



Livestock Development in the Zambezi Valley, Mozambique: Poultry, Dairy and Beef Production

Description of the current situation and emerging opportunities

Adriaan Vernooij
Joep van Mierlo

Mena dos Anjos

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Adriaan Vernooij (1)
Joep van Mierlo (1)

Mena dos Anjos (2)

(1) Wageningen UR Centre for Development Innovation

(2) Eduardo Mondlane University, Maputo.

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Abstract

This report describes the present situation in the three most important livestock sectors in Mozambique: poultry, dairy and beef production and defines opportunities for investors and service providers for these three sectors in the Zambezi Valley. It is based on studies in the area in 2015 and 2016, commissioned by the Zambezi Valley Development Authority and implemented jointly by Wageningen University and the Eduardo Mondlane University.

The demand for animal protein is growing in Mozambique and, with exception of poultry meat, still strongly dependent on imports from neighbouring countries. The growth of broiler production has been a success story in several parts of Mozambique and can spread into the Zambezi area as well. Dairy production has suffered a decline over the past decades, but recent NGO and national government efforts are first steps towards new investments in building up the sector. Beef production, based on extensive production systems, has been part of the Mozambican rural economy for a long time and more offtake is possible with targeted supported of services and investments in infrastructure.

Keywords: poultry, dairy, beef, processing, agribusiness, Zambezi Valley, Mozambique.



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Preface

This document i) describes the situation in the poultry, dairy and intensive beef value chains in Mozambique and especially in the Zambezi Valley, and ii) identifies opportunities for investments in this sector in the Zambezi Valley area.

This document should be seen as an introduction to the sector and to the investment opportunities that it provides.

The paper is mainly based on recent studies commissioned by the Zambezi Valley Development Agency (ZVDA). For more detailed information on the emerging business opportunities, the reader is referred to the reports of these original studies which include business plans. These full-fledged business plans are available from ZVDA on demand.

Summaries of these three (and other) opportunities can be found [here](#).

All prices and costs used in this document are based on research conducted in 2015 and the US\$/MZN conversions have been made with an exchange rate of 35 MZN per US\$.

Herman Brouwer
Project leader ZVDA/Wageningen UR collaboration
Wageningen UR Centre for Development Innovation

List of abbreviations and acronyms

AI	Artificial Insemination
AMA	Mozambican Poultry Producers Association
CDI	Wageningen UR Centre for Development Innovation
CEPAGRI	Agriculture Promotion Centre
CIM	Companhia Industrial da Matola
DNSV	National Directorate for Livestock Services
DPA	Provincial Agricultural Directorate
FAO	Food and Agriculture Organisation.
FK	Frango King
FMD	Foot and Mouth Disease
GAP	Good Agricultural Practices
GDP	Gross Domestic Product
GMP	Good Manufacturing Practices
GPZ	Planning and Development Office for the Zambezi Valley
GTZ	German Technical Cooperation
IIAM	Mozambique Institute of Agricultural Research
ILRI	International Livestock Research Institute
ISPM	Instituto Superior Politécnico de Manica
Lo'L	Lando'Lakes
MASA	Ministerio da Agricultura, e Sugurance Alimentar
MICO	Ministry for coordination of environmental action
MINAG	Ministry of Agriculture
MT	Metric tonnes
MZN	Mozambican Metical
ND-GAIN	Notre Dame Global Adaptation Index
NGO	Non-Governmental Organisation
NH	Novos Horizontes
OIE	World Organisation for Animal Health
PEDSA	Strategic Plan for Agricultural Development
PIPEC	Programa de intensificação da produção pecuária
PITTA	Agricultural Technology Transfer Programme
PNISA	Comprehensive Africa Agriculture Development Programme
PRODEP	Livestock Development Project
SDAE	District Services for Economic Activities
SPP	Provincial Livestock Services
TIA	Trabalho de Inquerito Agricol (National Survey)
UGC	General Union of Agricultural and Livestock Cooperatives
UNIDO	United Nations Industrial and Development Organisation
USAID	United States Agency for International Development
USD	United States Dollar
USDA	United States Department for Agriculture
WUR	Wageningen UR Wageningen University and Research
ZVDA	Zambezi Valley Development Agency

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Executive Summary

Livestock keeping has traditionally been an important part of the rural economy in Mozambique. As a result of the growing population and the rise in income, especially in urban areas, the demand for animal proteins is growing. Currently, Mozambique is largely dependent on imports to meet the demand. The country, however, does have the biophysical resources to produce adequate amounts of animal proteins. Nonetheless, the efficient utilization of these resources depend on additional inputs and services, in order to expand the livestock sector.

Poultry meat (broiler) production has been growing strongly over the past 10 years, self-sufficiency has increased from 35% to 75%. The poultry sector organised itself in response to illegal dumping of broilers from other countries, upon which legislation changed to avoid such importations. Through a successful national poultry branding campaign, supported by international donors, the demand for locally produced chickens has grown strongly. There are a few large players in the poultry industry in Mozambique, but their inputs and services do not yet reach all parts of the country. Besides, several parts of the operational area of the ZVDA still lack the necessary inputs and services. Though services, such as veterinary support and general extension, still need to be improved, the first steps that need to be taken to improve production circumstances in the Zambezi area are: investments in hatcheries, feed and slaughterhouses.

The dairy sector in Mozambique is still small, but it receives support from international donors. Though, currently, no clear government strategy for the dairy sector exists, the national government is actively stimulating the growth of the sector, by bringing all stakeholders together and discussing ways forward. The genetic base for appropriate and adapted dairy breeds or crossbreds in the country needs to be built up. Moreover, there is a need for training and extension to improve dairy farm management, including fodder production and additional services such as veterinary support. Last, More investments in collection, processing and marketing infrastructure are necessary, since the demand for dairy products is big. Besides, there is ample room to replace the current high dependency on imports by local production.

Traditionally, the beef sector has always been an important element of the rural economy in Mozambique. Beef production systems are extensive and based on the use of natural grazing, making it vulnerable to climatic influences and eminent climate changes.

In general, services to stimulate livestock production that need strengthening are veterinary services, training, extension and food safety control.

Although investment opportunities differ in the various livestock sectors, lots of investments are needed to strengthen the livestock sector. For the poultry sector, especially the input suppliers (day-old chicks, feed) and slaughtering facilities need investments. This in contrast to the dairy sector which requires investments to be built up: genetics, services, collection centres and processing plants. The beef sector can be made more profitable by investments in range management improvement and offtake stimulation, by building more slaughterhouses.

Conclusion

There are good growing possibilities for the livestock sectors in the Zambezi area. The future of the poultry sector can be built upon existing experiences from other parts of the country. The dairy sector is still in its early stages, but given the right type of support, certainly has a future in most parts of the operational area of the ZVDA. Beef production has been an ongoing activity for centuries, and there are certainly options for a better offtake.

Therefore, livestock can certainly play an important role in the economic development of the area and can significantly contribute to food and nutrition security. This is not only true for the Zambezi area,

but also for other parts of the country and the region, as even now livestock export for slaughter to, for example Malawi, is a regular phenomenon.

The ZVDA has the facilities to support the development of the livestock sectors and this offers good opportunities for service providers and investors interested in contributing to the growth of the livestock sector in the Zambezi area.

1 Mozambique: the country in brief

1.1 General country information

Mozambique is situated in South East Africa and is in size comparable to e.g. Turkey, Pakistan or Namibia. Neighbouring countries are: South Africa, Swaziland, Zimbabwe, Zambia, Malawi and Tanzania.

Table 1
General country information

General country information	
Country name	Republic of Mozambique
Population	25.041 million (2014) (urban 7,9 million)
Capital City	Maputo, (2.5 million inhabitants)
President	Filipe Nyusi
Total area (water 1,6 %)	799,380 km ² (world rank 35; 20x the Netherlands)
Language	Portuguese
Climate	Tropical climate with two seasons, a wet season from October to March and a dry season from April to September
Currency	Mozambican Metical (MZN) (4 Aug 2015:) 1 € = 56.17 MZN; 1 USD = 49.25 MZN
Nominal GDP	12,8 billion € (2013)
Nominal GDP per capita	528 €
Religions	Roman Catholic 28.4%, Muslim 17.9%, Zionist Christian 15.5%, Protestant 12.2%, other 6.7%, none 18.7%

Source: CIA, 2016

Administratively, the country is divided in 11 provinces. From north to south: Cabo Delgado, Niassa, Nampula, Zambezia, Tete, Manica, Sofala, Inhambane, Gaza, Maputo and Maputo-city.



Figure 1 Provinces of Mozambique

1.2 Climate

Lying at around 11-27° southern latitude, Mozambique has a warm, tropical climate with two seasons. A wet season from October to March, and a dry season from April to September. Rainfall is heavy along the coast and decreases in the north and south. Climatic conditions vary depending on altitude. Cyclones are also common during the wet season.

Daytime temperatures are generally 20-30°C in the summer (October-February) and 15-25°C in the winter (June-August). In Maputo, average temperature ranges are between 13 and 24°C in July and between 22 and 31°C in February. Highland areas in the north and west are cooler because of their elevations. Low-lying regions in the north are hotter, with daily temperatures over 30°C.

Humidity and rainfall vary across the country. Annual precipitation can differ from 500 to 900 mm depending on the region, with an average of 590 mm. Some regions in the south receive as little as 75mm during the wet season. In central and northern regions, some areas receive as much as 1,780mm.

1.3 Economy

At the time of independence in 1975, Mozambique was one of the world's poorest countries. In 1987, the government embarked on a series of macroeconomic reforms, designed to stabilize the economy. These steps, combined with donor assistance and political stability (since the multi-party elections in 1994), propelled the country's GDP from \$4 billion in 1993 to approximately \$34 billion in 2015. Fiscal reforms including the introduction of a value-added tax, and customs service reforms have improved the government's revenue collection abilities (CIA, 2016).

The Mozambican economy has been growing strongly over the past decade. The growth rate from 2005-2015 was 6-8%. The main drivers of the economic growth are Foreign Direct Investments, mainly in the mining sector, in which coal is the dominant product.

Mozambique's economy is largely agriculture-based. Unfortunately, the agricultural sector lacks dynamism, although growth rates stand at approximately 4%. The role of agriculture in stimulating overall economic growth and poverty reduction remains critical, as in 2010 about 69% of the country's population remained rural-based and largely dependent on agriculture for employment and livelihoods. The percentage of people below poverty level (19 MT/day = 0,5 US\$/day) decreased between 1996-1997 and 2002-2003 from 69.4% to 54.1%. However, in 2009 54.7% lived below poverty level. Mozambique is facing substantial economic growth in the near future that could lower the poverty rate considerably, if it is accompanied by measures that ensure a pro-poor, equitable distribution of economic and social benefits.

Little structural transformation takes place in the Mozambican economy. Besides, the capital intensive investment in mining, aluminium and energy sectors do not create enough jobs for the fast growing population. Fiscal revenues cover less than two-thirds of the annual budget and increased public spending on infrastructure widens the gap. Increasing public expenditure on infrastructure and salary rises equally contribute to the fiscal deficit. This increases the anticipation that the public investments generate positive economic returns in future (AfDB, OECD, 2015).

2 Agriculture and livestock production: general overview

2.1 The farming industry¹

Mozambique has a good potential for agricultural production. The land area consists of almost 800,000 km², divided in ten different ecological zones. 36 million ha's are available for agricultural production, of which presently only 10% are in use. Potentially, 3.3 million ha's could be irrigated (Ministry of Agriculture, 2010). The remainder of the area are natural pastures (44 million ha) and forest /woodlands (30.7 million ha). About 118,000 hectares are equipped for irrigation, covering 3% of the cultivated area.

Agriculture continues to be the backbone of the Mozambican economy and contributes to more than a quarter of the GDP, employing approx. 70% of the population.

Agriculture is for the most part based on small, hand-cultivated units, often farmed by women-headed households. The use of modern technologies and irrigation facilities is limited to a small number of commercial farms growing cash crops and vegetables, and to out-growers of tobacco and cotton-producing crops on contract (IMF, 2011, p. 11).

2.2 Crops

Food crop production is the most important agriculture sub-sector, accounting for around 80% of the cultivated area. Maize and cassava are the major staples; other food crops include sorghum, millet, rice, beans, groundnut, sweet potatoes and a wide variety of vegetables. Tree crops, especially coconut and cashew, grown by small farmers, are an important source of foreign exchange earnings, and contribute to household food security.

2.3 Livestock development

The potential value of the livestock sector in Mozambique is substantial, primarily because the country has favourable conditions for crop and livestock production in the 10 agro-ecological zones. It has extensive areas of good natural resources, a variety of potential animal feeds (copra cake, bran, cottonseed and molasses) and genetic animal resources (ILRI, 2011).

The family farming sector² which has a long tradition in extensive cattle keeping in the country, is based on three main local breeds of cattle: Landim breed in the southern lowland areas; Tete breed in the Tete province and in the central areas; and Angoni breed with zebu characteristics in the highlands of the Tete

¹ Several sources are used for this chapter, to which reference is made in the literature list. However, all sources use basic information from the National Agricultural Survey 2008 of Ministry of Agriculture, also known as TIA (Trabalho de Inquerito Agrícola). Additional statistics are being used from FAO.

² Family farming is the predominant form of agriculture both in developed and developing countries. There are over 500 million family farms in the world. Family farmers range from smallholder to medium-scale farmers, and include peasants, indigenous peoples, traditional communities, fisher folks, mountain farmers, pastoralists and many other groups representing every region and biome of the world. They run diversified agricultural systems and preserve traditional food products, contributing both to a balanced diet and the safeguarding of the world's agro-biodiversity. FAO. Source: <http://www.fao.org/family-farming/background/en/>

province. A few exotic breeds (for example Holstein and Jersey) as well as crossbreeds with local breeds, can also be found in all provinces (ILRI, 2011).

Cattle are primarily kept for meat and social status. However, in many provinces draught power, milk, manure and traditional or social ceremonies are other important reasons for keeping cattle.

Backyard poultry keeping has always been part of the rural village economy in Mozambique and over the past decades there has been a strong growth in commercial poultry production, especially broilers.

Mozambique has good climatic and land conditions for the development of livestock. Throughout Mozambique, the livestock population declined sharply in the 1980s because of the civil war and collectivization policies. The rearing of cattle, pigs, goats, and poultry has great potential as the existing supply does not meet domestic demand. Currently, significant volumes of meat, poultry and dairy products are being imported, mainly from South Africa and Europe. Local production covers only a small fraction of the existing market demand. The government has given priority to the introduction of animal stock extension and rearing programs.

Table 2

Animal production in Mozambique (tonnes)

	2008	2009	2010	2011	2012
Beef	18 631	18 602	18 685	19 083	25 383
Poultry	24 171	29 652	28 299	27 027	22 707
Duck	2 238	2 258	2 258	2 520	2 520
Sheep	876	912	960	984	996
Goat	24 000	19 200	19 200	19 680	21 600
Pork	111 000	93 600	97 200	99 000	102 000

Source: Faostat

Some of the challenges that affected livestock production in Mozambique include sanitary conditions of the livestock such as disease control, surveillance and eradication. There are problems with financing and professionalising the veterinary services in the country. As a result of this, the production and productivity of livestock in the country has suffered.

Livestock plays a vital role for the rural population. 65% of rural families has chickens, 25% has small ruminants (mainly goats), 12% has pigs and 6% has cattle. Only 11.3% of small farms uses animal traction, mainly oxen. This is more common in the southern and central provinces, where there is more experience regarding the use of animals for farming activities and transport. Due to the high prevalence of tsé-tsé and trypanosomiasis, cattle farming did not develop in the northern region (National Survey Figures, in PEDSA, Ministry of Agriculture, 2010).

The contribution of livestock to the national economy is developing. In 2008, it represented 10% of the total agricultural production and contributed only 1.7% to the total GDP. Meat production is growing at an average annual rate of 17%. Nonetheless, the value of animal traction in production, consumption and sales in informal circuits in the rural areas, are not calculated. The value of sales in the informal sector can be presumed to be considerably higher than the value of sales marketed in the formal sector.

Mozambique depends heavily on the external market for the supply of beef to the main urban centres, with over 40% of the total beef consumption imported from neighbouring countries.

The limited domestic supply of other livestock products also means, that there is high dependence on imports to meet consumer needs. Namely, 32.5% of meat, 83% of milk and 90% of eggs is imported. Most inputs for livestock production, such as rations, concentrates, medicines, vaccines, veterinary instruments and equipment are also imported, due to low or non-existent domestic production.

Nevertheless, the domestic supply of beef has grown in recent years, as a result of growing herds and the impact of development programmes, leading to a fall in imports. Production

rose from 1,500 tonnes in 2000 to 9,357 tonnes in 2009 (Ministry of Agriculture, 2010).

With the exception of poultry meat, which comes almost exclusively from peri-urban medium-scale poultry breeders, domestically produced meat marketed through official circuit, comes primarily from small family farms (TIA, 2008).

The production levels of beef to date are still far from satisfying the growing demand for beef on the domestic market. According to MINAG statistics (TIA, 2008), Mozambique only produced 68% of all meat consumed in the domestic market, which means that 32% of consumer needs to be covered by imports.

Only 17% of milk and its side products consumed in the main urban centres is from domestic production, with fresh milk coming exclusively from commercial farms. There is no systematic or official information about milk consumption in the rural areas.

The eggs consumed in the main urban centres come almost exclusively from neighbouring countries. Recorded domestic production, coming from the peri-urban areas, is insignificant: approximately 5% of the total consumed eggs in the formal market. There is no systematic information on egg production or consumption in the rural areas.

The main constraints on the development of livestock production, particularly of cattle, are the following:

- Low production and productivity of existing herds, due to the low genetic quality of the breeding animals and unsuitable management practices
- Weak network of veterinary assistance for the family sector
- Lack of infrastructures for watering and managing cattle

The commercial livestock sector, which is technologically underdeveloped, has declined drastically over the past thirty years and currently has a much reduced impact on supplies for the market. Though, there is capacity to increase participation in the market of the family sector, if there were effective activities to support them into commercial based livestock development. A more developed national livestock industry will be an accelerating factor for production and will contribute to import substitution.

2.4 Food and feed safety regulations

There are as many as 13 institutions involved in one or more aspects of food safety regulation and implementation in Mozambique. Annex 1 gives an overview of the different institutions, their mandate and their location in the food chain. There is no lead agency responsible for the entire food safety system although the Department of Environmental Health at the Ministry of Health seems to lead the food safety enforcement (Munguambe and Hendrickx, 2011). This often leads to obscurity in the division of responsibilities between Ministries.

The main food laws in Mozambique are comprised in the *Colectânea de Legislação no Âmbito da Higiene Alimentar* from 1994. The law states that meat must display a stamp of inspection by a certified inspector. This is almost always the case for meat from the abattoir, however, this meat represent less than 10% of the meat consumed in the country. The vast majority of meat is slaughtered and sold informally. Meat from the abattoirs is sold at butcheries and is estimated to be around 60% more expensive than the meat sold at informal markets, where no inspection takes place.

Competir com Qualidade, the Private Sector and Quality Promotion Programme in Mozambique, funded by the European Union and the Government of Austria and implemented by UNIDO, has been supporting the development of a national quality infrastructure and related services. It aims to strengthen food safety capacities in various areas, such as water, fishery products and food testing (UNIDO, 2015).

Export producing companies for Europe, in particular, have acquired certification under EurepGAP/GlobalGAP Standards, and they are covered regularly by foreign inspections. One Horticulture company operating in Mozambique, named *Companhia do Vanduzi SA*, has certification on BRC Global Standard Food and is currently exporting to the EU. There is not a single company certified under the food safety management system (ISO 22000). In addition, no laboratories or calibration services have been accredited under the ISO 17025 standard (Munguambe and Hendrickx, 2011).

The key legislation, governing manufacture and sale of animal feeds in Mozambique is Order No. 23.358 and is approving the regulation on production and trade of forage for animal consumption. This legislation was passed in August 1970 and consists of 37 articles specifying the sanitary procedures to be satisfied in order to produce and market forage for animal feed. It establishes the maximum limits of additives to be contained in such products (specifying the type of additive). These products must display the ingredients on the label and satisfy the packaging requirements as detailed in the text. Sanctions for illegal activities are prescribed.

The National Directorate of Veterinary Services is responsible for all legislation and regulation pertaining to livestock in Mozambique, including this animal feed legislation.

There is no Good Manufacturing Practices (GMP) legislation in place, outside of the current legislation. The manufacturing sector in general is receiving a great deal of attention from the international donor community, to improve its weaknesses. Since these affect Mozambique's access to international markets as well as the country's ability to get involved in value-added activities. This also applies directly to the animal feed industry, where shortcomings in various sanitary controls exist (Whitehouse and Associates, 2011).

There is no special legislation on the quality of milk in Mozambique.

2.5 Climate and its effect on agriculture and livestock in Mozambique

Agricultural production fully depends on and is influenced by climate factors such as higher temperatures and dryer areas versus higher rainfall with changing rainfall patterns in other parts. Such changes in climate result in changing crop yields, changes in biodiversity, higher water use (irrigation) in some areas, and changes in soil fertility conditions (IPCC, 2014).

Mozambique is one of Africa's most vulnerable countries to climate change (Netherlands Commission for Environmental Assessment, 2015). The changes in weather patterns that Mozambique experiences, such as droughts, floods and cyclones, are having a strong impact on an insufficiently prepared country. Mozambique ranks 137 out of 177 countries in the ND-GAIN index (2013). It is the 28th most vulnerable country and the 55th least ready country.³ The change in rainfall patterns is shown through the changes in average annual rainfall, which has decreased significantly at a rate of 3.1% per decade between 1960 and 2006. At the same time, the proportion of rain falling in heavy rain events has increased at a rate of 2.6% per decade. Climate projections show a significant average temperature rise (ranging from a minimum increase of 1.0°C to a maximum increase of 4.6°C for 2010-2100). Highest increases are expected for inland and southern regions, especially the Limpopo and Zambezi valleys (up to 3.0°C increase by 2055), but also in coastal areas (Climate Service Centre, 2013; McSweeney et al, 2010; Van Logchem et al, 2012).

Not only crops are affected by climate change; climate change also has direct and indirect effects on animal production. Direct effects can be felt through heat distress suffered by animals that will reduce

³ GAIN index summarizes a country's vulnerability to climate change and other global challenges in combination with readiness to improve resilience. <http://index.gain.org/country/mozambique>

the rate of animal feed intake and result in poorer performance. Indirect effects are caused by the impact of climate change on grassland and rangeland productivity.⁴ Areas where lack of water and increased frequency of drought may occur, may experience a loss of resources.

Livestock not only suffers from climate change, it is also a contributor to climate change, e.g. through methane emissions. However, there are strategies to mitigate the effects of livestock production on climate change, such as improved productivity and professionalization of post farm gate dairy value chain to reduce milk losses and improve nutrient efficiency for sustaining dairy growth in the long term.⁵

Livestock management practices mitigating environmental effects of livestock keeping, should focus on sustainable intensification and adaptation to current and future production environments. This includes improvement of genetic resources, that are efficient and well adapted to extreme temperatures, low quality diets and greater disease challenges. Future livestock development programmes in Mozambique need to be built upon these considerations.



Figure 2 Natural grazing areas in Mozambique

⁴ <https://www.ifad.org/documents/10180/48b0cd7b-f70d-4f55-b0c0-5a19fa3e5f38>

⁵ De Vries, M., et al, 2016: *Greening of Ethiopian Dairy Value Chains:*

Evaluation of environmental impacts and identification of interventions for sustainable intensification of dairy value chain. Wageningen UR Livestock Research. Commissioned by Agricultural Transformation Agency, Ethiopia. In print.

3 Poultry Value Chain Analysis

3.1 Background

Broiler production has been growing strongly over the past 5 to 10 years in Mozambique. From a situation in the beginning of this century, in which Mozambique depended for 65% on imports to cover the demand for poultry meat, this import dependency reduced to 25% over the last ten years. This led to a situation, in which the country could become self-sufficient. Several players, such as NGOs, private companies and governmental departments contributed to this success. The sector was instrumental in building up the poultry industry by creating the Mozambican Poultry Producers Association (AMA), developing advertising campaigns and recommending import requirements that would protect health and safety without constraining trade. Support was based on a study, which concluded that the supply of chickens was not up to standards. This was because of import of Brazilian broilers from Middle Eastern countries, which were relabelled at the end of their shelf life and cheaply sold on the Mozambican market.

At the beginning of the interventions undertaken in the sector (in 2005), Mozambique clearly was not able to compete on cost price with imports from Brazil. This was mainly because most of the necessary inputs, especially protein sources still needed to be imported. In order to address that problem, the production of soya was stimulated. After extraction of the edible oil, the soya cake formed a protein rich source for poultry feed, which was as such made available locally. Furthermore, training to all stakeholders in the poultry value chain was provided as well as micro-credit through the implementation of the FINAGRI⁶ project. This project provided loans for activities that were not funded by commercial banks. The AMA was established, which successfully lobbied against the dumping of expired broilers. Moreover, a successful marketing campaign (the “Frango” chicken) was launched and helped to raise awareness of the consumption of locally produced broilers.

As a result of these interventions, the poultry industry has grown strongly over the past decade and was able to reduce dependency on imports and to create a large number of jobs in the country. In 2012, the poultry sector had grown from a \$25 million industry to \$165 million industry. It created 3,385 jobs in hatcheries, abattoirs and feed mills, 5,333 jobs on smallholder poultry farms and increased income for 90,000 smallholders. The Mozambican soybean sector had grown from 2,000 to 30,000 farmers and had stimulated an expanded domestic vegetable oil industry (Karnani *et al*, 2014). The layer industry was and still is not as well developed as the broiler industry. An estimated 90 % of the eggs consumed in Mozambique still need to be imported from neighbouring countries (FAO, 2013).

3.2 Actors in the poultry value chain: general introduction

The growth in production over the past ten years was made possible through a strong collaboration between the private sector, the government, NGOs and lobby organisations (AMA). The combination of lobbying, linking partners in the value chain, stimulating local cultivation of feed sources has been the pillar of the improvement in local production. The poultry industry needs 5 major types of inputs: day-old chicks, feed, veterinary (vaccines, medicines), housing equipment and knowledge providers (training, extension).

1. Day-old chicks

⁶ FINAGRI is a grants programme to stimulate agribusiness.

Day-old chicks are provided by the hatcheries in the country, which mainly use imported hatching eggs. There are only two integrations in the country keeping their own parent stock to produce the hatching eggs. Parent stock management is rather complicated and requires highly specialised and experienced farm management, which is hardly available in Mozambique at the moment.

2. Feed mills

Feed is provided by several feed mills throughout the country, of which the majority belongs to the larger integrations. Most of the feed mills supply two types of feed: a starter feed for the first two weeks and a finisher feed for the remainder period. Most feed mills provide both a full starter and finisher feed. In addition, they provide these two types in a concentrated form, to which the farmers still have to add maize as an extra component. The advised ratio given by the milling companies is usually adhered to by the producers.

3. Veterinary services

Veterinary services at a more collective scale are provided only by the full integrations using the out grower system. In all other cases, the veterinary care (vaccinating, disease control and treatment) is the responsibility of the producers themselves. They buy their vaccines and medicines either from the integrators or from local agro input suppliers. The absence of good veterinary services and the often inexperienced starters are a great risk to both animal and human health, as it may lead to unnecessary usage of antibiotics, which can easily lead to resistance.

4. Housing equipment

Poultry, both laying hens and broilers, need adequate housing and appropriate equipment, such as feeders, drinkers, and in the case of laying hens nests are needed, if they are housed in free range systems. Basic building equipment (wood, zinc sheets, wire mesh, poles, cement etc.) are locally available and can be used to build locally appropriate poultry houses. Most important points to consider are space per animal (overstocking must be prevented) and a good ventilation to ensure a healthy, and preferably a relatively cool and constant climate inside the houses. To reach the latter, the possibility to regulate temperature during cold nights by installing curtains to close the wire mesh walls is recommended. Drinkers and feed troughs are available in various shops at village level.



Figure 3 Poultry housing, using basic locally available building material

5. Training and extension

Training and extension are still required on a large scale, despite improvements in knowledge and skills resulting from several projects in the region. The growth in number of producers is not matched by an equal number of trainers and extensionists. As one farmer mentioned during the field visits in Catembe: it takes 8 to 10 rounds of broilers, or up to 2 years to become a skilled and experienced farmer. During that learning period, many inefficiencies enter the system and several farmers drop out again, rendering their investment worthless. There is no government poultry extension service, since poultry is not a part of the livestock curricula. Besides, only a few private companies engage in training activities. The full integrators provide training and advisory services to their out growers through a public-private venture from Cargill that invested in a three year partnership with the Aga

Khan Foundation to provide support for the Bilibiza Agricultural Institute (vocational school for agriculture in Cabo Delgado Province).

Producers

The producers can be characterized (following FAO standards, FAO, 2013) as mainly small scale (< 1,000 broilers) and some medium scale (1,000 – 10,000) with relatively few growers having a housing capacity of over 10,000, apart from the production sections of some of the larger integrations. Most of the small-scale producers in Mozambique are independent producers, buying day-old chicks and feed from the major suppliers/integrators. They are themselves responsible for the sale of the broilers when the broilers reach slaughter age. Approximately 76% of the broilers are sold alive, the rest is slaughtered. The broilers from small-scale producers that participate in the out grower scheme of integrators are taken back by the integrator to be slaughtered in their facilities. The most prominent example of such a scheme is *Novos Horizontes* in Nampula.

Poultry meat in Mozambique is produced by a growing number of broiler farmers. There are a handful of large-scale poultry integrations or producers, who dominate supply of the main inputs (day-old chicks and feed). Main poultry producing areas in the country are around Maputo, Chimoio and in Nampula.

Broiler producing areas in the ZVDA operational area are in order of importance Chimoio, Beira and Tete. Especially Chimoio has a fairly well established poultry industry. Inputs in this area are provided by one large supplier (*Empresa Avicola Albillio Antunes*) of both day-old chicks and feed. The present capacity of this company in terms of provision of day-old chicks and feed, also determines the size the broiler industry in the area can develop into. Since feed import is possible from other regions of the country, but relatively expensive due to additional transport costs.

Government

The most important role of the government in this regard is under the responsibility of the Department of Veterinary Services of the Ministry of Agriculture. The main task of the Department is disease control and prevention. The current network of veterinary assistance needs improvement, to prevent risks to the further development of the poultry sector. For example, professional disease control and prevention (also for backyard chicken) is essential for the poultry industry's expansion.

3.3 Poultry production systems in Mozambique

In Mozambique, poultry production can be categorized into scavenging, smallholder and commercial systems. While the commercial system of intensive production is typically located around main cities and large towns, the scavenging system is dominant in rural areas, communities and villages. Both systems vary widely with respect to numbers and diversity of birds, bio-security and management practices. In Mozambique, as in many other African countries, eggs and poultry meat are important sources of animal protein. Poultry, and chicken in particular, are fast growing and prolific animals that produce meat and eggs over a short time-span. In a country such as Mozambique, where two thirds of the territory is infested with the tsetse fly that limits cattle production, poultry production is of great importance (Mata et al., 2000). By 2009, Mozambique's poultry industry accounted for 0.3% of its GDP. This percentage could easily double in the near future, if projected private investments are implemented. At least two of those investments are being made by American companies, facilitated by TechnoServe as part of an USAID program, including one in a large egg laying operation in Nampula province (TechnoServe, 2011). However, the development of this production is still far from meeting the needs of the Mozambican population. The poultry industry faces a number of challenges, in particular management, nutritional deficiencies, diseases and adverse climatic conditions.

Mozambique, like other tropical countries, experiences weather conditions that favour the growth of fungi and mycotoxins in feed ingredients. Warth et al. (2012) cited by Dos Anjos et al. (2015) reported that 46% of maize samples in Mozambique were contaminated with Aflatoxin at concentrations ranging from 16.3 to 363 µg/kg with an average concentration of 114 µg/kg.

The majority of the officially marketed poultry meat comes from broiler chickens produced by the co-operative and private sectors, whose holdings are close to the main urban centres. The largest producers include the General Union of Agricultural and Livestock Cooperatives (UGC), Mozambique Farms, the Mozambique National Poultry Association (AMA) in the south of the country; *Frangos de Manica*, *Empresa Avicola Abilio Antunes* in the Manica province in the central part of the country; and *Novos Horizontes*, *Frangos King* and *Pintainhos Stewart* in Nampula province, in the north of Mozambique.

Private livestock, feed, and veterinary companies sell day-old chicks imported from South Africa, Zimbabwe and Malawi, which are generally raised indoors for 35 days. The feed quality is high, although variability in feed quality is a major problem. Poultry houses are made by using baked bricks with a tin roof and inside each house, there are feeders and drinkers. Generally, there is minimum health care based on vaccinations against ND, Gumboro and Infectious Bronchitis, but this varies considerably.



Figure 4 Well developed professional poultry house



Figure 5 Poultry house using local building materials

3.4 Geographical distribution of poultry flocks

In 2009, the national chicken population was estimated at 23,922,192 birds (Ministry of Agriculture, , 2010). This includes all local scavenges birds and commercial farms. Statistics of the Ministry of Agriculture (2013) indicate that in 2012 there was a reduction of 23.83% in poultry number, see Table 3. The highest concentration of chickens was found in the central part of the country (Sofala, Manica, Tete and Zambezia) with 39.1% of the total national flock. The share of the northern part of the country was 21.7% of the national flocks and the south had a share of 30.8%.

Table 3

Distribution of poultry by provinces in 2012 (10³ birds), Source IAI, 2013

Region	Province	Chickens	Ducks	Geese	Turkeys	Guinea fowls
North	Niassa	660 829	86 580	-	3 334	14 027
	C.Delgado	1 198 005	135 949	-	-	-
	Nampula	2 091 273	305 120	-	6 316	50 727
Centre	Zambezia	3 939 257	235 400	-	6 358	26 478
	Tete	1 305 810	45 664	-	-	16 085
	Manica	1 871 738	86 034	-	27 494	98 988
	Sofala	1 540 960	132 054	45	8 263	125 862
South	Inhambane	1 095 436	231 205	350	21 634	15 163
	Gaza	950 772	155 162	1 298	411	4 901
	Maputo	3 568 125	386 631	1 484	1 931	25 666
Total		1 822 205	1 799 799	3 177	75 741	377 897

3.5 Production of chicken meat

Figure 6 shows the production of chicken meat from 2004 to 2011.

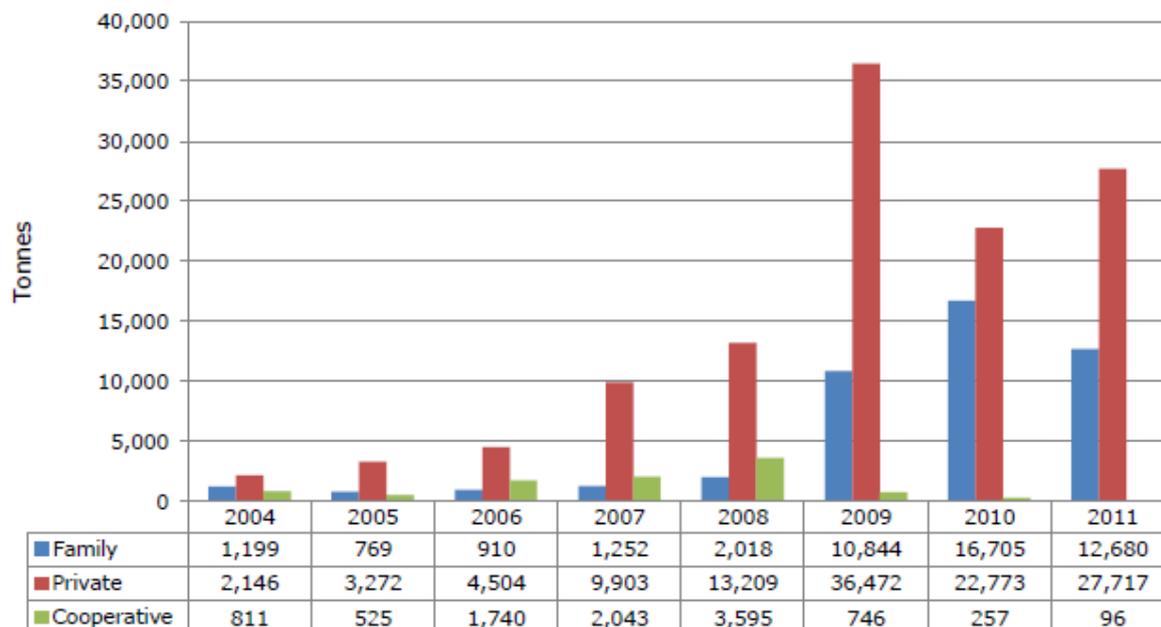


Figure 6 Chicken meat production, source FAO, 2013

In 2014, the total of production chicken meat reached 63,631 tonnes, 12,330 of which were derived from the small family sector⁷, 3,085 tonnes from the private sector⁸ and 20,443 tonnes from the cooperative sector⁹. In 2014, the province of Maputo was the largest producer of chicken meat, with a production of 36,507 tonnes of meat (57.4%), followed by Manica province with 11,858 tonnes (18.6%), and Nampula province with 11,224 tonnes (17.6%). The provinces of Niassa, C. Delgado, Zambezia, Tete, Sofala, Inhambane and Gaza only had a share of the total production between 0.43% (Zambezia) and 1.6% (Gaza and Inhambane). With the exception of the province of Manica, the broiler production in the Zambezi Valley is quite weak as is shown in Table 4.

Table 4

Chicken meat production in Zambezi Valley (tonnes)

Province	Productive sector	2010	2011	2012	2013	2014
Zambezia	Family	6.4	103.7	95.7	128.1	276.1
	Private	110.5	0.8	1.2	0.0	0.0
Tete	Family	67.8	149.5	336.9	341.5	332.8
	Private	161.1	149.1	29.7	65.8	151.2
Manica	Family	537.4	634.0	720.9	972.4	1 188.9
	Private	8 173.8	8 116.8	8 977.9	10 165.8	10 671.6
Sofala	Family	11,1	8.3	2.9	6.5	103.1
	Private	67.6	135.4	240,3	275.4	338.9
Total	Family	611.6	895.5	1 156.4	1 448.5	1 900.9
	Private	8513	8 402.1	9 008.8	10 507.0	11 167.7
Total		9 124.6	9 297.6	10 165.2	11 955.5	13 068.6

Source: DINAV, 2015

⁷ Family sector: Farmers who keep about 300-500 birds per cycle (small scale farmers)

⁸ Private sector: Industrial and integrated production

⁹ Cooperative sector: Farmers rearing 500 to 2000 birds/ cycle (small scale commercial farmers)

Five years ago, only the Changara district produced chickens for slaughter. Today, the major production centres are located in the Moatize and Changara districts and around Tete city. In the Moatize district, the Catembe community started a broiler production with support of Vale companies as part of their relocation and corporate responsibility program (Américo da Conceição, oral communication, January 26, 2015). There is one association with 172 members raising day-old chicks until 35 days, mainly consisting of household or family owned farms of 300-750 birds. This group of farmers is supported by BONIMAR (a supermarket chain) which provides day-old chicks, feed, medicines and vaccines. This program promotes the training of farmers. Moreover, it promotes the constructions of poultry houses made with local materials, which greatly decreases the total investment costs and contributes to reduce the heat in the poultry houses. These small producers receive technical support from the government, private sector and extension agents, who give advice and make regular visits to monitor the production. The program supports the farmers during the first three production cycles. After completion of these three cycles of production supported by the program, the poultry farmers are invited to continue producing by themselves. This means that they have to continue to buy the day-old chicks, feed, medicines and vaccines themselves. Of the 172 producers, only 46 continued the activity (27%). Apart from these small producers, there are a few others with greater capacity to produce. For example, Mitete Commercial has 10 poultry houses in Tete with a capacity of 5,000 chicks per cycle. An expansion with another pavilion with a capacity of 10,000 chicks is being built.

3.6 Cost price of broilers

The cost price for producing a broiler of 1.5 kg live-weight is estimated as follows¹⁰:

Table 5

Cost price calculation of broilers

Cost price calculation for Broiler production per unit for individual farmers	Cost (metical)	Cost (US\$)
Day-old Chick	27	0.84
Feed	51	1.59
Labour	5	0.16
Depreciation	5	0.16
Health (vaccines etc.)	3	0.09
Total costs	91	2.84

Most broilers are sold alive at prices between 110 and 130 Metical each¹¹. For slaughtered birds, more or less the same price is paid, see table 6 underneath. Slaughtering at a small scale is, therefore, not really attractive. Slaughtering on-farm when birds cannot be sold directly to consumers in certain times of the month, is only done to avoid higher feed- and other management costs of keeping birds alive for an unnecessary long period, until they can be sold again in the local rural market. Thus, slaughtering is only feasible as a separate commercial business, if it is undertaken at a large scale, in a very efficient type of operation.

Table 6

Selling prices poultry products

¹⁰ Based on visits and interviews with various farmers in Tete and Chimoio Provinces, March 2015:

The exchange rate used for March 2015 is 32 MET per US\$. (see also Preface at page 5)

¹¹ This cost price calculation is based on actual market prices of March 2015

Retail	Location	Brand	Weight (Kg)	Price (US\$)	Price (Mzn)	Origin
Moatize / Tete market	Catembe community	Local	1.2	150	4.69	Mozambique
Local chicken market	Chimoio	Local	Live	130	4.06	Mozambique
Shoprite	Chimoio	Perix	1.1	159	4.97	Brazil
VIP Supermercado	Chimoio	Perix	1.1	145	4.53	Brazil
Shoprite	Chimoio	Nacional	0.9	125	3.91	Mozambique
			1	129	4.03	
			1.1	135	4.22	
			1.2	140	4.38	
			1.3	155	4.84	
			1.4	159	4.97	
Shoprite	Chimoio	Swazi Highland	1.1	129	4.03	Swaziland
			1.3	159	4.97	
Shoprite	Beira	Galinha local	1.1	200	6.25	Local chicken
		Nacional	1.2	129	4.03	Mozambique
		Perix	1.1	159	4.97	Brazil
Local chicken market Beira	Beira	Local	1.1	120	3.75	Mozambique
			1.5	150	4.69	

The large slaughterhouses in Maputo pay between 68-74 Metical (\$2.13-\$2.38) per kg live weight, which is equivalent to an average of 105 Metical (\$3.28) per live broiler.

3.7 Production of consumption eggs

Although still far from meeting the needs, from 2010 to 2014, an increase of the domestic egg production occurred (see Table 7). The private sectors represent 91.7% of the total egg production, followed by the family sector with 7.3% of the total egg production.

Table 7
Egg production (dozens)

Region	Province	2010	2011	2012	2013	2014
North	Niassa	0	16 021	30 755	578	0
	C.Delgado	2,589	11 605	11 121	10 149	11 200
	Nampula	400 874	447 116	1 048 276	1 452 404	1 652 083
Centre	Zambezia	0	0	0	0	0
	Tete	0	90	0	0	0
	Manica	2 978 965	3 130 501	4 137 788	3 684 183	2 594 947
South	Sofala	0	935	5 684	1 800	150
	Inhambane	18 210	40 693	311 706	285 767	205 973
	Gaza	78 402	37 665	37 576	21 000	15 000
	Maputo	1 437 303	3 879 139	4 552 353	4 208 106	4 614 999
Total	Family sector	198 592	342 470	1 446 054	608 646	661 687
	Private sector	4 717 751	7 208 295	8 359 633	8 954 677	8 340 365
	Cooperative	0	0	329 572	97 070	92 300
	Total	4 916,343	7 559 765	10 135 259	9 663 987	9 094 352

Source: DINAV, 2015

According to Ricardo (Personal communication, 2016) who benefitted from a social development programme in Tete, there are many problems in egg production, most notably: the high cost of ration; lack of an easy accessible market for the eggs; and the distribution of the feed is not regular (e.g. for 2 months he had no feed for the birds). He also said that the company (Shimatsatsa) that sells medicines and layers cannot meet the needs in the supply of products. Ricardo has 99 layers and produces around 70 eggs per day and sells them for 180 meticaís per 30eggs in Moatize. Unfortunately, he cannot sell the eggs and consequently has difficulties with returning the loan. Therefore, he prefers to produce broiler chickens because the layer production is more difficult, mainly due to the poor availability of feed.

3.8 Trade of chicken meat and eggs import

The eggs and chicken meat consumed in the main urban centres, come almost exclusively from countries such as: South Africa, Swaziland, Brazil, Zambia, Zimbabwe and Malawi (DINAV, 2013). The amount of imported chicken meat and table eggs are shown in Table 8 underneath. However, a lot of eggs consumed in Maputo enter the country illegally from Swaziland and consequently no data is available.

Table 8
Importation of chicken meat and table eggs

	Unit	2010	2011	2012	2013	2014
Chicken meat	Ton	6 788	6 069	3 932	13 318	5 138
Table eggs	Dozen	5 538 924	451 233	416 871	2 650 254	2 801 549

Source: DINAV, 2015

Recorded domestic production is small (approximately 5% of the total eggs consumed in formal market circuits) and comes from the peri-urban areas (FAO, 2013). There is no systematic information on egg production or consumption in the rural areas (Ministry of Agriculture, , 2010). It is estimated that only 20% of the households consume the eggs from their own chickens, while the remaining eggs are hatched (ILRI, 2011).

Marketing and distribution of poultry products:

Chickens from commercial production systems are sold live at local markets or slaughtered and frozen by supermarkets or butchers. Eggs from commercial production systems tend to be sold door-to-door or through supermarkets and butcher shops. The local type of birds (village chickens) tend to be sold live door-to-door or in urban markets for higher prices than commercial birds. Eggs from local breeds tend not to be sold to customers. Large variations in the official import of eggs may be due to variations in the production of eggs in the country. Many producers start with the production of eggs, but give up very quickly, claiming that it is very costly to produce. On the other hand, many eggs get into the country outside the control of the authorities and are sold cheaply in the market.



Figure 7 Local chicken seller, Beira



Figure 8 Chicken market, Beira

The Association of Poultry Producers (AMA) estimates the current consumption at 75,000 tonnes (63 million broilers)¹². 75% of the current consumption is locally produced (56,000 tonnes or 48 million broilers) and 25% imported (19,000 tonnes or 15 million broilers). This equals an annual consumption of almost 3 broilers per capita. Growth in demand is expected to be outweighing production in the years to come, which may cause a rise in imports from Brazil once again.

3.9 Integrated poultry chains in Mozambique

There are only 4 integrated poultry chains in Mozambique, namely: *Empresa Avicola Abilio Antunes*, *Novo Horizontes*, Astral Foods and Frango King.

Empresa Avicola Abilio Antunes: Currently, Antunes has only one integrated poultry farm in Mozambique and is based in Chimoio, Manica province. It has a bio security level in accordance with international standards and is vertically integrated with separate profit centres: a parent stock, hatchery, poultry farms, slaughterhouse and a feed mill. Antunes keeps both broilers and layers. The company procures an estimated 13,000 tonnes of soybean and 20,000 tonnes of corn annually (AGRIX, 2012).

Novos Horizontes (NH): NH started in Nampula in 2005 and had some early support from TechnoServe as well as a Dutch PSOM subsidy. NH now supplies 40,000 day-old chicks per week from 187 out grower families, which produce 40 tonnes of poultry per week. Families build a chicken house according to NH specifications, including a bio security fence. NH provides day-old chicks and feed (AGRIX, 2012). NH has recently expanded into egg production and expects to involve out growers as well. Each farmer receives approximately 1,600 day-old chicks and feed. The one day-old breeder's chicks come from surrounding countries such as Zimbabwe, Zambia and South Africa (FAO, 2013).

Astral Foods: One of South Africa's leading integrated poultry producers establishes itself as an integrated broiler producer in Mozambique. Construction began in 2011, 45km south-west of Maputo. The company initiated its presence by establishing a feed mill (Meadow Mozambique Limitada) in 2010, in partnership with a local businessman and farmer. Presently, it produces 12,000 tonnes of animal feed on average per year. A hatchery and a breeder farm opened in 2012 near Mozpintos. The hatchery has a capacity of 158,000 day-old chicks per week. Three poultry houses will be refurbished to house broiler breeders. In addition, Astral plans to build three new broiler breeder sheds, allowing the hatchery to become self-sufficient in supplying hatching eggs (AGRIX, 2012).

Frango King (FK): FK is owned and operated by the African Century (a Mauritius based investment fund) and is one of the largest poultry producers and distributors in northern Mozambique (Nampula). FK produces and distributes day-old chicks, poultry feed as well as live and frozen birds. These products are sold domestically, through their own network of shops. Current production is around 3 million birds per year. The business is fully integrated with its own hatchery, feed mill, production, processing and distribution (AGRIX, 2012). To ensure the feeding of birds, FK has contracts with soya producers in the district of Gurué in Zambezia (Sergio Gouveia, oral communication, December 2015).

Table 9
Main poultry integrations in Mozambique

Name	Products	Area of operation
Higest	Day-old chicks, feed, broilers	Maputo
Manmart		Maputo

¹² Loko Roger, secretary AMA, interview.

Astral Foods	Day-old chicks	Maputo
General Union of Agricultural and Livestock Cooperatives (UGC)	Broilers	Maputo
Empresa Avicola Abilio Antunes	Day-old chicks, feed, broilers	Chimoio
Novos Horizontos	Full broiler integration using out-grower system	Nampula

3.10 Poultry Farmers Association

In Mozambique, there is an Association of Poultry Producers (AMA), that possesses branches in Maputo and Chimoio, ADAM and APAM respectively. APAM, the organization of Chimoio broiler producers, has currently 11 associated out growers. Antunes (see 3.9) supplies one day-old chicken to APAM members. However, sometimes there are no chicks available, in case Antunes needs them for its own production. Therefore, APAM intends to set up parent stock and a hatchery itself and is subsequently in need of working capital. Feed is no limitation. The APAM chairman produces 1,000 broilers per 45 days. APAM is presently preparing a business plan for expansion, assisted by CEPAGRI (AGRIX, 2012).

In the last years, the government works with the AMA, to improve the environment for the poultry industry. For instance, a credit line of approximately US\$620,000 at low interest rates was created through a partnership with a major bank to benefit poultry producers in the south of the country. The pilot has been successful and will be rolled out to other producers across the country.

3.11 Breeding stocks and hatching eggs

Hatcheries exist, but no eggs for reproduction are available locally, at least not on an industrial scale. Eggs for reproduction are nearly all imported, apart from the Antunes' and Novos Horizontos' integrations that keep their own parent stock. Hatching eggs are mainly imported from the neighbouring countries, since importation from Europe would be too expensive and is as such not competitive. Day-old chicks are often imported from Swaziland, Zimbabwe, Malawi or South Africa and sold locally. Thus, there is a clear need for more investments in the production of day-old chicks.

Table 10

Potential sources for fertile eggs

Zimbabwe	South Africa	Mozambique
Suncrest Chicken	National Chicks	Mozpintos (Astral Foods)
Ross Breeders	Astral Foods	Higest
Irvine's	CobbAfrica	TM Holdings
CFI Holdings		

Table 11

Distribution of incubators in the country

Province	Incubators	Capacity	Chicks Produced (2009)
Maputo	6	31 137 736	13 711 961
Manica	1	7 280 000	6 115 279
Nampula	2	4 149 600	2 613 391
Total	9	42 567 3360	22 440 631

3.12 Slaughtering facilities

Nowadays, there are 12 poultry slaughter houses registered officially in Mozambique. They all supply slaughtered and processed chicken to the urban market of the larger towns in Mozambique. Six slaughterhouses are located in Maputo, four in Manica, and two in Nampula.

Table 12
Poultry slaughterhouses by province

Provinces	Numbers	Installed capacity	Produced (2009)
Maputo	6	33 820 800	3 599 103
Manica	4	11 012 400	3 112 000
Nampula	2	10 608 000	729 926
Tete	1	1 144 000	144 300
Total	12	56 585 200	7 585 329

Source: FAO, 2013



Figure 9 Most broilers are still sold alive, **Figure 10** New slaughterhouse under construction, a ZVDA investment directly to consumers

3.13 Poultry feeds

Mozambique has seen a large increase in the production of sources intended for animal feed, mostly driven by growth and development of the poultry production chain. Corn and soybean meal are the main sources of feed ingredients for poultry production in Mozambique. The relatively high cost of these feed ingredients, still contributes to increased costs of chicken meat and eggs. The production of soybean is still growing strongly in the country, which is expected to lead to a lower feed price in the medium to long term. According to the farmers in Moatize, the price of the feed for broilers is 1,650.00 meticaís per 50kg and for layers 1,450.00 meticaís per 50kg (January 2016).

The main feed industries are located in the provinces of Maputo, Manica and Nampula. These produce various types of animal feed, mainly for poultry. In Maputo, there are three large factories, namely HIGEST, CIM (Companhia Industrial da Matola) and UGC. UGC has got two plants, one with a capacity of six tonnes per hour and the other of ten tonnes per hour (FAO, 2013). In the province of Manica, the factory of Antunes produces 780 tonnes per month. In Nampula, the three existing factories produce 3,006 tonnes monthly.

At the moment, only 12 factories are registered: Maputo (5); Manica (3), Nampula (3) and Niassa (1). Apart from these factories presented above, there is some other small scale unregistered production of chicken feed.

Table 13 shows the feed production from 2010 to 2014.

Table 13
Feed production from 2010-2014 (tonnes)

Province	2010	2011	2012	2013	2014
Maputo	7 2107.9	3 9419.4	172 117.2	74 201.5	521 134.0
Manica	1 2565.6	2 3645.7	34 478.3	35 596.9	32 222.0
Nampula	9219.5	11 922.3	13 622.6	14 189.7	18 968.0
Niassa	0.0	0.0	0.0	258.2	676.8
Total	9 3893.0	74 987.4	220 278.5	124 246.3	573 000.8

Source: DINAV, 2015

In Maputo the production shows fluctuation, while in Nampula province growth is clearly visible. In 2009, there was capacity to produce 619,494 tonnes of feed, however, only 81,834 tonnes (13.2%) were actually produced. This was due to shortage of ingredients, most of which were being imported. The total production of compound feed in 2014 was 573,000.8 tonnes. From the total amount, 90.9% was produced in Maputo and 5.6% in Manica province (DINAV, 2015).



Figure 11 *New feed mill near Chimoio*

Table 14
Imported feed and feed ingredient (tonnes)

Items	2004	2005	2006	2007	2008	2009	Change 2008/09
Concentrates	12 292	1 976	5 120	2 294	8 211	9 400	14.5%
Different Feed	122	1 780	3 410	4 515	7 741	15 147	95.7%
Soy meal	660	1 814	4 190	2 008	1 934	7 543	290.0%
Sunflower cake	192	836	2 360	9 806	0	0	.
Fish meal	1 777	1 264	3 207	1 948	21	0	-100.0%
Meat meal	26	270	30	0	0	0	.
Dicalcium Phosphate	18	0	0	149	911	845	-7.2%
Molasses	0	0	0	109	0	0	

The largest producer of chickens is located within the areas of lower production of corn and soybeans. Figure 12 shows where chickens and soybeans are produced (FAO, 2013).



Figure 12 Locations of poultry producers and major soybean production, source: AGRIX, 2012

3.14 Current policies, legal framework

Poultry production is nowadays still under pressure of imports, both of frozen chicken and eggs for consumption. According to PNISA (Ministry of Agriculture, 2014), to support the nationwide production of chicken a technology transfer programme (PITTA) is being implemented in the districts. Within the context of this investment plan, and with a view to meet the needs of the productive sector, the following actions are proposed to be implemented in coordination with CEPAGRI:

- The establishment of 6 chicken processing and conservation units with a total slaughter;
- Capacity of 30.000 poultry per day and a cooling system with a capacity of 30 tonnes in the provinces of Niassa, Nampula, Zambezia, Tete, Sofala and Maputo;
- The establishment of batteries for the production of consumption eggs in the provinces of Niassa, Nampula, Tete/Angonia, Sofala/Beira, Manica/Barué and Maputo;
- Investment in local market development to improve food availability, access and use of eggs for the poor and undernourished population. In particular encouraging and supporting the addition of poultry/egg production to existing outgrower schemes.

3.15 Strengths and weaknesses of the poultry sector

The poultry sector can in general be characterised as having shown a strong growth over the past decade based on enthusiastic contribution of virtually all stakeholders in the process. Several services and farm level management quality still need attention for improvement.

Table 15

Strengths and weaknesses of the poultry sector

Strengths	Weaknesses
Experienced strong growth in the broiler sector over the past decade through strong collaboration with government, private sector and NGOs	Layer sector still poorly developed
Strong lobby organisation	Shortage of locally produced day-old chicks, too high dependency on imports.
Successful national marketing campaign implemented	Quantity and quality of available feed still insufficient (no good coverage across the country)
Improved availability of soy as feed protein source	Poor poultry veterinary services, inadequate disease control
Poultry housing can easily be established, with mainly local building materials	Poorly developed training and extension services
Commercial poultry keeping can easily be started by small scale producers, does not need large investments	Still strong preference for "wet market" which can be a threat to bio security
Vaccines and other inputs are easily available from South Africa	Production often still insufficient, due to poor management practices
Good market: chickens are popular all over the country	
Good producer margin at current prices, despite relatively high feed prices (also due to costs of importation from South Africa)	
Improved quality control systems since growth of the sector started	

4 Dairy Value Chain Analysis

4.1 Background

In smallholder systems, which dominate tropical agriculture, cattle (and small stock) are important because they produce much more than food: they provide direct cash income; they are capital assets; they produce manure for use as fertilizer and fuel; and they may be a source of traction for transport and cultivation. Nevertheless, the one function of milk production for human food is in many cases the primary reason for keeping livestock. Milk is produced mostly by cattle, and primordially by those specific breeds, genetically selected for their milk characteristics. Presently, there are fewer than 2,000 classified dairy cows in the country.

Dairy production is an efficient biological system that converts large quantities of roughage (the most abundant feed in the tropics and unsuitable for human consumption) into milk, a high value protein. When there is access to market, dairying is preferred over meat production, since it makes more efficient use of feed resources and provides regular daily food as well as income to the producer.

Milk production in Mozambique used to rely to a large extent on state owned farms, yet most of which were privatized in the period 1994-1997. The result of this privatization led the milk production to fall steadily, due to poor farm management and civil unrest. Though exact figures on milk production in Mozambique are scarce and often conflicting, some indication on local production can be found in the following sources. The Emerging Markets Analysts Report (EMA, 2014) estimates milk production in Mozambique at 82,000 tonnes annually. According to the ILRI Report (ILRI, 2011), only 17% of the total milk consumption in the country is locally produced, that is approximately 14,000 tonnes. Local processing stands at 803 tonnes (2,200 litres daily x 365), which means that just over 13,000 tonnes of milk are produced and sold in the informal market. This is approximately 37 tonnes daily.

There are only four operational dairy plants in Mozambique, three of which process locally produced milk. Two privately owned dairy plants in Chimoio that process approximately 2,000 litres of locally sourced milk) daily, and a cooperative in Beira that processes 1,100 litres daily. The third is a privately owned dairy plant in Maputo that, however, mainly produces cheese from imported milk powder.

The main constraint faced by dairy farmers in Mozambique is the poor physical access to markets, which is exacerbated by their very small-scale production. With only one or two milk cows in production, most farmers produce a surplus of only a few litres of fresh milk per day, if any. It is unfeasible for them to transport fresh milk twice a day to the market. Furthermore, it is uneconomical for dairy processors to collect minute quantities of milk from large numbers of farmers, most of whom are not even living close to the road. What is primarily missing, therefore, is an organized supply chain that connects dairy farmers to the market.

In addition, low productivity prevents farmers to increase their milk surplus. Poor yields are the resultant of poor animal husbandry practices, poor animal nutrition, lack of adapted breeds, infertility, reproduction disorders, and animal diseases. These problems need to be strategically resolved to further the development of the dairy industry in order to attain self-sufficiency and enhance cash income generation for the dairy farmers.

Where temperatures may be relatively high for dairy cows (e.g. ranging from 10°C in the highlands of Manica to over 40°C in the lower Zambezi area), there is a need to adopt dairy cattle breeds resistant to high temperatures. Initiatives to use new breeding technologies to make such breeds available in the country have recently started. The temperature comfort zone for European type dairy breeds ranges from 4 to 24°C. All tropical breeds can tolerate higher temperatures up to 35°C, depending on the breed (Rolf, 2014).

In general, the current dairy sector can be characterized as a constrained market, lacking stimulating government policies, infrastructure and enabling conditions. Nonetheless, there are some interesting new initiatives, showing that despite difficulties, local production can be stimulated and become competitive with imported milk and milk products.

4.2 Actors in the dairy value chain in Mozambique

In this chapter, the actors are described at the national level. The development of the dairy industry, also in the Zambezi area, still depends to a large extent on actors and measures at the national level. There is little specific knowledge at the provincial level, nor in the Zambezi area.

The main actors in the dairy sector are the government (Ministry of Agriculture), NGOs, cooperatives and supplying industry (mainly feed/concentrates industry).

Government:

The Ministry of Agriculture, through the DNSV (National Directorate for Livestock Services), is responsible for regulating the activities of the livestock sub-sector.

The DNSV has six departments:

- Epidemiology
- Animal production
- Hygiene and public health
- Tsetse fly control
- Prevention and disease control
- Wildlife

In addition, there are two support units:

- Planning, monitoring and evaluation
- Administration and finance

At the provincial level, the Provincial Agricultural Directorate (DPA) oversees the activities of the Provincial Livestock Services (SPP). At the district level, livestock activities fall under the authority of the Directorate of District Services for Economic Activities (SDAE). At this level, there is usually only one technician who is responsible for all livestock related activities.

Livestock extension services are provided through the National Agricultural Extension Directorate and the Provincial Agrarian Extension Services, the latter under the supervision of the DPA. As mentioned above, at the district level there is one technician for both livestock and crop extension activities, under the SDAE. DNSV has no line authority over the SPP nor the district-level livestock technicians, and the SPP has no line authority over the livestock technicians under the SDAE.

Dairy cooperative

In Sofala province, a dairy cooperative was created in 2008 to promote milk production. In 2014, the cooperative built a new dairy plant with a capacity of 10,000 litres daily in Beira. This plant currently (February 2015) processes around 1,100 litres daily, which is mainly sold to government institutes in Beira.

NGOs

Presently, there is only one major international NGO active in dairy in the area, namely Lando'Lakes (Lo'L). Lo'L is implementing the Manica Smallholder Dairy Development Program. The project started in 2009 and is sponsored by the United States Department of Agriculture (USDA). The project aims to build Mozambique's smallholder dairy herd and dairy industry in order to meet the market demand for milk and milk products. So far, more than 300 dairy cattle of Jersey breed have been distributed,

which produce around 30,000 litres of milk per month¹³. The milk is sold through three collection centres to a private dairy producer in Chimoio.

Input suppliers:

Input suppliers for dairy production are limited in number. The feed companies provide dairy concentrates, but the demand is low as a result of the dairy sector's small size. Inputs such as breeding material (heifers and semen) are purchased in South Africa by Lo'L. The government and NGO both provide veterinary services.

Main challenges for the dairy sector's further growth are coming from the lack of technical skills of farmers and employees of breeding services, veterinary services and quality fodder production. In order to build up a fully integrated dairy value chain, the development plans for the ZVDA area should pay attention to all these aspects. Moreover, it is necessary to invest in the promotion of the right dairy-breed to further the capacity of the dairy chain. In the more suitable (that is relatively cool climate), the more specialized dairy breeds such as Jersey or Friesian could be used. In the hotter parts a more heat tolerant breed should be available.

4.3 Dairy production In Mozambique

Dairy industry in Mozambique is virtually non-existent, partly due to unfavourable agro ecological conditions, and due to other factors like the long civil war (Johnson *et al*, 2013). The history of dairy in Mozambique began in 1950 and had a course of ups and downs, corresponding with the country's situation. It seems, however, that the resumption of production of the last 15 years can be considered consistent (2nd dairy conference, 2015).

4.3.1 Dairy production nationally

The dairy industry in Mozambique still does not play an important role as a contributor to agricultural GDP, nor is it an important source of livelihood for a larger part of the rural population (Escrivão *et al.*, 2013).

In 2015, the national dairy cattle herd was estimated at only 2,304 heads (DINAV, 2015). The distribution of dairy cattle by province is shown in Table 16.

Table 16

Number of dairy cows, national per provinces (heads)

Region	Province	2010	2011	2012	2013	2014
North	Niassa	0	0	40	40	40
	C.Delgado	23	21	14	62	70
	Nampula	89	75	82	41	14
Centre	Zambezia	0	0	0	0	0
	Tete	0	0	0	0	0
	Manica	523	516	864	983	821
	Sofala	717	739	862	926	1 090
South	Inhambane	0	5	51	43	48
	Gaza	87	88	97	97	116
	Maputo	322	127	129	158	105
Total		1 761	1 571	2 139	2 350	2 304

Source: DINAV, 2015

¹³ Fidel O'Donovan, Country Director LO'L, interview..

In 2014, the total amount of milk produced is estimated at 2,268,700 litres (DINAV, 2015). The distribution of milk production by province is shown in Table 17.

Table 17
Milk production per province (10³ litres)

Region	Province	2010	2011	2012	2013	2014
North	Niassa	0.0	5.8	45.5	42.5	59.3
	C.Delgado	2.6	3.1	3.3	3.8	1.9
	Nampula	36.8	38.9	32.9	60.3	60.6
Centre	Zambezia	107.3	53.8	39.3	85.4	88.2
	Tete	0.0	0.0	0.3	0.2	0.0
	Manica	779.4	894.7	870.8	568.6	666.5
South	Sofala	878.5	889.1	579.5	744.9	772.9
	Inhambane	0.0	9.5	28.6	24.3	43.5
	Gaza	158.2	193.9	218.4	427.9	459.0
	Maputo	118.8	109.5	114.6	66.2	116.8
Total		2 081.6	2 198.3	1 933.2	2 024.0	2 268.7

Source: DINAV, 2015

In 2014, Sofala province was the lead producer of milk, followed by Manica province, Gaza province and Maputo province. The provinces of Niassa, Nampula and Zambezia, only had a share of the total production between 2.6% (Niassa) and 3.9% (DINAV, 2015). It should be noted that the production of the family sector has grown, having contributed in 2014 with 42.7%, thanks to the programs of support for the dairy sector. Besides Lando'Lakes, commercial farmers have three different supply channels of breeding stock, namely government supply of breeding bulls, direct purchases from other local producers and importation from neighbouring countries. The table below shows the amount of processed milk and the milk sold in the informal market.

Table 18
Milk processed and sold from 2010-2014 (10³ litres)

	2010	2011	2012	2013	2014
Processed milk in factory	1657.9	1783.8	1450.3	1313.5	1439.4
Milk sold in the informal market	423.7	414.5	482.9	710.6	829.3

Source: DINAV, 2015

In Mozambique there are very few milk processing plants. The table below shows the number and name of the dairy products company.

Table 19
Manufacturers of milk and dairy products per province in 2014

Province	Qty	Name
Maputo	1	Parmalat
Sofala (Beira)	1	Copolate
Manica	2	DanMoz, AgroMaco
Nampula	1	Rafiza Rostongy

Source: DINAV, 2015

Although, there have been some developments in the dairy processing industry in Mozambique, processed milk is still predominantly imported from South Africa. In 2014, Mozambique imported 191 tonnes of condensed milk (Maputo); 3,113 tonnes of milk powder (Maputo, Manica and Nampula) and 2,358,128 litres of fresh and pasteurized milk (Maputo, Gaza, Sofala, Manica, Tete and Nampula).

4.3.2 Dairy development initiatives in the ZVDA area

In the Zambezi Valley, Manica and Sofala have benefited from a dairy sector development program. **Lando'Lakes** did implement the **Manica Smallholder Dairy Development Program**, a 42-month project that started in 2009 and was sponsored by the United States Department of Agriculture (USDA). The project worked in the districts of Gondola, Macate District, Vanduzi and Sussundenga. The project's goal was to build Mozambique's smallholder dairy herd and dairy industry in order to meet the market demand for milk and milk products. In the first phase, the project had two primary objectives: i) rebuilding Mozambique's dairy industry to meet market demand and ii) increasing smallholder farmers' incomes through participation in a sustainable dairy value chain.

The program provided training as well as improved dairy cows to households and supported the establishment of producer cooperatives and milk collection centres in communities in Manica province. Through the program, Lando'Lakes provided each member of the Milk Collection Centres (MCCs) with a cow; training in dairy farming; and with a functional dairy infrastructure, such as a cooling tank and a generator, to ensure the constant flow of uninterrupted power needed to keep their milk fresh (African Agribusiness Magazine, 2014).



Figure 13 Milk Collection Centre assisted by Lando'Lakes

Currently, the program supports 330 households with dairy cows and 15 emerging producers. As a result more than 900 heads of Jersey were distributed to members of 5 registered cooperatives (Gondola, Matsinhe, Vanduzi host, Zembe and Chitanacue) and 6 milk collection centres were set-up in Manica and Sofala (Romualdo, 2016). Production varies from 5 to 15 litres of milk per cow per day. Producers receive support related to nutrition, health and business from extension teams and a team of trainers in the areas. Lando'Lakes has partnerships with educational institutions such as ISPM, Centro de Marerra and Amatongas, agriculture, veterinarians from the United Kingdom (regarding health management and feeding of cattle). German Cooperatives (Raiffeisen Confederation - DGRV) support the establishment and development of cooperative system and adult literacy.

The dairy infrastructures of smallholder dairy producers in Manica and Sofala comprise the kraal, feeder and drinker. One of the requirements to benefit from Lo'L program is to live at a maximum distance of 15km from the centre of the milk collection, as otherwise transport time would be too long to guarantee the quality of the milk.

The Lando'Lakes program is very interesting and encouraging. The program appears to have led to a significant increase in household milk production, sales, and income (Johnson et al, 2013). However, some problems were identified:

- Lack of compensation when animals are sacrificed due to tuberculosis and brucellosis.
- Lack of inputs for dairy cattle, mainly veterinary medicines and concentrate feed.
- In Manica, milk collection centres sell the milk to DanMoz for 15 Mzn/l. This price is not attractive, so many producers prefer to sell the milk in the informal market, due to more attractive prices (40-60 MZN/L). In turn, this may contribute to public health problems since the milk is not controlled or tested.
- The zero grazing system requires that the farmer collects daily roughage and buys concentrate feed. Because it is very arduous, some smallholders do quit the program.
- Mastitis and other diseases like tuberculosis, tick borne diseases, and brucellosis hamper production.

After the **first phase** (2009-2012) of the program, institutions such as GTZ and Beira Corridor showed interest in supporting the dairy production as it proofed to be a good source of income for families. Nowadays, there are several levels of production and producers, such as Clifton Meadows, AgroMaco and Norman (Fidel O'Donovan, oral communication, 2016). Clifton Meadows is a South African company currently producing close to 1,000 litres of milk per day. This company plans to increase the number of animals in order to sell daily 2,000 litres of milk. According to the director of livestock in Manica (Adolfo, personal communication 2016), there is a need to invest in private sector to improve production rates and to strengthen the milk value chain. DanMoz has the capacity to process 17,000 litres of milk a, but operates below capacity due to a lack of raw material: milk.

AgroMaco medium seized Dairy Farmer

AgroMaco was launched in 2011. It is a crop and dairy farm located about 75km outside of the city of Chimoio in the Sussundenga District. AgroMaco produces 210-230 litres of milk a day (from around 25 Jersey cows and crossbreds) most of which it sells to DanMoz. Through the funds of GAIN's Innovation Accelerator programme, AgroMaco started to expand into producing sterilised milk in smaller packaging units, to sell to the local community. AgroMaco will also be diversifying beyond plain sterilised milk to produce flavoured milks (chocolate and strawberry) and yoghurt. The company also aims to increase the size of its dairy herd to about 500 cows, aiming to produce around 4,000-5,000 litres a day. They already bought milking equipment from China, and a second-hand pasteuriser from South Africa. By 2019, they expect to be selling around 14,000 500ml bottles of sterilised milk a day, giving poorer consumers in the region far more affordable access to a protein, calcium and micronutrients rich produce. AgroMaco, with support from Lando'Lakes, built a feed mill for production of different rations for different animal species.

Norman, a small holder dairy farmer

Norman is a small dairy farmer producer in Vanduzi zone, that began operations in 2012 and has a herd of 28 dairy cows. The unit is capable of producing 125 litres of milk a day, but due to lack of feed production dropped to 35 litres day. Norman is feeding his animals with elephant grass, baby corn and concentrate ration produced by DanMoz. The supply of feed he gets from DanMoz is not consistent throughout the year, which negatively affects his production.

Escrivão et al. (2013), reported that the genetic profile of the cows involved in the milk production in Manica consists basically of purebred Jersey cows (80%) and crossbred dairy cows (20%). Milking is performed twice a day, irrespective of the season of the year. In the smallholder dairy farms in Manica, the average daily yield per cow recorded was 8.8 litre during the dry season and 9.4 litre during the rainy season.

According to Romualdo (2016) in the **second phase** (2012-2016), the development program for dairy products value chain in Mozambique, with a budget of 13.4 million US dollars, was extended to the provinces of Manica, Sofala and Maputo. The program covers three different target groups; small producers, emerging producers and educational institutions. Small producers receive a pregnant heifer and pay a development fee of 1200MTZ and should return a female calf to the program. Emerging farmers are supported on the basis of co-financing ranging from 35 to 50% depending on the number of animals. Lando'Lakes also finances (50%) of processing equipment and 100% in the elaboration of the business plan of interested parties. Educational institutions are supported in training, internships and research.

In Sofala (Beira and Dondo), till February 2016, Lando'Lakes distributed 145 pregnant Jersey heifers imported from South Africa., Part of the milk producers supply to COPOLEITE a dairy cooperative in Sofala and the other part is processed by a local micro-processor. This is in accordance with the regulations regarding the distances to the processing centres.

At this moment, Lando'Lakes (Lo'L) is building three milk collection centres in Nhangau, Inhamizua and Dondo. In Sofala, apart from small producers supported by Lo'L, there is COPOLEITE. COPOLEITE was created in mid-2008 to promote milk production. Currently, the cooperative's daily milk yield is around 2,500 litres from a total of 2,000 cows. The government of Mozambique plans to build a milk processing factory in Beira that will address one of the main constraints faced by the cooperative, namely a milk outlet for farmers (Escrivão et al., 2013).

4.4 Feeding

Feed comprises of natural and improved pasture, cultivated forage, grains and agricultural by-products, and mineral supplements. In general, most companies that produce concentrate feed for the animals have poultry and swine feed as their main product. Companies that produce feed for cattle do not do this on a regular basis, which can result in feed supply gaps (sometimes this gap extends to over 2 months). As a result of this situation, many producers rely on locally produced, on-farm concentrate feed from available (by-)products. These vary greatly throughout the year, resulting in a lack of homogeneity. Thus, a standard of quality is required. Mineral blocks are imported, which are very expensive and thus considered an additional constraint.

The **zero grazing management dairy production system**, where cows are housed throughout the year and are fed in-stable, was introduced in 2009 in Mozambique by the Lo'L in Manica province. Smallholder farmers in Manica produce forage from natural pastures. This forage is administrated either fresh (52%) or in form of hay (48%). Forage harvested from natural pastures is most widely used in the zero grazing dairy production system (Escrivão et al., 2013). The household members do produce hay for the dry season period. In Manica, dairy farmers have various feedstuffs available, including sunflower seed cake, soybean cake, maize bran, coconut cake, limestone and mineral blocks. These inputs are largely sourced from Chimoio. Baby corn from a local factory in Vanduzi and molasses supplied by the sugar plant (Mafambisse) are also available (Escrivão et al., 2013). Smallholder farmers use a concentrate mixture that is provided by DaMoz through the cooperatives, complementing natural pasture they harvest themselves and agricultural by-products of their own production.

Despite the advances recorded in forage production, the feeding of the animals remains a major challenge for small producers. First, because the animals are stabled around the house and farmers do not have enough land to produce fodder for the animals. Moreover, there are no large areas for cutting grass (hay or forage), especially when they consider to increase the number of animals. Furthermore, the concentrate price rose from 7 to 10 MTZ per kg, increasing costs.

Zero-grazing systems, have not yet been a common livestock management practice in most areas of Mozambique. This is a major challenge for most smallholder dairy farmers, because it requires a change of mind-set of the producers, who were used to feed their animals on natural pastures (free ranging). In addition to being able to feed their animals in a controlled manner, it reduces the risk of

diseases by not mixing with other animals (cattle/goats) on the communal grazing lands, or other tick borne diseases. This problem can be overcome through frequent extension visits, where producers are explained about zero grazing and are shown the benefits of it.

Commercial farmers produce grains and forage, the most common being Napier grass (*Pennisetumpurpureum*), Guinea grass (*Panicum maximum*), Buffel grass (*Cenchrusciliaris*), sorghum (*Sorghum bicolor*) and leucaena (*Leucaenaleucocephala*). Seeds are bought in the local market or imported. In Beira, Sofala province, different (by-)products are available to be used as feed ingredients, including molasses, maize bran, wheat bran, distiller's grains, coconut cake, rice straw, shrimp meal, fish meal, mineral blocks, and oyster shell. Most farmers are also using leguminous trees and/or shrubs such as leucaena, bamboo and moringa (*Moringa oleifera*) as fodder (Escrivão, et al, 2013).

It is important to note that despite the previously described points on the availability of agricultural products, the quality and quantity varies according to the seasons of the year and the agro-ecological conditions.

4.5 Reproductive and productive management

In Manica, smallholder dairy farmers perform a complete separation of calves (67%), a temporary separation of calves (25%) or a non-defined calf management (8%). The rate in Sofala for complete calf separation is 50%¹⁴. Treatment of calves at birth, which was observed in 55% of the farms in Manica, is mainly restricted to the disinfection of the umbilical cord. Reproduction management is performed by means of artificial insemination (AI) in 33% of the farms in Manica.

4.5.1 Current policies, legal framework

According to Caravela (Ministry of Agriculture, oral communication February 2016), there is no government strategy on milk production. There is only a clear need to produce more milk. In Mozambique, there is no legislation on the quality of milk. However, in the absence of standardized procedure for milk quality in Mozambique, international standards should be considered when deciding whether milk delivered by the producers at the MCC should be accepted (Escrivão et al., 2013). It should be noted that for milk production the Ministry of Agriculture (2014) defined the corridors of Maputo (Maputo), Limpopo (Gaza) and Beira (Sofala and Manica) as priority zones.

Nevertheless, the revitalization of the dairy sector is a priority for the Mozambican government and is one of the main goals of DINAV (National Directorate of Livestock). The meeting held in November 2015, shows the strong commitment of the government to stimulate the dairy production sector. The event had two main objectives: i) the interaction between the participants in order to strengthen the value chain of milk production and ii) reflection on the organizational structure of the sector in the country, based on experiences of other countries in the sub-Saharan region. The conference was led by the Deputy Minister of Agriculture and attended by 80 delegates from Mozambique (majority), Rwanda, Kenya, Zimbabwe, Uganda, South Africa and Brazil. Participants were different players of the value chain, ranging from dairy farmers, national and international organizations, processors, input suppliers, NGOs, technicians and leaders of MASA (Ministerio da Agricultura, e Suguranca Alimentar, especially DINAV, SPP and IIAM) and several other national and international personalities invitees.

At the forum, two main topics were discussed: i) production systems, which were presented looking at the history of dairy in Mozambique; the current situation of milk production in the country's provinces; the above project of Lando'Lakes; adapted breeds for the production systems; importance of forage in

¹⁴ Complete calf separation is normally practised in specialised dairy farms. Temporary or partial separation of calves is practised on semi-intensive dairy farms, usually using crossbreeds that do not always let down their milk easily without the calves being present.

milk production; and experiences presented by other countries; ii) dairy chain structure, by presenting various forms of organizational models existing in different countries like Kenya and Rwanda and by highlighting the role of the ESADA (East and Southern Africa Dairy Association).

Among others, the important lessons/recommendations of this forum were:

- The use of crossbred dairy cattle, in order to have more adapted animals which are potentially more profitable, if managed properly.
- The In-Vitro laboratory (embryo transfer) in Zambezia offers a great opportunity for widespread access to adapted dairy animals. The government of Mozambique supports all initiatives that seek to improve the dairy herd in Mozambique, including AI and in-vitro. The in-vitro project in Zambezia has strong support from the central government of Mozambique. However, experts have advised the government to follow the crossbreeding strategy, instead of relying on pure breeds, in order to generate a progeny that is more adapted to local conditions. This means in practice that a pure bred dairy bull or semen from a pure dairy breed, should be used to cross local cows.
- Forage production was highlighted as the cheapest way to improve milk production.
- The great importance of the role of government in the strategic definition of the sector was highlighted. It also became clear that the sector organization should be inclusive, involving all segments of the value chain. The established Forum/Board of the milk sector, composed of various value chain stakeholders, will certainly stimulate the industry, because it will be a platform for interaction between producers, processors, researchers and institutions responsible for policy and legislation.

As discussed, dairy production is a major weakness of the livestock sub-sector in the country. Presently, there is an old (semi-commercial) core producer in Beira and three cooperatives operating milk collection centres in Manica province. These were established in the last 7 years by the NGO Lando'Lakes. The production is still far too small to meet the needs of domestic consumption. Thus, programs to increase dairy production should, at the same time, promote the strengthening of existing value chain systems, while promoting (re-)stocking of dairy animals to new stakeholders.

4.6 Current strengths and weaknesses of the dairy sector

The dairy sector in Mozambique has always been relatively small and suffered heavily from recent tumultuous periods in the history of the country. As of now, virtually a complete new dairy value chain needs to be built up. There are some good projects stimulating dairy production, but these are limited and very localized. Services to support a dairy value chain still need to be built up completely.

Table 20

Strengths and weaknesses of the dairy sector

Strengths	Weaknesses
Milk is traditionally consumed, thus has a good market	Formerly existing infrastructure for dairy sector heavily affected by past civil war
Fodder (natural grazing) easily available	Quality of fodder needs to be improved
Good experience on the possibilities for dairy production gained through internationally funded project (Lando'Lakes)	Virtually no processing sector, formal market poorly developed
Good example of local private investment in the country	Very little knowledge on professional specialized dairy farming, virtually no training or extension, apart from donor funded project
Renewed interest from government, e.g. through national dairy conference (November 2015)	Little infrastructure for dairy value chain present in the country: no breeding policy, no development of quality foders, poorly developed veterinary services, hardly any formal marketing infrastructure for locally produced milk
	No research capacity to analyse bottlenecks and to develop dairy value chain

No quality concentrates available

Not enough dairy animals available

Poor veterinary services, inadequate disease control

5 Beef production

5.1 Background

Cattle are raised by two parallel systems: in the family and in commercial sectors. The family sector owns around 85% of the livestock. Producers living in the more remote rural areas have little or no access to animal health services or other animal production inputs. In general, all cattle raised by smallholder's farmers are of the Landim (Nguni) type. The cattle graze in communal areas around the villages, forming a single herd with one or more owners. The communal ownership of the grazing area often results in an overstocking around the villages and watering places. This leads to pasture degradation and in some cases to soil erosion. There is no separation between the different cattle categories and bulls are in the herd all the time. The few commercial producers have generally better infrastructures including water places, dip tanks and some fencing. Besides, they use improved technology such as artificial insemination and they practice crossing with imported breeds.



Figure 14 Angoni cattle in northern part of Tete province

5.2 Beef value chain stakeholders/players

Following the previous chapters, the actors of the value chain are described, starting at the national level. The development of the beef industry, also in the Zambezi area, is only driven by a few initiatives and players at the national level. There is little experience in specialised and intensive beef farming in the Zambezi area.

The main actors in the beef sector are the government (Ministry of Agriculture and Food Security, DINAV), NGOs, cooperatives and supplying companies.

Government

The Ministry of Agriculture (MINAG), through its National Directorate for Veterinary Services (DINAV), is the institution responsible for implementing national strategies and policies. The state veterinary services have classical functions of service provision, namely protection of animal and public health, prevention and protection against animal diseases and promotion of livestock production and productivity. The government provides vaccination against significant diseases as Foot and Mouth Diseases (FMD), anthrax and blackleg, free of charge for cattle.

Private sector

- Veterinary Chemicals and Services

As mentioned before, most communal farmers rely on government dipping and vaccination services. Veterinary chemicals sold in the Zambezi region are imported from South Africa, Brazil, China and Zimbabwe. Most veterinary medicinal products are distributed by companies based in Maputo. The chart below shows an example of innovation in the distribution of medicine.

Veterinary Chemicals Innovation in Mazoe/Tete

There is an entrepreneur based in Mazoe who realised that the large size of veterinary chemicals is not suitable for smallholder farmers. The farmers still require these services. The entrepreneur has established a bulking service model, where farmers with sick livestock bring them to his shop every 15th of the month. He opens up the chemicals (mostly for tick control and tetracycline which is applied to the eye, as an ointment to control most common eye inflammations) once a critical mass of livestock has come. These days, he gets enough farmers to utilise these large volume doses (ILRI, 2013, Unpublished data).

- Feed

In general, animals are grazing in communal pastures resulting in an overstocking around the villages and watering places, with consequent degradation of the pasture. During the rainy season, there is excellent pasture quality, in contrast to the dry season, when the pasture does not provide adequate feed. Faced with the situation, it was necessary to develop a strategy for a better utilization of pastures and availability of feed during times of shortage. This is an opportunity for the private sector to produce feed (hay and silage) and concentrates for cattle feeding, especially for animal feedlot.

Iniciativas para Terras Comunitarias (ITC) is a NGO working in 5 Mozambican provinces: Cabo Delgado, Gaza, Manica, Niassa and Zambezia. It works with communities to do a delimitation exercise and map outwards, separating production and grazing areas. They train associations in order to become custodians of legalised land use. The aim is to reduce the land conflicts in communities, and at the same time the over cropping of grazing land (ILRI, 2013, Unpublished data).

Stakeholders in Agriculture in Zambezi Valley

Apart from the government veterinary services, like carrying out vaccination campaigns and rehabilitating infrastructure, there are no organisations active in beef development in the area. The ZVDA provides support to the activities of the veterinary department.

5.3 Geographical distribution of cattle

The distribution of the cattle population is not uniform throughout the country. There are more animals in the central and southern region, where there is a long tradition of livestock keeping thanks to favourable agro-ecological zones (R2-R3). The national cattle herd is estimated at 1,533,025 heads (IAI, 2013). This was an increase by 20%, from 1,277,044 heads in 2010, and was due to the restocking programs by the government and NGOs. National beef production is increasing steadily, but falls well short of meeting the domestic demand. The country relies on imports, mostly from South Africa, Swaziland and Botswana. Imported high quality beef serves the rich urban-markets with the high-income groups and upmarket restaurants. The demand of the poorer class is met through informal domestic trade in live animals and in meat products often under unhygienic conditions (Munguambe and Hendrickx, 2011).

The distribution of cattle by province is shown in Table 21 below.

Table 21

Distributions of cattle by province (heads)

Region	Province	2009-2010	2012
North	Niassa	14 252	2 544

	C.Delgado	9 641	4 482
	Nampula	50 476	87 024
Centre	Zambezia	13 940	37 546
	Tete	318 911	394 731
	Manica	157 437	263 299
	Sofala	57 743	63 677
South	Inhambane	185 923	181 034
	Gaza	312 981	381 102
	Maputo	138 549	117 596
Total		1 277 044	1 533 025

Source: Cap, 2010; IAI, 2013

The distribution of adult cows, bulls, oxen heifers and calves by province is shown in Table 22.

Table 22

Number of adults cows, bulls, heifers and calves in 2014

Province	Bulls	Oxen	Beef cows	Dairy cows	Male heifers	Females heifers	Male calves	Females calves	Total
Maputo	12	12	122	105	33 717	50 551	34 381	36 333	302 610
	550	826	147						
Gaza	37	53	163	116	58 129	74 826	41 178	41 534	470 584
	498	769	534						
Inhambane	37	15	80	48	33 036	38 484	25 416	29 723	261 391
	992	802	890						
Sofala	3 858	1 995	26	1	12 055	14 267	7 584	7 713	75 244
			682	090					
Manica	22	26	85	821	30 182	37 463	26 801	28 567	257 743
	138	646	125						
Tete	16	24	93	0	29 341	34 401	27 394	27 944	257 632
	351	943	258						
Zambezia	4 695	558	13	0	8 553	7 318	7 313	6 683	48 600
			480						
Nampula	9 077	576	32	14	12 118	15 312	10 470	14 858	95 037
			612						
C.Delgado	293	663	4 245	70	2 137	1 689	1 348	1 046	11 500
Niassa	2 147	35	9 340	40	1 171	1 453	494	919	15 599
Total	14 599	137 813	631 322	2 304	220 439	279 764	182 379	195 320	1 795 940

Source: DINAV, 2015

In 2015 the districts with the higher number of beef cattle in Tete were Changara and Moatize with 44,476 and 30,589 cattle heads, followed by Marara with 26,141 cattle head (Claudio Gule, oral communication, January 26, 2015).

5.4 Slaughter cattle and meat production

The total number of cattle slaughtered in the country has increased from 2010 to 2014 by 35%, which was mainly from 2013 to 2014. The total number of cattle slaughtered annually per province are shown in Table 23.

Table 23

Heads of cattle for slaughtered per province from 2010-2014

Region	Province	2010	2011	2012	2013	2014
North	Niassa	336	694	766	700	861
	C.Delgado	2 840	2 857	3 065	2 804	3 285
	Nampula	3 195	3 125	3 284	5 038	5 986

Centre	Zambezia	2 378	3 325	6 299	6 982	5 160
	Tete	3 952	4 289	3 783	4 760	3 500
	Manica	2 245	2 421	2 428	6 454	6 650
	Sofala	3 938	3 805	3 326	3 366	3 352
South	Inhambane	1 860	2 218	2 389	2 900	3 166
	Gaza	7 417	7 944	9 835	8 426	10 348
	Maputo	31 398	41 478	48 836	28 960	37 986
Total		59 559	72 156	84 021	70 410	80 311

Source: DINAV, 2015

The national commercial beef production reached 11,919.5 tonnes in 2014 and increased by 3,818.8 tonnes: from 8,100.7 in 2010 to 11,919.5 in 2014. The meat production from 2010 to 2014 is shown in Table 24. At around 12% of the country's total beef production in 2014, Manica and Gaza were the greatest producer of beef, followed by Nampula whose contribution was about 11%.

Tete was the province that produced fewer amounts of meat, namely 3%. According to the provincial director (Américo da Conceição, oral communication, January 2015), there are two main companies (Canelfood and Carnes Zambeze) in Tete that process beef cattle. Canelfood has an abattoir, a butchery, refrigerated trucks and scales. Normally, there is a cattle market three times per week, the Marara, where animals for slaughter can be bought. As the Marara did not provide enough cattle, the company started its own cattle trading business. The company started buying animals in the family sector and fattens them for slaughtering. According to Domigos Vilas (2016) Canelfood intends to use 70-80% of the local cattle for their abattoir and butchery. The main problem with the local cattle is the availability and the poor quality of the meat. Often they add, because of the poor quality of the meat, value to the products by selling it as minced meat, canned meat products and sausages.

The main breed in Tete province is Tete breed (*Bovino de Tete*), a small animal with low a carcass weight, but that is resistant to the often hard conditions. The carcass weight for livestock slaughtered in Tete is on average between 85-110 kg, depending on the season. The quality of the meat is invariably considered too poor for selling in formal markets, especially for high income clients like hotels, restaurants and high income individuals (ILRI and SNV, 2013 unpublished data). The main causes of poor breeds are poor management including reproduction and feeding practices, and also the genetics. Moreover, it is observed that most oxen coming to the markets are bulls of a very small size and poor body condition. There seems to be a lack of awareness of the benefits of consciously choosing a few healthier breeding bulls and castrating the rest. Castrated oxen grow faster and bigger and can result in better quality meat, if they are well fed. The presence of so many small, poor and unhealthy bulls in the communities leads to uncontrolled breeding, resulting in smaller and smaller cattle.

These findings suggest that improvements in animal husbandry to increase the productivity of farmer's herd are necessary. This includes improvement of herd sanitation, breeding stock, nutrition, calving rates and offtake.

In 2014, the average carcass weight was 148.4kg versus 136.0kg in 2010. Manica and Nampula have the best carcass weights, 217.5kg and 201kg respectively.

Table 24
Meat production per province from 2010-2014 (tonnes)

Region	Province	2010	2011	2012	2013	2014
North	Niassa	29.7	62.5	67.6	62.8	76.2
	C. Delgado	368.7	375.4	413.6	380.7	460.1
	Nampula	407.7	446.9	598.8	912.4	1 203.0
Centre	Zambezia	428.3	458.6	916.9	1 025.1	823.5
	Tete	343.9	380.4	356.9	430.1	325.2
	Manica	330.3	374.3	470.4	1 175.6	1 447.9

	Sofala	517.6	607.8	716.8	492.7	509.0
South	Inhambane	245.5	307.3	341.1	377.0	404.6
	Gaza	1 000.5	1 107.5	1 284.3	1 149.0	1 352.0
	Maputo	4 335.5	5 805.0	6 685.0	4 765.6	5 318.0
Total		8 100.7	9 925.7	11 815.4	10 771.0	11 919.5

Source: DINAV, 2015

According to DINAV (2015), in 2014, 2,492 tonnes of beef were imported. Of these, 74.5% was imported by the province of Maputo, followed by Sofala province with 12.8% and Inhambane with 8%. With the exception of the province of Zambezia and C. Delgado, the remaining provinces imported small quantities: Manica (1 ton), Tete (2 ton), Niassa (3 tonnes) and Gaza (17 tonnes).

Updated production information from commercial farmers is almost non-existent for the target provinces. Information collected in the province of Manica indicates that in 2015 the province produced 1,873.9 tonnes of beef. 1,547.8 tonnes was produced in the private sector and the remaining 326.1 in the family sector (Dr. Adolfo, oral communication January 28, 2016).

According to the report of AGRIX (2012), in Manica there are 5 large livestock producers of beef cattle: Mozbife, Mavonde farm, Dombe farm, Inhazonia farm and Vanduzi feedlot. The Mozbife Company is a feedlot beef producer with a 6,900 head herd on three farms. It covers in total 22,000 ha of land, a feedlot with 3,000 head/month capacity, and a slaughterhouse with 4,000 animal/month capacity. It intends to increase the number of cattle to 10,000 heads in order to produce 3,800 animals per year for slaughter. Mozbife sells its beef in Manica, Tete and Nampula. The Mavonde farm has 2,350 ha with 1,200 animals. The Vanduzi feedlot has a capacity to fatten 3,000 animals each 90 days, at a slaughter weight of 500kg. The Dombe farm is 15,000 ha with currently 3,400 animals.

In Chemba, Sofala province, an organic sugar cane farm with 1,200 ha is keeping Brahman animals under feedlot conditions. The farm has a program to produce hay and pellets from alfalfa on 400 ha, using smallholder's livestock farms. Each farmer will work in 2 ha and they will be provided with a small stock of animals (Antony Van der Loo, oral communication, January 28, 2016). According to Luis Neves (oral communication, 2016) the farmer should take into attention the presence of tick and trypanosomes in the region of Chemba.

5.5 Feeding

The most common production system is extensive where rangelands are the main feed base. The animals of smallholder farmers graze in the communal area and are sometimes supplemented by crop residues. This is not an active process; it only means that after harvest animals are let into the cropping area to eat. It does not maximize the use of crop residues and is different compared to other countries in the regions (Homann-Kee Tui et. al, 2013). Despite feed shortages restricting livestock production, farmers invest little in feed technologies.

The animals usually drink from rivers and streams. The distance travelled to watering points is between 1 and 4 km and animals will drink once a day. Nonetheless, this may vary per province and per season. In some areas of the Inhambane province, animals drink once every two days, due to long distances to the watering points (ILRI, 2011).

In commercial farms, the animals are kept in a semi-extensive system supplemented with concentrate or with mixes prepared on the farm with locally available materials, such as agro-industry by-products. These include molasses and sugars can tops, maize brain, cottonseed, coconut oil cake and crop residues.



Figure 15 Commercial ranch in natural pasture, Chimoio area

5.6 Beef marketing

The marketing of cattle in the country is not well developed. In Marara, there is a big livestock market. This one and two other smaller markets at Mayombe and Mutendedzi in Tete province are considered the most successful for smallholder livestock trading in Mozambique. Farmers close to the Zambezi River, take their livestock to the Marara Market. The Marara Market operates weekly on Tuesday, Thursday and Saturday. Trade is done through one-on-one negotiation between the village middlemen or farmers on the one hand and the urban traders on the other.

There are two main groups of traders among beef traders. One is linked to the animal production part and the other to the inputs market. The animal traders are mainly active on the Tete/Manica routes to supply Beira and Maputo, and the Inhambane/Gaza route to supply Maputo. The Nampula and Cabo Delgado provinces are supplied with cattle coming from Tete and Zambezia. In the network of butchers, there are also the meat traders buying and selling at slaughter houses or wholesalers selling to the public in the urban areas. The Mozbife Carnes da Beira and Canelfood are good examples of companies that sell beef in Manica, Tete, Nampula, Sofala and Inhambane. The route of meat commercialization is not always the most rational. For example, the Manica goat goes to Maputo and back to Tete in the form of meat (Adolfo, 2016).

Private sector investment in feedlots in Tete will open more opportunities for local cattle to go through the formal markets and fetch better prices. The increased cost of shipping cattle out and beef back in (from Chimoio and Beira) increases costs and thus in the end the smallholder farmers lose out. Feed stocks, like maize bran and cotton seed cake will become increasingly available with the opening of maize mills in Angonia and Tete and a cotton factory in Guro.



Figure 16 Local cattle market, Tete



Figure 17 Transport in waiting, local cattle market

5.7 Current policies, legal framework

The government has various legal instruments and strategies for the development of livestock production aimed at recognizing the relevance of livestock production within the agrarian sector. Especially, considering its role in promoting food security, poverty reduction and its growing contribution to the socio economic development of Mozambique. Currently, there are key documents that define the main lines of action for livestock development with emphasis on: the Strategic Plan for the Development of the Agricultural Sector (PEDSA); the National Investment Plan for the Agrarian Sector (PNISA); Livestock Development Project Livestock Production Intensification Program (PIPEC); and the Livestock Development Project (PRODEP).

The Ministry of Agriculture (MINAG/MASA), through its National Directorate for Veterinary Services (DNSV/DINAV), is the institution responsible for implementing national strategies and policies. The state veterinary services have classical functions of service provision, namely protection of animal and public health, prevention and protection against animal diseases as well as promotion of livestock production and productivity. This responsibility is established by law (Regulamento de Sanidade Animal, Decreto nº26/2009 de 17 de Agosto). The responsibilities of this directorate are related to the quality of animal products, as well as the preparation, definition, evaluation and coordination of norms relating to the programs of surveillance, control and eradication of infectious and parasitic diseases. In order to achieve the above objectives, the state establishes synergies with other partners. Some examples of these synergies are shown below:

Capacitating MINAG's veterinary services is recognized as a priority task by the OIE, African Union and SADC, in order to support the development of a national livestock sector and good veterinary governance. The few activities supported by development partners are focused on trainings of technical staff and (food) producers, and development of animals and livestock production and animal product's commercialization networks.

IFAD finances capacity building activities, focussing on producers, the development of the animal and livestock production value chains and the development of the rural extension network. The project named PROSUL/ASAP, is being implemented in the Gaza and Maputo provinces.

The African Development Bank (AfDB) financed a regional project focussed on the improvement of laboratory diagnostics and capacity building of technical experts regionally, concerning transnational disease control. The project has reached its final phase.

USAID and AUIBAR (through the SPINAP project funded by the European Union) emphasized preventive measures and rapid response to any occurrence of avian influenza in the country. Both projects have had their actions throughout the country. Awareness raising materials were developed and some means of transportation and training of field staff and a laboratory were acquired.

The International Livestock Research Institute (ILRI) has conducted cattle and goat value chain work for the past 5 years in Gaza (Chicualacula and Chibuto), Tete (Changara and Magoe) and Inhambane (Inhassoro). This was done through targeted training of producers in improved husbandry practices, commercialization, and improving linkages among value chain actors through establishment of innovation platforms.

The Projects *Seed Policy Enhancement in African Regions (SPEAR)* and Lando'Lakes are two projects funded by the Development Cooperation of the Republic of South Africa. They are active in Sofala and Nhambane. Another project is funded by the United States of America, through the NGO Lando'Lakes. They work in Manica and Sofala. Both projects aim at the promotion of milk production in the country, specifically in the area of family, small scale and medium scale producers.

FAO provides technical assistance in the field of the diagnosis and prevention of diseases and implements a project of fight against Newcastle disease in 15 districts in 5 provinces of Mozambique.

Source: Ministerio da Agricultura, 2013

In line with the recommendations of PEDSA/PNISA and the broader approach to the whole agricultural sector, some ministries and key public institutions have to be involved in making the “cross-cutting” issues, such as veterinary and organisational capacity building, operational. These institutions are the Ministry for the Coordination of Environmental Action (MICOA) and the Ministry of Women and Social Action (MMAS). For the operational component, the provinces of Inhambane, Sofala, Manica and Tete were selected for their high livestock potential, reduced risks of trypanosomiasis (a deadly vector borne disease) and no overlapping with existing initiatives. The institutional strengthening component will cover, where possible and relevant, the national level. The project also aims at reinforcing national economic production. As said before, the reduced supply of national livestock products forces the country to depend largely on imports (32.5% meat, 83% milk and 74% eggs) to cover the consumption and the demand for these products. The majority of the resources required for livestock production, such as ingredients for the feed rations, medicines, drugs, veterinary tools and equipment are also imported. This is due to weak or absence of national production and a weak private livestock sector.

Based on its competences the livestock of services designed a program named “*Programa de intensificação da produção pecuária (PIPEC)*”. The PIPEC, a 4 year (2015-2019) program aims to promote the intensification of livestock production in areas with the greatest agro-ecological potential. The intensification of beef cattle production system consists of training of farmers and technicians in livestock management such as:

- Fencing of grazing areas to encourage rotation and construction of holding pens for overnight stay
- Opening of boreholes or building dams with drinking facilities using water collection systems using solar or wind power
- Equipment for hay baling
- The introduction of specialized breeds for meat, through breeding of artificial insemination or embryo transfer
- Identification and registration of animals for selection of the best breeders
- Availability of milling grain and oleaginous by-products for fattening and supplementation during the dry season
- Strict control of major diseases. For tuberculosis control compensation to farmers should be provided for animals that need to be removed

5.8 Current strengths and weaknesses of the beef sector

The beef sector in Mozambique can be characterised by a low input extensive management system with low offtake. As a result, there is a substantial import of beef into the country. Improvements in offtake will come from improved infrastructure and marketing, thus little expansion of commercial intensive beef keeping can be expected.

Table 25
Strengths and weaknesses of the beef sector

Strengths	Weaknesses
Long history and experience in extensive cattle keeping in the country	Poor veterinary services available
Strong and resistant local breeds available	Overgrazing often occurs near settled areas, also due to lack of watering points
Some good commercial ranches are operational in the country	Poor offtake due to poor herd management
	Low national production necessitates imports
	Poor rural infrastructure leads to high transport costs

6 Veterinary Services

6.1 Background

The state veterinary services, embodied by the National Directorate of Veterinary Services (DINAV) are the Veterinary Authority, are responsible for disease surveillance and control. However, there is no central chain of command and the provincial governments are supposed to contribute to the disease control effort. The only vaccination is carried out by the veterinary services against notifiable diseases such as Foot and Mouth Disease (FMD), Blackleg and Anthrax. This set up compromises at times the effective disease control efforts such as vaccination, as funds may not be available on time or at all. Whilst government veterinary services are to cover all livestock sectors including poultry, pigs and others; virtually all surveillance and vaccination activities are only geared towards cattle, mainly to prevent large disease outbreaks.

Access to veterinary services by farmers is limited due to lack of trained personnel in many parts of the country. In areas where NGOs have been operating (e.g. as part of a restocking program), community-based animal health care workers have been trained to provide primary health care. The government should promote the establishment of support services to the livestock health sector, such as pharmacies, companies providing material as medicines and vaccines, organizations or individuals (private veterinarians, private clinics) interested in providing services related to the health of animals.



Figure 18 Veterinary drug store in Beira



Figure 19 Cattle crush, used to treat cattle and for access to dip tanks, Chimoio area

6.2 Cattle

Meat inspectors of the Provincial Veterinary Service have the task of inspection in slaughter houses. They get annual training, sometimes in Botswana. TB is found at times, as well as various parasitic infections. Closing of under-performing slaughterhouses is difficult, because in most places they belong to the government and are the only facility available. Closing often means in practice that slaughtering will continue illegally. The number of private slaughterhouses is growing. Tick-borne diseases such as Anaplasmosis, Heartwater (Cowdriosis) and Theileriosis are the most commonly reported cattle diseases in Mozambique. Mozambique is free from one of the important cattle diseases: Contagious Bovine Pleuro Pneumonia (CBPP) and is presently carrying out targeted sampling to demonstrate freedom of disease, according to the Terrestrial Code of the World Organization for Animal Health (OIE, 2011).

There are regular outbreaks of infectious cattle diseases, like the Foot and Mouth Disease. In May 2016, Mr. Américo da Conceição the National Veterinary Director of the Ministry of Agriculture, announced that two million cattle will be vaccinated this year under a program to prevent and control the spread of diseases such as Anthrax, Nodular Dermatitis and Foot and Mouth Disease. Such vaccination campaigns are usually carried out at dip tanks.

Two of the dairy sector's greatest risks are Tuberculosis and Brucellosis, which are prevalent in many of the cattle herds in Mozambique and have led to several known outbreaks. Once the diagnosis has been established, all animals will be culled leading to large but (un)avoidable losses for the sector. Infected animals will have to be destroyed and farmers expect compensation. Since this is hardly given, the effectiveness of control programs is limited. Moreover, there are no certified clean herds from which replacement animals can be bought. Consequently, these have to be imported from South Africa. Since projects of the veterinary services need to be applied for well in advance, there are barely possibilities to address a situation with outbreaks of diseases, which requires immediate action to avoid further spread.

Manica Province has 75 dip tanks of which only 58 are operational and of these 58, 38 are public and 20 private. Several of those have been rehabilitated with support of the ZVDA. There are 8 agents that sell veterinary inputs, 7 of which are in the city of Chimoio. In Manica, Barué and Sussundenga, there are rural pharmacies. Although there are players who sell veterinary inputs, producers often turn to neighbouring countries for the purchase of drugs and veterinary equipment. Tete has 42 dip tanks, 33 corridors of conventional treatments and five shops selling veterinary supplies.

Maintenance of animal health is an important issue that requires well trained and well equipped veterinary services to enable disease diagnosis and treatment, the organization of vaccination campaigns and advise to dairy farmers on the correct health management measures to take on their farms. Farmers need a skill training on all aspects of the dairy production, starting from good fodder growing to hygienic milking. In order to deliver such trainings, enough specialized trainers need to be made available.

The Belgian government is considering a veterinary support programme for the provinces of Manica and Sofala. This programme will focus on improving veterinary services including public-private ones as well as the disease surveillance and monitoring system.

6.3 Poultry

Apart from the apparent focus on cattle for animal health services, the necessary veterinary health systems for the poultry industry should be developed. The sector's growth over the past decade warrants such an investment. Since little has been invested in developing a good veterinary knowledge base and service, there is limited knowledge on poultry management, disease diagnosis and disease control systems.

There is a need to improve the current, rather generalist veterinary training in the Universities. Moreover, it is necessary to train more specialised poultry veterinarians capable of diagnosing poultry diseases and to establish monitoring programmes for infectious diseases and implement vaccination campaigns. Veterinary diagnostic labs need to be realized and/or improved with adequate knowledge on diagnosing poultry diseases.

7 Investment opportunities in the livestock sector in Zambezi Valley

7.1 Introduction

Livestock production is an activity that has been existing in the Zambezi Valley over a long period. Nevertheless, the level of production and productivity is still below the desired level, as described in the previous chapters. Whilst this has been characterized as a weakness of the livestock sector, these, of course, also offer opportunities for those parties wishing to be involved in improving livestock performance in the area of the ZVDA.

7.2 Poultry

The poultry sector has been rather successful in various parts of the country, though in the operational area of the ZVDA still rather limited. The analysis shows the following shortcomings (and thus opportunities):

Day-old chicks

There is still a chronic shortage of day-old chicks in the area. The current suppliers do not have enough capacity to satisfy the growing demand for day-old chicks in the working area of the ZVDA. *A business plan for setting up a hatchery in Mozambique is available at the ZVDA.*



Figure 20 Transport of day-old chicks in Mozambique



Figure 21 Two days old chicks on a farm

Feed

There is still a shortage of poultry feed in several parts of the country, in terms of quantity, but also quality-wise. Poultry feed is the most important input required to produce broilers. Three types of broiler feed need to be produced: starter feed, grower feed and finisher feed. Existing feed factories sell these feeds in two different ways: either as a complete or as a concentrate feed. To the latter poultry farmers still have to add an energy source (nearly always maize) to turn it into a complete feed ready for use on the farm.

The main clients for feed production are the growing number of broiler farmers in the AVDA working area. The number of farmers turning to broiler farming has been growing strongly over the past five years due to the growth in demand and the resettlement of communities from the mining areas. Mines have given compensation -amongst others- by supporting the setup of broiler farms. Many of the

broilers farms established in this way are now expanding their production capacity, increasing even more the demand for feed.

An investment plan for a feed plant is available at the ZVDA.



Figure 22 Local market stall with broilers

Slaughtering

Slaughtering and processing of broilers in Mozambique is in most cases still done by consumers themselves, apart from the broiler production that belongs to the larger integrations. In areas such as Chimoio, where broiler production has grown strongly, the market for live birds is often saturated in the beginning and the middle of the month (till pay-day), demanding producers to invest in slaughtering facilities as well. The present facilities are small and usually established on individual farms. They are often of poor quality and do not comply with basic hygiene and health regulations.

The poultry industry's professional development depends on the efficient and hygienic organisation of the boiler's slaughtering. Integrating hygienic slaughtering conditions requires specific investments in the set-up and layout of a slaughterhouse. Thus, qualified and specialised slaughtering processes are necessary in order to promote the growth of the professional industry's market.

An investment plan for slaughter house has been worked out by the ZVDA and is available for interested investors.

7.3 Dairy production

In Mozambique, the formal milk production and the processing of locally produced milk is limited to three dairy plants. These are located in the central part of the country, one in Chimoio and one in Beira. Both process limited volumes only. A third dairy plant near Maputo only produces milk from imported milk powder. There is a big demand for milk in the country, which is now fully met by imports. Consequently, there are many opportunities to stimulate and invest in milk production and processing. A dairy value chain consists of producers, collection centres, processing plants and retail. There are opportunities in all parts of the value chain.

Primary production

Breeding stock, fodder, utensils (for milking and cleaning), veterinary treatment on farm, cooling facilities on-farm, AI and others.

The improvement of **fodder and feed** supply is the most important issue to be addressed as part of building up the dairy sector. More emphasis needs to be put on fodder production, but also on its conservation for use in the dry season. This requires further agricultural mechanisation and improved fodder varieties such as seeds and planting material. The use of agricultural by-products also for dairy feeding can be intensified. There are increasing amounts of oil seed cakes available that are presently not always put to the most efficient use possible. Compound feed can be produced by the existing

feed companies: the total amount of concentrates needed for the dairy sector can be met as extra product from these factories.

Breeding

It is important for the future of the sector to establish a good base for optimizing the right choice of breeds suitable for the climate in Mozambique. This requires importation of breeding stock, embryo's, semen and equipment to carry out artificial insemination (AI) services.

The demand for housing equipment will be low, since most of the housing structures can be established using locally available material. At first, the need for milking equipment on dairy farms will be low as well, though it will be growing in the near future.



Figure 23 *Milking parlour under construction on a farm, Chimoio area*



Figure 24 *On-farm cooling equipment, Chimoio area*

Milk collection centres

Building up a dairy value chain depends on a good milk collection infrastructure. Milk Collection Centres (MCC) are essential intermediary steps in the transport of milk from farmers to the processing plant. The investments necessary for a MCC are: cooling tanks, generators, stainless steel cans, quality testing equipment and cleaning utensils and materials.

A full investment and operation plan for setting up and running a milk collection centre is available with the ZVDA.

Processing

The processing capacity in Mozambique is very small at the moment: only three plants are operational, all with limited capacity. An investment in a dairy plant is complex and requires cooling equipment, a generator, pasteurizers, yoghurt processing equipment, milk separators and homogenizers, pumps, filling machines, and cold storage.

An investment plan for a dairy processing plant with a capacity to process 10,000 litres daily, producing pasteurized milk and yoghurt is available with the ZVDA.

7.4 Beef production

Beef production in Mozambique mainly takes place based on extensive management practices, with low inputs.

Primary production

That is fodder, utensils, housing (for intensive feedlot operations). Beef production can be carried out very well on natural pastures. Nonetheless, improvement of these pastures is required and would be advantageous in areas where intensification is possible. This would require seeding materials of the most suitable varieties.

Feedlot-finishing requires high quality feed justifying the high investments in housing and intensive daily care. This requires comparable investments in fodder production as dairy production does: seeds and planting material.

Feed

Whilst beef cattle graze on rangelands, they often do not receive additional concentrates. Feedlot finishing, however, requires concentrates on top of the quality fodder they should be getting. This can be produced by any existing feed mill company.

Slaughtering facilities

Currently, the number of slaughterhouses in the country is limited, and certainly not equally spread across the country. There is already a clear need for more slaughterhouses to improve commercial offtake and this need will only rise with investments taking place in intensified beef production. The ZVDA is already taking the lead in investing in slaughterhouses, which will be leased out on a management contract to third parties interested in operating and managing these new slaughterhouses.



Figure 25 Slaughterhouse under construction, a ZVDA investment

The ZVDA has worked out an investment plan for a slaughterhouse, which is available for interested investors.

7.5 Threats to livestock production

In the previous chapters the strengths and weaknesses of the poultry, dairy and beef sectors have been described. An overview of the opportunities that exist has been given in the first part of this chapter. Because of the current stage of development of most of the livestock sector, there are still quite a number of hurdles that have to be taken, before the sectors really can take off.

These can in general be summarized as follows:

Table 26

Threats to livestock production

	Poultry	Dairy cattle	Beef
Poor veterinary services	Inadequate disease control, prevention and cure	Inadequate disease control, prevention and cure	Inadequate disease control, prevention and cure
Unavailability of breeding stock	Shortage of day-old chick can frustrate potential producers	Unavailability of locally adapted dairy breeds or crossbreds	Unavailability of selected good performing breeding animals in local breeds
Poor management levels/knowledge on farm	Farmers run extra risks in starting up years	Farmers run extra risks starting up years	Under present production systems not that important, will be more important for intensifying

			farms
Poor knowledge with extension services	Farmers run extra risks in starting up years	Farmers run extra risks starting up years	Under present production systems not that important, will be more important for intensifying farms
Poor water availability in some areas	n/a	n/a	Is important obstacle in extensive beef keeping systems
Poor infrastructure	Effects of poor roads on transport of animals and produce	Virtually no functioning facilities such as dips, fences	
Poorly developed processing and marketing infrastructure	Not enough slaughterhouses operational	There is a need for more collection centres and processing plant to strengthen the formal value chain	Not enough slaughterhouses available
Lack of access to credit, making it difficult for many potential producers to get started	This is certainly the case for poultry, needs many initial investments: housing, feed, day-old chicks	This equally applies to dairy cattle, which requires high investments in animals and housing	No high need for credit in the existing extensive production systems

7.6 Doing business in Mozambique

Investing and doing business in Mozambique means taking into consideration a broad range of issues that characterise the market (World Bank, 2013; Embassy of the Kingdom of the Netherlands Maputo-Mozambique, 2014). Two other publications are available with further detailed information on agro-food and business related issues in Mozambique (Agrix, 2012; Soethoudt, 2015).

The “Doing Business” project of the World Bank¹⁵ measures and compares regulations relevant to the life cycle of a small to medium-sized domestic business in 189 economies. The “Doing Business” project records all procedures officially required or commonly done in practice, for an entrepreneur to start up and formally operate an industrial or commercial business, as well as the time and cost to complete these procedures and the paid-in minimum capital requirements. Mozambique lists 124th on the list of 189.

Mozambique has several institutes facilitation investment and trade:

- CPI, Investment Promotion Centre
CPI is a Government institution with a mandate to attract and facilitate the establishment of private domestic and foreign direct investment.
- GAZEDA – Special Economic Zones Office
GAZEDA is a State body with administrative autonomy, overseen by the Minister responsible for planning and development matters. GAZEDA tasks are to promote and coordinate all activities related to the establishment, development and management of Special Economic Zones (SEZs) and Industrial Free Zones (IFZs).
- CEPAGRI Investment Facilitation in Agriculture
CEPAGRI Agriculture Promotion Centre is an agency of the Ministry of Agriculture responsible for the promotion of investment opportunities in agriculture.

¹⁵ <http://www.doingbusiness.org/data/exploretopics/starting-a-business>

The publication of the Netherlands Embassy “Doing Business in Mozambique: A practical guide for Dutch Companies and Investors” describes the major issues to be taken into consideration when doing business in Mozambique.

Fiscal incentives for investment projects carried out under the Investment Law

Tax and customs incentives as well as other benefits, such as the right to import capital, export profits and re-export invested capital are given to domestic and foreign private investments pursuant to the Investment Law and its Regulations.

The Code of Fiscal Benefits approved by Law 4/2009 of 12 January 2009, establishes the framework of fiscal incentives. The Code applies to investments made by individual and corporate persons provided that such persons are duly registered for tax purposes.

Setting up a business in Mozambique

Under the Mozambican Commercial Law it is not compulsory for a limited liability company to be incorporated jointly with a national partner. The Decree-Law 2/2005, which is part of the Mozambique Commercial Code, offers foreign or Mozambican individuals and companies with a choice of six different ways to set up their business: i) partnerships; ii) limited partnerships; iii) capital and industrial companies; iv) private limited company (Lda); v) private limited company with a single quota holder; and vi) public limited companies (SA).

Taxation

The tax system applicable in Mozambique consists of national and local government taxes.

Land Law

All land is property of the State. Land Use and Benefit Rights (DUATs) are regulated by Law No. 19/97 of 1 October (Land Law) and Decree No. 66/98, of 8 December (Land Law Regulations).

In order to acquire land directly from the State, it is, therefore, necessary to apply for a land use and benefit title or DUAT (*Direito de Uso e Aproveitamento da Terra*). Foreigners can apply for a DUAT, if they have been living in Mozambique for more than 5 years. For foreign companies a registration or incorporation in Mozambique is required.

Labour Law

The labour Law 23/2007 of August 1 defines the general principles and establishes the legal framework applicable to individual and collective working relationships with respect to paid work done by hired employees. The Law establishes the rules for hiring foreign workers.

Sustainable Economic Development themes (Corporate Social Responsibility)

Mozambique has ratified all major human rights instruments. Particularly among local SMEs, there are as of today few companies that have a CSR policy or strategy that takes into consideration the UN framework for protecting and respecting human rights.

Infrastructure and Communication

Building adequate infrastructure is a major challenge for a country 2,600 km long from north to south. The EN1 (Estrada Nacional Número 1) connects the capital city Maputo to the northern part of Mozambique. Government plans include the construction of bridges, roads, transport corridors, airports, ports and other facilities. Mozambique has five international and several domestic airports. The country has three main sea ports: Maputo, Beira and Nacala. Railways are only available for the coalmines in central Mozambique. Mobile phone and internet connections are easily available.

Visa application

Foreign citizens are required to obtain a visa to enter Mozambique. Applications for a single entry, multiple entry, study, residence or work visa are handled by the Mozambican Embassies and Consulates. The requirements are available at the Consular section of Mozambican Embassies and Consulates as well as on the internet.

Banking

A total of 12 commercial banks with participations of both local and foreign capital operate in Mozambique with their headquarters based in Maputo and branches throughout the country. Rabobank has a joint venture with Banco Terra Mozambique.

Various facilities of the Netherlands Enterprise Agency (RVO) are available to support Dutch companies by offering information, advice and funds. Further assistance can also be obtained from the Economic Affairs department of the Netherlands Embassy.

8 The Zambezi area and the role of the Zambezi Valley Development Agency

The Zambezi Valley Development Agency (Agência de Desenvolvimento do Vale do Zambeze, ZVDA) was established in 2010, as a follow up to the former Bureau for the Promotion of the Zambezi Valley (GPZ).

Overall objective

The ZVDA is a public-sector agency under the Ministry of Planning and Development (MPD). The objective of the ZVDA is to promote inclusive and sustainable socio-economic development within the Lower Zambezi River Basin, through forming strategic partnerships for the accelerated, integrated and inclusive development of the Zambezi Valley. The ZVDA's mandate emphasizes regional strategic planning, coordination, and facilitation, rather than direct implementation as the GPZ (Planning and Development Office for the Zambezi Valley) does. The Agency's work program is strongly oriented towards agriculture, basic infrastructure and market/value-chain development.

The Agency was established by the Mozambican government to prioritize the development of the Central Region, of which the Zambezi Valley is a core part. The region covers 34 districts in the four provinces of Manica, Sofala, Tete and Zambezia. The Zambezi Valley is one of the most fertile regions of Mozambique, with large agricultural development potential. Much of the agricultural development potential is presently underutilized due to lack of basic infrastructure, public and private sector services, qualified human resources, and private business investments.

Geographical scope

The Lower Zambezi River Basin comprises 34 districts in four provinces: Manica, Sofala, Tete and Zambezi. In addition to these districts the Agency's geographical remit also comprise 6 districts that fall outside the River Basin area. The 34 districts of the River Basin are:

- Tete: Angonia, Cahora Bassa, Changara, Chifunde, Chiuta, Magoe, Marávia, Macanga, Moatize, Mutarara, Tsangano, Zumbo and the city of Tete
- Zambezia: Chinde, Mopeia, Inhassunge, Maganja da Costa, Milange, Mocuba, Morrumbala, Namacurra, Nicoadala and the city of Quelimane,
- Sofala: Caia, Chemba, Cheringoma, Gorongosa, Maringué, Marromeu and Muanza;
- Manica: Barué, Guro, Tambara and Macossa

Mandate and action areas

Within the Lower Zambezi River Basin, the Agency following Decree No. 23/2010 of June 2010 is mandated to act in three areas:

- Undertake studies and present strategies for the socio-economic development of the Lower Zambezi River Basin
- Provide technical and financial assistance to socio-economic development initiatives in the Lower Zambezi River Basin, including mobilizing funds for such initiatives and channelling them to beneficiaries
- Provide support to local governments in local land use planning and socio-economic development

9 Conclusions and recommendations

9.1 Strengths and weaknesses of the various livestock sectors summarized

In the previous chapters, analyses have been made of the strong and weak points of the various livestock sectors. The following table presents a general overview covering the various points of importance for further development of the different livestock value chains. There are clear differences in development stages between the three value chains. Its consequences for the interventions of the ZVDA will be further elaborated in the next paragraphs.

Table 27

Strengths (green) and weaknesses (red) of aspects of the three livestock sectors

Development aspects of the livestock sectors	Poultry	Dairy	Beef
Genetic base for developing value chain	Unavailability of day-old chicks in various parts of ZVDA area, need for more hatcheries	Full dependence on import of breeding material, need for local breeding programme, AI services	Locally well adapted breeds available
Feed (concentrates)	Still inadequately available (quantity and quality), necessitating further investments	Still inadequately available (quantity and quality), necessitating further investments	In local extensive production systems, hardly any need for concentrates
Fodder	n/a	Natural grazing available, but there is a need for better quality fodder, new varieties	Improvement of rangeland management necessary
Veterinary services	Poorly developed	Poorly developed	Poorly developed
Slaughtering, processing, value adding	Growing need for more slaughterhouses due to higher supply and changing demand	Need for more processing plants	Need for more slaughterhouses to stimulate offtake
Marketing	Strong national marketing campaign realised by poultry lobby	No marketing	No marketing
Organisational level in value chain	Strong and effective National Poultry Producers Association	No organisation in value chain	No organisation in value chain
Quality control, food safety	Little effective quality control, due to large number of individually owned small slaughterhouses	No milk quality control system	Quality control does take place in slaughterhouses
Training and education	Only little training and extension provided in the poultry sector, through government and projects (NGOs, private companies)	Training and extension provided by only one project (Lo'L).	No training or extension provided in the beef sector
Availability of finance	Some micro financing available	Very little financing available	Hardly any financing available for improving extensive beef production
Research capacity	No research capacity on poultry sector	No research capacity on dairy sector	Some research activities on local beef production, e.g. range management in Angonia

Though no full stakeholder analysis has been made as part of this study, most of the relevant stakeholders have been identified and contacted. In a livestock value chain, the following stakeholders can be identified:

Table 28

Stakeholder overview

Producers	Poultry farmers, dairy farmers, beef cattle farmers
Input suppliers	Genetics (breeding programmes, breeding companies, AI services); housing and farm equipment (usually local suppliers); feed and fodder (feed companies, fodder breeding and multiplication companies); veterinary services (government, private); education, training, extension (government and private); research (government)
Processors	Slaughtering and processing companies, cold chain supplies
Marketing/retail	Informal (village) and formal markets (urban, supermarkets)
Consumers	Mainly urban consumer, informal marketing
Policies, regulatory framework	Government, local and regional

This framework will be used to characterize the stakeholders in the three different livestock sectors.

9.1.1 Stakeholders in the poultry value chain

A general overview of a poultry value chain can be captured in the following figure:

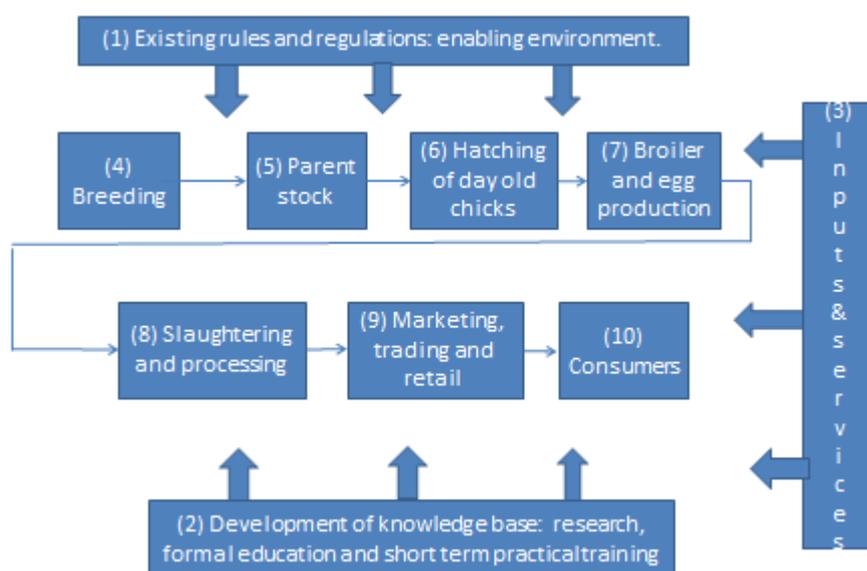


Figure 26 Poultry value chain

The role of the stakeholders in the poultry value chain in Mozambique at present can be summarized as follows:

Table 29

Role of stakeholders in the poultry value chain

Producers	Poultry farmers; management levels poor but slowly improving, some but still inadequate advisory support, most of the farm development is through trial and error
Input suppliers	Currently mainly dominated by a few monopolists (day-old chicks, feed) and poor service provision (veterinary, extension, research)
Processors	Rapid growth of small individually owned slaughterhouses, not cost effective, no control on quality and food safety aspects
Marketing/retail	Most birds and eggs still sold in informal markets, only formal marketing in some of the larger towns
Consumers	Mainly urban consumers in formal marketing chain
Policies	Government policies in support of growth of poultry value chain has been effective, need for further development of effective government services

The attention for future support and investments should be geared towards regionally better access to input supply and training and extension.



Figure 27 Informal poultry marketing

9.1.2 Stakeholders in the dairy value chain

A dairy value chain, representing all stakeholders, can be summarized as follows:

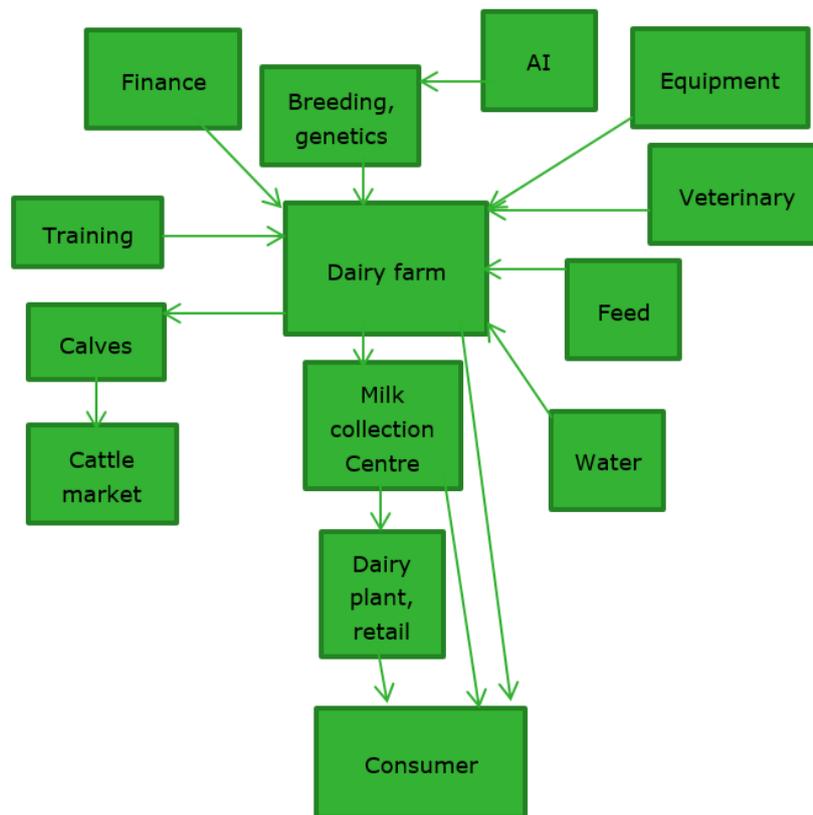


Figure 28 Dairy value chain

Table 30

Role of stakeholders in the dairy value chain

Producers	Only few smallholder specialised dairy producers, in all aspects still fully dependent on one NGO
Input suppliers	No specialised input suppliers in the dairy sector, all inputs through mediation of one NGO
Processors	Only four processors in the country: one near Maputo only using imported powder milk: three in operational area of ZVDA with limited volume and in need of management strengthening
Marketing/retail	Informal sector through the processors
Consumers	Only in urban areas
Policies	No dairy support policies from government side

The support and investment needs for the dairy sector are manifold and a comprehensive dairy value chain development and investment effort is needed to stimulate milk production and processing.



Figure 29 Fresh, good quality fodder



Figure 30 Good animal genetics: Jersey breeding bull

9.1.3 Stakeholders in the beef sector

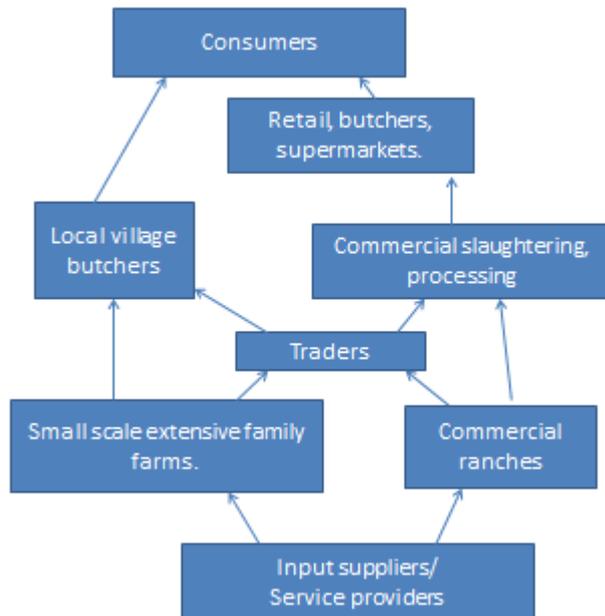


Figure 31 Beef value chain

Producers	Small scale farmers, using extensive production methods
Input suppliers	Apart from veterinary (vaccination campaigns) services, virtually no other inputs are provided to this low input system
Processors	Slaughterhouses are operational
Marketing/retail	At village level in informal marketing, from slaughterhouses supply to urban markets
Consumers	Meat is a commodity consumed at both rural and urban markets
Policies	Apart from vaccination campaigns, no government support for the sector

Table 31

Role of stakeholders in the beef value chain

Support to the beef sector should focus on gradual improvement of the extensive production system, taking small steps forward towards genetic improvement, veterinary control and grazing management.



Figure 32 Improved breeding bull, Borana crossbred

9.2 The role of ZVDA in livestock development in the Zambezi area

The development stages differ for the three different livestock value chains. Subsequently, the support strategies needed to stimulate the growth of these sectors will vary. There are a number of general crosscutting issues that, nonetheless, need to be addressed for all sectors. These are all related to various types of input supplies and can be addressed through either government or private sector or in some cases in a combined public-private approach.

Government responsibilities affecting livestock development are veterinary services, enforcing quality standards for food safety, and research into current livestock sector bottlenecks.

Based on a good analysis of the need for **veterinary services**, the role and responsibilities of the departments involved can be strengthened through training activities and in some cases provision of the necessary, but currently lacking infrastructure. Note that the infrastructure should be integrated in a long term plan on improving the veterinary services. Donor initiatives for support to the veterinary departments, in some parts of the ZVDA operational area, are in preparation. Furthermore, ZVDA could determine additional activities to equally strengthen the veterinary service in other parts of the Zambezi area.

The relevant **departments of public health** need to be strengthened to enable them to apply stricter control of food safety standards. Both regarding human training on inspection and the facilities needed (e.g. laboratories) to carry out the necessary inspection measures.

Agricultural research in Mozambique is carried out by the IIAM (Instituto de Investigacao Agraria de Mozambique). Animal production and animal health research is one of the four themes of IIAM. The research station in Chimoio has some equipment to do various lab tests. Operational procedures are very bureaucratic though and available funds are more often used for new equipment, rather than for staff development. ZVDA could engage in some of the research capacity aimed at the identification of appropriate technologies to improve livestock development.

Education, training and extension are at first instance public functions. Despite this, several international companies, also in Mozambique, do provide training activities to investors and small scale farmers as part of their corporate responsibility policies. These corporate activities need to be backed up by a strong formal education system. Education in livestock production requires improvement in Mozambique to be able to prepare the country for a stronger and more professional livestock sector. Thus, investments in education are essential. Educational institutes, universities, and especially vocational training institutes need to be strengthened and to have their curricula updated. Donors can contribute to this by means of professional educational institutes that can provide such kind of assistance.

The ZVDA could assist in strengthening some of the educational institutes in the area, that have potential (and in some case the facilities) to get more actively involved in practical training for livestock development. ZVDA could learn from the effectiveness of the public-private approach in implementing training schemes and stimulating the introduction of the positive elements hereof. This could be done in cooperation with other players in the field of education, training and extension. For example, several educational institutes, such as the Instituto Superior Polytechnico de Manica could play a role in implementing more practical hands-on training for both farmers and advisors/extensionists.

Feed as in input is provided by the private sector. ZVDA can stimulate investors to get involved in livestock feed production in those areas where it is insufficiently available. Detailed investment plans for feed plants are available with the ZVDA.

In general the conclusion must be drawn that there is a great need for **better coordination along the livestock value chain** to strengthen horizontal and vertical linkages.

There is great potential for maximizing values from horizontal and vertical integration at every level of the value chain strategy. In the long run, expected gains from the strategy would undoubtedly justify intervention costs in terms of economic diversification, increased productivity, food security, job creation and poverty alleviation.

9.2.1 The role of ZVDA in poultry development

The poultry sector has seen a strong growth in several parts of the country over the past decade. The further growth of poultry production in the Zambezi area can be based on the experiences and successes of other parts of the country.

ZVDA's major role should be to stimulate and support investors to get involved in the missing elements in the poultry value chain: provision of day-old chicks, feed and slaughtering facilities.

Detailed investment plans for a hatchery, a feed mill and a slaughterhouse are available and can be obtained on request from the ZVDA.

9.2.2 The role of ZVDA in dairy development

Further stimulating dairy production in the Zambezi area will be much more complicated than developing the poultry sector. Infrastructure, knowledge and facilities which used to be better and

wider available in the past, all need to be re-established again. This requires a comprehensive approach towards dairy development.

A strategic approach to developing emerging dairy sectors¹⁶ consist of a number of steps and is based on the presumption that the dairy sector in most countries is complex. Thus, clear-cut individual strategies and interventions cannot be easily identified and no single strategy framework can be designed that fits the dairy sector in every country. Therefore, it is not a matter of focusing on blueprints, but implementing a proper process in which all steps for building up a dairy sector are incorporated.

This process is illustrated in the conceptual framework in Figure 33 and has five steps:

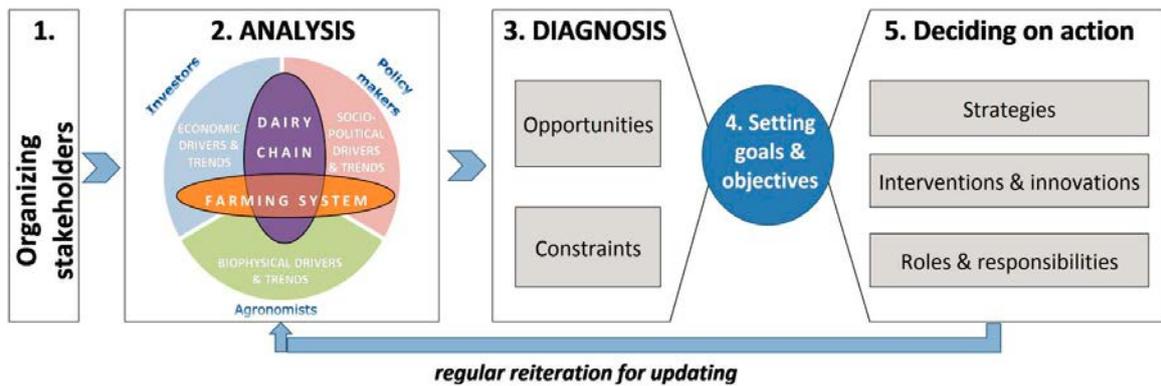


Figure 33 Conceptual framework for dairy development, source: van der Lee et al.

1. Organizing stakeholders

The local dairy sector actors are key throughout the entire process and need to be organized to work out joint development initiatives. Stakeholders have various backgrounds and interests that need to be taken into consideration. Governments, investors and farmers differ in interest in policy issues, economic trends and biophysical conditions for dairy farming.

Recently, initiatives to bring all stakeholders together have been organised by the Mozambican government, reflecting the growing interest in dairying as an economic activity. In November 2015, a national conference on dairy production was held in Chimoio, which covered general trends in the dairy sector, genetic base for dairy production, legislation and the need to form a national platform.

ZVDA could play a coordination role in follow up these national initiatives in the Zambezi area.

2. Analysis

The dairy sector can be analysed by looking at the farming systems and the dairy chain(s) in their context. A proper analysis needs to pay attention to the economic, biophysical and socio-political factors that have shaped the dairy sector in the past and present. This report describes the current situation in the dairy sector in the country, however, this information needs to be reviewed in the lights of present and future economic and political trends.

The ZVDA can initiate a process of validating the present analysis with opinions of the relevant stakeholders e.g. in a regional follow up conference that combines the outcome of the national conference of December 2015 with the findings of this report.

3. Diagnosis

The next step in the development of a strategy for committed stakeholders pays due attention to prioritizing constraints and opportunities.

¹⁶ Lee, J. van der et al, 2014: Milking to potential. Strategic framework for dairy sector development in emerging economies. Wageningen University and Research. [pdf](#)

Key question: What are the key constraints and opportunities for further development that can be derived from trends and drivers? This report highlights the major strengths and weaknesses of the three livestock sectors. Further consultation processes should determine priorities that need to be addressed primarily and translated into goal and objective setting.

4. Goal and objective setting

Goal setting can be particularly arduous, as different stakeholders can have very different ideas about the goals and objectives to pursue. This requires a well-managed consultation process in which prominent questions are raised by the major stakeholders regarding key goals for the dairy sector and a common goals and objectives are defined.

5. Decisions for action

In this last step, following the consultation process, actors need to agree on intervention strategies, and the roles and responsibilities regarding the implementation of these. The key driving questions are on deciding on what strategies and interventions can help capture the opportunities and alleviate key constraints and which innovations are necessary to effectuate this. And last but not least, it needs to be agreed upon which actors play which role and how they can cooperate.

The ZVDA can play a leading and coordinating role by bringing parties together in this process. When final decisions have been taken and development goals been set, the ZVDA can assist in the process of both social and economic innovation. This is a vital part of the revival of the dairy process and can be done by initiating and supporting dairy development programmes and stimulating the necessary private investment needed to build up the required dairy value chain infrastructure.

9.2.3 The role of ZVDA in beef development

Beef production development in Mozambique requires a different approach as compared to poultry and dairy. Whereas poultry is a recently established industry that has shown a strong growth and dairy is still in its infancy stages, beef production (extensive livestock keeping) has been an important farming activity in Mozambique for centuries.

In Mozambique, as in many developing countries, livestock keeping is a multifunctional activity. Beyond their direct role in generating food and income, livestock are a valuable asset, serving as a store of wealth, collateral for credit and an essential safety net during times of crisis. Furthermore, livestock is Mozambique's largest user of land resources.

In mixed-farming systems, livestock is one of the several production activities that helps spreading risks mainly caused by natural factors such as droughts and flooding. Such extensive livestock keeping systems are mainly resource driven and less responsive to economic factors, which are either market or development project driven. Developments in breeding, nutrition and animal health will continue to contribute to increasing potential production and further efficiency and genetic gains.

ZVDA could play a role in strengthening and supporting locally adapted breeding policies, improved veterinary services and improving range land management for better grazing.

For better offtake, more slaughtering facilities need to be established. A full investment plan for a new slaughterhouse is available on request from ZVDA.

9.3 Cooperation with Dutch industry and institutions

Livestock is an important activity in the Netherlands, which is traditionally a dairy country, but where intensive livestock production (poultry and pigs) have become an equally important part of the livestock sector.

The primary producers are supported by strong education and with an organised and coordinated input supply and services system. This has made the Netherlands the second largest exporter of

agricultural and livestock products in the world.

Many of the input and service suppliers are internationally active. Educational institutes, from practical hands-on training to the vocational and university level work together internationally as a "Borderless Network" providing training and education support needed to build up livestock sectors at all levels.¹⁷

Internationally operating companies are united in networks, focussing on opportunities for international trade. The companies in the poultry sector collaborate in the Dutch Poultry Centre (www.dutchpoultrycentre.nl). Companies in the dairy sector work together in the Dutch Dairy Centre (<http://dutchdairycentre.com/>).

Both centres represent prominent companies and service providers in both sectors and are open for collaboration in the livestock sector in Mozambique as well.

¹⁷ <https://dairyethiopia.com/news/>

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Appendix 1 Overview of the main stakeholders involved in food safety regulation in Mozambique

Stakeholder Name	Ministry or Supervising Authority	Where in the Food Chain	Staff working on food safety	Mechanisms/Mandate
1. National Institute for Normalisation and Quality (INNOQ)	Ministry of Industry and Commerce (MIC)	Production; Processing; distribution	NA	<ul style="list-style-type: none"> - Development of standards (including food standards) - Provides calibration services to food testing laboratories; calibration of legal, Industrial, and meteorology equipment - Enquiry point for the TBT agreement of the WTO
2. Department of Inspection of MIC (DI-MIC)	Ministry of Industry and Commerce	Distribution /Commercialisation	NA	<ul style="list-style-type: none"> - Food business premises licensing - Food safety inspection of food business operators - Develops regulations on food business - Controls food at entry ports
3. Department of Environmental Health (DSA)	Ministry of Health (MISAU)	Production; Processing; distribution	NA	<ul style="list-style-type: none"> - Develops food regulations - National <i>Codex Alimentarius Commission</i> focal point - Coordinates the food legislation enforcement
4. Environmental Hygiene and Medical Examination Centre (CHAEM)	Ministry of Health	Production; Processing; Distribution	NA	<ul style="list-style-type: none"> - Inspection of food business premises and food at entry ports - Controls the occupational health - Food safety legislation enforcement
5. National Laboratory for the Hygiene of Food and Water (LNHAA)	Ministry of Health	Production; Processing; Distribution	25	<ul style="list-style-type: none"> - Food and Water testing (Chemistry and Microbiology)
6. National Institute for Fisheries Research (INIP)	Ministry of Fisheries (MIP)	Production; Processing; Distribution	NA	<ul style="list-style-type: none"> - Regulates on fishery activities - Enforces the fisheries legislation - Licences premises and vessels for fishery activities
7. Fisheries Inspection Laboratory (LIP)	Ministry of Fisheries (MIP)	Production; Processing; Distribution	26	<ul style="list-style-type: none"> - Analysis of Seafood (Chemistry and Microbiology) - Enforces the fisheries legislation
8. Central Veterinary Laboratory- Directorate of Animal Sciences (DCA)	Ministry of Agriculture – National Agricultural Research Institute (MINAG-IIAM)	Production; Processing; Distribution	166	<ul style="list-style-type: none"> - Conducts Research in Animal Diseases - Animal Disease Surveillance - Animal Vaccine Production - Chemical and Microbiological Analysis of feed and food of animal origin
9. Biotechnology Laboratory –	Ministry of Agriculture	Production	8	<ul style="list-style-type: none"> - Genetically improvement of plant food

(IIAM)				<ul style="list-style-type: none"> - Research on food plant improvement
10. Department of Agricultural Services	Ministry of Agriculture	Production; Processing; Distribution	NA	<ul style="list-style-type: none"> - Farm Diagnosis of Animal and Plant diseases - Animal and Plant Disease Surveillance - Animal Vaccination, Plague Control - Inspection of food from animal and plant origin - Livestock Licensing
11. Legal Department	Ministry of Agriculture	Production; Processing; distribution	NA	<ul style="list-style-type: none"> - Regulates on food from animal and plant origin - Regulates on land use rights
12. Plant Protection Department (DSV)	Ministry of Agriculture	Food Regulation, Food Inspections	NA	<ul style="list-style-type: none"> - Regulates on sanitary and phytosanitary measures - Regulates the use/distribution of pesticides (licensing of pesticides importation and distribution) - Operates quarantine services - Controls plague and insects - National Enquiry Point for the WTO's SPS measures agreement
13. National Directorate for Veterinary Services (DNSV)	Ministry of Agriculture	Production; Processing; Distribution ,	4	<ul style="list-style-type: none"> - Regulates on livestock health - National Notification Authority to the OIE (same activities as of the Department of Agricultural Services, but at a National level

Source: Munguambe and Hendrickx, 2011

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Centre for Development Innovation
Wageningen UR
P.O. Box 88
6700 AB Wageningen
The Netherlands
www.wageningenUR.nl/cdi

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