASFs and encourages the private sector to promote the benefits of ASFs in the context of food and nutrition security through marketing.

It is becoming evident that the long-term economic and disposable income growth in both Zimbabwe and Eswatini, particularly among urban and semi-urban populations, is leading to greater demand for ASFs. ASF consumption depends on a wide variety of factors, the most critical for low- and middle-income earners being (affordability) and availability. With an anticipated increase in production and supply creating greater availability post-farmgate, demand for and consumption of greater numbers of ASFs available could be increased through awareness-raising programmes, education on the nutritional benefits of ASF consumption, and the adoption of social and behaviour change (SBC) measures aimed at breaking taboos and targeting cultural and traditional practices. In addition, the marketing of ASFs to specific demographics could be used not only to raise awareness, but also increase consumer knowledge of the benefits of ASF consumption.

Recommendation 3. Increase commitment to safe food handling at all stages of the food system, from farm to fork

Support for this recommendation will involve the engagement of stakeholders to raise awareness of the benefits of preventing food contamination at all levels and stages of production, processing and retail, by adopting basic phytosanitary measures during on-farm production, post-farm handling, processing (primary and secondary), packaging, storage and transport, and retail to the consumer. This should be applied throughout the food system and involve the country's ministry of agriculture, veterinary authority, meat inspectors and extension service providers. Stakeholders should be involved in actively identifying specific, readily adoptable measures at each stage of the food system. These food safety measures identified, which can include HACCP at all levels of the chain and appropriate to the actors can and will ensure mitigation of risk to contamination,

spoilage etc. The process is resource intensive and will require involvement of a wide range of stakeholders and the oversight of the national food safety body and ministries of agriculture and health. These initiatives would also benefit from being implemented alongside awareness-raising programmes aimed at consumers and producers; the programmes should focus on different areas depending on the audience and include capacity building for the different stakeholders. As part of this process, slaughter facilities will need to be upgraded and adopt recognised standards and practices for food safety handling.

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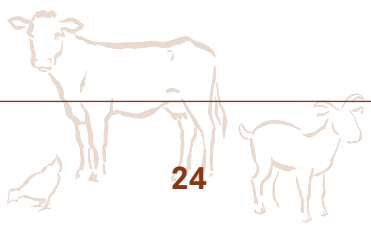

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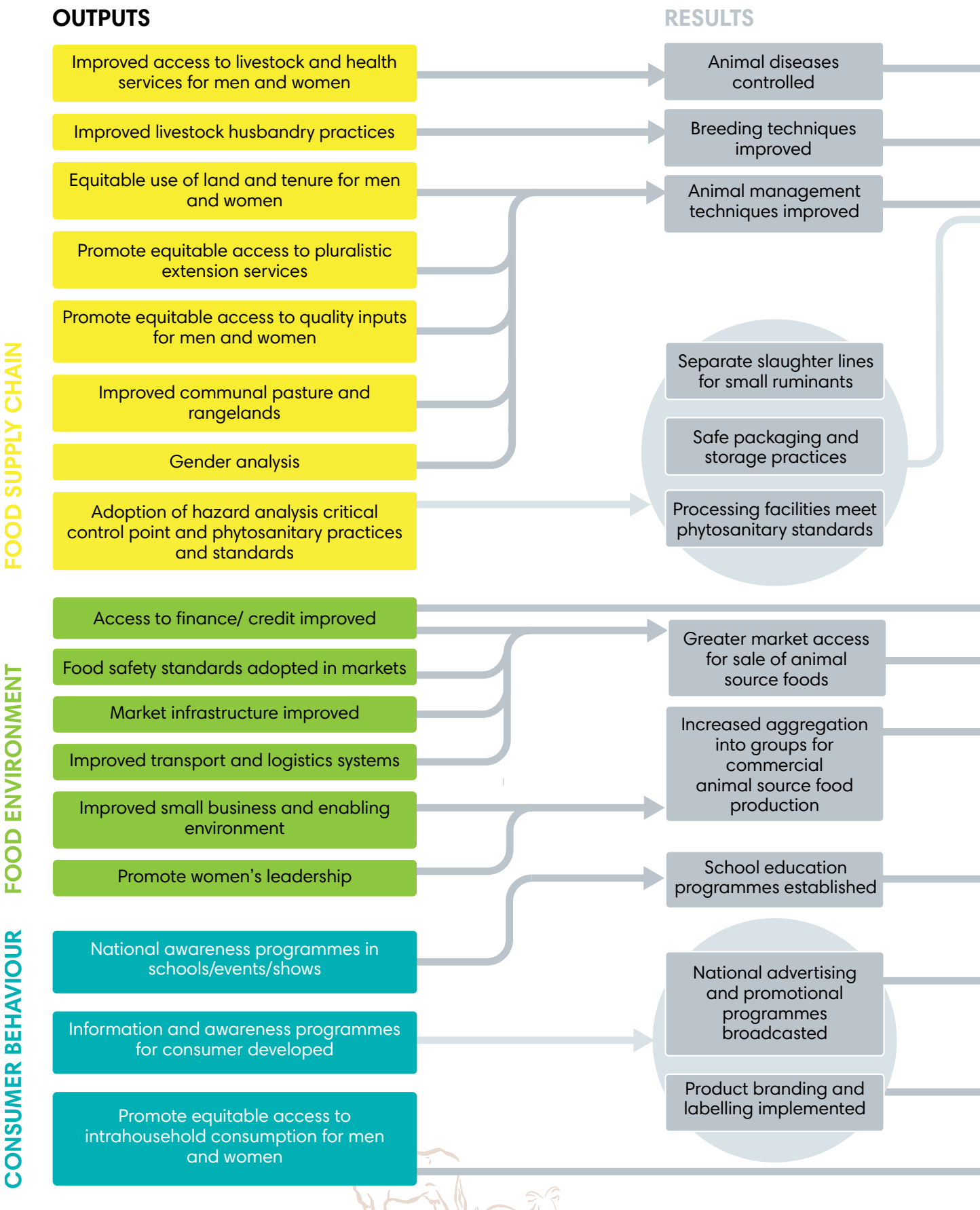
Annex 1. Impact pathways and indicators

Annex 1a. Improving dietary diversity of vulnerable households through the small-ruminant sub-sector



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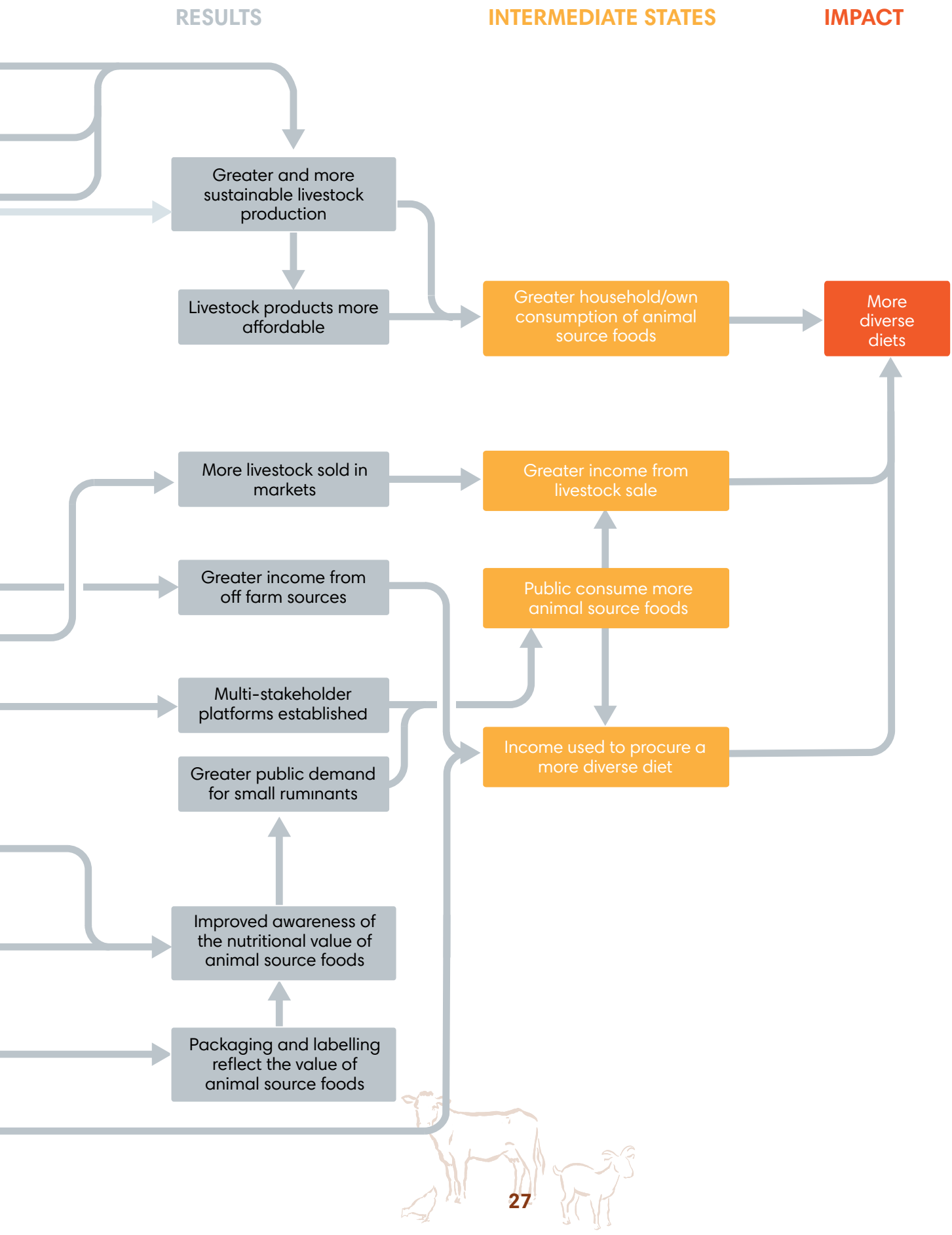
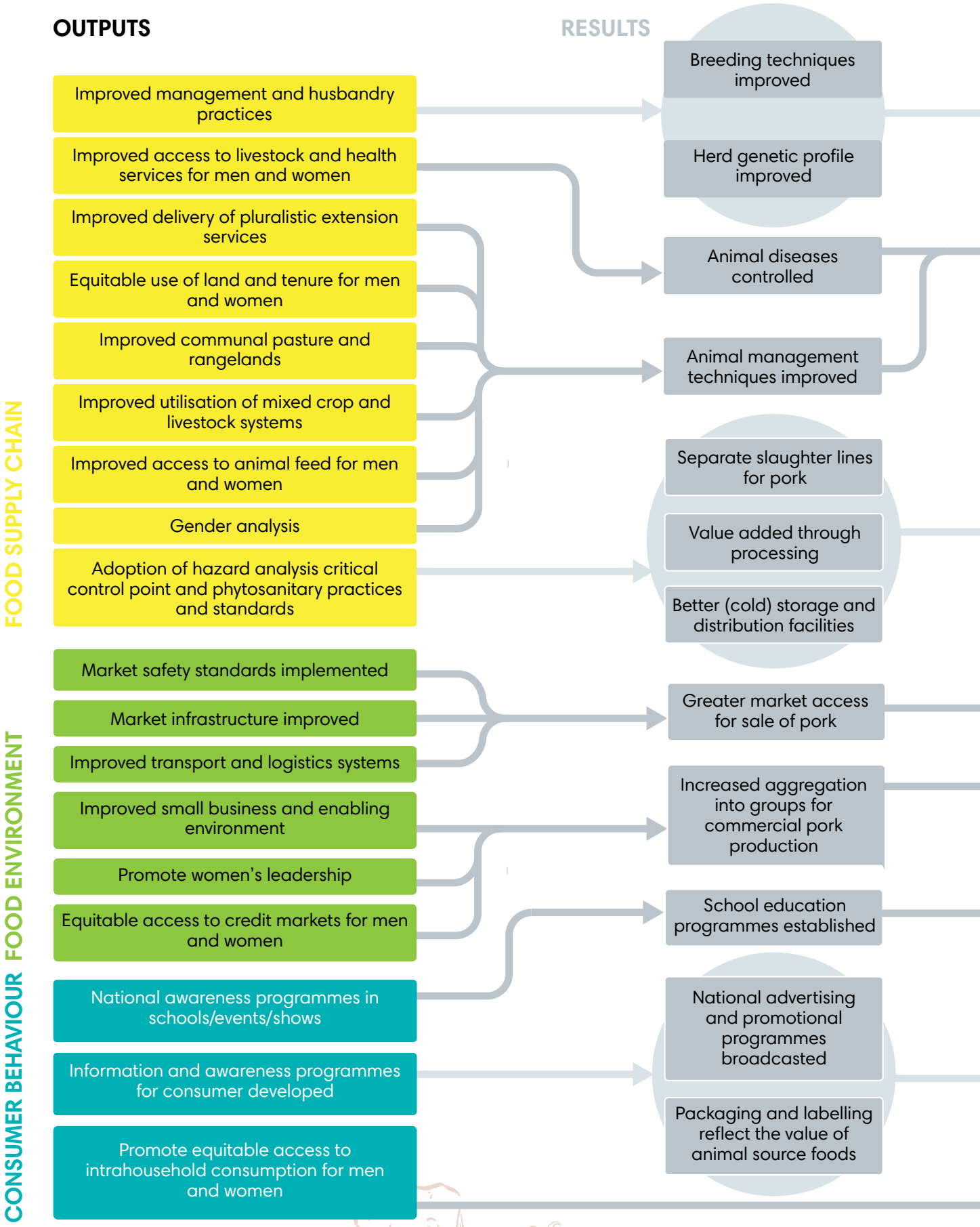


Annex 1b. Improving dietary diversity of vulnerable households through the swine sub-sector



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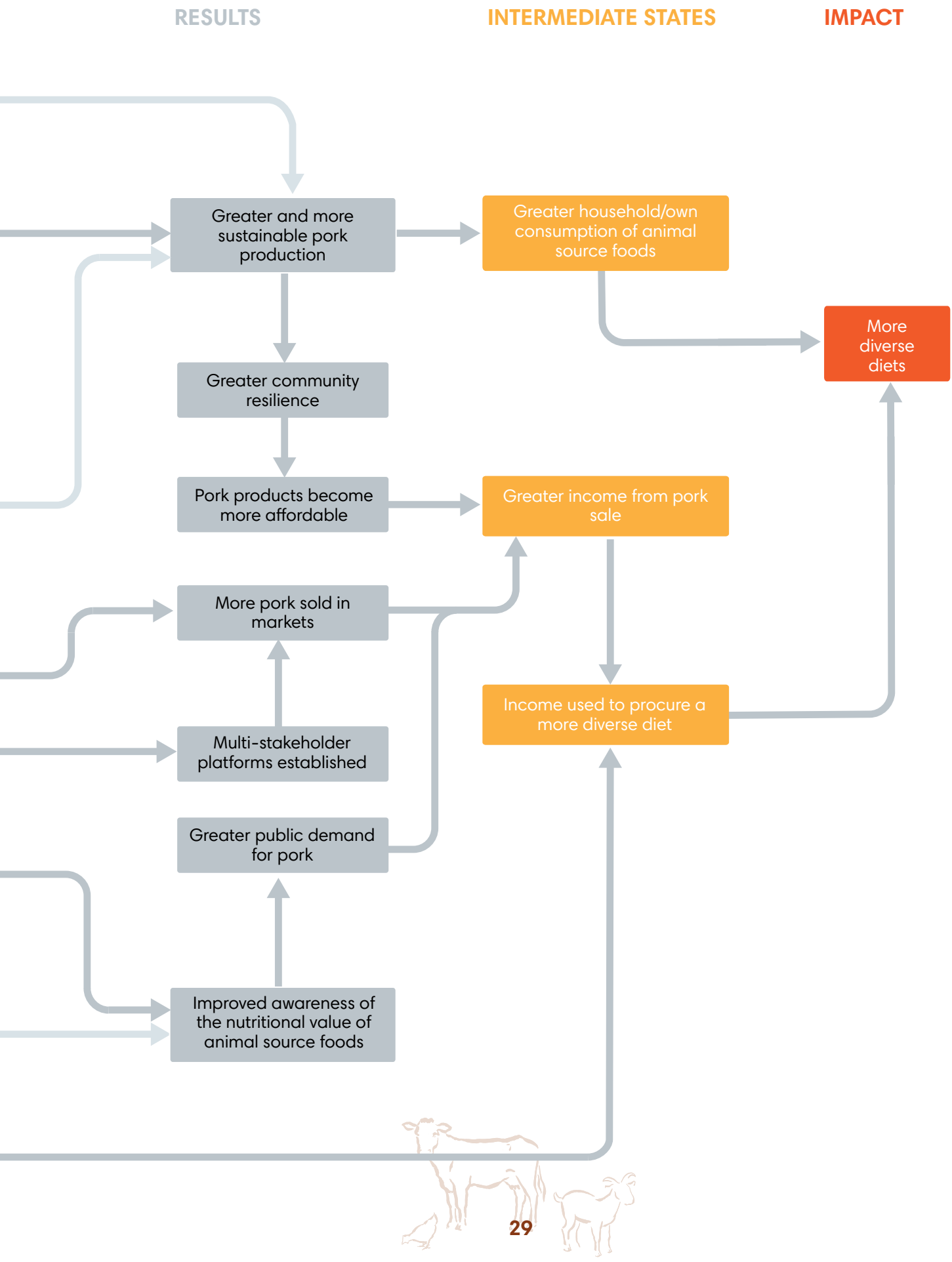
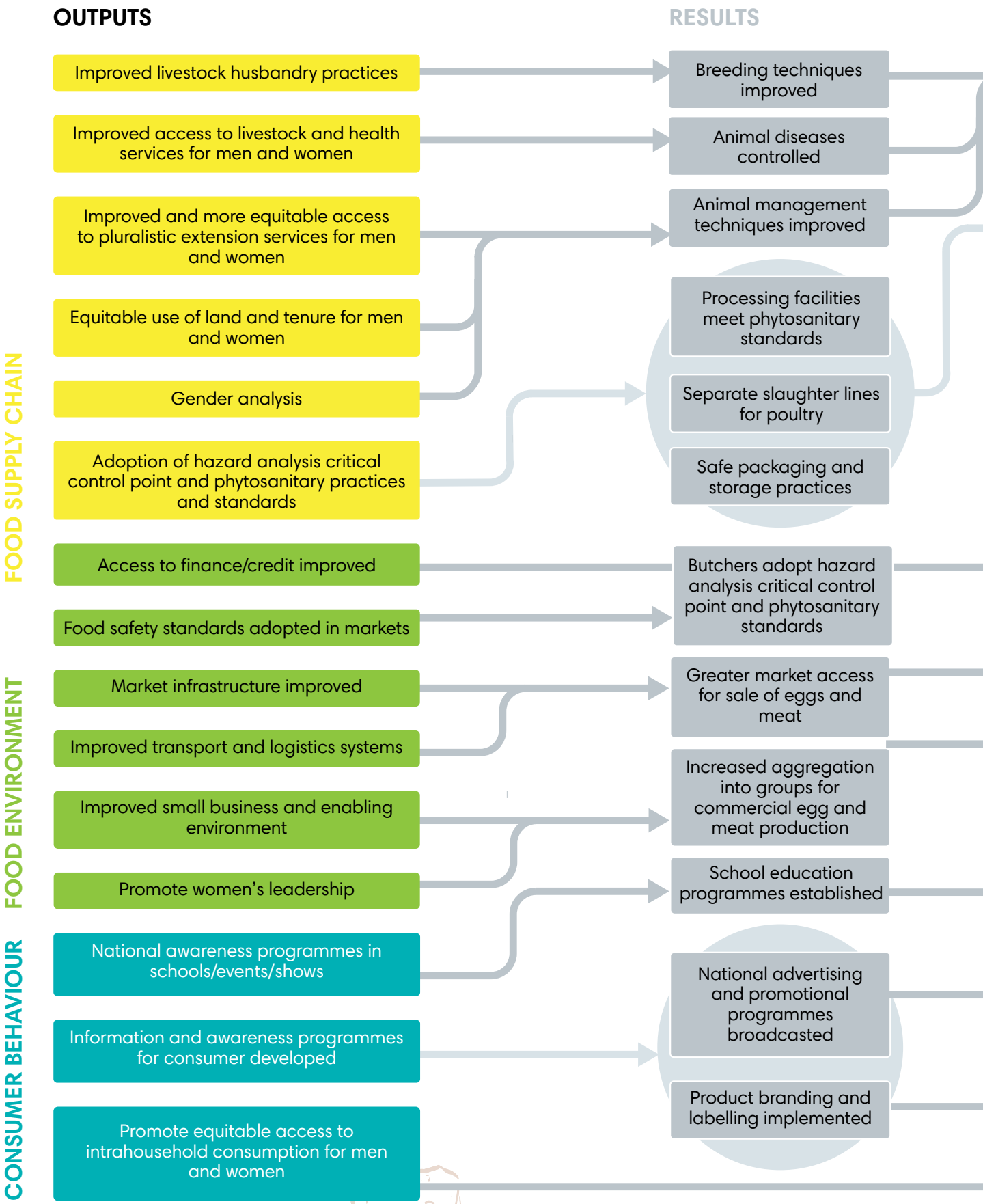


Annex 1c. Improving dietary diversity of vulnerable households through the poultry sub-sector



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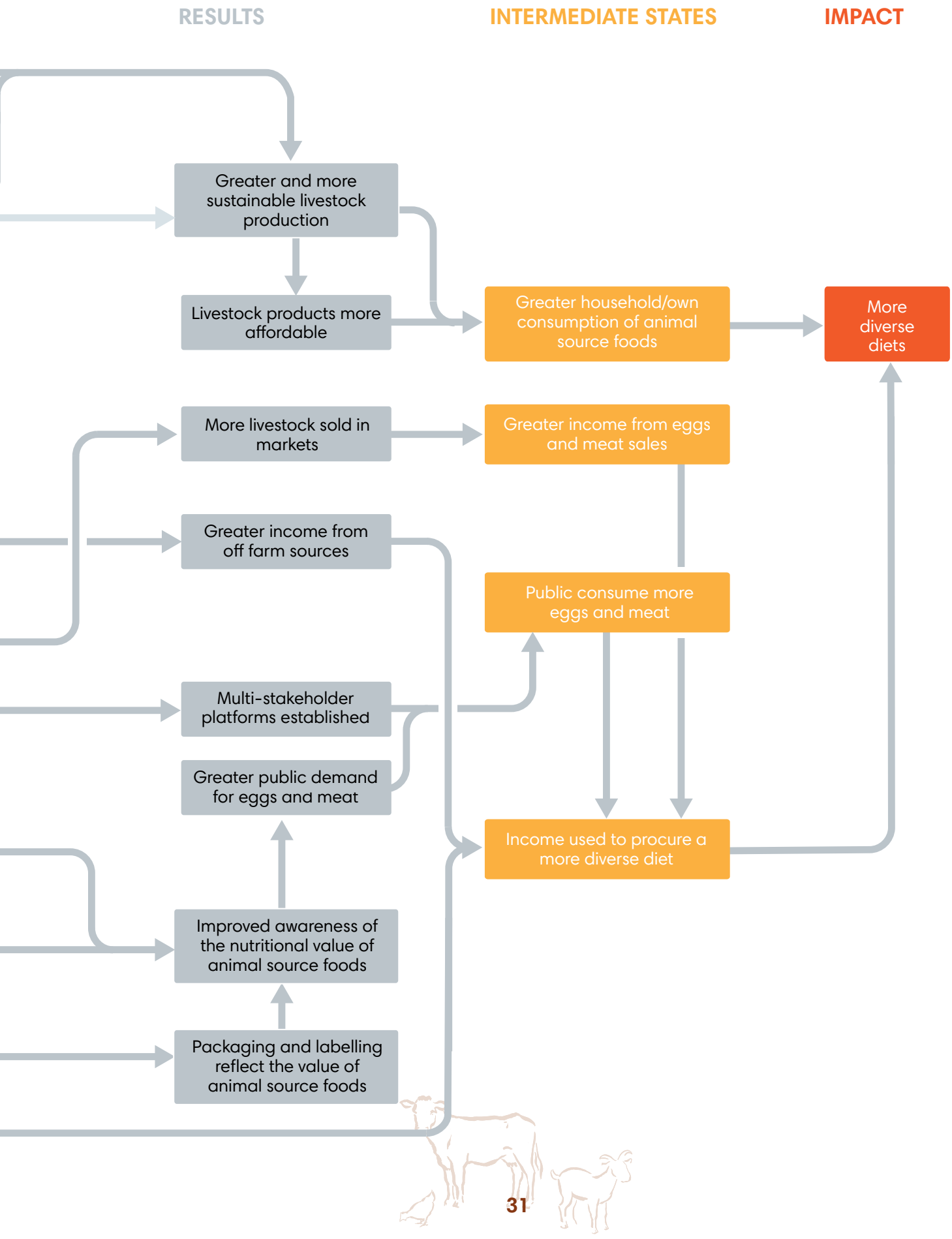
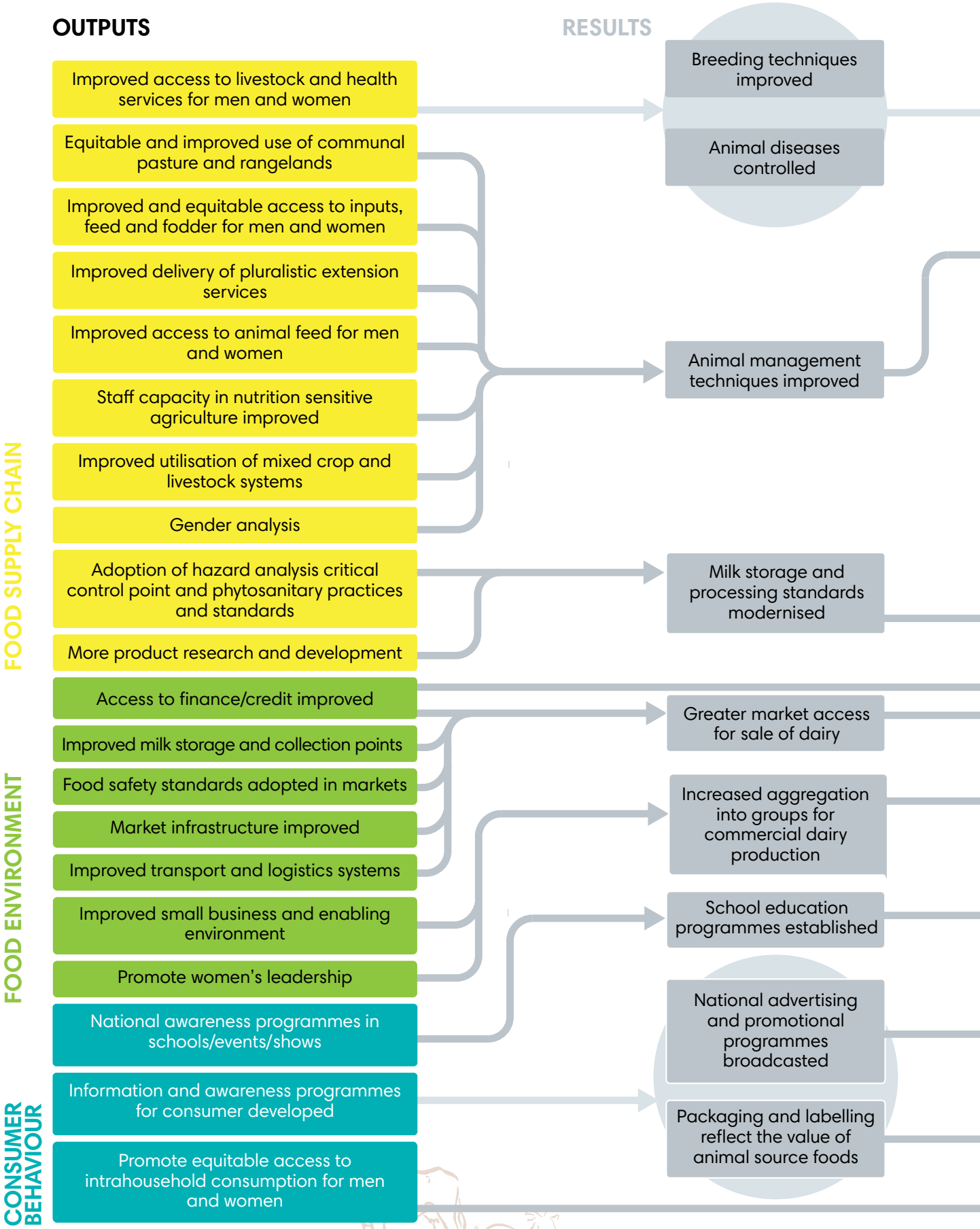


Annex 1d. Improving dietary diversity of vulnerable households through the dairy sub-sector



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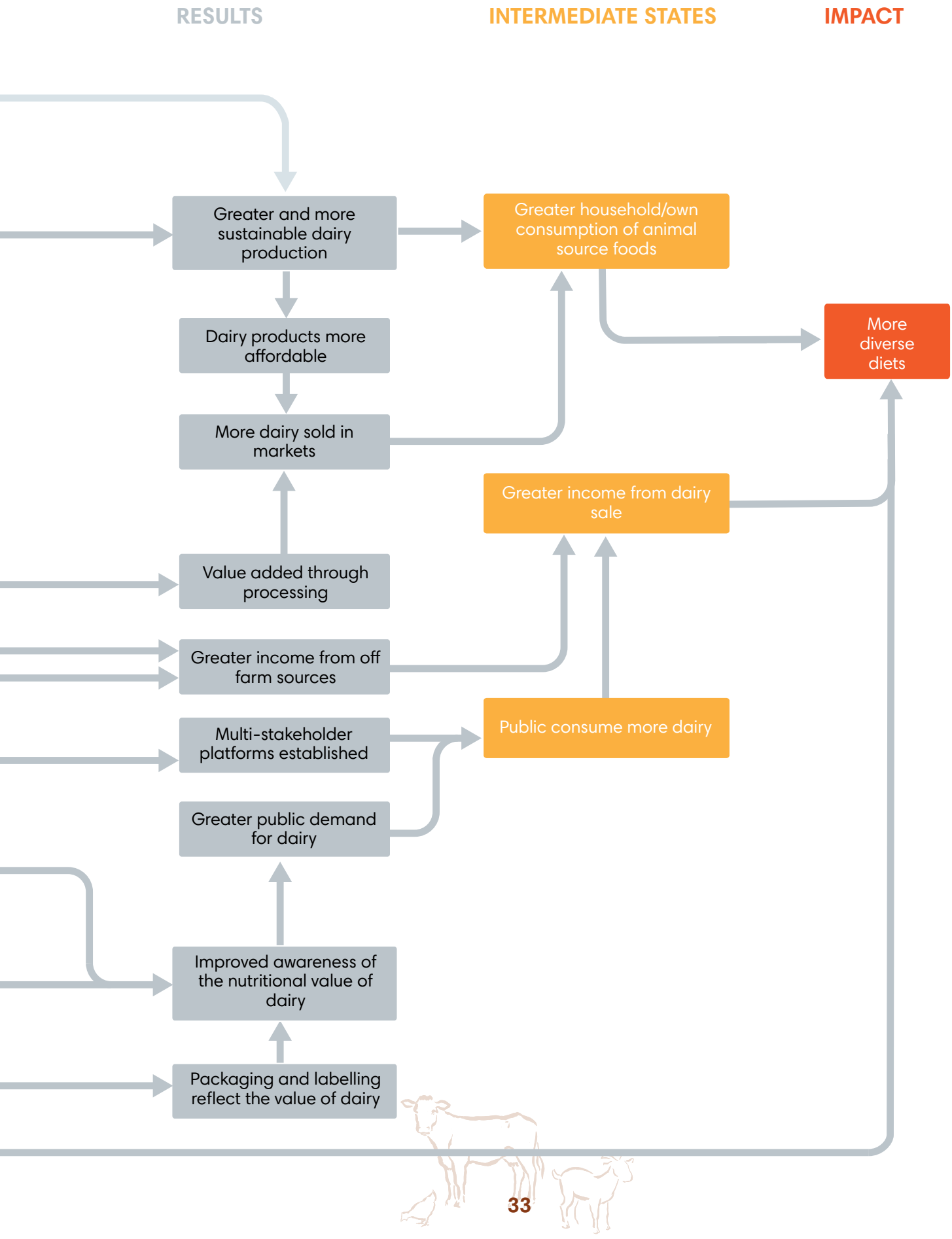
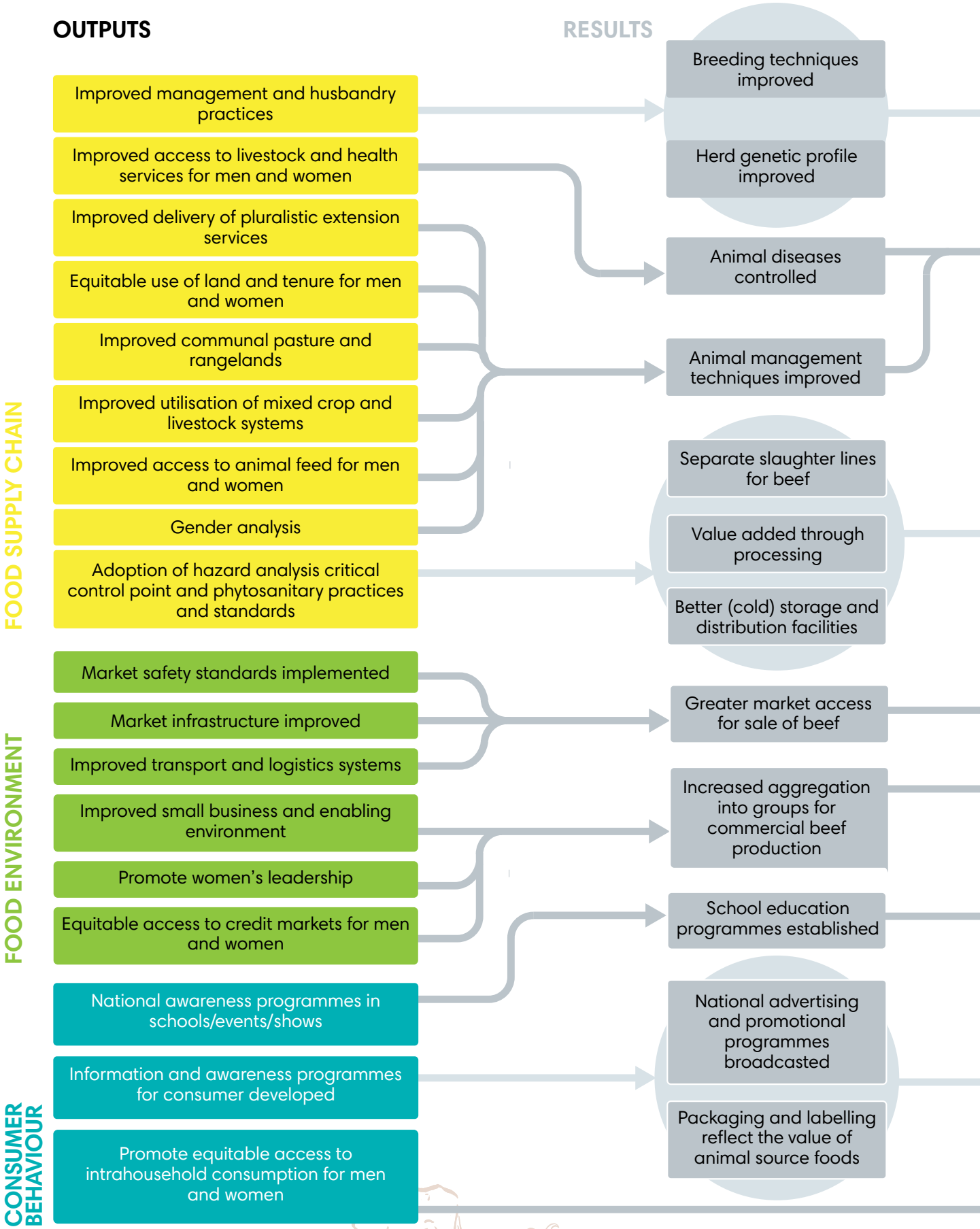


Annex 1e. Improving dietary diversity of vulnerable households through the beef sub-sector



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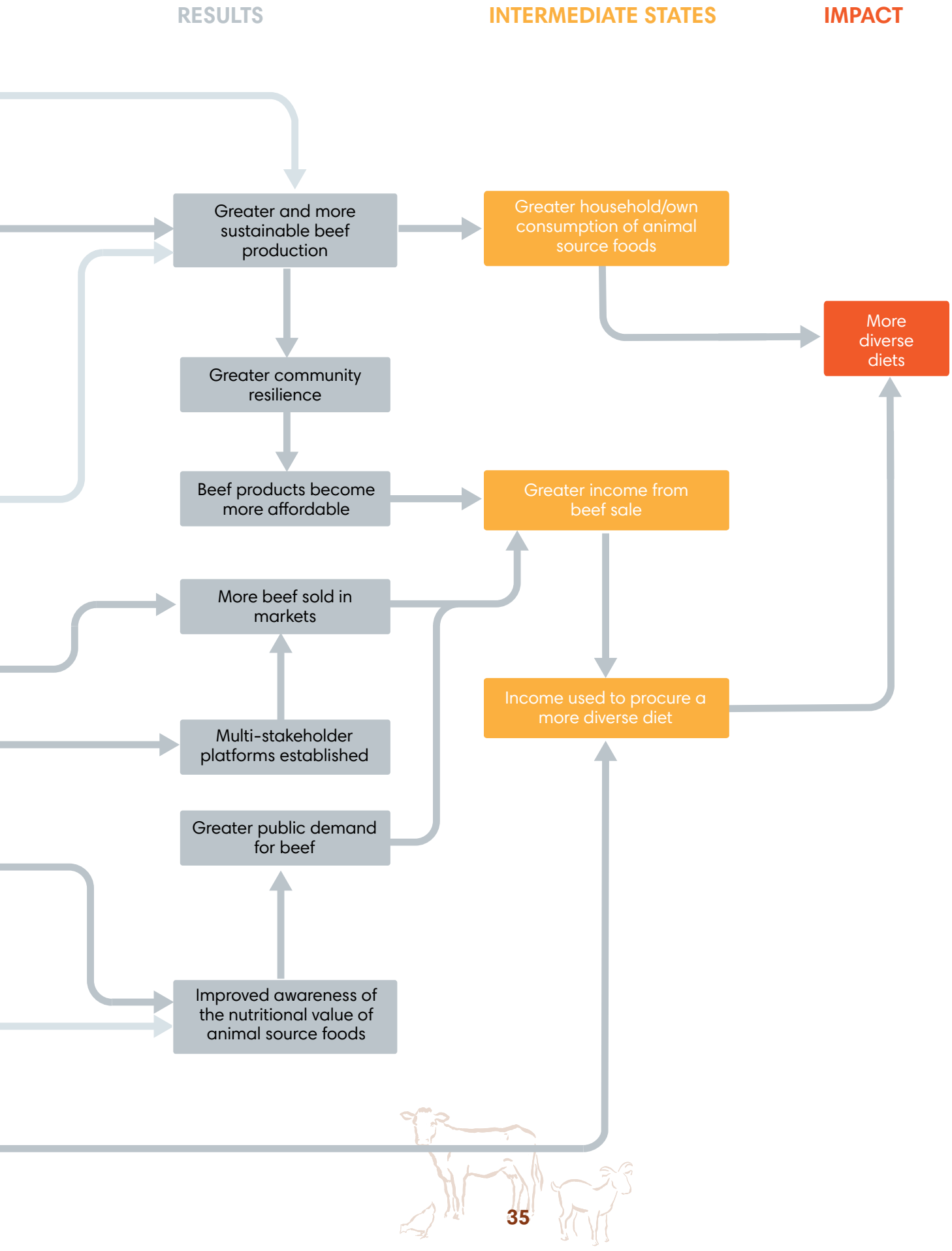


Annex 2. List of participants in the stakeholder consultation group

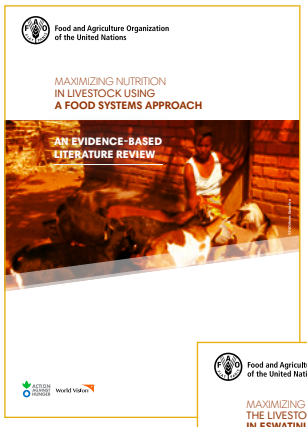
List of Eswatini stakeholders

Name	Organization	Position
Anette Mngadi	Kalulu Hatcheries (private sector)	Director
Nikiwe Dlamini	Ministry of Agriculture	Principal Home Economics Officer
Xoilisiwe Simelane	Ministry of Agriculture	Regional Home Economics Officer
Nozizwe Tsabedze	Ministry of Agriculture	Regional Home Economics Officer
Celumusa Motsa	Ministry of Agriculture	Poultry Officer
Xolani Ndlangamandla	Ministry of Agriculture	Animal Health Officer/Piggery
Bonginkhosi Mabuza	World Vision	Livelihood Project Officer
Mncedisi Dlamini	Ministry of Agriculture	Livestock Officer
Siphindzile Maseko	World Vision	Nutrition Coordinator
Mpendulo Simelane	World Vision	Livelihood Technical Program Manager

List of Zimbabwe stakeholders

Name	Organization	Position
Richard Ndou	World Vision	Senior Advisor Research and Reporting
Delilah Takawira	FAO	Nutrition and Food Safety Specialist
Jonathan Rusirevi	FAO	Livestock Specialist
James Mugombi	FAO	Food Safety Specialist
Nigel Makwembere	World Vision	Livelihoods Advisor
Norest Hama	World Vision	Nutrition Advisor
Loveness Bamala	Ministry of Agriculture	Principal Agricultural Specialist
Rutendo Nyahoda	Ministry of Agriculture	Chief Livestock Production Specialist
Gift Mashango	UNDP	Livelihoods Analyst
Dr. Gareth Horsfield	UNDP	Resilience Advisor
Lorraine Maunze	Nutrition Action Zimbabwe	Nutritionist
Mathieu Joyeux	UNICEF	Nutrition Manager
Dexter Changwena	Ministry of Health (National Nutrition Unit)	Nutritionist and Researcher
Ruth Karidza Machaka	UNICEF	Nutritionist
Zephania Gomora	UNICEF	Nutritionist
Patience Hoto	FAO	Nutrition Specialist

For more information check also:



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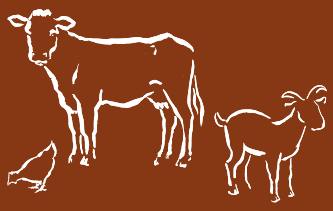

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