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Zambia

What Would it Take for Zambia's Beef and Dairy Industries to achieve their Potential?

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ACRONYMS, ABBREVIATIONS AND CURRENCY

BTB	Bovine Tuberculosis
CBPP	Contagious Bovine Pleuropneumonia
COMESA	Common Market for Eastern and Southern Africa
CSO	Central Statistical Office
DFZ	Disease Free Zone
DNEI	Diseases of National Economic Importance
DRC	Democratic Republic of Congo
DWT	Deadweight Tonne
ECF	East Coast Fever
EU	European Union
FAO	Food and Agriculture Organization
FAOSTAT	Food and Agriculture Organization Statistical Database
FCP	Full cream powder
FMD	Foot and Mouth Disease
GDP	Gross domestic product
FSRP	Food Security Research Project
HACCP	Hazard Analysis and Critical Control Points
JPC	Jobs and Prosperity: Building Zambia's Competitiveness Program
LSD	Lumpy Skin Disease
LSU	Livestock Units
MACO	Ministry of Agriculture and Cooperatives
NDM	Nonfat dry milk
NGO	Non-governmental organization
OIE	World Organization for Animal Health
PROFIT	Production, Finance and Improved Technologies Project
SADC	Southern African Development Community
SMSDFZ	Small/Medium Scale Disease Free Zones
Tryps	Cattle Trypanosomosis
UHT	Ultra High Temperature
USAID	United States Agency for International Development
VAT	Value Added Tax
WHO	World Health Organization
WTO	World Trade Organization
ZMK	Zambian Kwacha
ZNFU	Zambia National Farmers Union

All dollar amounts are U.S. dollars unless otherwise indicated.

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ACKNOWLEDGMENTS

This report is a window into a larger initiative, the Jobs and Prosperity: Building Zambia's Competitiveness (JPC) Program. The JPC Program is a "joint venture" between the Government of the Republic of Zambia, the Zambian private sector, the United Kingdom's Department for International Development (DFID), the African Development Bank Group and the World Bank Group. As such, the report represents the collective efforts of many people who engaged in this work at different stages in the process.

As this report is being published, the Program is being implemented by teams of stakeholders from Government, industry and civil society. While these teams are driving the work forward in an effort to achieve results, a smaller group of people has been involved in preparing this report.

This report is part of a series produced by the World Bank's Africa Finance and Private Sector Development Unit (AFTFP).[1] The team is led by Marie Sheppard (Senior Private Sector Development Specialist) and includes Anna Morris (Private Sector Development Specialist), Michael Engman (Economist) and Sipiwe Chihame (Team Assistant). The report is based on a draft prepared by Sunil Sinha and Ahmed Sidahmed (Consultants, Nathan EME, Ltd.)

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[1] For a list of reports in the series, see Annex A.

EXECUTIVE SUMMARY

This report explores the potential contribution that the beef and dairy industries could make to jobs and prosperity in Zambia, and what it would take to achieve this potential. The Zambian government has been looking to increase growth and job creation, and the prosperity resulting from them, by developing a more competitive and diversified economy. This report explores the potential contribution that the beef and dairy industries could make to the government's ambition and sets out what it would take for the industries to achieve their potential.

Two main factors provide Zambia with large potential for developing its beef and dairy industries:

1. **The country could sustain more than double its current population of cattle.** Zambia has one of the lowest densities of cattle in the region. Its grazing area of 20.3 million hectares currently supports just 3 million cattle. Meanwhile, Zimbabwe's 12.1 million hectares support 5.4 million cattle and Kenya, with virtually the same amount of grazing land as Zambia, has a cattle herd of 13.5 million. All three of Zambia's agro-ecological zones are suitable for cattle but the country's cattle stock is currently concentrated in just three provinces. It is estimated that Zambia could sustain over 7 million cattle using current livestock practices.

2. **The demand for beef and dairy products in the domestic and regional markets is likely to increase significantly,** providing the opportunity to increase output. The domestic market is small and underdeveloped but demand for beef and dairy products is likely to grow rapidly as incomes increase. There are also opportunities to export more beef and dairy products to neighboring countries.

However, Zambia's beef and dairy industries are currently underperforming and uncompetitive. Both have been growing rapidly. The beef industry has attracted considerable levels of new investment and there is interest from a major regional firm in investing in the dairy industry. However, held back by drought and disease, the cattle population is only now recovering to levels recorded in the early 1990s. Productivity is low, with beef production undermined by low off-take rates and low live weight of animals, and dairy output undermined by very low raw milk yields. The price of dressed beef is 20 percent higher and the price of raw milk 50 percent higher than in South Africa, the largest regional market. Zambia currently exports very little beef or dairy products to its neighbors.

The industries have failed to achieve their potential due to a combination of a poor operating environment and the immaturity of the industries themselves, which has rendered them slow to improve efficiency and productivity. The main deficiencies in the operating environment are as follows:

1. Weak domestic demand, caused by comparatively low incomes, high prices for beef and dairy products and a significant proportion of Zambians not traditionally being large consumers of beef and dairy products.

2. Zambia's inability to certify its beef disease-free, which restricts access to export markets. In addition, neighboring countries imposing non-tariff barriers on dairy products.

3. The low availability and high cost of breeding animals and feed. The cost of feed is not helped by the government's policies of maintaining maize prices above international levels.

4. The high cost of veterinary care and drugs and major weaknesses in the supply of veterinary services in the public sector combined with underdeveloped private provision.

5. Low levels of access to affordable finance, especially long-term finance.

6. The high cost of fuel and transport.

7. Frequent power outages which force the industries to rely on expensive standby power generation.

8. Public policies and institutions concerned with the industries have been extremely weak. In the past, responsibility for them lay within a broader Ministry of Agriculture that focused primarily on crops. The recently-established Ministry of Livestock and Fisheries Development is attempting to remedy the situation but has a lot of catching up to do. With the country having four times more grazing than arable land, it may be argued that the county's potential lies more in cattle and small ruminants than in the crop sector which continues to receive the major share of the government's support for agriculture.

9. The government has failed in providing the key public good of controlling disease. Periodic outbreaks of disease cost cattle farmers dearly and high levels of endemic disease are a barrier to increasing the cattle population and accessing export markets.

10. The business environment is not enabling and the beef and dairy industries are subject to bureaucratic regulations and corruption, levies intended to develop services for these industries being used for other purposes, and currency instability resulting in high financial risk.

The industries' low productivity starts with cattle farmers. There are, in effect, three systems of cattle farming: traditional, emergent and commercial. Farmers using the three different systems have different motives, incentives and constraints:

- The *traditional system* accounts for 80 percent of the cattle population. This is a low input, low output system characterized by low productivity. The calving rate is low and calving and adult mortality high. Off-take rates (10 percent) and the live weight of beef animals (250 kilograms) are low. Milk yields are extremely low (2 liters a day). Animals suffer high rates of disease and poor nutrition. They lose weight and condition during the dry season when forage becomes scarce. Traditional farmers tend to regard cattle as a store of wealth and cultural prestige rather than a productive asset from which income should be maximized. Animal husbandry is therefore poor and the inclination not to sell animals leads to overgrazing in some areas. They tend to sell animals at the same time to pay for school fees and this drives down the price they receive.

- The *commercial system* is based on modern animal husbandry. It matches the best in the region (South Africa) in terms of calving rates, keeping mortality low and productivity. Off-take rates are 17–18 percent and live weight 300 kilograms per animal. Milk yields are 17–23 liters a day from exotic breeds. These farmers invest heavily in disease prevention and good veterinary care and rear crops to feed their animals as well as buying in feed. Dairy farmers practice zero grazing for fear of disease thereby negating one of the main comparative advantages that Zambia could afford them of plentiful supply of grazing land. They are constrained by high cost of veterinary care and feed and lack of access to long-term, affordable finance.

- The *emergent system* combines elements of the traditional system with modern, commercial cattle rearing. Calving rates are higher than in the traditional system (with both breeding bulls and artificial insemination used) and mortality rates are lower. Off-take rates are between those of the traditional and commercial systems. Milk yields are 7–10 liters a day from cross-bred dairy cows. Emergent farmers view cattle as a source of income as well as having cultural value and are prepared to invest limited resources in preventing diseases and supplementing natural pasture. They are constrained by access to affordable finance to build up their herds.

In practice, the emergent system is the most competitive of the three. It relies on plentiful grazing land but augments it with low cost supplemental feeding. In dairying, for example, the emergent farmer can produce at an internationally competitive cost of under $0.20 a liter. The commercial farmer, constrained mainly by the high cost of feed, barely makes a profit at the current raw milk price of $0.60 a liter and is clearly not competitive regionally or internationally. It is the emergent system that is the most dynamic and it is gaining ground: in dairying, it now holds 10 percent of the market.

The lack of competitiveness is also due to inefficiencies at the processing stage of the value chain. These inefficiencies disadvantage the farmer while pushing up prices for the consumer. For example, Zambia is competitive internationally in terms of live weight prices paid to farmers but is not competitive in terms of dressed weight prices or prices to the consumer.

The beef industry is immature. The major firms are vertically integrated from the farm to retailing. The specialization that produces efficiencies in international industries has yet to take hold. High transport costs, small abattoirs and meat processing facilities and the use of standby power lead to a high cost base. The beef industry used to be dominated by a single, large firm. But new competitors have emerged recently and these new entrants are beginning to develop better business models to secure a reliable supply of animals. They are beginning to specialize.

In the dairy industry, the dominant firm took over the assets of a large, publicly owned dairy plant in Lusaka. It has been working with emergent farmers to develop better collection systems. Its inefficiency is caused by low capacity utilization because its plant is oversized in relation to the Lusaka market. Other major plants in Livingstone and Eastern Province are constrained by low raw milk production and still rely on imported full cream powder which is more expensive than locally sourced raw milk. They have yet to invest in developing better supply chains by working with emergent farmers.

Under a 'business-as-usual' scenario, Zambia's beef and dairy industries are likely to continue to grow at a rate of 1–2 percentage points above gross domestic product (GDP). Higher incomes will drive demand for beef and dairy products. However, the unfavorable operating environment and the lack of efficiency in the processing industry will continue to cause domestic prices to be higher than regional levels, thereby constraining the growth of domestic demand. The prevalence of disease and periodic droughts will check the growth of the cattle population and productivity will remain low. Exports of beef will be limited by an inability to supply meat certified as disease-free. Dairy exports will be limited by a lack of price competitiveness and the presence of non-tariff barriers to regional trade.

Yet these industries have the potential to grow more rapidly and provide a more significant contribution to rural livelihoods. With a stronger partnership between the public and private sectors and measures taken by farms and firms themselves to improve productivity and competitiveness, the industries would start to achieve their potential. The cattle population would grow at 5 percent a year and spread to other provinces. The industries would be able to grow at 4–5 percentage points above GDP and Zambia could become a large exporter to other countries in the region. The industries would attract greater levels of investment, creating formal jobs and improving rural incomes.

There are a number of results that, if achieved, could help Zambia's beef and dairy industries achieve their potential. These are set out below under four headings.

1. ***The operating environment improves:***

- Diseases are controlled and animal health improved through better policies and institutions.
- Improved breeding practices increase animal reproduction as a result of greater investment in breeding and artificial insemination services.
- The quality of feed improves and costs come down as a result of greater investment by the public and private sectors in developing low cost feed.
- Fuel and transport costs fall as a result of policy changes and efforts to improve the efficiency of the road transport industry.
- Access to affordable finance increases as a result of a targeted intervention to drive down spreads and encourage product innovation in the commercial banking system.
- The power supply is more reliable and available in rural areas through an increase in generating capacity and improving incentives for the private sector to supply renewable solutions off-grid.
- Regulations are streamlined regulation, better use is made of levies and the exchange rate is more stable and competitive.

2. ***Farmers increase productivity and improve competitiveness:***

- Traditional farmers become more commercially-oriented. Assured of lower risk from drought and disease outbreaks, and with better fed, healthier animals able to fetch higher prices, traditional farmers increase off-take rates.

- Emergent farmers increase their level of activity. Better access to affordable, long-term finance enables emergent farmers to invest in increasing the size of their cross breed herds, invest in fodder crops and purchase drugs and veterinary care. These would contribute to an increase in output.

- Commercial farmers become more competitive: closer links with the feed industry help to reduce feed costs; the supply of veterinary care services increases, thereby reducing their cost; policy changes lead to a fall in fuel and transport costs; and better access to affordable, long-term finance enables expansion, reducing the overhead burden created by the relatively small size of commercial farms (by regional standards).

3. The beef industry becomes more efficient and competitive:

- Investment in developing closer relationships with commercial and emergent farmers enables the industry to receive animals in a better condition much of the year round.

- Improved access to affordable short-term finance helps smaller processors to expand their businesses, thereby increasing the pressure of competition on the larger processors. Improved access to long-term finance at an affordable cost enables investment in feedlots and the modernization of abattoirs, bringing them up to regional levels of efficiency.

- The cost of fuel and transport (particularly rural and refrigerated transport) falls, reducing a major competitive disadvantage and enabling a more economic location of fattening and slaughtering facilities.

- Power outages cease, reducing the need to use standby generation.

- Disease-free zones or quarantine facilities enable beef exports to be certified disease-free.

- Expansion of the industry attracts a greater number of suppliers of equipment and consumables (e.g. spices, casings), thus reducing cost.

- Greater specialization develops, leading to the emergence of a wholesale market for beef.

4. The dairy industry overcomes raw material and market constraints:

- Dairy plants build closer supply relationships with emergent farmers, providing embedded services to secure increased supply, especially in the south and east.

- Greater access to long-term finance at an affordable cost enables the establishment of small-scale dairies that are able to compete against large ones by developing innovative business models.

- A growing supply of skilled labor, especially technicians, helps to increase labor productivity and reduce repair and maintenance costs.

- The cost of fuel and transport falls and uninterrupted power is available, enabling a more efficient location of dairy farming and processing to emerge.

- Dairy cooperatives develop viable business practices through better training in business management practices and improved access to business development services.
- Government and the industry build a partnership to promote the consumption of milk and dairy products by measures such as school feeding programs and advertising.
- The price of milk and dairy products to the consumer falls by 25 percent, helping to stimulate faster growth of demand.
- Non-tariff barriers to dairy trade are reduced through the Southern Africa Development Community (SADC) and the Common Market for Eastern and Southern Africa (COMESA).

Achieving these results and achieving the industries' potential is possible. Bringing about these results may seem like a tall order. However, not everything needs to be done at once. Stakeholders in the public and private sectors can choose the priorities.

The potential impact of faster-growing and more competitive beef and dairy industries on economic growth, diversification and job creation make the effort worthwhile. The development of larger beef and dairy industries would help to increase the low contribution (around 20 percent) that livestock currently makes to agricultural GDP and boost the growth of the agricultural sector. Beef and/or dairy could emerge as major industries, thereby helping to diversify the economy. For instance, if Zambia's beef and dairy industries matched Kenya's in performance, their joint output could increase from around $230 million currently to almost $1.6 billion, representing over 10 percent of current GDP.

The growth of these industries would make a substantial contribution to increasing rural prosperity and addressing persistently high levels of rural poverty. Around 30 percent of rural households own cattle and cattle ownership already contributes a considerable proportion of rural incomes. The growth of the industries would benefit both the cattle farmers and the considerable numbers of people who earn their living from trading in cattle and beef and dairy products. Their growth could also make a significant contribution to the currently very low levels of formal employment in Zambia, contributing as many as 100,000 formal jobs.

1. INTRODUCTION

- Why are industries in which Zambia has an apparent comparative advantage, such as commercial agriculture and tourism, not generating more jobs and income?
- What can be done differently - by Government, businesses, civil society and donors - to change this situation and make these industries more productive?
- Can innovative approaches such as crowd sourcing, often adopted by the private sector, be used to generate results and facilitate accountability for achieving them?

These questions continue to preoccupy policy makers, businesses and civil society – especially in light of Government's strategy to embrace private sector-led growth and facilitate competitiveness and diversification.

While Zambia's economy performs well, in macroeconomic terms, low levels of productivity plague industry, and this constrains growth, diversification and prosperity. In recent years, economic growth has averaged 5-6% a year, business reforms are being implemented (Zambia was one of the top ten reformers in the Doing Business Index of 2011[1]), and investment levels are at an all time high. However, according to the World Economic Forum's Global Competitiveness Index 2010-2011, Zambia is not a competitive place in which to do business (ranking 115th out of 139 countries). Not surprisingly, business productivity tends to be low, and few Zambian industries are internationally competitive. Formal employment is shrinking (estimated at 10% of the labor force) and rural poverty is increasing. In summary, there is an urgent need to increase productivity, growth and employment.

In 2008, when discussing Zambia's progress relative to its Fifth National Development Plan, government and the World Bank agreed to try a different approach to building business productivity and industry competitiveness. Collectively, we wanted to know: is there a better way to design/implement policies and programs so that they are more effective? The World Bank discussed this question with other donors supporting private sector development in Zambia, some of whom then became partners in a new initiative, the Jobs and Prosperity: Building Zambia's Competitiveness (JPC) Program.[2]

The JPC Program has two phases. Phase I encourages *demand for results* that, if achieved, could increase the productivity of Zambian businesses. Phase II facilitates the *supply of these results*.

During Phase I, stakeholders identified beef, dairy, tourism and copper as industries with large but unexploited potential that could benefit from the JPC approach. A collaborative process was used to analyze the competitiveness of these industries and identify opportunities and challenges to realizing them. The analytical work was structured so as to maximize the accuracy and ownership of results. This participatory approach helped to mobilize stakeholders and *catalyze demand* for achieving the target results. While the industries had been studied before and many of their challenges were known, they remained largely uncompetitive within the region and the world. The JPC Program leveraged off this previous work and adjusted the process of performing analytical work so as to avoid similar

pitfalls. Specifically, the JPC sought to generate strong consensus around the analytical findings, which included the explicit consideration of political, social and institutional issues. This approach distinguishes the JPC approach from previous analytical work and is expected to increase the likelihood of tangible results being achieved. Following the analytical work, industry stakeholders used agreed criteria to select three to four priority target results that – if achieved – could assist in unlocking the industries' potential. These target results became the focus of the program's Phase II (implementation).

Phase II has two goals. First, to *supply some concrete results* by experimenting with a range of tools, including challenge competitions and crowd-sourcing, both of which have been used successfully by the private sector. Tapping into the "wisdom of crowds" (both local and global) can identify cost-effective ways to achieve the target results – which can then be implemented on a pilot basis. Second, *to facilitate advocacy and accountability* for achieving the target results. The JPC provides information, analysis and resources to enable advocacy, and, equally important, a means by which stakeholders can hold each other accountable for delivering results.

What happens next? The JPC Program is a pilot, operating with limited time and resources, seeking to deliver concrete results within 2-3 years. It is too early to know whether the program is successful – in terms of outcomes. What is clear, however, is that the approach of mobilizing demand and supply for clearly defined results can be an effective way to improve the caliber of analysis and to build consensus around priorities. The ownership generated by this process increases the likelihood of outcomes being achieved, as key stakeholders advocate for outcomes and monitor progress towards attaining them.

The JPC approach is an experiment, and while the risk/return ratio is not yet known, the experience is useful. Whether or not the Program is successful, the experiences gained will be captured for future work in Zambia as well as for other countries with similar challenges. It is hoped that the return on investment will be positive – both for Zambia, which needs more productive industries to drive prosperity, and for the development community, which needs more effective ways of supporting competiveness and diversification.

This report is one in a series of documents produced under Phase I of the JPC Program[3]. It explores the potential contribution that the beef and dairy industries could make to jobs and prosperity in Zambia, and what it would take to achieve this potential.. It aims to facilitate the development of a common vision of the industries and of what it would take to bring about this vision. In line with the Program's approach, the report does not contain recommendations on what should be done or plans for their implementation.[4] It is organized as follows:

- Chapter 1 (this chapter) **introduces** the background to the program and to this report.
- Chapter 2: **The Huge Potential of Beef & Dairy in Zambia** sets out the potential of the beef and dairy industries in Zambia and the contribution that these industries could make to jobs and prosperity.
- Chapter 3: **Underperforming Beef and Dairy Industries** examines the gap in performance and competitiveness of Zambia's beef and dairy industries in relation to those of its neighbors and other international comparators.

- Chapter 4: **A Poor Operating Environment** describes the business climate that constrains the industries from fulfilling their potential.
- Chapter 5: **Low productivity, Low Competitiveness** identifies the input factors that cause under-performance and a lack of competitiveness in the value chain.
- Chapter 6: **What Could the Industries Deliver?** assesses what is likely to happen to the industries and their contribution to jobs and prosperity under (1) a business-as-usual scenario and (2) if measures are taken to improve their competitiveness.
- Chapter 7: **What Would it Take to Achieve the Potential?** explains the rationale for supporting Zambia's beef and dairy industries and highlights a set of results that – if achieved – would help the industries to achieve their potential.

The research and consultations on which this report is based were conducted during the first half of 2010.

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[1] See www.doingbusiness.org
[2] For more details of the JPC Program and its achievements to date, see World Bank Group. 2011 (forthcoming). *More Jobs and Prosperity in Zambia: What Would it Take?*
[3] For a list of reports in the series, see Annex A.
[4] The Program is experimenting with tools such as challenge competitions and crowd-sourcing in order to identify recommendations for action.

2. THE HUGE POTENTIAL OF BEEF AND DAIRY IN ZAMBIA

This chapter shows the huge potential for developing Zambia's beef and dairy industries and the substantial contribution that the growth of these industries could make to jobs and prosperity.

It starts by examining the scope for increasing the cattle population in Zambia, comparing the availability of grazing land and climatic conditions with those of neighboring countries. This is followed by an analysis of market prospects in the domestic, regional and international markets for beef and dairy products. It then considers the contribution that the beef and dairy industries could make to economic growth and diversification. The final section examines the industries' potential contribution to creating jobs and increasing rural prosperity.

2.1. The Scope for Increasing the Cattle Population

Zambia is well-placed to sustain a much larger number of cattle than it does now. It currently has one of the smallest cattle populations in the region (see table 1).

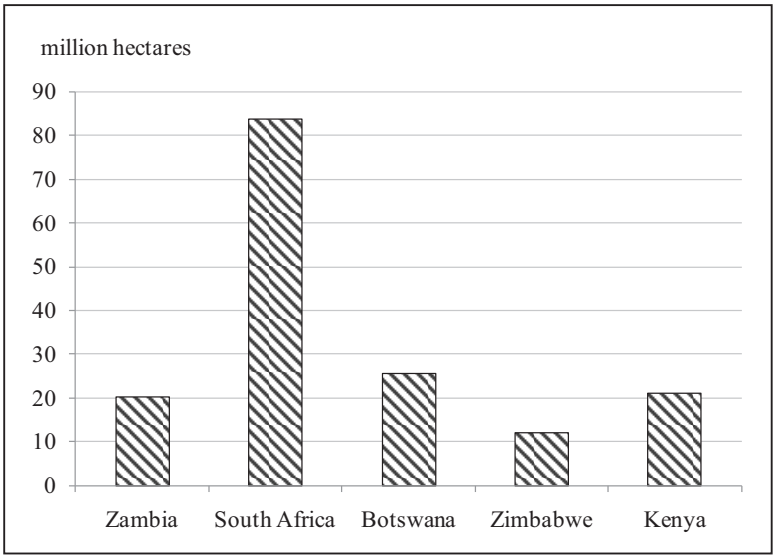
Table 1: Cattle Population of Zambia and Neighboring Countries, 2008

Output Indicators	Zambia[1]	South Africa	Botswana	Zimbabwe	Kenya
Cattle population (million head)	2.90	14.40	2.45	5.40	13.50
Grazing land (million hectares)	20.30	83.93	25.60	12.10	21.30
Cattle per hectare of grazing land	0.14	0.17	0.10	0.44	0.63

Source: FAOSTAT, FAO 2009, industry consultations[2]

The comparatively small population contrasts with Zambia's outstanding natural advantages for the rearing of cattle. The area of grazing land in Zambia is comparable to Kenya's (21.3 million hectares) and Botswana's (25.6 million hectares) and is over twice that of Zimbabwe (12.1 million hectares). In the region, only South Africa has significantly more grazing land (see figure 1).

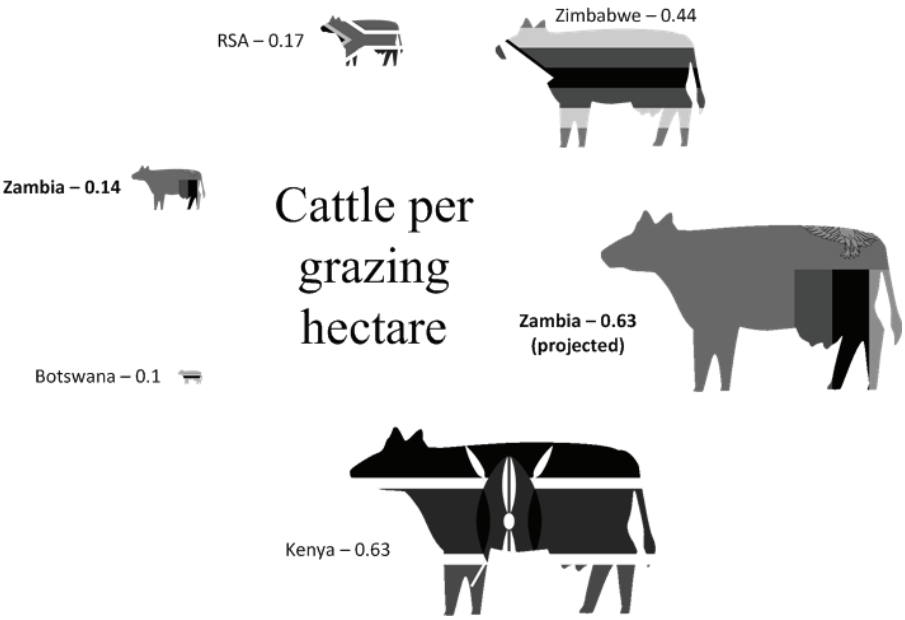
Figure 1: Regional Comparison of Grazing Area



Source: Based on FAOSTAT data.

As a result of its large grazing area but low cattle population, the density of cattle in Zambia is amongst the lowest in the region: South Africa has a comparable cattle density and only Botswana has a lower density (see figure 2). The low cattle density in South Africa is, in part, due to having to share the grazing area with over 25 million sheep and nearly 7 million goats, over twice the cattle population. Zambia has comparatively fewer small goat and sheep (1.2 million) than cattle. A significant proportion of Botswana's (17 percent) grazing area is reserved for wildlife.

Figure 2: Cattle Density in Southern Africa



Moreover, in Botswana and Kenya, large parts of the grazing areas have extremely low rainfall and so can only support animals for short periods.[3] In Zambia, much of the grazing land has enough rainfall for livestock.

If the cattle density in Zambia were the same as in Kenya, the country would have four times more cattle. Perhaps a more accurate way of estimating how much more cattle the country could support is using livestock carrying capacity, which is measured in livestock units (LSU) per hectare. An indicative cattle carrying capacity in Zambia would be an average of 0.18 LSU per hectare, resulting in total carrying capacity of 3.65 million LSU or a total of 7.3 million beef cattle (average 0.5 LSU per two-year-old beef animal). Thus, both cattle density and carrying capacity indicate that Zambia could support a much larger cattle herd than it does at present.

Zambia has four times more grazing land (20.3 million hectares) than arable land (5.2 million hectares) and much of its grazing land is ideally suited to cattle rearing. Zambia lies on a plateau mostly consisting of grassland, becoming semi-arid in the west and swampy in the north-east, interrupted by the fertile valleys of the three main rivers, the Zambezi, the Kafue and the Luangwa. It has three main agro-ecological zones (IFAD 2004; Mulemba 2009):

- **Zone I**, which is found in parts of Eastern, Western and Southern Provinces, receives 600–800 mm of rainfall annually and has a short growing season with high temperatures and a high risk of drought. The dominant agricultural activities are extensive traditional livestock rearing and low-input cultivation of drought-tolerant crops. Forty-eight percent of all rural people live in this zone.

- **Zone II**, which is mainly located in the Central and Lusaka Provinces and parts of the Eastern, Southern and Western Provinces, where annual rainfall is 800-1000 mm and more stable, and soils are moderately fertile. This zone accounts for most marketed agricultural production and half of all smallholder cash incomes, and it has the potential to support a wide range of crop and livestock enterprises. Forty-three percent of all rural people live in this zone, which covers 58 percent of the land area.

- **Zone III**, which is in the Northern, Luapula, Copperbelt and Northwestern Provinces. Annual rainfall in this zone is above 1,200 mm, the growing season is long, but soil fertility is low. The zone contains 9 percent of the rural population, who account for one third of all smallholder cash income.

With substantial grazing land, all three agro-ecological zones suited to livestock, and low cattle density, Zambia has the conditions for a substantial increase in its cattle population. Its carrying capacity suggests that the country could support over 7 million cattle.

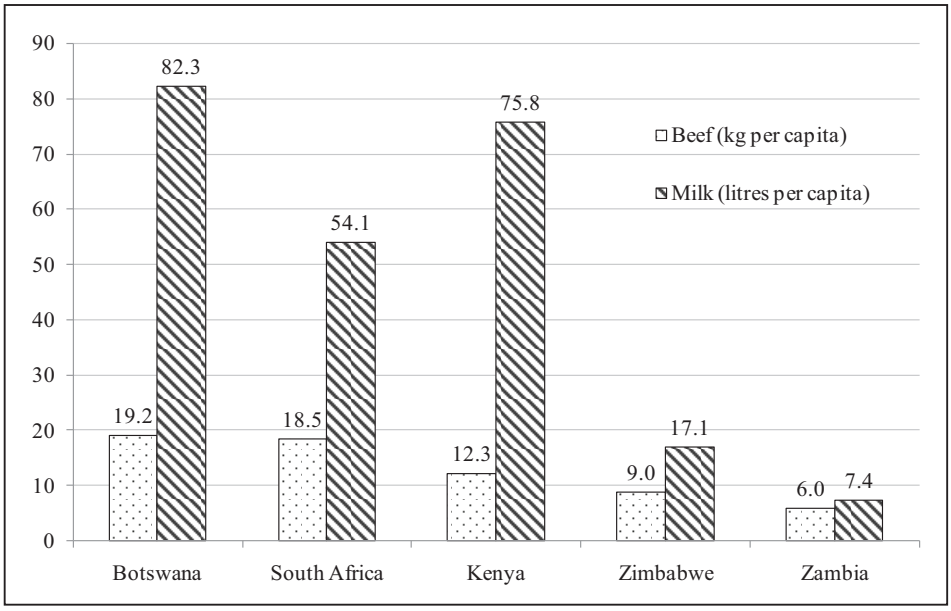
2.2. Favorable Market Prospects

In addition to Zambia's natural advantages, conditions in the domestic, regional and international markets provide the country with an opportunity to grow its beef and dairy industries rapidly.

2.2.1. Small But Growing Domestic Market

Zambians currently consume small quantities of beef and milk products compared to other countries in the region (see figure 3), so the domestic market is small. Until recently, beef and dairy products have not featured strongly in the dietary patterns of urban Zambians. Significant parts of the Zambian population do not have a tradition of consuming large quantities of beef and dairy products. But this is likely to change rapidly.

Figure 3: Comparison of Meat and Milk Consumption, 2005



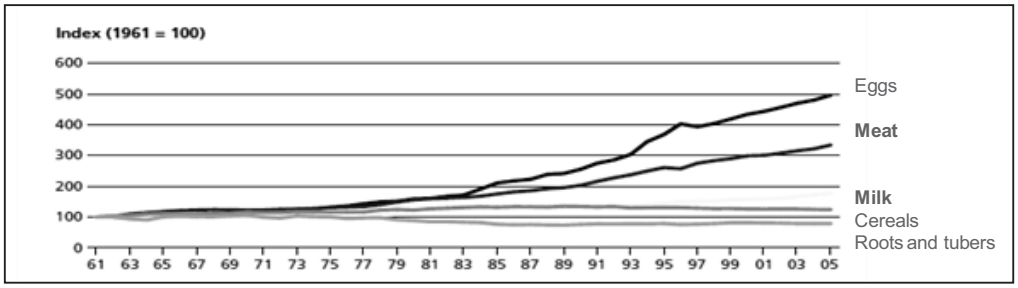
Source: FAO 2009; World Bank estimates based on data provided by industry sources.

Beef and dairy products have high income elasticity at lower levels of income.[4] In its 2009 State of Food and Agriculture Report, *Livestock in the Balance*, the Food and Agricultural Organization (FAO) reports that, since the early 1960s, consumption of milk per capita in developing countries has almost doubled and meat consumption more than tripled. Meat and dairy products have recorded some of the fastest growth of consumption of food items (see figure 4).

The fastest growth of consumption of meat and dairy products has been recorded in countries transitioning from low to middle income status. Brazil and China have led the growth of meat consumption and, along with India, have led growth in the consumption of dairy products. At this stage of development, the income elasticity of these products is greater than one.

As Zambia develops and incomes increase, the demand for beef and dairy products will increase rapidly from the current level of consumption. The scope for rapid increases in demand is especially high in Zambia because of the low per capita consumption levels noted above. There is evidence that this has been taking place already. The beef industry reports that, before the slowing down of growth caused by the global downturn, consumption of beef was rising by between 5–7 percent a year, and that of dairy products close to 10 percent a year.

Figure 4: Per Capita Consumption of Major Foods in Developing Countries, 1961–2005



Source: FAO 2009

Low per capita consumption and rising incomes should support rapid growth of the domestic market for beef and dairy products.

2.2.2. Significant Export Potential

There is also considerable scope for Zambia to export beef and dairy products to its neighbors and, if it is able to compete in a fiercely competitive market and to overcome disease issues, to European markets too.

Beef export potential

The major regional exporters of beef are Botswana and Namibia (table 2). These countries export to Europe and, increasingly, to South Africa, which is becoming a sizeable importer while continuing to export to Europe. Other significant regional importers include the Democratic Republic of Congo (DRC) and Angola, for which import figures are not available.

Table 2: Main Regional Importers and Exporters of Beef (Boneless Cuts), 2007

Main importers	$ '000	Main exporters	$ '000
South Africa	23,665	Botswana	111,207
Angola	4,819	Namibia	38,487
Zimbabwe	727	South Africa	10,557

Source: FAOSTAT

Zambia has already started to take advantage of regional beef markets. It exports small quantities of beef to the DRC and Angola, mainly informally and outside of official channels. It could follow the example of both Namibia and Botswana and develop a sizable volume of exports to the region targeting DRC, Angola and, if it can meet sanitary standards, South Africa.

However, it should be noted that all these countries have the option of importing frozen beef at $2–$3 per kilogram from major exporters such as Brazil and Argentina who make up the bulk of world exports. Zambia is currently not able to compete at these world market prices. Regional imports, including from Zambia, are directed to premium markets for fresh beef where Zambia is more competitive. These premium markets will, however, become more demanding in requiring that the meat supplied is certified disease-free.

Further afield, world markets for beef and dairy products are large. World trade in beef and dairy products is in excess of $50 billion annually. However, these markets are not growing rapidly as increased consumption in middle income countries is being offset by falling consumption in high income countries. And world markets impose demanding standards and are highly competitive in price terms.

The European market for beef has some of the most attractive prices in the world ($4 a kilogram) and, in the past, offered preferential access to African, Caribbean and Pacific countries. However, the market has always had exacting standards that many countries have struggled to meet and those standards have become more demanding of late. The minimum required is certification that the meat supplied is disease-free and produced using internationally recognized practices of health and safety such as the Hazard Analysis and Critical Control Points (HACCP).[5] Even Botswana and Namibia, two established exporters, are only allowed to export meat off the bone. European importers are now demanding traceability of all meat supplied. Carcass size is also important to meet the size of cuts demanded by supermarkets. Generally cuts from 180 to 220 kilogram carcasses are preferred. Many Zambian indigenous breeds do not presently produce a carcass of that weight but the country could meet the size of cuts required through the use of improved bulls.

High transport costs, exacting standards and exposure to greater competition from Argentina and Brazil caused by the decline of preferential access are causing Botswana and Namibia to increasingly focus on their growing domestic markets and South Africa. They continue to export to Europe the surplus that the more attractive markets cannot absorb.

Zambia could follow Botswana's and Namibia's example and develop beef exports to Europe, but it would need to be able to meet European standards. Its best prospects for exporting beef are to supply fresh beef to the premium markets of neighboring countries.

Dairy export potential

The main regional importers of milk and dairy products are Botswana, South Africa and Angola (table 3). South Africa, Zimbabwe and Kenya are the main regional exporters but the value of their exports is low. South Africa is a net importer, importing from major world producers in Australia and New Zealand and exporting to other countries in Africa. It has recently increased domestic production and is becoming more self sufficient.

Table 3: Main Regional Importers and Exporters of Dairy Products, 2007

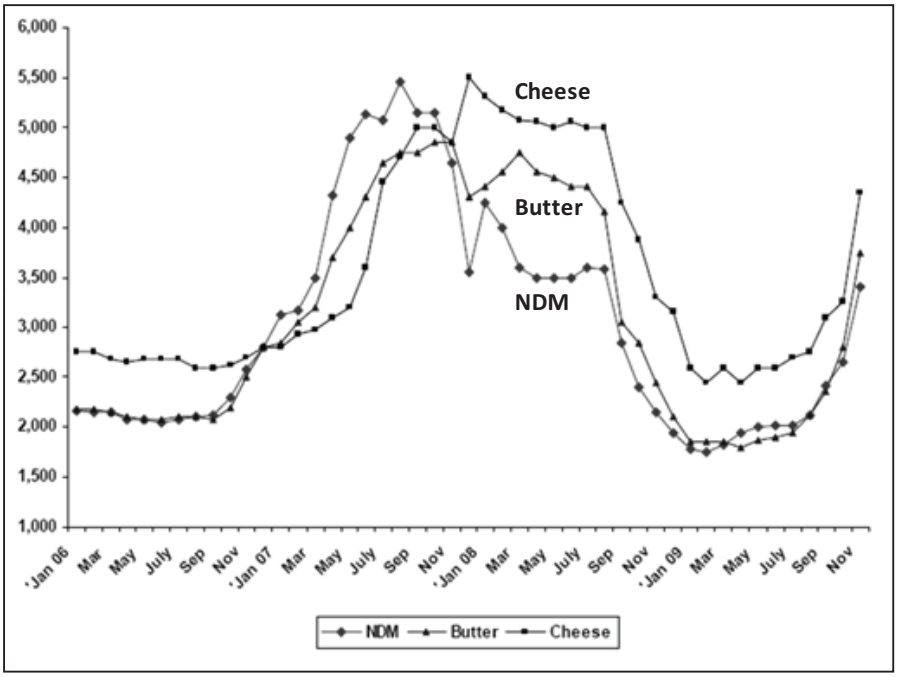
Main importers	$ '000	Main exporters	$ '000
Botswana	15,242	South Africa	2,223
South Africa	6,823	Zimbabwe	885
Angola	5,387	Kenya	778
Tanzania	1,611		
DRC	661		
Malawi	403		

Source: FAOSTAT

Zambia exports small quantities of dairy products to other countries in the region, especially to Malawi, Tanzania, Angola, the DRC and Zimbabwe. Unable to compete on price against the major world suppliers of milk powder, its advantage lies in supplying fresh milk and dairy products. The regional market holds considerable potential and could help the Zambian industry develop quickly. However, regional markets are characterized by high non-tariff barriers with importers demanding all kinds of certification. For example, Malawi has been known to demand certification that dairy products are radiation-free. If such non-tariff barriers could be reduced, there is scope for increasing Zambia's regional exports of dairy products.

In the longer term, it could also develop exports of dairy products to the international market. To do so, it would have to meet international standards and compete on price terms with the major world producers. Markets for dairy products are hugely competitive and, as shown in the following chapter, it will take Zambia many years to compete successfully. Prices, having increased along with the rise in global food prices, fell sharply and have yet to recover to peak levels (figure 5). Beef prices have followed a similar pattern. In real terms, the price of beef and dairy products has been falling and this makes it very difficult for new entrants to compete.

Figure 5: International Dairy Product Prices ($ per tonne), 2006–9



Note: NDM is nonfat dry milk

Source: USDA

There is scope to increase exports to the region and, in the longer term, internationally. But to do so Zambia needs to improve price competitiveness and product standards.

2.3. Potential for Industry Growth and Contribution to Diversification

If the country could take full advantage of its natural endowments and favorable market prospects, beef and dairy could develop into major Zambian industries. For example, if Zambia could match Kenya's cattle density, the numbers of cattle in the country would rise from around 3 million to nearly 13 million. The result would be to increase the value of the national herd from just over $1 billion to over $4.5 billion.

Zambia is currently one of the smallest producers of beef and dairy products in the region (table 4). This is partly because large parts of Zambia do not have a long tradition of cattle ownership and hence sufficient knowledge of cattle husbandry. Many countries in the region (Botswana, Namibia, and Zimbabwe) have a large population of traditional livestock owners which accounts for their larger herd sizes. Even if herd productivity is low among these traditional farmers, large herd sizes allow them to produce more beef and dairy products.

Table 4: Beef and Dairy Output in Southern Africa, 2008

Output Indicators	Zambia	South Africa	Botswana	Zimbabwe	Kenya
Beef production (thousand tonnes)	58.4	764.1	34.5	103.9	367.5
Raw milk (thousand tonnes)	84.0	3,200.0	101.5	388.6	3,990.0

Source: FAOSTAT

If Zambia could match Kenya in terms of output, allowing for the lower prices in that country, the value of Zambia's beef and dairy output would rise from around $230 million to almost $1.6 billion (table 5).

Table 5: Comparison of Zambian and Kenyan Beef and Dairy Industries

	Beef		Raw Milk	
	Thousand tonnes	*Value (US$)*	*Thousand kiloliters*	*Value (US$)*
Zambia	58.4 @ $3.32 per kg dwt	193.9 million	65[6] @ $0.6 per liter	39.0 million
Kenya	367.5 @ $2.16 per kg dwt	793.8 million	3,990 @ $0.2 per liter	798.0 million

Source: FAOSTAT, TechnoServe Kenya 2008

In the past, the livestock industry contributed as much as 7 percent of Zambian GDP, but now its contribution is less than 2 percent, and beef and dairy together account for about 1 percent. Raising output to Kenyan levels would enable livestock's contribution to rise again and could generate an output equivalent to 10 percent of current GDP.[7]

Of course, comparisons with Kenya can be misleading. That country's larger population (around 40 million) and stronger traditions of consuming dairy products and beef make the domestic market substantially larger than Zambia's. Zambia could only develop a comparably sized industry by exporting beef and dairy products. Nevertheless, the comparison shows what could theoretically be achieved with Zambia's grazing area.

In addition, larger beef and dairy industries would raise the contribution that livestock currently makes to agricultural GDP. Although the Central Statistical Office (CSO) does not make available data on the contribution of livestock, estimates suggest that it is around 20 percent of agricultural GDP. In South Africa the ratio is higher, at 30–35 percent, and, worldwide, 40 percent, suggesting that Zambia's livestock industry has a major opportunity to raise its share of agricultural GDP, especially in view of the country having four times more grazing than arable land.

In turn, this would help to improve the performance of Zambian agriculture. Over the period 2001–8, agriculture substantially underperformed GDP and its contribution to GDP fell from 16 percent to just over 12 percent. A stronger contribution from beef and/or dairy could help increase the rate of growth of a sector on which the majority of Zambians rely for their livelihoods.

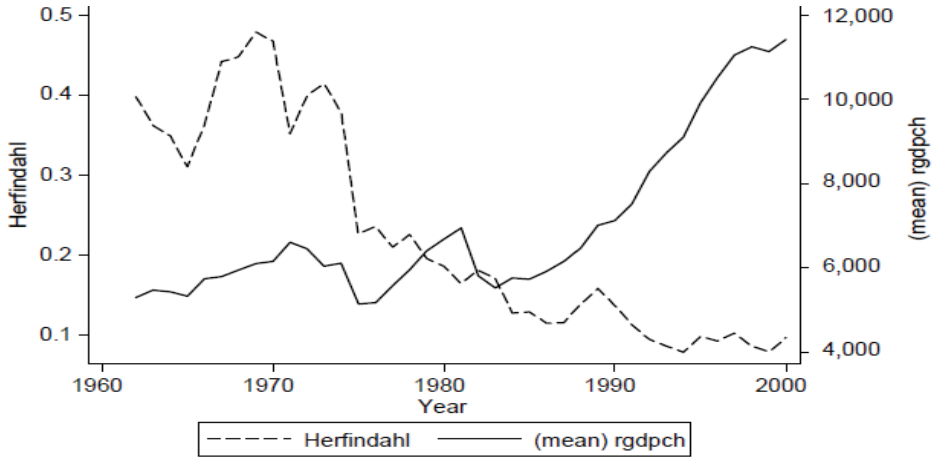
Zambia has long been seeking ways to diversify its economy away from its reliance on copper, and the emergence of competitive beef and dairy industries that were able to grow

sustainably, would contribute to diversification as well as national prosperity in the longer term.

Moreover, higher levels of prosperity worldwide are associated with the ability of an economy to diversify its export base so that it is more resilient against downturns and provides multiple sources of competitiveness and productivity gains for the economy through technology 'spillovers' into other industries.

For instance, economic growth in Chile was marked by a reduction on its reliance on copper as a source of exports (figure 6). The country was able to develop exports of wine, fish, horticulture and forestry products and take advantage of its tourism assets.

Figure 6: The Evolution of Export Concentration and Real GDP in Chile



Source: figure taken from Hesse 2008.

If Zambia is to follow Chile's example, the country's natural advantages and favorable market prospects mean that the beef and dairy industries are strong candidates for leading diversification.

The beef and dairy industries could drive the growth of agriculture; thereby diversifying the economy and its export base.

2.4. Creating Jobs, Increasing Rural Prosperity

The beef and dairy industries could contribute to creating formal jobs in a country that is desperately short of them.[8] Their major contribution, however, is likely to come from increasing rural prosperity by expanding income earning opportunities and raising the incomes of cattle owning households.

2.4.1. Creating Formal Jobs

Currently, the rearing of cattle provides incomes for cattle-owning households and for a large number of people working on farms, herding cattle or trading and transporting cattle and beef and dairy products. However, much of this employment is informal and casual. The number of formal jobs on cattle farms, or in feedlots, abattoirs, butcheries or dairies, is likely to be less than 5,000 at present.

This pattern of a large contribution to incomes and employment, but low propensity for formal job creation, is typical of beef and dairy industries of the developing countries. In Kenya, for instance, over 2 million households keep cattle and the dairy industry provides the equivalent of over 800,000 jobs, largely in informal, self employment. It has created 54,000 formal jobs (FAO 2009). Formal jobs in Kenya's beef industry are not likely to exceed that number. The processing and marketing of beef and dairy products is not very labor-intensive.

It is estimated that the total number formal jobs available to the Zambian workforce was just 416,000 in 2005 (CSO 2005). With a young population, Zambia is desperately in need of more formal jobs. Even if Zambia's beef and dairy industries were to match Kenya's, the numbers of formal jobs created (50,000–100,000) would not represent a major proportion of the jobs needed for the workforce. The estimated Zambian workforce (people between 15 and 65 years old) is 46 percent of the population (around 6 million), so 100,000 jobs would equal close to 2 percent of the workforce. However, even a contribution of between 50,000 and 100,000 additional formal jobs would not be negligible in a country that has so few formal jobs, most of which are in the public sector. 100,000 jobs equals nearly 25 percent of the formal jobs presently available.

2.4.2. Increasing Rural Prosperity

Despite limited formal job creation, the number of informal jobs in the beef and dairy industries could be increased by raising the number of households that keep cattle, the number of cattle kept per household and by providing greater opportunities for trading and transporting cattle products. In this way, these industries could make a major contribution to increasing rural prosperity.

Livestock keeping is widely practiced in rural areas of Zambia. Surveys in the past have shown that approximately 45–47 percent of the rural population owns livestock. Government data show that poultry makes up the largest share of the national livestock population, followed by cattle (table 6).

Table 6: Estimated Livestock Population, 2008

	Cattle	Sheep	Goats	Pigs	Poultry
Million heads	3.1[9]	0.485	0.746	0.704	9.9[10]

Source: MACO-DVLD 2008

In value terms, however, cattle make up by far the biggest livestock asset as cattle are worth roughly $350 (ZMK 1.5 million) each, as against a few dollars for poultry (table 7). The national herd is estimated to be worth over $1 billion and could be increased four-fold in future.

Table 7: Value of Cattle and Poultry

	Number	Price per unit (US$)	Total value (US$)
Cattle	3.1 million	350	1,050 million
Poultry	9.9 million	3.65	36.13 million

Source: MACO-DVLD 2008

A survey in 2006/7 and 2008/9 showed that cattle are owned by over 310,000 households.[11] The average number of cattle owned by small-scale farmers is 9, by medium-scale farmers 17, and by large owners 66. For the rural households, cattle represent the primary store of wealth.[12]

Livestock contributes a large part of rural incomes (table 8). Animal sales alone account for 26 percent of rural household incomes. Surveys have found that livestock contribute 39.2 percent of rural income, a larger contribution than field crops (20.9 percent).

Table 8: Sources of Income for Rural Households

Source of income	Percentage contribution
Animal sales	26.2
Other animal products	7.1
Hiring out animal draft power	5.9
Field crop sales	20.9
Fishing	3.7
Piece work	14.6
Gardening	8.3
Other	13.3

Source: Freeman et al. 2008, based on surveys carried out in Sinazongwe, Namwala, and Kasangula.

The growth of larger, more competitive beef and dairy industries would increase the assets of cattle owning households. If off-take rates were also to increase, then the incomes of cattle keeping households would also increase. This would require a change in attitude among farmers since cattle are currently regarded by many as a cultural asset to be used for paying bride price and to be slaughtered at funerals, rather than as an income-earning asset. However, attitudes are changing (see chapter 5) and more could be done to accelerate the change (see chapter 7).

Higher off-take rates would also provide the rural population with more opportunities to earn incomes from employment in the beef and dairy industries, on farms as well as from transporting and trading cattle products. This should help to reduce rural poverty.

There are plenty of examples of this being achieved, including in the region. Botswana's track record in addressing rural poverty and the progress Kenya has made show how more productive beef and dairy industries can provide economic opportunities, help create formal jobs and reduce rural poverty.

Zambia's beef and dairy industries could make a major contribution to increasing rural prosperity as well as contributing to formal job creation.

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[1] The data on cattle population are taken from the FAO, which compiles data provided by countries. There is considerable uncertainty attached to Zambian data, starting with the estimate of cattle numbers. There has been no comprehensive census of the cattle population for a considerable period and so what is available are estimates based on surveys. There is uncertainty also with respect to other indicators but this source has been used as it provides comparable estimates for several countries.

[2] The total livestock figure for Zambia is taken from the CSO/MACO/FSRP Surveys. There are also other sources of government data that give different figures. Accurate, up to date data are not available as there has been no census for some time.

[3] Though Botswana and Matabeleland in Zimbabwe have 'sweetveld' with highly nutritious grasses.

[4] One unit increase in income leads to more than one unit increase demand for beef and dairy products.

[5] HACCP is a systematic preventive approach to food safety and pharmaceutical safety that addresses physical, chemical, and biological hazards as a means of prevention.

[6] Raw milk production used here is our estimate of production in the commercial dairy sector alone. It is estimated that a further 85,000 tonnes is produced in the traditional sector. However, most of this is produced on-farm and not commercialised, and is not included here. Throughout this report (in table 4, for example), we have used FAO data for comparison with other countries, even though in some cases our own estimates for Zambia's production differ from FAO figures.

[7] It should be noted that the GDP contribution of the output could be lower depending on the extent to which the system of production relied on intensive or extensive farming. Both have relatively high value added as most of the inputs are grown on farm, but the extensive system has exceptional value added as it buys in almost no inputs.

[8] Of the 4.1 million Zambians who are employed, the vast majority (90 percent) work for informal enterprises with less than five employees. See CSO 2005.

[9] See note 2 on data inconsistency with regards to number of cattle.

[10] It should be noted that poultry numbers provided by this source could represent a substantial underestimate. For consistency purposes, we have used numbers provided by the Ministry of Livestock and Fisheries Development. The Poultry Association of Zambia reports an annual slaughter rate of 25 million broilers. Taking layers into account, the population of chickens could be well over 30 million. However, even if the population was 3-4 times larger than the 9.9 million used here, it would not deflect from the finding that cattle are the main form of livestock in value terms.

[11] Carried out by the CSO, the Ministry of Agriculture and Cooperatives, and the Food Security Research Project.

[12] Zambia's customary and leasehold tenure systems leave most small-scale farmers with little control over/opportunity to sell land.

3. UNDERPERFORMING BEEF AND DAIRY INDUSTRIES

This chapter examines the performance and competitiveness of Zambia's beef and dairy industries, benchmarking them against neighboring countries and international leaders. It puts into perspective the extent to which competitiveness needs to improve if Zambia is to achieve the potential of its beef and dairy industries.

The chapter examines how the industries have performed in terms of growth of the cattle population, benchmarks productivity and prices and then examines international trade. It describes the competitiveness gap that the Zambian beef and dairy industries need to fill. The causes of the lack of competitiveness are dealt with in the following two chapters.

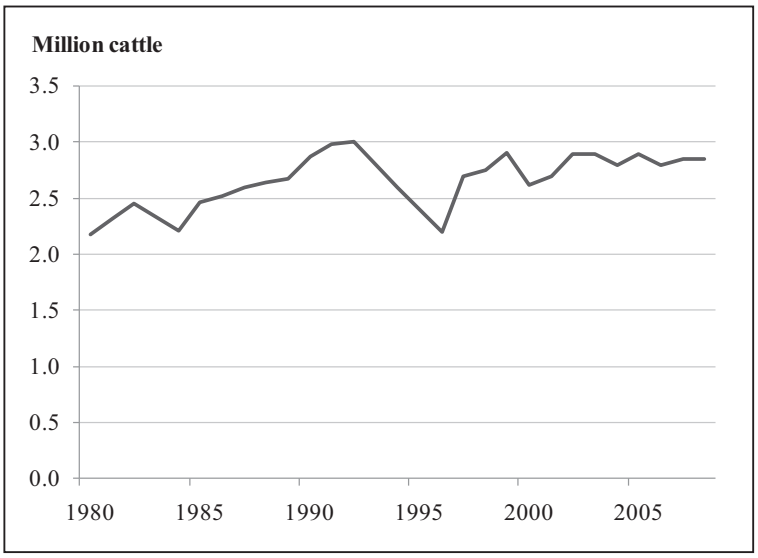
3.1. Slow Cattle Population Growth, Low Yields

Zambia's cattle population has hardly grown since the 1980s and its productivity is low by international standards.

3.1.1. The Failure to Sustain a Growing Cattle Population

Poor disease control is the main reason for Zambia's low cattle density and its inability to sustain cattle population growth. In the 1970s and 1980s, the cattle population increased at a reasonable average of 3.3 percent a year and 2.8 percent a year, respectively. But in the 1990s, the cattle population declined from 2.9 million to 2.6 million (figure 7). The previously state-led system of livestock development and veterinary care was neglected, leaving the cattle population vulnerable to disease and droughts. Calf and adult mortality increased and this reduced the growth rate of the population.

Figure 7: The Slow Growth of Zambia's Cattle Population



Source: FAOSTAT

The 2000s have also witnessed periodic outbreaks of disease and drought. Population numbers have increased, albeit at a modest average of 1.2 percent a year. Yet disease and poor nutrition have continued to undermine fertility rates and led to high rates of morbidity, especially during disease outbreaks and droughts.

In contrast, countries such as Botswana and Kenya experienced a decade or more of rapid growth. Botswana's cattle population grew at an average 5.8 percent a year in the 1970s; Kenya's grew by 3.2 percent a year in the 1980s. Most importantly, these countries were able to consolidate these gains, keeping the population rising slowly or maintaining it at high levels.

3.1.2. Low Productivity

The productivity of Zambia's cattle is low. Using FAO data, table 9 compares the proportion of the cattle herd that is slaughtered each year (off-take rate), the yield per animal slaughtered (carcass weight) and milk yield per cow with those of neighboring countries.

Table 9: Key Performance Indicators in Zambia and Neighboring Countries, 2008

Indicator	Zambia	South Africa	Botswana	Zimbabwe	Kenya
Cattle ('000 head)	2,900	14,400	2,450	5,400	13,500
Animals slaughtered ('000 head)	365	3,050	180	430	2,450
Off-take rate (%)	12.6	21.2	7.3	8.0	18.1
Beef yield (kg/carcass)	160	265	190	225	150
Milk yield per cow (liters/day)	8.2	15.2[1]	9.6	8.6	15.1
Beef ('000 tonnes)	58.4	764.1	34.5	103.9	367.5
Milk ('000 tonnes)	84	3,200	101.5	388.6	3,990

Source: FAOSTAT[2]

FAO data are often out of date and can be inaccurate. Nevertheless, the overall picture that emerges from FAO data leads to conclusions confirmed by industry sources: Zambia's beef and dairy industries are not productive compared to those of its neighbors.

In beef, off-take rates and the weight of the animal are low. Zambia's off-take rate is just a little over half of South Africa and Kenya's off-take rates, which are already low by international standards (25–35 percent). Carcass weight per animal is lower than all neighboring countries with the exception of Kenya. By international standards, the best of the neighboring countries, South Africa, has higher productivity in terms of live weight of cattle than some of the world's major exporters (e.g. Argentina and Brazil), although there are some countries that produce much larger animals.[3]

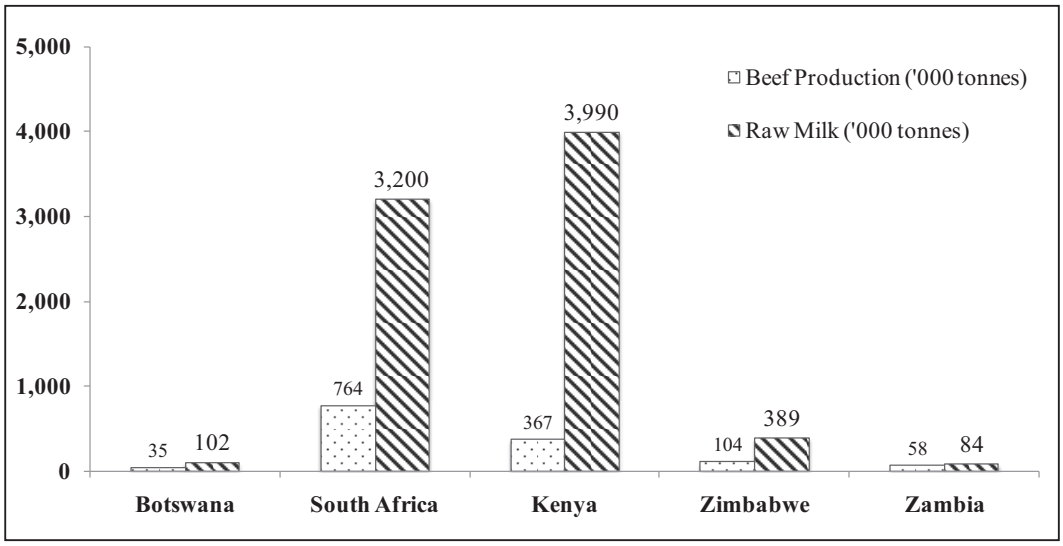
This low productivity is not just about the breed of animal. Low off-take rates are almost entirely the result of cultural attitudes which result in cattle being regarded as a store of wealth and sold only to meet important household cash needs such as paying school fees. While indigenous cattle may produce smaller carcasses, under the existing management regimes they are often more fertile than larger, exotic breeds, as they are less prone to certain diseases, have lower mortality, and are better able to survive droughts.

Zambia's milk yield is the lowest in the region, averaging 8.2 liters per day. This is around half of Kenyan and South African yields. Internationally, yields can be over twice the South African average with exotic breeds producing between 30–40 liters a day, though such yields are not achievable in southern Africa given regional breeds and conditions of animal husbandry.

3.1.3. Slow Growth of Output

The result of slow population growth and low productivity is low output. As shown in figure 8 below, Zambia's beef and milk production is low relative to that of neighboring countries.

Figure 8: Beef and Dairy Output in Zambia and its Neighbors, 2008

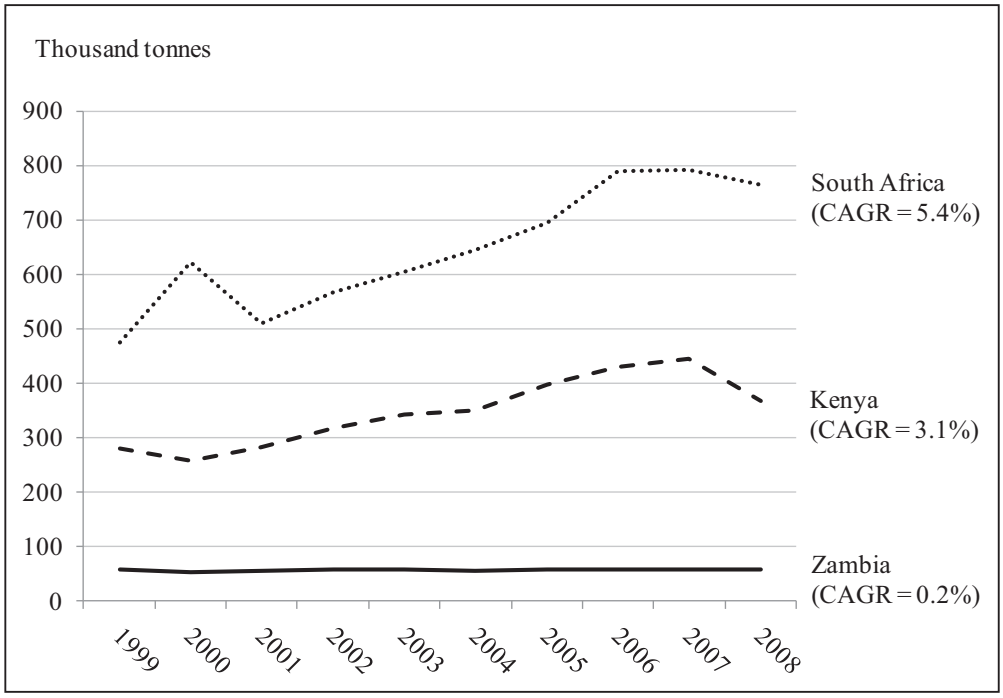


Source: FAOSTAT, FAO 2009, industry consultations

According to FAO data, Zambia's beef industry has shown little growth in output over the past decade. Even relatively mature industries such as South Africa's and Kenya's have recorded stronger growth, with South Africa leading the way (figure 9). Beef production in Botswana, another mature industry, also averaged growth of 4 percent a year over the 1999–2008 period.

In fact, the FAO data probably understate the growth of Zambian beef production. Industry sources suggest that beef production has increased roughly in line with market growth of 5–7 percent a year.

Figure 9: Comparative Growth of Beef Production

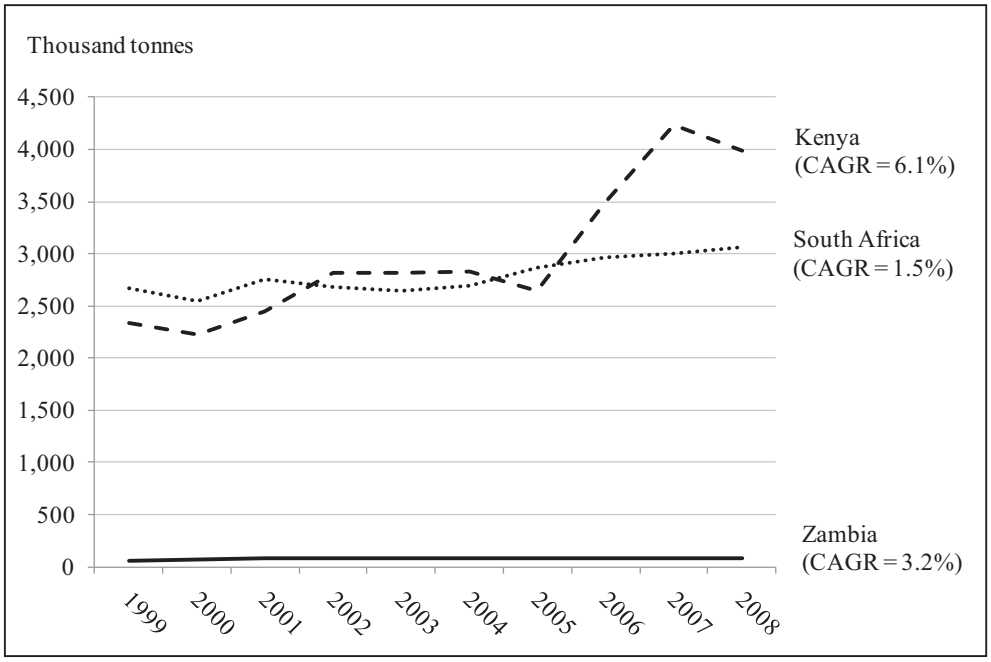


Source: FAOSTAT

Zambia produces the least amount of milk in the region. Milk production has declined since 1995, though it is now rising. According to FAO data, over the 1999–2008 period milk production has increased at an annual average rate of 3.2 percent, suggesting reasonable, but by no means strong, growth. Over the same period, Kenya's milk production increased by an average of 6.1 percent a year (figure 10).

As is the case of beef, FAO data probably understate the growth of milk production. The industry reports that commercial milk production has been rising rapidly in line with market growth of 10 percent a year, though the overall supply of milk (including the traditional sector) has not increased as rapidly.

Figure 10: Comparative Growth of Raw Milk Production



Source: FAOSTAT

Zambia is a comparatively small producer of beef and dairy products and output growth has trailed neighboring countries.

3.2. Zambia is Not Price Competitive in Beef and Milk

Low productivity and high costs make it difficult for the beef and dairy industries to respond to growth in demand. Compared to its neighbors and to world industry leaders, Zambia is uncompetitive in price in both beef and dairy products.

Table 10 compares the price of beef at live weight and dressed weight[4] with other countries. It is clear that, from a straight per kilogram comparison of price, Zambia is midway between its regional counterparts in live weight but much higher in cost when it comes to dressed weight.

Table 10: Comparison of Beef Prices, 2007

$/kg	**Zambia**	**Kenya**	**Namibia**	**RSA**	**Argentina**	**Brazil**	**UK**	**USA**
Live	1.29	1.11	1.19	1.57	1.26	0.99	2.26	1.98
Dressed	3.32	2.16	2.13	2.80	2.70	2.04	4.19	3.81

Note: Above dressed weight prices are a weighted average of standard and choice meat.

Source: Zambia – World Bank estimates based on data provided by industry sources; other countries – FAOSTAT.

The telling comparison is that, in live weight, the cost of standard meat produced by slaughtering un-fattened animals in Zambia is $1.29 per kilogram live compared to $1.11/kg for the same meat in Kenya. The price per kilogram live weight paid for commercially bred, fattened animals in South Africa is $1.57 compared to $1.59 in Zambia. Zambian prices are higher, but not appreciably so in live weight.

Where the difference is striking is in dressed weight. Only the UK and USA have higher prices and Zambia is considerably more expensive than its neighbors, even if the standard meat price of $3.18 is used, rather than the weighted average between standard and choice shown in table 10.

In terms of factory gate prices, Zambia is one of the most expensive countries in the region for raw milk (table 11).

Table 11: Comparison of Raw Milk Prices in the Region, 1999–2009

$/liter	**1999**	**2000**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**
Zambia						0.45	0.68	0.60
South Africa	0.20	0.20	0.30	0.30	0.30	0.40	0.40	0.40
Zimbabwe	0.16	0.26	0.38	0.31				
Kenya	0.21	0.18	0.21	0.25	0.30	0.30	0.20	0.30

Source: Zambia – World Bank estimates; other countries – FAOSTAT & TechnoServe 2008.

The lack of competitiveness in raw milk is passed onto processed dairy products (see table 12). The more intensive the use of raw milk, the more uncompetitive the dairy product is likely to be. Therefore, Zambia is even more uncompetitive in products such as cheese, butter and skimmed milk powder than in fresh, pasteurized or UHT milk.

Table 12: Comparison of UHT and Pasteurized Milk Costs

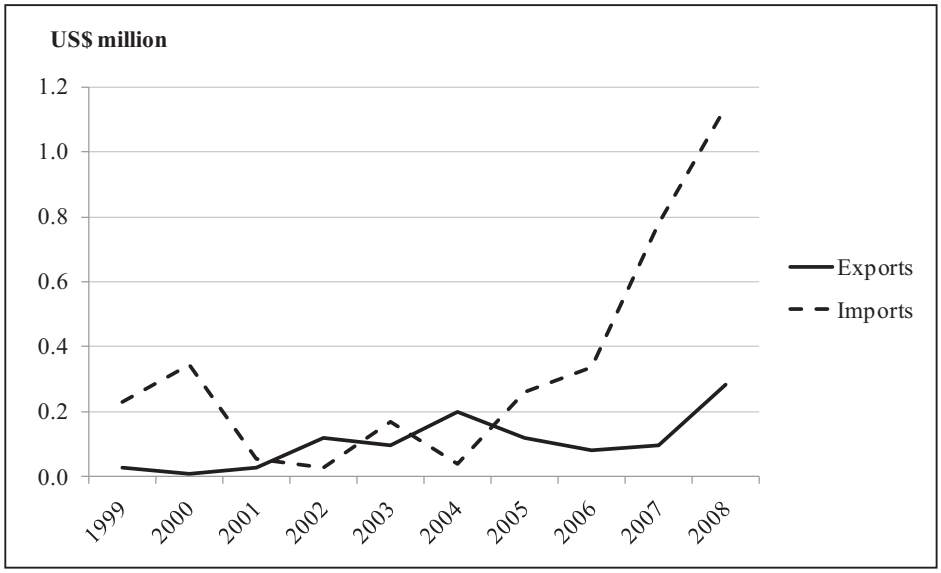
$/liter	**Zambia**	**Kenya**	**South Africa**
Price of UHT or pasteurized milk[5]	0.84	0.67	0.73

Source: Industry consultations, TechnoServe 2008.

3.3. International Trade is Limited

Zambia's uncompetitive prices and its inability to certify that its beef is disease-free and meets international hygiene standards (i.e. HACCP) mean that its beef exports are relatively low, limited to the export of fresh meat into the premium segments of the markets in DRC and Angola. Buyers from these countries often come to Zambia to buy and it is not always the case that these exports are declared to customs, so the volume of exports may be higher than shown in the CSO data used in figure 11.

Figure 11: Zambia's International Trade in Beef Products



Source: CSO

By and large, beef imports are low, confined to speciality processed meats. Despite the comparatively higher prices prevailing in Zambia, non-tariff barriers make the import of beef more costly and risky. As beef would have to be transported by road, there is natural protection afforded to the industry by Zambia's location and the major retailers are content to source locally to avoid the non-tariff barriers.

Table 13: Zambia's Beef Imports, 2008

Products	Value ($)	Net Weight (kg)
Live animals	4,040	10,400
Carcasses	0	0
Frozen beef cuts	4,880	4,810
Frozen livers	1,005,628	618,116
Other edible beef	123,463	48,778

Source: CSO

Zambia is a relatively minor importer of dairy products in relation to the size of the industry, but imports are rising. In 2008, Zambia imported nearly $12 million worth of dairy products, mainly skim milk powder, full cream powder (FCP), condensed milk and cheese (table 14). These are products that the Zambian dairy industry cannot produce competitively because of the high cost of raw milk. Full cream powder is imported by the processing industry to reconstitute as milk to be used in making dairy products such as UHT when raw milk is not available and in producing yogurt.

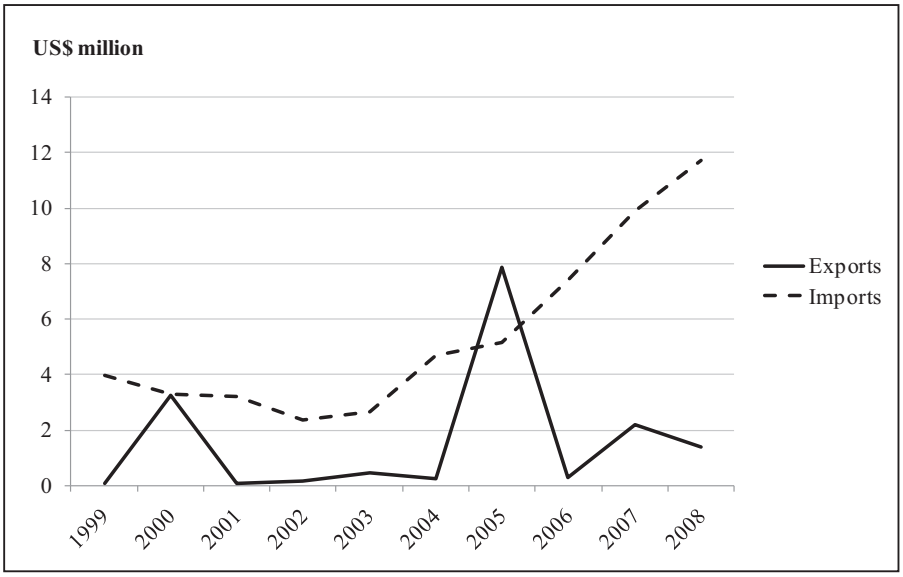
Table 14: Zambia's Dairy Product Imports, 2008

Products	Value ($)	Net weight (kg)
Un-concentrated milk	1,118,436	1,040,818
Powdered milk	8,730,358	2,314,932
Buttermilk	70,549	8,544
Yogurt	87,264	68,037
Butter	502,669	145,888
Cheese	1,213,752	281,764

Source: CSO

FCP prices shot up after January 2007 as a result of the general increase in commodity prices, but prices have been falling since January 2008. Nevertheless, it is still cheaper to use raw milk at Zambian prices than to import FCP to reconstitute as milk as FCP attracts the 25 percent import duty levied on all finished goods. This provides an incentive to all dairies using FCP to invest in their supply chains for raw milk. The incentive may not hold if FCP prices continue to fall.

Figure 12: Zambia's International Trade in Dairy Products



Source: CSO

Some Zambian dairies have exported dairy products to neighboring countries. These do not constitute a large part of the industry's turnover as only one or two dairies and an equal number of retailers have exported, and they report that exports do not exceed more than 10 percent of their turnover. These exports were not driven by price competitiveness but made possible by the fact that neighbors such as Malawi are short of milk and the suppliers found a way of supplying on the basis of their reputation or close links to the buyer (e.g. were part of the same group).

Overall, the picture that emerges is of an industry failing to fulfil its potential and unable to compete regionally, let alone in international markets.

[1] The FAO data reports milk yields at 85 liters, which is clearly incorrect. The South African industry reported average yields at 15.2 liters in 2006.
[2] These are overall figures for each country. These figures can vary significantly within each country due to different types of farmers with different characteristics and productivity levels.
[3] Carcass weight can be as high as 350 kilograms per animal in the USA.
[4] Weight of a carcass being prepared for use as meat: the head, lower limbs, skin, and viscera (except kidney) have been removed.
[5] Zambian and South African figures are for UHT Milk in 2009, Kenyan for pasteurized milk in 2008.

4. A POOR OPERATING ENVIRONMENT

To understand why the Zambian beef and dairy industries are failing to fulfill their potential, it is necessary to understand the context in which these industries operate. Performance and competiveness are determined by: (1) the external environment made up of demand conditions, the policy and institutional environment and the availability and cost of inputs provided by support industries; and (2) the productivity and efficiency of the industries themselves, which are in turn determined by the motives, opportunities and constraints of the different industry participants and the structure of competition.

This chapter starts by analyzing the market constraints that limit the industries' growth. It then assesses the policy and institutional environment and the cost of inputs. Chapter 5 examines the effect of the external environment and the industry-specific factors that have caused the industries to underperform and be uncompetitive.

4.1. Domestic Market Constraints Prevent Faster Growth

There is no doubt that the domestic Zambian market for beef and dairy products has potential for growth: low per capita consumption combined with rising incomes ensures this. And, as shown in Chapter 2, the market has been expanding rapidly: by 5–7 percent a year in the case of beef and 10 percent a year in the case of dairy products.

The drivers of higher demand have been threefold:

1. *Growing urbanization*. Rates of consumption of both products are higher among urban dwellers and so increased urbanization combined with better employment opportunities and rising salaries for urban dwellers has led to greater demand.

2. *Changing lifestyles* in the urban areas favor greater consumption of catered foods and the fast food market has been growing rapidly. Fast food outlets feature beef and dairy products prominently in their menus.

3. *Food consumption patterns* at home and in catering establishments favor greater consumption of beef and dairy products as incomes rise.

However, there are constraints on how much the domestic market can consume:

- Large parts of the Zambian population do not have a history of consuming beef and dairy products and it will take time for them to change their eating habits. The consumption of beef and dairy products will rise but this will be from a small base: the low rates of per capita consumption that afford the potential for faster growth in the future limit the market now. So, even high rates of demand growth do not translate into large volumes of demand for beef and dairy products.

- Outside formal employment, incomes are still low. The Zambian middle class is still small.

- The high prices of beef and dairy products in Zambia combined with a low-income population that already spends more than 10 percent of its consumption expenditure on beef and dairy products.

As incomes rise, urbanization increases and consumption patterns change, the market will grow rapidly. Periodically, economic downturns will cause growth to slow down or contract, especially if they cause formal employment to fall: the growth of beef consumption slowed and consumption of dairy products dropped as formal employment fell during the 2009 downturn.

A key factor that will determine how quickly the market for beef grows will be beef's price competitiveness against other meats. The market for poultry has also been growing rapidly with the Zambia Poultry Association reporting a 20 percent increase in 2008 alone. Chicken is naturally a cheaper meat than beef. However, the cost of feed in Zambia is high, as discussed below, and hence if the Zambian beef industry could tap into the country's natural advantages it need not suffer too wide a gap in price against chicken.

Growth of both the beef and dairy markets would be faster and more sustained if Zambia could increase its competitiveness and the prices of both beef and dairy products were to fall.

A lack of competitiveness also limits the export potential of the country. Regional competitors such as Namibia, Botswana and South Africa are more competitive on beef prices, and South Africa is more price-competitive in dairy products. In addition to this, two main factors limit the potential for exports:

1. Zambian beef products cannot be certified as free of disease because of the lack of disease-free zones or quarantine facilities.

2. Non-tariff barriers imposed by neighboring countries are an effective barrier to increasing dairy product exports sustainably. Zambia also imposes non-tariff barriers so is not in a position to argue strongly for them to be lifted by other countries.

4.2. Low Availability and High Cost of Inputs

The main input costs for the beef and dairy industries are: (1) the cost of breeding animals and feed; (2) the cost of veterinary services and drugs; (3) the cost of capital; (4) the cost of power; and (5) the cost of fuel and transport. The breakdown of costs varies among different types of farmer.

4.2.1. High Cost of Breeding Animals and Feed

The cost of breeding animals is high in Zambia at around ZMK 8 million for an exotic bull ($1,800) and animals are in short supply. The government-run breeding centers do not supply enough breeding stock and private breeders take advantage of strong, unfulfilled demand. There are high non-tariff barriers to restrict imports from South Africa and further afield. Many of the cross-breeds found among emergent farmers, especially dairy farmers, were introduced by non-governmental organizations (NGOs).

Feed is more expensive in Zambia than South Africa by some 15 percent. The price of most ingredients of feed is set in dollars in relation to international prices, so there is little benefit

to the livestock industry from crops produced locally. In fact, the government has been setting maize prices above international levels, which results in a higher cost to the feed industry. In other countries, maize is used extensively in feed. This may be regarded as a policy that favors crops over livestock.

Maize bran, which is used extensively as a low cost source of roughage in the feed industry, is exported to neighboring countries, so Zambian cattle farmers (and feedlot operators) do not enjoy much of a competitive advantage. Ingredients (vitamins, minerals, trace elements) for pre-mixes are imported from South Africa, which imports them from their country of origin. When feeds are imported from South Africa by feed mills, there are additional transport costs which drive up the overall production cost for Zambia's beef and dairy industries.

Zambia has nine feed companies, most of which focus on poultry feeds but also produce feeds for beef and dairy cattle. The feed mills recognize that the main impediment to growing a bigger market for cattle feed is its higher cost relative to farm produced feeds. They are certain that the use of their feeds would result in higher productivity and would therefore ultimately prove more economical.

The need to build the market could be harnessed to develop a more supportive feed industry that provides better nutritional advice and more cost effective formulations that take account of local cropping patterns and the availability of crop residues. The major international companies that supply the specialized formulations that go into pre-mixes are not present in Zambia because of its small market. But if Zambian farmers are to receive the best nutritional advice, these international companies need to be involved with Zambia's feed industry. Their expertise is developed thorough research and trials worldwide and is better than that of the nutritionists working for feed mills.

In Zambia, the cost of feed and of animals for breeding is higher than for regional comparators. Policies restricting the import of animals for breeding and the setting of maize prices above international levels contribute to high costs.

4.2.2. Low Availability, High Cost Drugs and Veterinary Services

There are only three significant importers of semen, veterinary drugs and medicines in Zambia. This is a reflection of the small market. Two of these are not distributors but retail outlets based in Lusaka which are unable to cover the country. Drugs and medicines are imported from South Africa in small quantities and hence are relatively expensive. The range stocked is fairly extensive but, as it covers all kinds of animals, inevitably there are gaps.

The firms recognize that the usage of veterinary products is a reflection of the low input, low output system of animal husbandry that has evolved in Zambia. They have made efforts to develop the market by demonstrations and use in treatments they carry out. However, as comparatively small firms, with limited resources, they cannot make major inroads. Shifting the mindset of farmers takes patient, sustained effort.

As with feed, the companies that produce the drugs and medicines have not paid much attention to Zambia's small market. They might be more willing to invest their resources in

developing the market if they felt that the government and the private sector were making serious efforts to improve veterinary care.

Veterinary services are provided by the government and the private sector. Government vets are mainly involved in the monitoring and control of diseases but can be hired for private services at a very reasonable price. The government has also trained para-vets and technicians able to offer artificial insemination services. However, government vets and para-vets are not always available and may not be willing or able to travel.

In the private sector, the number of vets specializing in cattle is low. The result is that veterinary service can be expensive in the private sector, with call-out charges as high as $250 or more (and some reporting charges as high as $1,000). These high costs are a barrier for all but the wealthiest commercial farmers.

The irony of the situation is that the supply of vets in the country is not deficient. The University of Zambia produces 20 or so vets each year. Most prefer the security of government service or the money and easy working conditions that come with working on household pets. Some remain unemployed and do not obtain the experience that comes from working in the field under the supervision of an experienced vet.

Attempts have been made by the USAID-funded Production, Finance and Improved Technologies (PROFIT)[1] Project to increase access to veterinary services for emergent and traditional farmers. To get over the problem of affordability and cash flow, they helped establish a herd health plan whereby farmers pay a single up-front payment for year-round check-ups and vaccination services. Where the service was provided by conscientious vets, the plan delivered good results. However, on occasions the plan failed because vets pocketed the money without providing the service or because the farmer expected the annual premium to cover all costs of treating sick animals - which the plan was not meant to do. This caused resentment among farmers.

While the herd health plan itself has not become widespread outside the dairy industry, it has evolved into a different business model whereby members of local communities have been trained as community health workers and asked to organize visits by a vet who could deal with a group of farmers at a time. This has led to aggregating demand around a central location for on-the-spot, cash-based dipping and vaccinating services and vets selling drugs to cattle communities. The vet is able to charge a small amount to each farmer yet earn an adequate return from his visit. This less formal business model still delivers the benefits of lower transaction costs and better services and advice to framers provided by private providers who have an incentive to develop the market (embedded extension services).

PROFIT's pilot demonstrated that it is possible to incentivize the private sector to increase the supply of affordable services to less well-off farmers and that the benefits of increased veterinary access are high.

The supply of veterinary services and drugs is poor. The public sector is under-resourced and supply from the private sector expensive and limited by what small farmers can afford. New business models could increase private sector supply of veterinary and extension services.

4.2.3. Insufficient Access to High Cost Finance

To facilitate greater investment, farmers and processors require greater access to reasonably-priced capital. A recent report prepared by the Zambia National Farmers Union (ZNFU) and PROFIT shows that commercial banking lending to agriculture is low and the rate of non-performing loans is high, in the region of 37 percent (Taylor, Dougherty and Munro 2009). The report categorized the market for agricultural lending as dysfunctional. It identified three main causes:

1. A high-risk lending environment caused by unpredictable government intervention.
2. Limited understanding of agricultural markets and limited expertise in agricultural finance among the banks and financial institutions.
3. Poor risk management and limited financial analysis and management capabilities within the agricultural sector.

The processing industry also complains of poor access to finance and its high cost. The problems noted above for agricultural lending also apply to other parts of the value chain.

The banking system is generally not performing its financial intermediation function well, evidenced by Zambia's low private credit to GDP ratio of 12 percent in 2007. The consequences for the beef and dairy industries are as follows:

- The banks rely on high collateral requirements (130–150 percent) and the security cannot be the asset purchased with the loan. So, with the exception of large, blue-chip companies, the loan is secured on the personal assets of the borrower. This makes finance inaccessible to the vast majority.
- Interest rates for private sector borrowing are also high, upwards of 20 percent and approaching 30 percent for small borrowers. There are sufficient numbers of banks to develop a competitive market but, though falling, spreads remain in excess of 8 percent for kwacha lending. Borrowing in dollars is cheaper (around 12 percent) but that carries a high exchange rate risk as the beef and dairy industries mainly sell in kwacha.
- Long-term finance, needed to establish new farms, improve the breeding stock on existing farms and establish new businesses is not available. Banks prefer to lend for 1–2 years with a maximum term of 3 years. They lack access to a long-term savings base to increase the term of lending and have not been able to tap the main source of long-term capital in the country, the pensions and insurance industries.

Finance need not always be provided by banks. Suppliers' and buyers' credit also have a role to play. For example, the Cold Storage Commission in Zimbabwe used to run a cattle finance scheme under which the breeding cows belonged to them until the debts were repaid through the delivery and sale of progeny. The commission benefited from the increased supply of animals.

In South Africa, there is a well-known example of a scheme in which a bank cooperates with a private sector firm that supervises the feeding of beef cattle, making sure that the farmer is able to earn sufficient returns to repay the bank. The firm benefits from the increased supply of animals on which it can earn a profit.

There is nothing like this in Zambia, but such product innovation could—alongside traditional loan products—help increase access to affordable finance. In some cases, it may even be more effective than commercial bank finance. For instance, a scheme to provide breeding cows on a hire-purchase basis could address the lack of long-term finance and the provision of advice and supervision by a private firm (embedded services) could address the high rates of non-performing loans that result when loan finance is provided to inexperienced farmers.

Access to affordable finance is very low. The banks need to be incentivized to reduce collateral requirements and spreads. Product innovation by suppliers and buyers needs to be encouraged to develop non-bank sources of finance.

4.2.4. High Cost of Standby Power

Electric power is essential for the beef and dairy industries. For beef it is needed not only to power equipment in abattoirs but also to operate the cold rooms and refrigeration equipment needed by retailers. In dairying, the chilling of raw milk is required on farm or at collection centers. The dairy industry has to operate a cool chain to cope with high ambient temperatures which would otherwise cause milk and dairy products to spoil quickly.

Power from the grid is reasonably priced and Zambia still has a cost advantage over South Africa, despite raising tariffs recently. The problem has been interruptions in supply from the grid (especially before the downturn in 2009) and the lack of grid access in areas located away from the line of rail.

These problems lead to farmers and processors having to invest in standby power generation that is much more expensive than grid supplied power. While grid-supplied power may cost in the region of $0.06 per kilowatt hour,[2] standby diesel generation may cost upwards of $0.40 per kilowatt hour as well as tying up scarce capital in equipment purchases.

The lack of power and problems in purchasing and running the cool chain explains why UHT milk commands such a high share of the market for milk in Zambia.

4.2.5. High Cost of Fuel and Transport

Fuel represents an important cost for commercial farmers operating farm equipment. It is a major cost for standby power generation and for transport. Until about mid-2008 fuel prices in Zambia were among the highest in Africa and in the world, although prices were reduced considerably in late-2008. Yet Zambia's fuel prices have remained high relative to those of other countries. A study conducted in 2009 showed diesel prices to be 37 percent lower in Botswana, 35 percent lower in Zimbabwe, 72 percent lower in South Africa and 19 percent lower in Tanzania (Engman 2010).

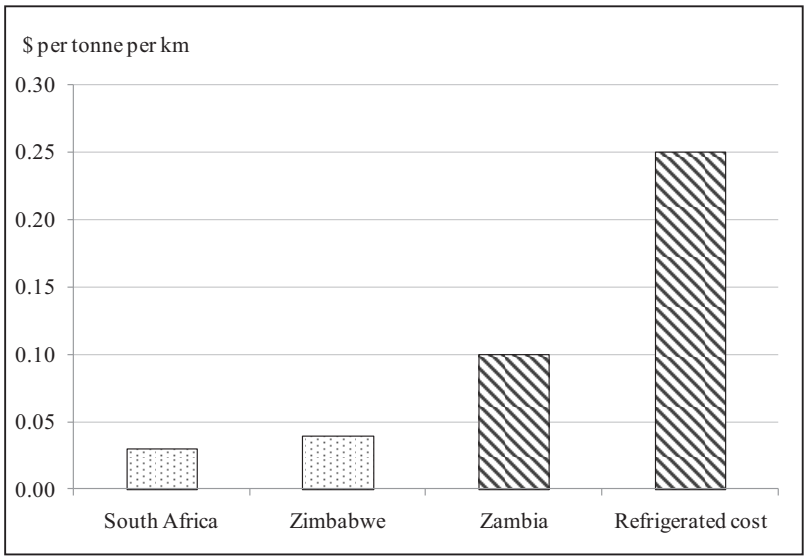
Transport is an important part of the cost of operation of both industries, all along the supply chain. Farm gate prices are affected by distance to processing facilities, factory gate prices by the distance to market. For instance, milk delivered at the dairy in Lusaka fetches ZMK 2,600 a liter whereas farmers in Southern Province receive ZMK 2,200. The difference is due to transport costs. Similarly, the cost of transporting animals is factored in to the lower live weight price of beef in more distant areas.

The cost of unrefrigerated transport is relatively high in Zambia at $0.10 per tonne per kilometer for a fully laden truck on a trunk road. In rural areas with poor roads, even fully laden trucks will charge up to $0.40 per tonne per kilometer. This compares with $0.03 to $0.04 per tonne per kilometer in South Africa and Zimbabwe (figure 13) and the $0.04 to $0.05 per tonne per kilometer charged by international haulers for transporting copper from Zambia to ports in South Africa (Engman 2010). International haulers operating in Zambia are able to buy fuel abroad where it is cheaper. However, there are other factors that also contribute to the high cost of transport in Zambia, including the high cost of finance to purchase vehicles, the lack of skills to maintain and repair the fleet and the high cost of imported spares and consumables.

The cost of refrigerated transport is naturally higher (upwards of $0.25 per tonne per kilometer) and there is an indication that there is a scarcity premium attached to it, especially for part shipments.

Those that really benefit are abattoirs close to the market that can also source animals nearby. This is the case with integrated operations based in Central and Lusaka provinces and the Copperbelt. A functioning rail system would negate some of these advantages, by reducing the cost of transporting animals and creating a more level playing field for those located further afield. The World Bank's *Transport Prices and Costs in Africa* report estimates that the spread between average road and rail prices in Africa varied from 44 percent to 213 percent (Teravaninthorn and Raballand 2008). But rail transport functions very poorly in Zambia, and to all intents and purposes, is not available to the beef and dairy industries.

Figure 13: Comparative Road Transport Costs



Source: Industry consultations.

High fuel and transport costs and lack of electric power undermine the competitiveness of Zambia's beef and dairy industries.

4.3. The Policy and Institutional Environment is Weak

The main role of government is to establish an environment in which Zambia's beef and dairy industries can achieve their potential. This entails two obligations: (1) to establish a business environment in which the private sector can thrive; and (2) to establish supportive policies and build effective institutions for the beef and dairy industries.

4.3.1. The Business Environment is Not Enabling

The shortcomings of the Zambian business environment have been documented by the World Bank's Doing Business Report, Investment Climate Assessments and other reports. Therefore, this report does not deal with the general business environment; instead, this section addresses the main business environment issues that affect the beef and dairy industries more specifically, before turning to policies and institutions and the vital issue of controlling disease.

The beef and dairy industries face a number of problems related to the business environment:

1. Farmers need to obtain licenses and permits to slaughter their animals. The process is complex and difficult to comply with, involving travelling to the municipality, proving that the animal is disease-free even though government vets may not be available, and obtaining approval from both the veterinary and food safety inspectors. It provides opportunities for rent-seeking by the officials concerned. This causes many farmers to sell their cattle at the farm gate to intermediaries even though they could earn a higher return by taking them to the slaughter house themselves.

2. Beef and dairy processors face a multitude of licenses, permits and certificates before they can hope to start up their operations and many of these require annual inspections which increase the cost of doing business.

3. Lack of coordination between the public health function (local authorities) and veterinary services holds up the process of slaughtering, probably due to a lack of understanding by public sector staff of the needs of the private sector. They do not see why they, as facilitators of essential services, need to coordinate efforts so that the process can be streamlined and made more user-friendly.

4. Local authorities charge a levy on beef and dairy products to pay for inspection services and provide infrastructure. They can collect large sums of money in this way. As this is a levy and not a tax, any money left over after paying for the cost of inspection should be invested in infrastructure needed by the industries. But in practice they regard the levy as a tax and do not spend it on the industries.

5. Standards are private (developed by the industries themselves) and crude, and enforcement is weak.

6. Since dairy products are zero-rated, dairy plants cannot offset against output VAT the input VAT paid on imported and domestic purchases. In the 2004 National Budget, milk and other agricultural products were removed from the VAT-exempt list and are now zero-rated. This increases production costs as VAT paid on inputs cannot be claimed against outputs.

7. The exchange rate volatility that affects all parts of the economy is also a constraint to the beef and dairy industries. Currency depreciation increases the cost of imported inputs but, due to limits on consumers' ability to pay, the higher cost cannot always be passed on in the selling price. This depresses the profitability of import-dependent parts of the industries.

4.3.2. Policies and Institutions are Weak

In terms of policies and institutions, the livestock sector, including the beef and dairy industries, was neglected in the past. The development of the sector was the responsibility of the Ministry of Agriculture, the spending priority of which was subsidizing the uses of fertilizer. However, the government has recently established a new Ministry of Livestock and increased considerably the resources available to it. The private sector has welcomed the establishment of the Ministry of Livestock in the hope that its needs will from now on be given greater priority.

Nevertheless, the new ministry faces daunting challenges. It did not inherit a clear policy framework and the institutions needed to regulate and provide public goods to the industries are extremely weak. The ministry is developing a livestock strategy and intends to use the greater funds at its disposal to:

- Enact new legislation to set a clearer regulatory framework.[3]
- Increase investment in livestock research and breeding.
- Strengthen livestock extension services.
- Increase the capability of the government veterinary services to prevent, monitor and control diseases.
- Establish a disease-free zone (DFZ) by establishing a veterinary cordon fence around parts of Lusaka and Copperbelt and Central Province.
- Improve hygiene and safety by working with the local authorities and the Ministry of Health.
- Improve traceability by tagging animals.
- Invest in livestock marketing centers to cater for the lack of livestock markets in the country and also enable the government and private sector to provide services to farmers.
- Develop better product standards and improve the enforcement of standards.
- Establish meat and dairy boards to set and enforce standards, improve market access for small farmers and promote the consumption of beef and dairy products.

These are worthwhile objectives which, if achieved, would help the industries to grow faster and become more competitive. However, the ministry intends to achieve them by letting the public sector take the lead. The private sector is not viewed as an equal partner, no doubt because it has not provided for the needs of smaller farmers in providing inputs (feeds, drugs and medicines and veterinary services, information and so on).

While it may not have done so yet in Zambia, the private sector could make a sizeable contribution to providing information and advice, supplying veterinary products and services and breeding better animals—including for smaller, poorer farmers. Given the magnitude of the challenge of shifting the Zambian beef and dairy industries from a low to a high productivity path, it would appear sensible to forge a partnership between the public and private sectors rather than to expect the public sector to supply these services on its own.

The government is proposing meat and dairy boards. Such boards could help in the development of competitive beef and dairy industries and ensure that small farmers are not excluded from the process. But the track record of such boards is not good in Zambia. There is a danger that old problems will surface with the new boards. It may be better to provide incentives for the private sector to develop business models that are more supportive of small farmers. Good examples of such business models are efforts by major processor Parmalat to pick up raw milk from collection centers, which has played a pivotal role in the growth of emergent dairy farmers, and the way PROFIT's herd health plan has evolved into a system that provides embedded services to smaller farmers.

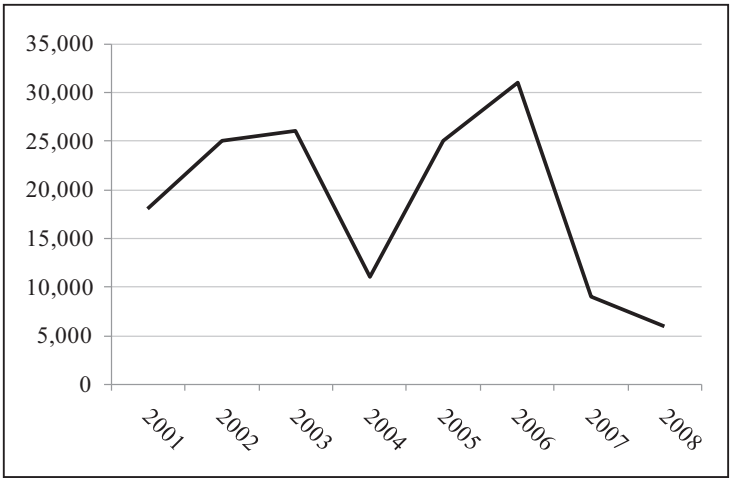
4.3.3. Poor Prevention and Control of Disease: the Key Issue

The single most important policy and institutional issue facing the industries is the prevention and control of disease. It is the failure to do this that has been an important contributor to:

1. The country not being able to sustain a period of rapid growth of the cattle population.
2. The periodic imposition of bans of cattle movement that cause great hardship among farmers in affected areas and cause sharp increases in the price of beef.
3. The inability to certify that animals are disease-free, which impedes the growth of beef exports.

The impact of disease outbreaks is shown by a decline in cattle sales whenever bans on movement are imposed. In its 2008 report, the Department of Veterinary and Livestock Development charts cattle sales over the 2001–8 period (figure 14).

Figure 14: Cattle Sales, 2001–8



Source: MACO-DVLD 2008[4]

The Department notes that the bans on cattle movements caused cattle sales to plummet in 2003–4, resulting in an increase in the price of beef from ZMK 6,500 to ZMK 12,000–16,000. In 2006–8, the price of beef rose from ZMK 8,500 to ZMK 20,000. Not being able to sell their animals badly hurt farmers who had also lost animals to disease. Further downstream, the industries could not source animals just when prices were high.

Zambia has one of the highest rates of cattle disease in the region and, with the exception of Rinderpest, which has been eradicated in Africa, is not classified as disease-free by the World Organisation for Animal Health (OIE) for important cattle diseases (table 15).

Table 15: Disease-free status of African OIE member countries, 2010[5]

Member country	Rinderpest	CBPP	FMD
Angola	X		
Botswana	X	X	X (DFZ)
Kenya	X		
Malawi	X		
Mozambique	X		
Namibia	X		X (DFZ)
South Africa	X		X (DFZ)
Tanzania	X		
Zambia	X		
Zimbabwe	X		

Most of the major cattle diseases are endemic in Zambia or brought in from neighboring countries (table 16).

Table 16: Zambia—Summary of Disease Status

FMD	Sporadic. Outbreaks originate from buffalo. Outbreaks in the north, probably from Tanzania.
CBPP	CBPP spread from Angola. Incursion into Western Province, south-west, and parts of Southern Province. Mortality rate is greater in larger herds and among females.
Lumpy skin disease (LSD)	First seen in Zambia in 1929, spreading into Botswana by 1943 then South Africa; spread via contact with wildlife (e.g. Thompson gazelle and impala). Reported in 2008 and 2009.
East Coast Fever (ECF)	A major tick-borne disease. Main cause of restricted animal movements in Zambia. High incidence in Southern and Eastern provinces where most cattle are found. Reported in 2008 and 2009.
Liver flukes	Important problem in low-lying areas through the country, especially Western Province. Fasciola hepatica and F. gigantica occur.
BTB	Common condition leading to cattle carcass condemnation. A major public health concern Reported in 2008 and 2009.
Brucellosis	Underreported in spite of high occurrence, especially among the small-scale dairy farmers. Reported in 2008 and 2009.
Tryps	Mainly Eastern Province but also parts of Southern and Western provinces. Excludes farmers from trade.
Rinderpest	Last recorded 1896.

Source: OIE

To combat disease and to enable parts of the country to export beef, the ministry intends to develop a DFZ. The focus would be on the public sector enforcing the Zone. As set out in Annex B, this is the approach adopted successfully by Botswana and Namibia. Though successful in those countries, there are doubts over how effective such an approach would be in Zambia for the following reasons:

- The approach depends on strong political will and sustained investment. Botswana's and Namibia's elites owned cattle. That shaped their policy on crucial economic issues such as maintaining competitive exchange rates and ensured strong and sustained investment in disease control. After 50 years, Namibia still spends $8 million on its veterinary corridor fences. It remains to be seen whether Zambia, which has lacked comparable commitment in the past, will be able to sustain the effort.

- Botswana and Namibia invested heavily in veterinary fences. The Zambian plan involves the use of natural barriers such as rivers to segregate cattle populations. Yet Zambian rivers are seasonal and easily forded in the dry season.

- Regulatory enforcement does not have a good track record in Zambia. If farmers and the private sector were not fully on board, the incentive to flout the regulations would be strong and that could make the DFZ ineffective.

- Unless the DFZ worked well, with a continuous flow of animals through control points and quarantine areas, a DFZ around Lusaka and Central provinces would effectively reduce cattle prices in the main cattle rearing areas of Southern and Western areas. That would reduce the incentive to invest in better husbandry and may create huge resentment.

As the new policies of the ministry are currently in the process of being finalized, this is an opportune moment to have an informed debate on the options available. The principal alternative to a cordoned-off DFZ would involve:

1. Targeting disease prevention and monitoring measures in areas where disease prevalence is high and disease transmission is greatest. The Kafue flats in Southern province and low-lying areas in Western Province are obvious candidates.

2. The construction of water and feeding points along the main migration routes that Zambian cattle follow when they move to and from wetter areas. These could be used for disease prevention and monitoring.

3. The establishment, under the supervision of the OIE, of quarantine facilities for animals destined for export—as Sudan has done as a result of the failure to make DFZs work in that country.

4. Training and extension services provided by government and/or private service providers. The latter could also monitor producers who have accessed loans for their cattle farms.

While Botswana and Namibia succeeded through the DFZ route, the use of buffer zones and corridors to control disease is exemplified by Zimbabwe. That country set up 'red zones' next to its wildlife areas where diseases were endemic, vaccinating cattle against FMD. Next to the red zone was a buffer zone where diseases were monitored and controlled and then 'green zones' from which meat could be exported. Gradually, the green zones expanded, enabling the country to export disease-free cattle from its main producing areas.

Whichever alternative is chosen, there is also a need to debate the choice between leaving all aspects of the supply of disease prevention and control measures and the supply of veterinary products and services to government or to actively involve farmers (such as through ZNFU) and the private sector (i.e. input suppliers, feedlot operators, abattoirs and dairy processors) as they also stand to gain.

Provided the government remains in control of monitoring the effectiveness of policies, addresses the free rider problem (farmers failing to dip or vaccinate their cattle and report diseases), and retains its regulatory role over the private sector, it would seem that there is much to be gained and little to lose from involving the private sector. Pilots such as PROFIT's herd health plan have shown that involving farmers and the private sector can provide worthwhile results.

The recent performance of the industries has been shaped by poorly performing public institutions. The future performance of the beef and dairy industries will be shaped by the policy choices made now. It is important therefore that the consequences of the options are analyzed and used in evidence-based dialogue between government, farmers and the rest of the private sector.

The critical issue for the Zambian beef and dairy industries is the prevention and control of disease. There are important policy choices that need to be made now on how the Zambian government approaches this task. An assessment by stakeholders of the costs and benefits and likelihood of success of the various options is highly desirable.

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[1] A private sector development program integrating smallholders into commercial input and output markets in Zambia.
[2] The cost varies with the amount of power consumed.
[3] New Acts planned include a Dairy and Dairy Cattle Act, a Professional and Para-Vet Act, a Brands Act and an Animal Health Act.
[4] These data are probably based on surveys of a few of the Ministry of Livestock's stations, hence are illustrative of trends only.
[5] From the OIE: see http://www.rr-africa.oie.int/en/mandates/en_disstatus_map.html

5. LOW PRODUCTIVITY, LOW COMPETITIVENESS

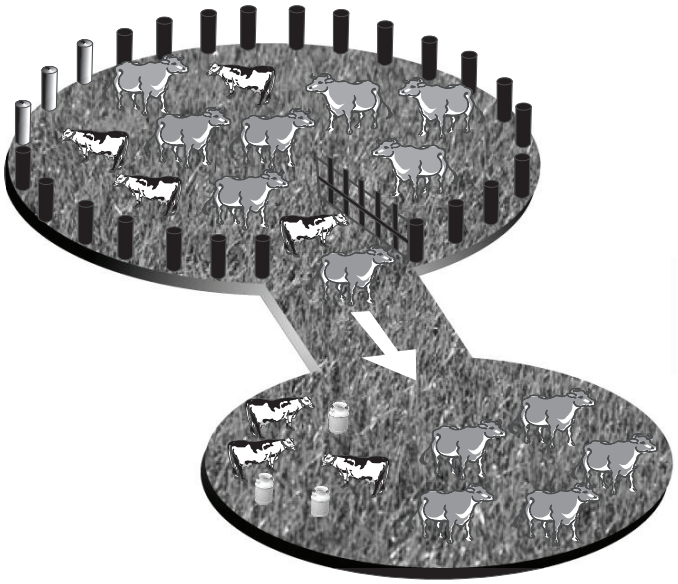
This chapter sets out how weaknesses in the operating environment combine with the motives and opportunities of farmers and the structure of competition to result in inefficient and uncompetitive beef and dairy industries.

It starts by considering the reasons for the country's failure to increase its cattle population and increase farm productivity. It then examines the efficiency and competitiveness of the different types of cattle farming. Finally, it analyzes the structure of competition across the beef and dairy value chains in order to assess how this affects efficiency and competitiveness.

5.1. Low Cattle Population, Low Productivity

Zambia's problems of low cattle population levels and low productivity can be depicted as failing to fill the paddocks with enough cattle and then failing to drive enough output (cattle for beef and raw milk for dairy products) out of these paddocks (figure 15).

Figure 15: The Problems of Low Cattle Population and Low Productivity



At the root of the difficulty in developing and sustaining a large cattle population is that the national herd is concentrated in just three provinces: 70 percent of the traditional cattle stock is located in Central, Southern and Western Provinces while exotic beef and dairy cattle are concentrated in Central Province. This concentration is a result of the pastoralist livelihoods of the people of Southern and Western Provinces and the benefits of locating in Central Province to serve markets in Lusaka and the Copperbelt. The potential of other provinces has yet to be realized even though they are able to support far greater cattle numbers.

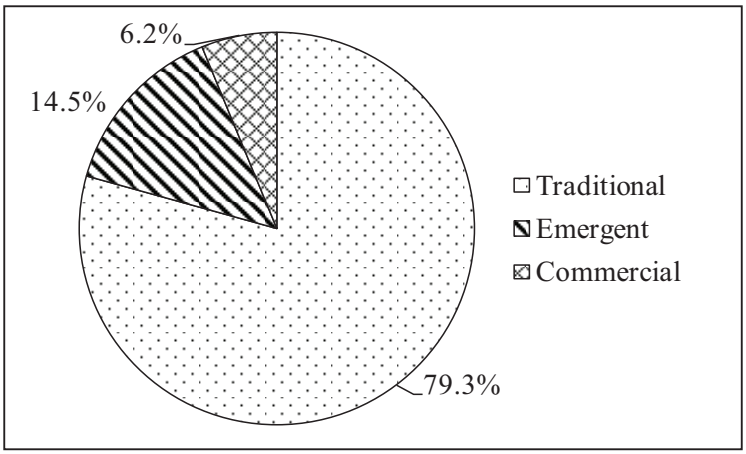
However, players in the beef and dairy industries are showing interest in investing in other parts of the country such as Northern Province, where land is cheaper and more plentiful. The Ministry of Livestock is supportive of the idea. Such expansion would be facilitated by:

1. Greater access to the lower-cost, long-term finance needed to establish cattle farms;
2. Strengthening the supply of government disease prevention and control measures and veterinary services;
3. Reducing transport costs.

5.1.1. Three Systems of Production with Differing Motives, Incentives and Constraints

Understanding the reasons for under-performance in the main provinces requires a closer look at approaches to cattle rearing. In fact, there is a sharp contrast between commercial farmers—who approach the best levels of animal husbandry in the Southern African region—and traditional farmers who lag woefully behind. In between are emergent farmers that are in transition from traditional to commercial farming. The share of each type of system is shown in figure 16 and their levels of productivity in table 17.

Figure 16: The Three Cattle Rearing Systems' Shares of the Cattle Population



Source: DVLD data on cattle numbers

Table 17: The Productivity of the Three Systems

	Traditional	Emergent	Commercial
Calving rate	55%	In between traditional and commercial	70%–80%
Calving mortality	20%	In between traditional and commercial	1%–2%
Adult deaths	5% (adult)–7% (heifer)	Lower	Lowest
Off-take rate	10%	10%–15%	17%–18%
Live weight	250 kg/cow	250 kg/cow	300 kg/cow
Milk yields	2 liters/day	7–10 liters/day	17–23 liters/day
Characteristic	Low growth	Dynamic	Dynamic

Source: World Bank estimates based on previous reports and industry consultations

The motives of farmers in the three systems and their opportunities and constraints vary.

5.1.2. The Traditional System

In the traditional system, cattle are regarded as stores of wealth and are parts of the social fabric that are used to pay bride price and slaughtered to mark social occasions. They are sold when cash is needed to tide households over hard times and to pay for necessities such as school fees. This is the dominant segment, accounting for approximately 80 percent of the country's cattle population. The gap between the farm gate price and the consumer price is very large and so the smallholders do not get maximum value for their animals.

In this system, the cattle population has been growing slowly, perhaps as little as 1–2 percent a year, and productivity is low for the following reasons:

- Calving rates are quite low, resulting from the use of traditional methods of insemination. There are fertility diseases in both bulls and cows, along with other diseases that can cause abortion.
- Calving mortality is high given the poor health of cows and low access to veterinary services.
- Adult mortality is high because of poor nutrition and disease. Periodically, the outbreak of disease or prolonged drought cause a sharp fall in the population of animals.
- Low off-take rates for beef result from cultural norms. The Tonga and the Lozi, the main owners of cattle, as well as other ethnic groups, are particularly loath to part with cattle, often keeping them well beyond their prime.
- The low weight of the animal at slaughter is due to breeding smaller animals, and especially, poor nutrition. Traditional breeds, in good condition, can put on weight, just as well as their cross-bred or exotic counterparts. However, traditional animals are free-grazing and, in the dry months, lose weight due to poor nutrition. The reluctance to sell may lead to overgrazing.

- Low milk yields. The traditional system is oriented to beef and hardly produces any milk for sale. Most of what is produced is consumed within the household. Small quantities are sold raw, direct to consumers, often in neighboring urban centers.

- The inherently non-commercial motives for cattle ownership manifest themselves in poor management practices.

It is these farmers that are most disadvantaged by the weaknesses of public services. Because they cannot afford the high cost of private services, traditional farmers suffer in the following ways:

- Poor disease prevention and control makes them vulnerable to epidemics, with dire consequences for incomes and herd size. The risk of periodic disease outbreaks reinforces their cultural attitudes towards not selling cattle.

- Poor extension services mean that they are often unaware of low cost ways of improving nutrition. The practice of establishing community banks is not followed in Zambia because there is no one to organize it.

- The lack of organized cattle marketing events means that traditional farmers lack a sales outlet for their animals that ensures transparent price formation. A combination of licensing and permit issues, transport availability and cost persuade them to sell to cattle dealers at the farm gate even though they know they could probably get higher prices by bringing their cattle to feedlots and abattoirs.

The whole system is in a low level equilibrium with low inputs and low output. For example, though traditional farmers know that selling one animal could pay for the veterinary services needed to keep the rest of the herd healthy or to pay for the feed supplement that would help them gain weight and improve their condition, very often the reluctance to sell overrides this compelling logic.

The lack of incentive to change is due also to the low returns earned. Traditional dairy farmers do not earn much from selling the surplus they produce. In beef, returns are depressed by low animal weight and the timing of sale, as shown in the following section.

5.1.3. Commercial Farmers

The commercial system is dominated by what are, by Zambian standards, large farms with an average herd size of 320 for exotic beef cattle and 100 for dairy cattle, though there are much larger farms run by firms such as Zambeef, for example. However, commercial farming accounts for only around 6 percent of the cattle population.

Here the profit motive drives behavior. Commercial farmers sell cattle for beef and supply milk at times when prices are high, especially in the dry season when the traditional farmer is loath to sell animals because of poor condition and milk from traditional and emergent farmers is in short supply. In the beef industry, some of the largest farms are part of integrated firms that carry out all the functions in the value chain up to retailing. In dairying, many have opened small dairies on farm from which they sell milk and dairy products directly to consumers.

They are able to sustain much faster population growth and productivity compares with the regional leader (South Africa):

- Calving rates are high, up with those of the industry in South Africa, with the use of artificial insemination and the purchase of breeding animals. Weaning is tightly controlled ensuring that lactation intervals are low.

- Calving and adult mortality is kept low by good feeding of animals and keeping diseases in check.

- Disease prevention and control is taken extremely seriously, aware that most cattle diseases are endemic in Zambia. Good veterinary care is ensured by the use of private vets that inoculate against disease and by the farmers dipping their animals regularly.

- Nutrition: commercial farmers invest in growing crops to feed their animals, collecting hay and making silage to assure a good diet year round. Better feeding and disease control combine to ensure a weight of beef animal and milk yields comparable to South Africa. These farmers tend not to buy in feed because of its high cost, preferring to make their own. They are not convinced that ready-made feed available in the market results in a higher conversion ratio for beef or higher milk yields.

- Off-take rates, weight of live animals and milk yields are in line with South African norms as a result of the commercial attitude to cattle rearing and investing in animal husbandry (disease prevention and control and nutrition).

The numbers of such farmers has increased with the in-migration of white farmers from Zimbabwe and South Africa drawn to Zambia by its greater stability or for lifestyle reasons. They are concentrated in Zone II in Lusaka and Central Provinces, close to the line of rail so they benefit from greater proximity to urban markets such as Lusaka and the Copperbelt and greater access to infrastructure.

The major constraints to the expansion of this system of farming are:

- Market constraints: these farmers produce animals used for premium beef known as "choice". The market for choice beef is limited by affordability issues. These farmers' ability to increase raw milk production is limited by the main Lusaka dairies' ability to absorb their output. Many have invested in dairy processing and selling through their own farm shops, but that does not provide a mass market.

- Cost of disease prevention: the high prevalence of disease in the country and the failure of public services impose a high cost burden on these farmers who have to spend large sums on expensive veterinary drugs and services.

- High cost of feeding: dairy farmers practice zero-grazing for fear of disease, cancelling out one of the major advantages Zambia has in rearing cattle, which is the availability of grazing land. For dairy farmers, feed can make up over half the total cost of production.

- Access to land: because of the high cost of transport and the availability of infrastructure, these farmers are concentrated in Central and parts of Southern Province adjacent to Lusaka. Finding land with clear title is difficult in Zambia and that limits the amount available in the areas where it makes economic sense to farm.

- Access to finance: as a rule, these farmers do not borrow from the banks because they find the cost of borrowing too high, the collateral requirements too stringent and the term of loans too short. This means that they prefer to grow at a pace determined by their ability to generate cash from operations, which is necessarily slower than if they could borrow.

5.1.4 Emergent Farmers

Perhaps the most dynamic part of the industries, in terms of growth of cattle numbers, is the emergent farmer. Emergent farmers rear both beef and dairy cattle, though they are more prominent in the dairy industry where they may account for as much as 10 percent of milk supply. Such farmers combine aspects of both traditional and commercial farmers. Drawn from the same ethnic backgrounds as traditional farmers, they reflect a shift in attitude in that their cattle are viewed more as a source of revenue than as a social asset.

Farming practices amongst these farmers are developing as they learn from the commercial farmers:

- Calving rates are higher than those of traditional farmers, though not quite up to the level of commercial farmers. Artificial insemination is used, though not universally, and they struggle to afford breeding stock. Weaning is not as tightly controlled so lactation periods are lower.

- Calving and adult mortality is lower than for traditional farmers as cows are better fed and an attempt is made to prevent diseases.

- Disease prevention and control: these farmers are aware of the high incidence of disease in Zambia but the cost of private veterinary care is a burden and they often have to rely on poorly-funded government services. They will spend money on drugs and veterinary care when their animals are sick.

- Nutrition: They collect crop residues and hay and some are investing in making silage to assure a good diet year round. But their animals still lose weight during the dry season and milk yields fall.

- Off-take rates are 10–15 percent as a result of the more commercial attitude to beef farming.

- Animal weight and milk yields: better bred and fed animals ensure a higher weight of animals and higher milk yields than for traditional farmers, but they are unable to match the productivity of commercial farmers.

The differences in the farming practices of the traditional, emergent and commercial systems are exemplified in dairy farming. Table 18 illustrates the main features and performance of the three types of farmer.

Table 18: Characteristics of Zambian Dairy Farming Systems

	Traditional	**Emergent**	**Commercial**
	Indigenous beef cattle	*Cross-bred*	*Exotic (Friesian or Jersey)*
Lactation period (months)	4	10	12
Yield (liters/day)	2	7–10	17–23
Grazing regime	Grazed	Semi-grazed	Zero-grazing
Method of insemination	Traditional	Artificial	Artificial
Lactation interval (months)	14–15	Closer to commercial	2

Source: World Bank estimates based on data provided by industry sources.

In the traditional system, yields are low (2 liters a day) as the cow is essentially bred as a beef animal: the milk produced is often referred to as beef milk. The cow is unlikely to lactate for more than 4 months. Emergent farmers artificially inseminate their cows and their cross-breeds perform much better, lactating for 290 days and yielding, on average, 7–10 liters a day. Like their beef cattle-rearing counterparts, the commercial dairy farmer matches South Africa farmers in yields (17–23 liters a day) using similar exotic breeds and husbandry regime.

Emergent farmers learn from the commercial farmers and wish to adopt their practices. Their growth is limited by the same constraints as commercial farmers but they are able to cope with them better:

1. *Market constraints:* they sell beef animals for both standard and choice cuts and so are less constrained by the market.

2. *Cost of disease prevention:* though exposed to the same dangers as commercial farmers, they are able to cope with them at less cost because their cross-bred animals are more resistant to disease and they can access government vets and para-vets.

3. *High cost of feeding:* they are able to supplement the feeding of their animals without going to high-cost zero grazing. Their animals are exposed to more risk of disease as a result but they are more cost competitive.

Their major constraint is *access to finance*. They need capital to invest in breeding animals, investing in growing fodder crops, improving their pastures and purchasing hay making and other equipment.

5.2. The Efficiency and Competitiveness of Cattle Rearing Systems

Faced with the inputs costs described above and based on their motives, opportunities and constraints, the three systems of cattle rearing vary in efficiency and competitiveness. Taking this into account, the following sections examine the potential for more efficient beef and dairy farming in Zambia.

5.2.1. Zambia is Competitive in Live Cattle Production

The traditional farmer does not maximize returns. A small scale farmer, with an average nine animals and current low calving and high calving mortality rates, can realistically only sell one animal per year. This is likely to fetch between ZMK 1–1.5 million ($225–$350) which, after meeting household expenses, is insufficient to provide a surplus to invest in the herd.

The incomes earned per animal are undermined by low live weights caused by poor feeding, disease and badly-timed sales. Traditional farmers tend to sell at the same time as each other, when school fees are due and the rains have enabled their animals to put on weight. For example, if traditional animals were sold in the same condition as commercial animals, at a time when prices were high, the income from selling a single animal could increase to $400.

The prices received by traditional farmers are low by regional and international standards. The realized price at live weight equates to less than $1.15 per kilogram, which is competitive with Namibia and not far off Kenya. The main problem with beef from traditional farmers is low productivity and quality resulting from the animals' poor condition and the fact that they often suffer from disease.

An emergent farmer with an average of 17 animals, can, with higher calving rates and lower calving and adult mortality, sell four animals a year. However, in practice, off-take rates are between 10–15 percent and so they are likely to sell between 2–3 animals. Because their animals weigh more and are in better condition, the prices they realize are higher. They can expect to earn between ZMK 3.5–5 million ($800–1,150) per year, leaving a surplus that can be reinvested in the herd. They could earn even higher prices if they were able to sell them during the dry season when traditional farmers are not selling. But that requires feeding them during the dry season in order to maintain weight.

The price that emergent farmers get is $1.59 per kilogram (live weight). For an animal in good condition, this is not dissimilar to South Africa. Revenue per animal is close to $400 as the average live weight is 250 kilograms.

Commercial farmers are more productive than their emergent counterparts. With an average herd size of 320 and off-take rates of 17–18 percent, they are able to sell close to 60 animals per year. With an average live weight of 300 kilograms, this fetches them close to $480 per animal. The cost of production is likely to be much higher than the emergent farmer as they use fuel for equipment and invest in growing crops to feed their animals. Nevertheless, the price of an animal in good condition is not dissimilar to South Africa.

In beef, the main constraints to developing an export market are:

1. Low productivity constrains supply, especially in the traditional system where the majority of cattle are reared.

2. Seasonality: a large number of animals come onto the market at the same time when school fees are due. There is oversupply followed by shortages in the dry season.

3. Animals cannot be certified as disease-free.

5.2.2. Emergent Farmers are Competitive in Dairy Farming, Commercial Farmers are Not

Because emergent farmers are able to use the natural advantage of grazing land, they are more efficient than their commercial counterparts. They can produce milk at $0.18 a liter which is very competitive regionally and internationally.

Returns to emergent farmers from dairy are attractive. Based on information supplied by the ZNFU, an emergent farmer able to achieve a good yield for a cross-bred cow of 10 liters per day should be able to earn over $3,000 a year, representing a good return on the cost of buying it ($6,500).

Table 19: The Efficiency and Competitiveness of Emerging Dairy Farmers: Profitability

Number of cows	4 cows	
Exchange rate	US$ 1 = ZMK 4,400	
Number of cows lactating	3 cows (1 dry)	
Selling price of milk	ZMK 2,200/liter = US $0.50	
Milk production period	290 days/year	
Yield	10 liters/day	
Revenue	US$	
Milk	4,350.00	
1 cow culled	500.00	
Subtotal	**4,850.00**	
Costs		*Cost as % of total costs*
Feed costs	771.21	53.5%
Artificial insemination service	68.00	4.7%
Drugs & vet fees	250.00	17.3%
Labor	300.00	20.8%
Transport (20km at 30 liters/km)	16.00	1.1%
Dairy council levy 0.5%	21.75	1.5%
Beef council levy 0.3%	15.00	1.0%
Subtotal	**1,441.96**	
Gross margin	**3,408.04**	
Interest (working capital)	60.00	
Repairs	30.00	
Net profit	**3,318.04**	
Cost of Milk	0.18/liter	

Source: ZNFU data for 2008, updated.

Commercial farmers are far less competitive and profit margins are lower. Table 20 shows that, at the current price of $0.60 a liter, a commercial farmer with 100 cows yielding 23 liters a day each is able to produce raw milk at a cost of $0.57 a liter, three times the cost for an emergent farmer.

Table 20: The Efficiency and Competitiveness of Commercial Dairy Farmers

Direct costs	Total actual costs		Cost per liter of milk		% of total cost
	ZMK	US$	ZMK/liter	US$/liter	
Feed	93,710,838	21,298	1,415	0.32	57.8%
of which:					
- Purchased	73,142,598	16,623	1,105	0.25	45.1%
- On farm production	20,568,240	4,675	311	0.07	12.7%
Chemicals, semen, veterinary, vet medicines and consumables	11,119,417	2,527	168	0.04	6.9%
Diesel	22,024,374	5,006	333	0.08	13.6%
Power	4,743,750	1,078	72	0.02	2.9%
Wages	8,628,632	1,961	130	0.03	5.3%
Repairs and Maintenance	6,899,929	1,568	90	0.02	3.7%
Overheads	17,184,108	3,905	224	0.06	9.2%
Total costs	**165,543,379**	**37,623**	**2,448**	**0.57**	**100.0%**

Source: World Bank estimates based on data provided by industry sources

Feed accounts for the major proportion of raw milk production costs throughout the world and it is the lower cost of feed that makes the emergent farmer more efficient and competitive:

- The commercial farmer spends $0.32 cents per liter on feed alone under a system of zero-grazing. Purchased feed accounts for nearly half the total cost of commercial production. Commercial farmers able to mix their own feed would be more competitive than in the example above and this is why many do not buy feed.
- The emergent farmer spends just $0.09 per liter on feed. This is in line with costs in Kenya which were estimated at $0.07 in 2008 (TechnoServe 2008).

As well as facing higher feed costs, Zambian commercial farmers are also disadvantaged against South African farmers by the higher costs of diesel and veterinary drugs and services, although these account for a much smaller share of costs relative to feed. Lastly, overheads account for $0.06 per liter of costs. This reflects the small size of Zambian commercial farms compared to their South African counterparts. South African farms are getting bigger in order to benefit from economies of scale, including on overheads.

The figures above suggest that Zambia's commercial farmers may struggle to make profits at the prevailing price of $0.60 a liter. Though they complain of difficulties, the fact is that there are new commercial farmers converting from arable farming. The figures above do not take account of the possibility of growing more feed on farm and culling of old animals.

The above analysis poses the question why, if the emergent farmer is so much more competitive, do commercial farmers not adopt their practices, for instance, relying much more on natural grazing to reduce their feed costs and not spending so much on veterinary care. While this would appear to be a rational course of action, there are very major differences in motives, opportunities and constraints between the two types of farmer that explain why commercial farmers choose not to adopt the practices of the emergent farmer:

- The greater risk of disease that natural grazing poses to dairy animals makes it unacceptable to commercial farmers who need to earn a return on the considerable investment they have made in their farms. Emergent farmers are more willing to take the risk of disease because their lower outgoings allow them to tide over losses of output and they often have other sources of income from arable farming or other activities.

- In beef farming, the emergent farmer has access to extensive communal grazing areas that, for periods of the year, allows him to feed his cattle at very low cost (though exposing them to higher risk of disease). The commercial farmer, with much more limited access to land, needs to maximize the number of animals and so has to grow crops and buy expensive feed.

There is some evidence to suggest that the two systems are actually learning from each other. For example, practices such as strip gazing on their farms have enabled some commercial beef farmers to get more out of the natural grazing available while still minimizing the risk of disease. And emergent farmers learn continuously from commercial farms. Of course, the optimal system would be to have diseases controlled so that all farmers could make more of Zambia's natural advantage of grazing land. For commercial farmers, this needs to be accompanied also by increased access to land with clear title.

The problems of low growth of the cattle population and low productivity would be addressed substantially if emergent farming activity increased. Emergent farming is the most competitive of Zambia's three cattle rearing systems.

5.3. The Beef Value Chain

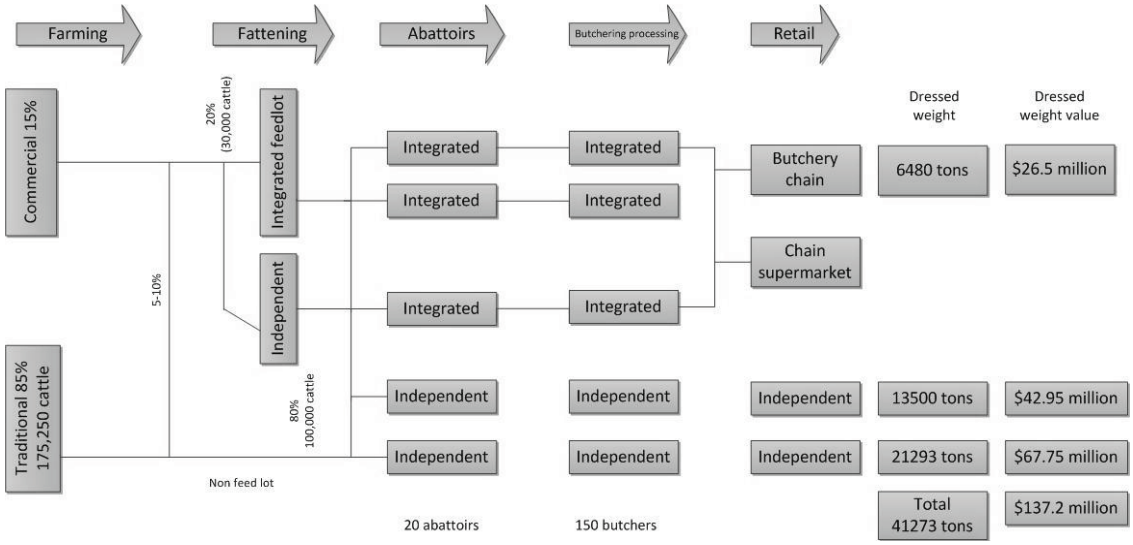
This section examines the structure and efficiency of the beef value chain. The first part provides an overview of the value chain and this is followed by an analysis of its structure and competitiveness.

5.3.1. Overview of the Beef Value Chain

1. Zambia's beef value chain, illustrated in figure 17 (below), has been shaped by two major forces: A distinction between a commercial market segment which serves mainly urban consumers and a traditional segment which meets the consumption and social needs of the rural population.

2. The comparatively recent emergence of private participation in the beef industry. Previously the public sector dominated the industry. Private participation in the industry is less than 20 years old and so what has developed is still at an immature stage.

Figure 17: Zambia's Beef Value Chain[1]



Source: World Bank estimates based on data provided by industry sources.

The traditional market segment is informal. Slaughtering may well be performed at an abattoir if one is available but, for the large part, the beef is produced and consumed within the household for social occasions or sold by informal, rural butchers. A high percentage of animals (57 percent) are slaughtered in this segment and it still accounts for the bulk of the market in terms of volume and value. This is not surprising given the fact that 65 percent of Zambia's population is rural. However, it is quickly losing ground to the commercial segment as the latter is growing rapidly driven by an increase in the size of the urban middle class.

The two segments are not entirely separate from each other. A significant proportion (20 percent) of the cattle reared in the traditional system find their way to the commercial segment of the market. This is largely in response to traditional farmers selling cattle to pay for school fees or when the household needs cash for other reasons (sickness, loss of crops and so forth).

Within the commercial segment, the industry has arrived at a private standard of choice or standard meat depending on whether the animal has been fattened in a feedlot or not. The bulk of the commercial market by volume and value is standard meat. The cattle originate in the traditional system, or from emergent farmers, and are slaughtered without fattening in feedlots.

A small proportion of animals from emergent and traditional farmers are fattened alongside animals from commercial farms. In total though, only an estimated 30,000 animals are fattened, so the choice market is about 25–30 percent of the commercial market by volume and 35–40 percent by value. Both standard and choice sub-segments have grown rapidly over the past few years but there were affordability issues in the choice sub-segment last year when the market softened due to the economic slow-down in Zambia.

Table 21 presents the best estimates we have been able to develop of market segmentation and value-addition in Zambia's beef industry. It should be noted that our estimates of beef production are lower than those given in FAOSTAT and more in line with the estimates presented in FAO 2009.[2]

Table 21: Market Segmentation and Value Addition for Beef

Key Indicator	Traditional	Commercial	
		Non-Feedlot *Standard*	Feedlot *Choice*
Animals slaughtered per year	175,250	100,000	30,000
Live weight (tonne)	39,431	25,000	12,000
Live weight price (US$/kg)	1.25	1.25	1.59
Live weight value (US$)	49.3 million	31.25 million	19.1 million
Dressed weight (tonne)	21,293	13,500	6,480
Dressed weight price (US$/kg)	3.18	3.18	4.09
Dressed weight value (US$)	67.75 million	42.95 million	26.5 million

Source: World Bank estimates based on data provided by industry sources.

5.3.2. An Immature, Vertically Integrated Industry

The key features of the processing of cattle in the commercial system are as follows:

1. The majority of feedlots, abattoirs and butcheries are owned by firms that are completely vertically integrated or are integrated from feedlots to butchery outlets. The dominant firm in the beef industry and another major player are both fully integrated from farm through to butchery and several of the next tiers are integrated from feedlot to butchery. However, several new entrants have chosen only to invest in abattoirs and butcheries. These predominantly serve the standard meat sub-segment.

2. There is growing interest in fattening cattle for the choice market. Originally, there was only one major firm operating feeding lots. However, the entry of modern retailers requiring large quantities of assured, good quality meat cuts has caused several others to open up feedlots and there are now about 8–9 suppliers able to meet the needs of major retailers such as Shoprite and Spar. Returns to feedlots are good and so more new entrants may be expected.

3. There has been significant new investment in abattoirs in the urban centers of major cattle rearing provinces as well as in Lusaka and the towns of the Copperbelt. Overall, there is no shortage of capacity but there may be capacity constraints in particular provinces when a ban on cattle movement is imposed by the authorities in response to an outbreak of disease.

4. The rise of modern retailing in Zambia has made all the major firms understand the importance of securing outlets in the main shopping malls or selling beef in modern butcheries.

5. Unlike mature markets such as South Africa's and those of most other developed countries, there is no formal wholesale market for beef in Zambia. This why most of the large supermarket chains have opted to let the industry open up franchised outlets

in their stores rather than operating their own butcheries as is the practice in South Africa and most developed countries. This is an indication that the industry is at an immature stage in Zambia.

The value chain is buyer-driven with the processing industry having power over farmers and the consumer. This is reflected in the relatively high price of beef at wholesale (dressed weight) and retail level. This will only change if the rate of entry and investment continue at a high pace, increasing competition so shifting the balance of power to the consumer.

The business strategies pursued by firms and the structure of competition have a major bearing on performance and competitiveness. In particular, the extent to which firms are motivated to invest in innovation that helps them and the industry become more productive and efficient is crucial for the industry's growth and competiveness.

Vertical integration is symptomatic of an immature industry and reflects the comparatively recent emergence of competition between private firms. In more mature industries, most of these functions in the value chain are performed independently with the following advantages:

- Greater efficiency: by focusing on one stage of the value chain, specialization causes firms to concentrate on earning profits by becoming more efficient rather than by capturing value addition from several stages. Specialization may deliver greater efficiency through process efficiencies or through scale economies such as those possible in abattoirs. Integrated firms are also less nimble in responding to changes in market conditions as they have to be concerned with the consequences of changes in one stage upon parts of the business upstream and downstream of that stage.

- The separation of functions leads to secondary markets developing that allow for greater transparency in pricing and more flexibility in responding to changes in markets. An example is a wholesale market for beef which would allow farmers to gauge market trends better and retailers to buy what they like when they like.

- Specialization lowers the cost of entry: firms can invest in areas in which they have competence instead of having to master several competences and the cost of investment should fall.

There is little evidence of specialization emerging in the beef value chain. Recent entrants have chosen not to go into farming but they are either integrated feedlot-to-retail or abattoir-to-butchery firms. Nevertheless, these firms do appear to be more nimble than the fully integrated farm-to-retail operators and so could be more efficient.

Some of the new entrants are pursuing business strategies that focus on providing lower cost beef to consumers. These family-owned businesses have the advantage of using unpaid family labor and so could exert additional pressure to increase efficiency which should be to the benefit of the industry. Others appear to be addressing the need for more reliable quality at the upper end of the market. Such diverse strategies are welcome if a more competitive industry is to emerge.

There is still scope for new entrants in several stages of the value chain. There is scope for increased investment in feedlots and possibly even abattoirs and retail outlets as the market grows.

There used to be one dominant player with a very high share of the market. Dominant market power is usually a barrier to entry as it scares away competition. It can be used to earn monopoly rents at the expense of suppliers or consumers or both. These dangers are diminishing in Zambia due to the new entrants. There are now 10–15 sizeable businesses and the market share of the dominant player has dropped to 40–45 percent, still a dominant position, but likely to fall further when recent new entrants start to reach their operational capacity.

However, there is little evidence that greater competition has resulted in new, innovative business models that can help to build more productive and reliable supply chains starting from the farmer. There have been only relatively minor efforts to build a better relationship with suppliers. These need to be built on and expanded.

5.3.3. High Cost Base Undermines Competitiveness

Because of the poor quality of animals and the growing demand from the middle class, the demand for fattening has increased although choice meat still represents only 25–30 percent of the market by volume. The typical costs and returns to operating feed lots are shown in table 22.

Table 22: The Efficiency and Competitiveness of Feedlots: Profitability

Revenue	US$
400 kg Dead Weight @ ZMK 9,000/kg (US$ 2.05)	**820**
Costs (variable)	
Purchase of Animal 250kg @ ZMK 7,000/kg	400
Feed	200
Drugs & Vet Service	13
Labor	20
Transport on Farm	15
Insurance	8
Electricity	4
Council levy 0.3%	3
Variable Costs	**663**
Gross Margin	**157 (20%)**

Source: World Bank estimates based on data provided by industry sources.

Apart from the purchase of the animal, the main cost is feed. The source of feed varies with the type of operation. Most feed lots mix their own feed because commercial feed is expensive. If the feed lot is attached to a farm or to a poultry operation, some of the ingredients will be sourced in-house. But most need to buy some ingredients, especially the pre-mixes that provide supplementary nutrients.

Feed conversion ratios in Zambia are around 5.3 to 1 and so are competitive for the region. The feed produced is able to do what it is required to and the industry is not inefficient in this regard. Although returns to feed lots are reasonable in Zambia, the higher cost is still a disadvantage compared to other countries.

This cost disadvantage in feed, combined with the higher cost of drugs, veterinary services, fuel prices and insurance compared to South Africa, result in a cost of $1.75 for each kilogram of weight added to an animal. This is a significant contributor to the high premium attached to choice meat in Zambia of $0.91 per kilogram (29 percent) paid for dressed choice against standard meat. In South Africa the difference between equivalent of standard and choice is smaller.

Processing margins at abattoirs are also higher in Zambia. Most Zambian abattoirs are small in scale by international standards. The largest can compete with international rivals processing an animal at a cost of $5. But the smaller ones are less efficient with costs rising to $25 per animal. Abattoirs make their money from trading in animals rather than from slaughter fees as is the norm internationally. Table 23 shows the typical returns to buying live and selling dressed animals for abattoirs.

Table 23: The Efficiency and Competitiveness of Abattoirs: Profitability

Choice grade	
Revenue	US$
Dressed weight (216 kg @ ZMK18,000/kg)	883
Plus off-take (skin, offal)	68
	951
Costs	
Live animal 400 kg @ ZMK 9,000	818
Abattoir costs (US$ 5–US$ 25/animal)	15
Transport	10
	843
Gross margin	**108** (11%)

Source: World Bank estimates based on data provided by industry sources

Transport is a small but significant cost at all stages of the value chain:

- Prices paid to farmers depend on where they are located. The cost of transporting a 250 kilogram animal 200 kilometers from Southern Province to Lusaka could amount to $5, which will be reflected in the price paid.
- The cost of transporting a feedlot-ready animal over the same distance would be $8.
- It is of course cheaper to transport a dressed animal ($3 per animal unrefrigerated) from an abattoir instead of live which, together with bans on animal movements, explains why investment has taken place in abattoirs in the main cattle rearing provinces. However, if the meat has to be transported in a refrigerated truck over the same distance, dressed transport cost would match that for the live animal.

The retailing of meat also provides good returns. Typically, the mark up from abattoir to the customer is about 100 percent. From this, the cost of butchery needs to be deducted. Nevertheless, the substantial increase in the number of butcheries recently attests to good returns.

For the industry, perhaps the biggest risk is in the form of supply disruptions and price volatility caused by the outbreak of disease. There is evidence also that the returns to the industry are prone to considerable risk from exchange rate volatility. Those integrated firms that had bought inputs and then had to pay for them in depreciated kwacha in 2009 suffered considerable losses. These risks result in the industry demanding a higher return to investment by factoring exchange rate risk into profit margins.

When all these factors are taken into account, an industry that buys inputs at a competitive live weight cost supplies the consumer at a cost that is considerably higher than that of its neighbors. Input costs need to be lower, especially for feed, transport costs need to be lower and more specialization is required to develop bigger, more efficient abattoirs. The business environment, in terms of permits and licenses and exchange rate volatility could also be improved.

The beef processing and retailing part of the industry is inefficient and uncompetitive, buying cattle from farmers at an internationally competitive price but supplying consumers at prices that are considerably higher. The industry suffers high input costs and has an immature structure that prevents efficiencies of scale and specialization from driving down costs.

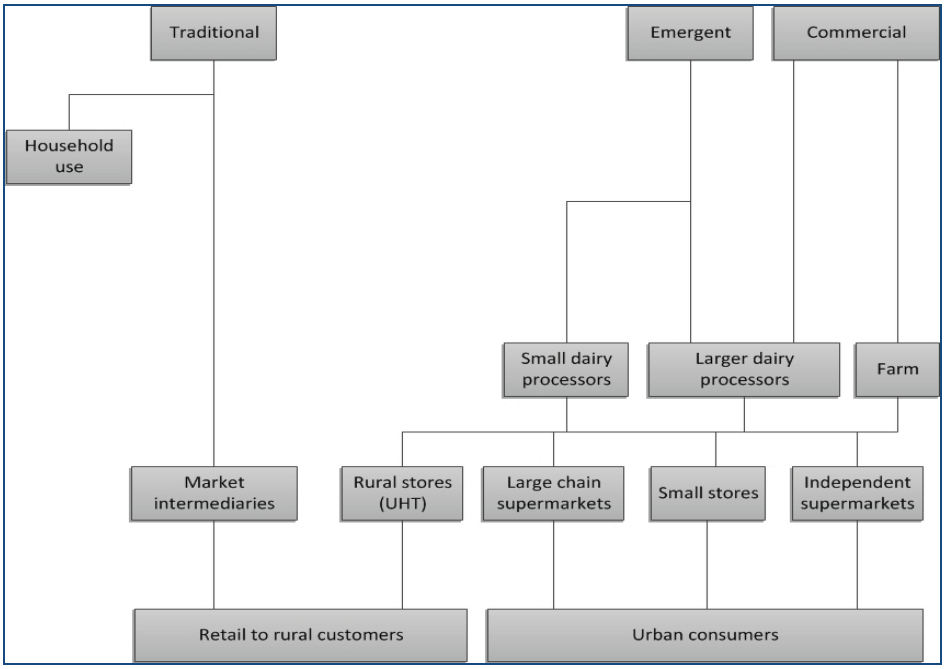
5.4. The Dairy Value Chain

This section examines the structure and competitiveness of the dairy value chain.

5.4.1. The Structure of the Dairy Value Chain

Figure 18 presents an overview of the dairy value chain in Zambia. Like the beef value chain, there is a divide between the traditional and commercial segments, but in dairy, it is the commercial segment that dominates, accounting for 75 percent of raw milk sold.

Figure 18: The Dairy Value Chain in Zambia



The commercial system is dominated by 4–5 comparatively large dairy processors, two of which run producer dairies. The dominant player, accounting for roughly half the commercial market is an independent processor, 14 percent of whose raw milk is sourced from emergent farmers. The willingness of the major dairy to collect milk from chilling centers established by NGOs or cooperatives sponsored by government has played a major role in helping to develop emergent farmers.

Table 24: Zambia's Dairy Processors

Producer	Brand name	Status of firm	Market share
Parmalat	Parmalat	71.5% foreign	50%
Zambeef	Zammilk	Publicly owned	20%
Galaun Holdings	Diamondale	Privately owned	12%
Finta	Finta	Locally owned with Danish interests	10%
Others			8%
Total			**100%**

Source: Zambia Competition Commission 2008.

In total there are about 20 processors, most of whom are small producer dairies or independents specializing in products that do not require much investment, such as ice cream. The two biggest processors (Parmalat and Finta) have very low capacity utilization rates in their plants (45 percent and 20 percent respectively). There is surplus capacity in the industry

left over from investments in the publicly owned past, so there is not much room for new, large-scale investors.

Despite the growth of raw milk output, it is notable that there is still a shortage in some areas. One of the largest dairies located in Livingstone has not been able to source sufficient raw milk to meet its needs and continues to rely on imported full cream powder. The area is not well suited to dairy farming with high temperatures, limited rainfall and a high incidence of disease. A similar situation holds in Eastern Province. While the Lusaka-based dairies are constrained by the size of the market, dairies in other provinces are constrained by the shortage of raw milk.

These provinces provide a significant opportunity for increasing raw milk production by emergent farmers. To date, only the large Lusaka-based processor has invested in developing supply linkages with small farmers. That experience shows that better supply chain linkages have much to offer the industry by tapping into the most competitive type of farmer (emergent). More innovative business models of this type are required as the other large processors either prefer to buy only from large commercial farmers or have captive dairy farms.

There is very little competitive pressure to increase efficiency and innovate. The larger plants are spread out across the country and do not compete head to head. The only competition comes from the smaller dairy plants, but they hold too small a market share to make a telling difference in the market.

The majority of dairy products are sold through the use of the cold chain to urban consumers. However, the absence of an extensive cold chain in rural areas and among poorer urban households has meant that there is a sizeable market for long-life UHT milk. The Zambian market for milk is roughly evenly split between fresh and UHT milk. Milk, fresh and long life, accounts for about 80 percent of the market for dairy products. The only other product of any significance is yogurt which has enjoyed strong sales growth in the past few years. Cheeses are produced, frequently by producer dairies, but quantities are small. As discussed above, the cost of raw milk in Zambia is high and this makes it uncompetitive to produce raw-milk-intensive cheese, butter or milk powder.[3]

A critical distinction between the beef and dairy value chains is that dairy processors have not invested in retail outlets to a large degree, though most have one or two retail outlets and one of the majors sells products through its butcheries. Retailing of dairy products is easily accommodated in either large or small store formats so there has been much less need to develop retail outlets. The emergence of large, modern retailing formats will place a premium on the supply of large quantities.

5.4.2. Inefficient, Large, Dairy Processing

The profitability of a Zambian dairy processing facility is shown by the figures for a small processor in table 25 below. The figures show an attractive gross profit margin of 48 percent. The small processor is able to get over the scale advantages of the large by selling directly to consumers using its own sales force. In this way, it no longer has to meet the main purchasing criteria of the large supermarkets: a large quantity of processed milk of assured quality at an attractive price. The small processor is able to compete because its direct sales force enables it to capture most of the margin earned by retailers without incurring the high fixed costs of retailing from stores. It can therefore remain competitive by undercutting supermarket prices.

Table 25: The Efficiency and Competitiveness of a Small Dairy Processor: Profitability

Revenue (US$)	
Fresh pasteurized milk (1,200 liters @ ZMK 3,800/liter)	1,030
Yogurt (900 liters @ ZMK 8,880/liter)	1,800
Flavored milk	545
	3,375
Costs (US$)	
Raw materials	
Raw milk (2,500 liters @ ZMK 2,400/liter)	1,365
FCP (12 kg @ ZMK 24,000/kg)	65
Packaging	120
Operating costs	
- Labor	50
- Fuel and electricity	42
- Transport	76
- Maintenance	15
- Rent	33
	1,766
Gross margin (US$)	**1,609 (48%)**

Source: World Bank estimates based on data provided by industry sources.

The costs of small dairy processors are competitive with those faced by small dairies in Kenya. Smaller-scale dairy processors are emerging in the centers of milk production in Southern and Central province. Some are dairy cooperatives supported by government while others are being developed by commercial farms. Developing more of this type of processor would provide more outlets for farmers and exert more competitive pressure on the large processors.

However, like all small businesses, there is a risk of failure attached to small processors. Unless they develop innovative business models, like the example above, they will struggle to compete against the large processors. This will be especially so if the large retail formats become more dominant.

Larger processors are disadvantaged in relation to their South African counterparts. The main cost disadvantages are shown in table 26. The main cost disadvantage is fixed costs which are over half as much more than in South Africa. This is a result of low capacity utilization in Zambia, a legacy of the large plants established under public ownership. The other causes of loss of competitiveness are the cost of packaging, which has to be imported from South Africa, and energy, probably a result of the need for high-cost standby generation.

Lastly, labor costs are higher despite the wage rate being lower. This is further evidence of the finding of the World Bank's Enterprise Survey that lower labor costs in Zambia were more than offset by lower labor productivity. The industry complains of a lack of skilled technicians to maintain and repair machinery.

Table 26: The Cost of Dairy Processing in Zambia and South Africa

Zambia – South Africa differences in cost of dairy processing	Percentage
Raw material	4.9%
Packaging	36.0%
Direct labor	18.6%
Energy	36.8%
Factory depreciation	-21.1%
Production fixed cost	56.6%
General expenses	-55.4%
TOTAL	14.0%

Note: a positive figure indicates that the cost is higher in Zambia than in South Africa.
Source: data provided by industry sources.

The Zambian dairy processing industry is not efficient, thereby compounding the lack of competitiveness in producing raw milk. Some dairies are faced with market constraints, others by a lack of raw milk. All suffer low capacity utilization and there is little competition.

5.5. Conclusion

Zambia's considerable natural advantages in rearing cattle—principally large tracts of land suitable for grazing—are not being turned into competitive advantage. The operating environment undermines the potential of the beef and dairy industries. The high prevalence of disease, periodic droughts and poor supply of public services undermine the growth of the cattle population. The cost base is high.

Attitudes towards cattle, as well as the low availability and high cost of private services, undermine productivity, especially among traditional farmers. High intensity zero-grazing reduces the potential advantage as Zambia is not competitive in producing feed.

Zambia's emergent farmers can compete regionally and even internationally on price of live cattle and raw milk. This suggests that if the natural advantages are utilized—and public and private services improve—the country can become a significant supplier regionally.

Until now, service providers have not invested much in developing close ties with cattle farmers. But this is about to change. Because of increased competition in the poultry market, a few of the more progressive companies are increasing efforts to grow the market by arranging demonstrations and trials. One is considering providing veterinary services and selling veterinary products alongside feed, thus offering a package of services to the farmer.

The beef and dairy industries are evolving from the structure developed under public ownership. Neither has developed a competitive structure, though competition is increasing in the beef industry. The high cost of inputs affects both beef and dairy industries. In beef, the small scale of plants and the lack of specialization of firms erode efficiency. In dairy, low capacity utilization is a major cost disadvantage.

There is a shortage of know-how among farmers and the smaller processors which has been partly met by NGOs and donor projects. In the processing of beef and especially dairy, the private sector complains of a lack of technical skills to maintain and repair machinery.

Improving the operating environment, helping the more competitive emergent farmer to expand and supporting the development of competitive businesses by improving access to finance could make a difference. Supporting innovative business models would also help.

Nevertheless, the beef and dairy industries are growing and attracting investment. There is no binding constraint to realizing their potential. Kenya in milk and Botswana in beef show that it is possible to develop competitive industries in the region. Both faced similar problems to Zambia in the past. There is no doubt the emergent and commercial herd is growing rapidly. As production increases new markets will need to be found.

The growth of demand in the domestic market for beef and dairy products would be aided by the development of more efficient processing industries. This requires better business models to emerge that help to develop more stable relationships between farmers and processors, a reduction in input costs and a change in the structure of the processing industry to ensure greater competition and take advantage of the economies of scale and specialization. There is evidence that new investment is likely to give rise to more processing industries in future.

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[1] Only 15 percent of the beef herd in Zambia is reared in the commercial system. Most of the commercial animals go through the feedlots. 20 percent of cattle reared in the traditional system find their way to the feedlots as well.

[2] It is not clear why there is a difference between the data given in FAO 2009 and in FAOSTAT.

[3] Many types of hard cheeses require 10 liters of milk to produce 1 kilogram of cheese.

6. WHAT COULD THE INDUSTRIES DELIVER?

This chapter examines the prospects for Zambia's beef and dairy industries under two scenarios: (A) business as usual, and (B) realizing their potential. The latter sets out what can be gained by a much stronger government and private sector partnership to develop the industries.

6.1. Scenario A: Business as Usual

Carrying on business as usual is likely to have the following outcomes:

1. The cattle population will continue to grow at about 2–3 percent a year. Periodic outbreaks of disease and drought will check faster growth and the risk of another fall in population cannot be discounted.

2. The cattle population will remain concentrated in just three provinces. The beef and dairy industries will spread to other provinces but only slowly and be confined to a few enterprising farmers and businesses.

3. The density of cattle will remain among the lowest in the region and the total number of cattle well below the carrying capacity.

4. The continued dynamism of emergent farmers and investment in commercial farms (especially dairy) should lead to modest increases in productivity. The high cost base will remain and will disadvantage commercial farmers in particular.

5. Investment in the beef industry will continue but it will take time for a more efficient and competitive industry to emerge.

6. The dairy industry will continue to grow and capacity utilization will increase gradually, leading to some gains in efficiency.

Overall, the growth of demand will be slightly faster than GDP growth because the propensity to consume beef and dairy products will increase with incomes and with the changing lifestyles and consumption patterns noted in Chapters 2 and 4. However, high prices will restrict the growth of demand to no more than 1–2 percentage points above GDP.

The industries will remain uncompetitive, catering mainly for domestic demand. A combination of high prices and a lack of disease-free certification will limit beef exports to opportunistic supplies to DRC and Angola. Dairy exports will be limited by high prices and non-tariff barriers. The industries will therefore only grow slightly faster than GDP and their contribution to GDP will only increase slightly above the current 1 percent share.

The continued increase in emergent farmers and faster growth of demand should help to increase farming incomes and employment opportunities, but the impact will be modest. Formal job creation will not increase dramatically.

This is not an unfavorable outcome but one which represents considerable underperformance given the potential that exists.

6.2. Scenario B: Realizing the Potential

With a stronger partnership between the public and private sectors and measures taken by the industries themselves to improve productivity and competitiveness, the industries will start to achieve their potential. Over a 10-year period, the following outcomes should be achievable:

1. The cattle population grows at 5 percent a year. Disease prevention and control improves so that periodic disease outbreaks do not cause a sharp fall in population. An improved stock of fodder crops enhances input productivity.

2. The cattle population is no longer concentrated in just three provinces. The beef and dairy industries spread to other provinces with good conditions for cattle rearing and reasonable access to markets.

3. The density of cattle increases but the population of cattle—at under 5 million—remains below the country's carrying capacity.

4. Led by emergent farmers, productivity increases and lower cost of inputs helps to make commercial farmers more competitive. The price of raw milk falls.

5. The beef industry attracts more investment in feed lots and abattoirs and more specialist firms develop. Greater competition and specialization help to reduce the cost of processing and retailing, which brings down prices for the consumer. Combined with per capita incomes increasing at about 2–3 percent a year, lower beef prices lead to faster growth of demand.

6. The establishment of quarantine facilities and/or disease-free zones enables exports of beef to the region to increase dramatically. The country also exports to Europe but on a limited scale as regional markets are more attractive.

7. The dairy industry is able to increase capacity utilization and improve its supply chain for raw milk enabling prices of milk and dairy products to fall. New investment increases the level of competition, driving up competition.

8. Exports of milk and dairy products to neighboring countries increase as Zambia and its neighbors reduce non-tariff barriers.

The overall impact of these results would be much faster growth of the beef and dairy industries than in the business-as-usual scenario. With Zambia's GDP likely to grow at around 6 percent a year, per capita incomes should rise at about 3 percent a year. Income elasticity of beef and dairy products at Zambia's level of income is high and beef and dairy prices are expected to fall in real terms, thereby making these products more affordable to urban dwellers. Changes in eating habits will also favor consumption growth.

Taken together with these factors, domestic demand for beef and dairy products should increase at about 8–10 percent a year or 3–4 percentage points above GDP. This would certainly seem to be achievable given that in the period up to 2008 demand for beef grew by 5–7 percent a year and for dairy products by 8–10 percent. In addition, growth in exports to the other countries in the region should help to boost output growth. Together, the industries could grow at a rate of about 4–5 percentage points faster than GDP.

Over a 10-year period, at a 10 percent average annual growth rate, Zambia's beef and dairy industries could more than double their output to $600 million a year. Longer-term, if they

were able to match Kenya's level of output, the industries would generate output of almost $1.6 billion a year.[1]

Crucially, the potential gains from such an outcome will accrue to the rural economy. Led by emergent farmers, there will be new opportunities to earn better incomes. Some of the traditional farmers that adopt the practices of emergent farmers will escape poverty. Others will find better opportunities for employment on farms or by providing labor to those engaged in trading in beef and dairy products.

[1] Currently revenue is about $230 million.

7. WHAT WOULD IT TAKE TO ACHIEVE THE POTENTIAL?

This chapter sets out the results that, if achieved, could contribute to more competitive beef and dairy industries that fulfill their potential. The results listed below emerged from consultations with a number of farmers, processors, government officials and other industry representatives.[1] This chapter starts by addressing desired results related to the operating environment and then looks at results for farmers and the wider beef and dairy industries.

7.1. The Operating Environment Improves

7.1.1. Diseases are Controlled and Animal Health Improved

Improving animal health requires more government investment in disease prevention and control. The precise form that policies and institutions would take should emerge after discussion and dialogue between the Ministry of Livestock, the ZNFU, other farmers and firms in the beef and dairy industries and private sector suppliers of drugs, medicines and vaccines. The following results would help achieve better disease control:

1. A partnership is developed between the public sector, farmers and the private sector that sets out clear roles for each in preventing and controlling diseases. The partnership recognizes the differing levels of resources and motives of the three participants and sets appropriate roles for them. Deliverables expected of each are specified so that stakeholders can hold them to account.

2. The main areas for disease transmission are targeted by a combined effort from government, farmers and the others in the industry.

3. Migration routes have feed and watering points and facilities for inspection, inoculation and spray races.

4. Adequate quarantine infrastructure in each province is established, starting with the main cattle rearing provinces.

5. A tagging system is introduced for all animals to allow trace back of diseased animals. Disease reporting and follow up action is improved by better cooperation between farmers, the Ministry of Livestock and the Ministry of Health.

6. Laws and regulations concerning animal health and animal health are enforced.

7. The extension services and ZNFU work together and use the media to educate farmers and police relating to the enforcement of livestock movements and disease control measures. Both the private and public sectors could provide extension services.

8. The supply of veterinary services and drugs, especially targeting traditional and emergent farmers, increases though improved coordination between the public and private sectors.

9. Innovative business models developed by the private sector enable emergent farmers to afford more private services. Examples of such business models include the herd health plan or simple aggregation of farmers that have emerged already from the work of PROFIT. In the future it could be possible for farmers to be given privately provided veterinary care as part of out-grower scheme arrangements initiated by beef or dairy processors, on a stand-alone basis or in partnership with the banks.

10. The tax burden on importing drugs is lowered.

11. The number of qualified veterinarians increases to 20–25 per province over the next 5 years to 30–40 per province within 10 years through a combination of government and private services.

12. The number of trained and certified para-vets increases to 800 over the next 5 years and to 1,500 within the next 10 years. Para-vets are deployed at district and camp levels and encouraged to earn fees.

13. Diseases of National Economic Importance (DNEIs) are given priority and the following targets, in terms of disease incidence and mortality, achieved over 5 and 10 years:

Table 27: Targets for DNEIs

	Short Term (5 years)	Long Term (10 years)
CBPP	2%	0%
FMD	2%	0%
ECF (mortality)	5%	2.5%
Anthrax (mortality)	5%	0%
Brucellosis	5%	0%
Tryps	2%	2%

Note: unless otherwise stated the target refers to the incidence of the disease
Source: Discussions at workshop held in Lusaka on 23 March 2010

7.1.2. Improved Breeding Practices Increase Animal Reproduction

The following results, if achieved, would help to increase the rate of growth of the cattle population:

1. The extension service educates farmers on the use of weaning practices to reduce calving intervals, especially in the traditional sector.

2. The extension service educates farmers in isolating good breeding stock.

3. The government invests more in breeding research, working with farmers and research institutions to study high productivity breeds.

4. Calf mortality falls as a result of lower disease, better veterinary services and farmer training in feed and care.

5. The public and private sectors combine to increase the supply of artificial insemination services.

6. A breeding program that uses good local cows to produce progeny able to withstand disease and thrive in local conditions helps to produce more productive animals and provides greater incentive for farmers to rear cross-breeds.

The overall result should be that animal reproduction is improved as follows:

Table 28: Targets for Animal Reproduction

	Short Term (5 years)	**Long Term (10 years)**
Adult mortality	2%	1%
Calf mortality	10%	2%
Calving rate	60%	70%

7.1.3. Quality of Feed Improves and Cost of Feed is Lower

The following results, if achieved, would improve milk yields and the weight and condition of beef animals:

1. Government and private feed mills increase investment in research and development activities, so as to provide cheaper mix-feed solutions that are effective in increasing productivity for different types of breeds.

2. The extension service and feed mills combine to educate farmers on the benefits of feeding animals using low cost solutions appropriate for their breeds.

3. The extension service, working with local ZNFU chapters and local community leaders, helps to organize better range management practices and the establishment of community hay banks. One option could be cattle training centers, where farmers are brought to a central ranch where all the different operations and their benefits are demonstrated. This was a system used in Zimbabwe which was supported and managed by the private sector. It targeted both smallholder and commercial farmers.

4. An open forum for discussing how to solve the problems of animal health and nutrition faced by traditional and emergent farmers is established using media and information and communication technology platforms.

5. Input suppliers (feed mills and suppliers of veterinary products and services) increase rural distribution and develop new business models that make inputs more affordable to farmers.

6. Testing laboratories are established under public-private partnership arrangements in the rural areas to enable farmers to understand and correct shortcomings in their animals' diets.

7. The suppliers of the ingredients for pre-mixes are engaged in improving nutrition in Zambia.

These above would combine to achieve the following over a 5-year period:

Table 29: Targets for Live Weight and Milk Yield

	Live weight	Milk yield
Traditional	275kg	2–4 liters
Mixed breed		10–15 liters
Pure breed	325kg	25–30 liters

7.1.4. The Business Environment Improves

The business environment for the beef and dairy industries is improved as a result of:

1. The government zero-rates for VAT purposes all dairy and beef products.
2. All levies on cattle charged by councils (in excess of the cost of the inspection service) are ploughed back to establish infrastructure such as livestock markets, loading points, better access roads, and so forth. Alternatively, the levies are abolished and farmers pay the actual cost of the services provided by the councils.
3. The issuing of permits and licenses is streamlined and farmers bringing cattle to market centers may obtain them either on farm from a government vet or at the center.
4. In consultation with local communities, security of tenure is increased which provides emergent farmers with the incentive to invest in range management.
5. Better fiscal incentives for investments in the rural areas are established providing more incentive for commercial farmers and dairy and beef processors to invest.
6. A competitive and stable exchange rate is maintained reducing risk.
7. Dialogue between the industries and government results in agreed standards that have legal backing and are enforced.
8. Public agencies involved in the beef and dairy industries, including the Ministry of Health, are better coordinated and made more effective.
9. Zambia's consumer protection and competition regimes are strengthened to ensure standards are enforced and the concentration of market power in the beef and dairy industries does not lead to abuses.
10. Boards, associations and unions involved in the beef and dairy industries are more answerable to their members' needs.

7.1.5. Fuel and Transport Costs Fall

The following, if achieved, would help reduce the cost of fuel and transport:

1. Lower taxes on fuel.
2. Cheaper spare parts as a result of a lower tax burden.
3. A better trained workforce helps the road transport industry to reduce the cost of repair and maintenance.

4. Better access to low cost finance enables haulers to reduce the age of their fleet and hence repair and maintenance costs and fuel consumption.

7.1.6. Access to Affordable Finance Increases

The following, if achieved, would increase access to finance on better terms for farmers and the beef and dairy industries:

1. Reduced government borrowing provides the incentive for the commercial banks to increase lending to the private sector.

2. Competition amongst the banks to increase lending to the private sector reduces the cost of borrowing (spreads).

3. The financial sector develops innovative products and business models for lending to emergent farmers that reduce the rate of non-performing loans. This may include sale and lease back arrangements to enable farmers to rear cattle for processors, short-term loans to pay for veterinary care and feed with professional assistance, cattle depository warehouses where cattle are kept and fed until the owner repays the loan or asks for them to be sold, and so forth.

4. Better training of commercial bank staff enables them to better understand the industries and to supervise loans to farmers and processors more effectively.

5. The quality of business plans submitted by emergent and commercial farmers and small processors improves. Private business development service providers are incentivized to develop specialist services that reduce the cost of developing good business plans.

6. Equipment leasing services target the needs of emergent and commercial farmers and processors.

7. Asset registries enable banks to use equipment as collateral.

8. The banks enter into arrangements with insurance and pension companies to on-lend longer-term finance.

9. A revolving fund is created and managed, within or outside the banking system, specifically to support the beef and dairy industries. Alternatively, a credit guarantee scheme incentivizes the banks to lend to these industries.

7.1.7. Power Supply is More Reliable and Available in Rural Areas

1. Power generation increases through public-private partnership arrangements, ensuring power outages do not occur and enabling farmers and businesses to stop investing in standby generation.

2. Targeted grid extension into rural areas where economic activity is concentrated makes power available to the main centers of cattle rearing and processing.

3. Support for renewable solutions enables rural areas not served by the grid to use solar and wind power which is cheaper and more environmentally friendly than standby generation.

7.1.8. The Rural Road Network is Expanded and Maintained Well

A better rural road network would be achieved if the government increases investment in rural roads targeting the main centers of economic activity, including the main centers of cattle rearing.

7.2. Farmers Increase Productivity and Improve Competitiveness

With their varying motives, opportunities and constraints, the required results will vary for each type of farmer.

7.2.1. Traditional Farmers Become More Commercial, Increasing Off Take

The critical result required is for traditional farmers to adopt a more commercial attitude towards cattle rearing. The following would help make this possible:

1. Greater security from the threat of disease epidemics enables traditional farmers to sustain the growth of their herds.
2. Better fodder management and the establishment of watering points reduce the threat of drought.
3. Extension services, provided by the public and private sectors, enable farmers to adopt good practices for animal health and reproduction and nutrition, increasing the size of the herd and the weight of beef animals.
4. Assured of lower risk from drought and disease outbreaks, and with better fed, healthier animals able to fetch higher prices, traditional farmers increase off-take rates.
5. Greater contact with buyers and emergent farmers at market centers helps to increase the incentive to commercialize farming practices.
6. More transparent pricing at market centers and greater availability of information provides a more assured return to farmers.
7. Payment plans for school fees enable traditional farmers to pay in advance, reducing the incentive for all to sell at the same time, thereby improving farmer incomes and developing a more year round supply of beef.
8. More progressive traditional farmers, starting to adopt practices from emergent farmers and overcoming low off-take rates, are helped to transition to emergent farming through greater access to affordable finance.

7.2.2. Increased Activity by Emergent Farmers

The key result for emergent farmers is that the proportion of the national cattle population farmed under this system increases, thereby increasing the industries' overall productivity and competitiveness. The following would help to achieve this:

1. Better access to affordable long-term finance enables emergent farmers to invest in increasing the size of their cross breed herds, invest in fodder crops and purchase or lease equipment to develop a more productive farming system.

2. Better access to affordable short-term finance enables farmers to invest in purchasing inputs (drugs, veterinary care, feed supplements and so on) that improve animal health and nutrition.

3. Input suppliers (vets, suppliers of drugs and medicines, feed suppliers and the like) increase the supply of inputs and develop payment terms that make them affordable to emergent farmers.

4. Input suppliers provide business development advice, training and support (embedded services) to emergent farmers to help them improve productivity and expand their businesses.

5. The beef and dairy industries develop more stable supply relationships with emergent farmers that include providing business services and support through embedded services.

6. New supply chain models introduced by the beef industry enable emergent farmers to supply animals in the dry season by providing feed on a pay-back arrangement.

7. Secure tenure over land provides emergent farmers with the incentive to invest in better range management.

7.2.3. Commercial Farmers Become More Competitive

The key result required for commercial farmers to fulfill their potential is that they become more competitive and increase their returns on investment. The following would help to achieve this:

1. The cost of feed falls through better research, leading to more cost effective solutions.

2. Feed suppliers work closely with commercial farmers, providing them with lower cost feed solutions and embedded services.

3. Private sector supply of veterinary products and services increases, causing their cost to fall.

4. The cost of fuel and transport falls and power outages stop.

5. Greater access to cheaper long-term finance enables an increase in scale of farming which helps to reduce the overhead burden.

6. The system of permits and licenses is streamlined.

7. A stable, competitive exchange rate reduces risk.

7.3. The Beef Industry Becomes More Competitive

At present, the beef industry takes live cattle at prices that are competitive but delivers beef to the consumer at prices above regional levels. Reducing the price of beef is essential if domestic consumption and exports to neighboring countries are to increase more rapidly. The following would help to achieve this:

1. Investment in developing closer relationships with commercial and emergent farmers enables the industry to receive animals in better condition much of the year round.

2. Improved access to affordable short-term finance helps smaller processors to expand their businesses, thereby increasing the pressure of competition on large processors.

3. Improved access to long-term finance at an affordable cost enables investment in feedlots and to modernize abattoirs, bringing them up to regional levels of efficiency.

4. The cost of fuel and transport (including refrigerated transport) falls, reducing a major competitive disadvantage and enabling a more economic location of fattening and slaughtering facilities.

5. Power outages cease, reducing the need to use costly standby generation.

6. DFZs or quarantine facilities enable exports to be certified disease-free.

7. Expansion of the industry attracts a greater number of suppliers of equipment and consumables (e.g. spices, casings), thus reducing cost.

8. Greater specialization develops, leading to the emergence of a wholesale market for beef.

7.4. The Dairy Industry Overcomes Raw Material and Market Constraints

For the dairy industry to become more competitive, much will depend on the ability of emergent and commercial farmers to supply raw milk at a regionally competitive cost and for dairy plants to increase capacity utilization. The following would help to achieve this:

1. Dairy plants build closer supply relationships with emergent farmers and provide embedded services to secure increased supply, especially away from Lusaka.

2. Greater access to long-term finance at an affordable cost enables the establishment of small scale dairies that are able to compete against large ones by developing innovative business models.

3. Increased supply of suitably skilled labor, especially technicians, helps to make labor more productive and reduces repair and maintenance costs.

4. The cost of fuel and transport falls and uninterrupted power is available enabling a more efficient location of dairy farming and processing to emerge.

5. Dairy cooperatives develop viable business practices through better training in business management practices and access to business development services.

6. Government and industry build a partnership to promote the consumption of milk and dairy products by measures such as school feeding programs and advertising.

7. The price of milk and dairy products to the consumer falls by 25 percent, helping to stimulate faster growth in demand.

8. Non-tariff barriers to dairy trade are reduced throughout SADC and COMESA.

7.5. Why is it Worth Doing?

7.5.1. A Few Priorities to Get Things Going

Getting the industries to start on the path to realizing their potential may appear a tall order, requiring substantial investment by government and major investment and changes in behavior on the part of the private sector. However, in practice, not everything needs to happen at once.

Focusing on a few priority results would get things started. The rest would follow through periodic reviews of progress, undertaken jointly by the government, the ZNFU, input suppliers and the wider beef and dairy industries. The reviews would help to determine what should come next.

Discussions with industry representatives have identified the following priorities, which could represent a starting point for efforts to improve the competitiveness of Zambia's beef and dairy industries:

- **More effective disease prevention**: better prevention systems and lower cost of drugs and veterinary care;
- **Integration of traditional farmers into the commercial value chain:** improved market awareness and access as well as more regular/better-timed cattle sales for traditional farmers; and
- **A better enabling environment:** in particular, better enforcement of laws, better rural infrastructure and measures to curtail theft and illegal cattle trading.

7.5.2. Building on Solid Foundations

Investing time, resources and political capital in the beef and dairy industries is likely to deliver good returns for the following reasons:

- Zambia has a proven natural advantage in cattle. With four times more grazing than arable land, this is where the country's greatest potential for agriculture may lie.
- The industries are growing and investing even under current conditions. Demand is increasing and this is providing incentives for the private sector. Improving the operating environment and productivity of farmers and the efficiency of the beef and dairy industries should deliver worthwhile results.

7.5.3. The Prize is Worth It

What the industries could achieve over the next 10 years would make the effort worthwhile:

- A doubling of the value of the national cattle herd to $2 billion;
- An industry growing at 4–5 percent above GDP a year (the beef and dairy industries' rapid growth should help to boost the livestock sector and agriculture);
- Diversification of the export base and a new source of competitiveness for the rest of the economy;

- A major contribution to reducing rural poverty;
- About 15,000 additional formal jobs.

[1] Including a workshop held in Lusaka on 23 March 2010.

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FAOSTAT (FAO Statistical database): http://faostat.fao.org

OIE (World Organization for Animal Health): http://www.oie.int

USDA (United States Department of Agriculture): http://www.usda.gov/wps/portal/usda/usdahome?navid=AGENCY_REPORTS

ZNFU (Zambia National Farmers Union): www.znfu.org.zm

ANNEX A – TECHNICAL PAPERS PREPARED UNDER THE JPC PROGRAM

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ANNEX B – IMPROVING ZAMBIA'S ANIMAL HEALTH SITUATION

Trade in meat and animals is highly regulated, with strict international standards set by the OIE. These standards exist primarily to prevent the spread of animal diseases. Effectively managing the health of the national herd is the starting point for the development of an export industry. Unfortunately, Zambia is the most animal-disease-stricken country in the SADC region. In 2008 and 2009 the country registered incidents of all economic diseases, especially Foot and Mouth Disease (FMD) and East Coast Fever (ECF). While the situation may be worse for some diseases in some SADC countries (notably Angola and DRC), most of these diseases have been eliminated or brought under effective control in competing neighbors especially South Africa, Botswana, Namibia and Zimbabwe.

Table 30: Summary of Disease Status in Zambia

FMD	Sporadic. Outbreaks originate from buffalo. Outbreaks in the north, probably from Tanzania.
CBPP	CBPP spread from Angola. Incursion into Western Province, south-west, and parts of Southern Province. Mortality rate is greater in larger herds and among females.
Lumpy skin disease (LSD)	First seen in Zambia in 1929, spreading into Botswana by 1943 then South Africa; spread via contact with wildlife (e.g. Thompson gazelle and impala). Reported in 2008 and 2009.
East Coast Fever (ECF)	A major tick-borne disease. Main cause of restricted animal movements in Zambia. High incidence in Southern and Eastern provinces where most cattle are found. Reported in 2008 and 2009.
Liver flukes	Important problem in low-lying areas through the country, especially Western Province. Fasciola hepatica and F. gigantica occur.
BTB	Common condition leading to cattle carcass condemnation. A major public health concern Reported in 2008 and 2009.
Brucellosis	Underreported in spite of high occurrence, especially among the small-scale dairy farmers. Reported in 2008 and 2009.
Tryps	Mainly Eastern Province but also parts of Southern and Western provinces. Excludes farmers from trade.
Rinderpest	Last recorded 1896.

Table 31: Disease Status in Zambia in 2008 and 2009[1]

Disease	Number of cases 2008	Number of cases 2009
ECF	8,054	8,364
BTB	48	11
Brucellosis	85	52
CBPP	3	12
FMD	1,925	2,085
Tryps	239	220

The dismal situation of animal health is caused by the breakdown of disease control and management systems in the country. The majority of the livestock producers have poor knowledge and skills and veterinary services are either unavailable or prohibitively expensive to all but the larger commercial farmers. The liberalization process that intended to shift veterinary services from the public to the private sector has not succeeded. A large number of government veterinarians were laid off without being supported to develop the capacities they needed to run private practices (training in business management, finance and marketing). Private veterinarians who are willing to treat livestock are few and are very expensive ($150 – $250 a visit) and are only affordable for medium or large commercial dairy farmers. In addition, the support to the provincial structures (laboratories, check points, field veterinarians and para-vets) was discontinued leading to serious animal diseases outbreaks.

The market for animal health services is now very thin. Drugs are not produced within Zambia and there are no large-scale distributors. The incentives for purely private sector businesses can be undermined by interventions funded by donors or NGOs which may help their target beneficiaries but may also contribute to the slow development of an effective market.

There are promising attempts by donor supported efforts to create private sector services that reach the traditional producers (e.g. Livestock Service Centers supported by PROFIT) and develop the capacity of the communities and the service providers (e.g. Land O' Lakes). These efforts have demonstrated the possibility of delivering affordable health services, stimulating disease reporting by the community livestock workers and expanding treatments and vaccination to the traditional herds. However, these models and prototypes, although promising, cannot take off and reach out to the majority of the cattle producers without policy, legislative and financial drivers.

Developing an effective system will require a clear strategy and well defined roles for the government, farmers, and service providers. In the next section experience in the region is analyzed to identify best practice.

Learning from Experience in the Region

FMD control is critical for the development of exports and is important for the domestic industry. Box 1 shows the options for control:

Box 1: The options for FMD control

1. Country freedom: unachievable owing to the presence of African buffalo.
2. FMD-free zones without vaccination: the status quo. This is problematic due to cost and the marginalization of producers not living in free zones.
3. FMD-free zones with vaccination: used in South America, but problems of acceptance are exacerbated by technological problems related to vaccines in SADC.
4. Commodity based trade: regulation of the product rather than the area of origin. This allows products export from regions where disease exists without compromising safety or quality – some products are inherently unable to transmit FMD virus.
5. Compartmentalization: biosecure production units (such as farms or groups of farms). This concept not yet internationally accepted for FMD but acceptance is likely, although the expense will limit use for poorer producers
6. Living with and managing endemic FMD. This means the certain loss of all external markets and has a negative effect on dairy production, as dairy cattle are seriously affected.

The ideal is a combination of options that support access to a variety of target markets and protect the national herd – for example, combining compartmentalization, commodity based trade and protective measures in high risk areas, and alternatives to cattle production including game ranching.

Source: Scoones, 2010.

There are only three OIE-recognized DFZs in the SADC countries (Botswana, Namibia and South Africa – see table 32) that are mainly concerned with the control of FMD. The three countries have the acknowledgement and blessing of OIE and are transparent in disclosing their import/export activities as required by the World Trade Organization (WTO). They apply option 2 for FMD control (see box 1).

Table 32: Disease-free status of African OIE member countries (as per decision of the 2009 International Committee)[2]

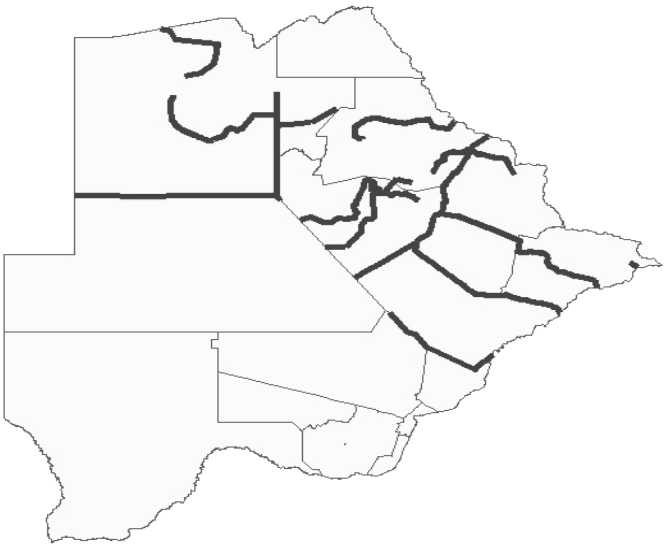
Member country	Rinderpest	CBPP	FMD
Angola	X		
Botswana	X	X	X (DFZ)
Kenya	X		
Malawi	X		
Mozambique	X		
Namibia	X		X (DFZ)
South Africa	X		X (DFZ)
Tanzania	X		
Zambia	X		
Zimbabwe	X		

Botswana and Namibia serve as exemplary cases of maintaining a competitive beef industry capable of integrating into the global beef market for several decades (Cabrera et al. 2008).

This is because their industries are built on an effective DFZ. Similar to Zambia, both are blessed with vast free grazing areas, and most of the cattle are produced by the traditional subsector (85 percent and 50 percent in Botswana and Namibia, respectively). The governments in both countries have played a leading and positive role in promoting the industrialization of the beef sector by: (1) ensuring effective, country-wide disease control, and (2) assuming a market intermediary function. However, there is much to do in order to put the right incentives in place for full commercialization.

In Botswana, the government provides good governance, maintains transparency and assures compliance and good reporting, all of which have helped sustain the continued confidence of European Union (EU) importers for over 30 years. The DFZ in Botswana is quite extensive and includes a country-wide system of veterinary cordon fences (see figure 19) regularly patrolled by veterinary personnel. Movement of animals between fenced regions is allowed only at specific supervised checkpoints. The fences have played a key role in controlling animal movements and in reducing spread of diseases.

Figure 19. Botswana's Veterinary Cordon Fence (VCF) System (in black)



Source: SADC

Namibia is another example of successful DFZ operation supported by a strong and instrumental public-private partnership and full compliance with OIE codes of transparency. Although less extensively fenced, the Namibia DFZ has elaborate fence-surveillance structures: double fences address both domestic and wild animal movements and divide the infested areas in Caprivi Region; buffer zones north of the Cordon Fence where regular vaccination of FMD occurs; a surveillance zone immediately at the southern border of the fence; and the FMD-free zone south of the fence. The public sector veterinary service is well resourced and managed and supervises surveillance, vaccination in the buffer zone and the abattoirs. It also offers limited veterinary services to the farmers in the communal areas north of the cordon fence. The private sector veterinary market serves the commercial farmers.

Overall, the impact of the DFZs in South Africa, Botswana and Namibia is very significant[3] and the benefits reach beyond FMD to the control of other diseases (e.g. CBPP, ECF, BTB and so on). The FMD-free zone has allowed Botswana and Namibia to sell fresh red meat to the EU. Without the internationally recognized zoning infrastructure, Botswana's and Namibia's meat would have not enjoyed the continued confidence of the markets in which case the entire industry (commercial and traditional) would probably have collapsed. The DFZ in Namibia, in spite of the extensive structure and maintenance cost, maintains a positive benefit-cost ratio.[4] The annual cost of running veterinary services in Namibia (which largely assure freedom from diseases and animal traceability within the zone) is about $8 million, while annual earnings from the red meat industry are over $100 million.

Achieving Effective Disease Control in Zambia

With wild buffalo in the country and long borders with Angola and DRC (countries where several major animal diseases are endemic), Zambia cannot achieve disease-free status at the national level. One possibility is to define a zone and achieve disease-free status within it. This is the intention of the newly organized Ministry of Livestock and Fisheries Development which aims to start this process in 2010. Central Province, parts of Lusaka and Copperbelt Province have been identified as the preferred areas for the initial DFZ.

As a member in OIE, WTO and Codex Alimentarius (FAO/WHO), Zambia is expected to establish the DFZ according to the objectives, guidelines and requirements of OIE, and to observe compliance with WTO sanitary and phytosanitary and import/export disclosure frameworks, and the public safety and global food standards of the WHO/FAO commission. There is much work to be done before the establishment of the DFZ:

- There is need for feasibility studies supported by environmental and socio-impact assessments to assess the benefits from the DFZ in the control of the major livestock diseases (especially FMD, CBPP and ECF), improved livestock productivity and provision of infrastructure.
- The DFZ cannot be established successfully without the identification and development of the required basic infrastructure such as quarantine facilities, camp houses and location, dip tanks, crush pens, abattoirs, slaughter slabs, processing plants and market centers.
- Learning from other countries such as Botswana, a strategy for a strong public-private partnership must be put into place and supported by transparent and well governed certification, public and animal welfare measures.

While the experiences of countries with successful DFZs such as Namibia and Botswana are useful in learning lessons, any attempt to simply replicate their approach is unlikely to be best for Zambia. These systems have been in place for many years and have been institutionalized over time.

In the Zambian context it is clear that an alliance is needed between the government, the farmers—both within and outside the proposed DFZ(s)—and service providers (particularly drug distributors and veterinarians). It is unrealistic to expect the government to take on all the responsibility for disease management and maintenance of the DFZ.

The table below sets out a possible definition of roles.

Stakeholder	Role
Government	• Ensure international standards are met through surveillance and regulation of the DFZ • Support the flow of veterinary services to farmers outside the DFZ strengthening their economic position and supporting the development of their linkages to local markets • Execute vaccination and disease control measures outside the zone using government vets and private sector service providers to manage disease levels
Farmers within the zone	• Maintain the health of their animals using private sector service providers and with the support of the government service • Develop formal farmer and export organizations to maintain standards, put traceability systems in place, ensure that any disease outbreaks are reported and addressed, and provide services to members in herd business management • Use peer pressure within the DFZ to ensure that standards are maintained
Farmers outside the zone	• Work together to improve disease management with a view to eventually being able to join a DFZ or create a new one
Private sector veterinarians	• Invest in the development of practices serving both public and private sector clients
Veterinary drug importers and distributors	• Invest in marketing and distribution of their products, ensuring farmers are informed of the benefits of their use, safe in the knowledge that their businesses will not be undermined by free distribution schemes and that if subsidized drugs are to be provided to poor livestock farmers, they will still be contracted to supply
Privately owned SMSDFZs	• This would be a small quarantine business that checks, treats and certifies admitted animals in production areas (Southern, Western and Eastern Provinces) very close to the abattoirs. The SMSDFZs would be for profit but fully accredited and subject to monitoring and evaluation by the international bodies and the independent stakeholders from any level of the cattle value chains.
All private enterprises in the beef and dairy industry	• Monitoring and reporting of disease

Clearly this will take time, but if it is a vision that is shared by all the stakeholders, it can be achieved.

[1] Source: Dr Liywalii Mataa, National Livestock Epidemiology and Information Center.
[2] From the OIE: see http://www.rr-africa.oie.int/en/mandates/en_disstatus_map.html
[3] Dr. Juan Lubroth, Chief Animal Health Service FAO headquarters, personal communication.
[4] Roger Baskin, 2010, personal communication.