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The Milk Revolution

The role of the 'emergent' smallholder farmers in the
commercialisation of the Zambian Dairy Sector

By

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Abstract

The purpose of the study is to contribute to the debate on whether smallholder or large-scale farming is the more pertinent strategy to spur agricultural growth and commercialisation in Sub-Saharan Africa. This study will examine the meteoric increase in the growth of 'emergent' medium-scale commercial dairy farming in Zambia. Both the Magoye and Fisenge dairy cooperatives will serve as a case study to explore the growth of commercial dairy sub-sector. The time period will explore the development of the dairy industry from 1991 when the Zambian economy moved from central planning to a market orientation to the present day. In Zambia, the commercialisation of smallholder agriculture has become an integral part of the national strategy to address the problems of economic stagnation and food poverty. Despite extensive government efforts from numerous African countries to promote the transition of smallholder farmers from subsistence-based to commercially-oriented livelihoods, a broad based transformation of the sector has not yet materialised.

Key words: Zambia, dairy, structural transformation, commercialisation, emergent farmer

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1 Introduction

The agriculture sector in Zambia is dominated by smallholder subsistence agriculture (Jayne et al., 2010). Since the mid-1990s, however, the country has witnessed a meteoric increase in the growth of ‘emergent’ medium-scale commercial oriented farming (Sitko and Jayne, 2012). This reignites the debate of whether Zambia should pursue a smallholder or large-scale strategy to spur agricultural growth and commercialisation. Historically, proponents of the structural transformation paradigm argued that broad-based intensification of smallholder production is the most effective way of initiating inclusive growth in predominantly agrarian societies (Johnston and Kilby 1975; Mellor 1976). Yet the broad-based approach focusing on smallholder development has yet to achieve sustained agricultural growth in Sub-Saharan Africa, and has invited much contestation from researchers who favour a shift in priority to large-scale commercial farming (Collier, 2008). Proponents of this view, point to substantial constraints to African smallholder production and marketing systems which make it improbable for very small farms to promote significant capital accumulation, farm expansion, and increases in production (Collier 2008; Collier and Dercon 2009). Given the perpetual development pattern in Sub-Saharan Africa (SSA), they argue, a more effective means for achieving increased productivity and poverty reduction is to support the development of larger more commercially viable agricultural enterprises (Collier and Dercon, 2009; Diao et al., 2010). This paper sets out to analyse the spatial and socio-economic implications of emergent dairy farmers in reshaping the dairy landscape and their prospects for achieving a commercially oriented growth strategy. In particular, this study will examine the characteristics of the medium-scale dairy farmers in two case study regions in Zambia. In a final step, the paper will empirically assess the commercialisation and market expansion of dairy farming in the peri-urban regions or urban periphery of the Copperbelt and Southern Provinces in Zambia. By exploring this largely underappreciated development, the analysis hopes to provide insights into the role of this middle-tier transformation on the future of agricultural development strategies in Zambia.

Over the last decade Zambia has witnessed a significant increase in dairy production, driven primarily by an expansion of a dynamic group of indigenous market oriented dairy farmers (Kenny and Mather, 2008; World Bank, 2011). The dairy sector, therefore, has been identified

as a key potential growth sector for smallholders in Zambia (World Bank, 2011). The dairy sector in Zambia consists of a distinct dual structure. Specifically, there is industrial scale commercialised dairy farms which settle along a corridor running parallel to the line of rail and then there are the many smallholder dairy farmers clustered in the nearby villages. Two case study regions were purposively selected Fisenge, in the Copperbelt province, and Magoye in the Southern province (see Figure 1) in order to capture the diversity of agro-ecological zones, market access and communications, and socio-demographic characteristics. In total 30 households were interviewed over a period of a month in April and May 2016.



Figure 1: Map of Zambia – Research Regions (Aregheore, 2005).

1.1 Research Problem

In examining the potential of the dairy sector in Zambia this study will take into consideration the distinct differences in smallholder households. It should be noted that a significant proportion of Zambian smallholders cannot be expected to transform into market oriented production producers, while other smallholders are better positioned to make the transition. Understanding the different potential of agricultural producers is critical to designing strategies

for commercially viable smallholders (Siegel, 2008). This study also subscribes to the view that small-scale farmers have to date been unsuccessful in breaking through the barriers of subsistence agriculture into more commercialised production systems. The prevailing debate on the large-scale versus smallholder farmers' strategy for agricultural transformation in Africa rages on. However, the wider discussion has largely ignored the growth of 'emergent' farmers and their potential to transition into large-scale commercial farmers. A review of the literature indicates that a significant group of smallholder farmers have transition from subsistence to commercial medium-scale and large-scale farmer in Ghana, Uganda, Kenya, Mozambique and several other African nations (Chapoto, et.al, 2013). Zambia shares this sustained growth of emergent farmers, however, that is where the similarity ends. This study argues that the increasing number of market oriented emergent farmers, is a critical aspect of the agricultural transformation taking place in Zambia.

In order to gain a fuller understanding of the subject matter, the study will systematically trace the trajectory of a group of dairy farmers located in two milk producing regions in Zambia. In particular, the study will examine the socio-economic characteristics and land use patterns of the emergent smallholder farmers; while attempting to analyse how this group of farmers achieved their current scale of operation. As such, the case study will specifically focus on human capital, productivity, and land acquisition strategies. Therefore, this paper aims to answer the following research questions:

1. What are the socio-demographic characteristics of the emergent dairy farmers in Zambia?
2. What is the context within which the emergent farmers achieved their current scale of operation?

The aim is to better understand the characteristics of these farmers, their development path in the commercialisation process, and the context within which they commercialised. This will contribute to the literature and debate on the appropriate strategy for agricultural transformation in Sub-Saharan Africa.

1.2 Aim and Scope

The paper seeks to challenge the traditional development pattern of agricultural transformation. By 'traditional development' Timmer (2005) refers to the development patterns that the East Asian economies experienced in the 1960s and that are proposed in the prevailing literature. It will discuss the implications of Zambia's development experience in contrast to the traditional agricultural transformation strategies. The current research suggest that the number of 'emergent' farmers is growing at a significant rate, and is notably outpacing the growth rate of the smallholder farmers in the country, a pattern that is consistent with a changing farm structure in the African agricultural sector (Jayne and Sitko, 2012; Sitko et al., 2015; Chapoto et al., 2016). For the purposes of this study, dairy farmers in Zambia will be classified as either smallholder farmers or large commercial farmers. While, the smallholder farmers are grouped into two groups: small-scale traditional farmers who posses less than 5 hectares of land and medium-scale emergent farmers who possess anywhere in the range of 5 hectares and 20 hectares of land. The emergent farmers are often characterised as inhabiting a transitional period between small-scale, semi-subsistence production and larger-scale, more commercial oriented farming (Sitko and Jayne, 2012). These farmer are associated with innovation, dynamism, superior management skills, and greater access to capital, compared to traditional farmers (Sitko and Jayne, 2012). The study will emphasise the bottom-up processes and the potential for smallholder led development in local systems of dairy production. Moreover, the paper will explore the theory that the majority of emergent farmers in Zambia originate mostly from the urban professional elite, a pattern which significantly diverges from the trend in most of Sub-Saharan Africa (Chapoto et al., 2012). The pattern of land aquisition dynamics will also be explored. Finally, the study will consider the potential influence of historical path dependency on the development of the dairy sector in Zambia.

1.3 Outline of the Thesis

To answer the research question and fulfil the aim the thesis will be structured in a manner that assists in guiding the arguments through a theoretical framework built upon theories of agricultural transformation, and path dependence. The logical structure of the thesis formulates

a historical context and theoretical framework in order to garner a greater understanding of how development patterns may have looked and transformed throughout time and space.

The outline of this paper is organised as follows. The introductory section is followed by a brief background outlining the current macro-economic conditions in Zambia, it will also discuss the historical development of the dairy sector in Zambia. This is followed by a review of the literature on the wider debate on agricultural commercialisation, structural transformation, and the growth of emergent farmers. Subsequently a theoretical framework is presented which examines the potential influence of path dependence of the growth of the dairy sector in specific regions in Zambia. This will be followed by a presentation of the research methodology including description of the study area. The findings from the questionnaire are the subject of the next section, and the final section will provide the results based on the analysis documenting the characteristics of the emergent or medium-scale commercial farmers.

2 History of the Dairy Sector in Zambia

2.1 Macroeconomic outlook

Zambia is a country with little over 15 million inhabitants and an annual population growth rate estimated at 3.2 percent, while enjoying a robust growth rate averaging around 6% gross domestic product (GDP) over the last decade (UN, 2016). The expansion of the economy in this period has contributed to the rise of a Zambian middle class, yet the majority of the population, particularly those in rural areas, poverty rates hover at nearly 80% (Sitko et.al., 2015). Despite having the lowest population density in the region (Jayne et. al., 2009), Zambia’s population clusters compactly in urban districts following the north-south line of rail from Livingstone in the south, northeast to Lusaka, through to the Copperbelt cities in the north, which is illustrated in Figure 2. Around 50% of the population live within 40km of this railway, and there is marked dichotomy between the line of rail and most of the rest of the country.

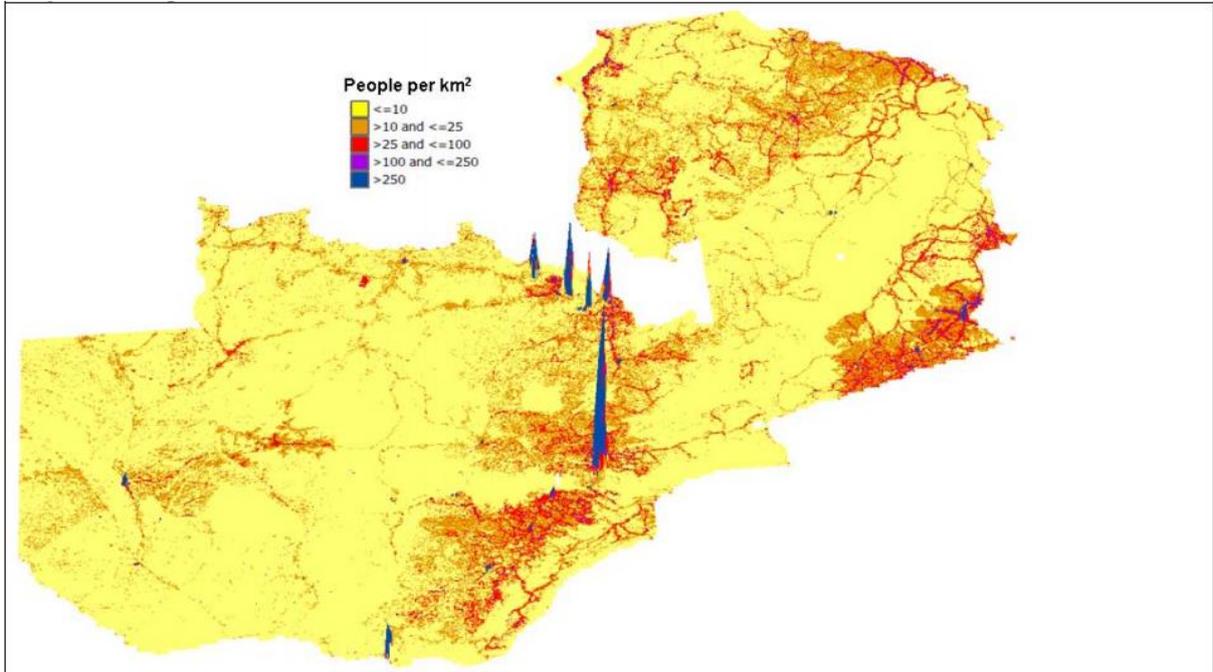


Figure 2: Population Distribution in Zambia (Haggblade et al., 2009)

Zambia has an economy which is historically heavily dependent on copper, and has struggled to diversify into other commercial activities when faced with price shocks in the commodity market. According to government statistics, the agricultural sector employs 92 per cent of the rural working populations (Mulemba, 2009).

Historically, agriculture in Zambia has been characterised by lethargic growth, low-factor productivity, and diminishing trade (Salami, 2010). Beginning in the 1990s, Zambia set about reorganising the sector by implementing macroeconomic and institutional reforms which sought to stimulate agricultural growth, increase food security and reduce poverty (Chapoto et al., 2012). However, the sector's growth remained insufficient to adequately address poverty, and attain food security, despite the country's demonstrating consistently strong GDP growth (World Bank, 2008). Much of the Zambian population are small-scale subsistence producers, they are asset-poor and they experience curtailed growth stemming from insufficient access to the necessary credit facilities, markets and technologies. In recent years this has been compounded by economic stagnation, runaway inflation and volatile commodity prices.

2.2 History of the dairy sector in Zambia

The smallholder sector offers the greatest potential for the improvement of milk production in Zambia as it retains the majority of the dairy cattle (Mumba et al., 2011). However until recently, the sector has hugely underperformed largely due to inadequate government policy, shortage of capital, insufficient inputs and poor marketing infrastructure. The origins of the dairy sector can be traced back to a group of large white settler farmers who introduced dairying to Zambia in the early 1920s (Kaluba, 1993). In 1964 Zambia gained independence and many of the settlers migrated to southern Rhodesia or returned to Europe, this propagated a steady decline in commercial milk production the 1960s and 1970s (Bwalya, 1987, cited in Kenny and Mather, 2008). Additionally, the decline in production coincided with a sharp increase in the demand for milk in the urban centres of Lusaka, Livingstone and the Copperbelt. The government responded by setting up state dairy farms, dairy settlement schemes, rural milk production schemes, parastatal dairy operations on former white settler owned land, also known as crown land (Swanson, 2009). According to the Land O' Lakes Dairy Development Program,

the dairy development programs ended in failure largely due to ‘poor selection of farmers who were not market oriented’, they had unsuitable cattle breeds, inadequate access to extension services, high transaction costs and a dependency on government for subsidies and price regulation (Swanson, 2009, p.17).

The formal part of the dairy sector was controlled by the government’s Dairy Produce Board (DPB), which was responsible for the processing, price setting and marketing of raw milk. The Board’s main sources of raw milk were supplied by the parastatal dairy farms and smallholder producers (Neven, 2006). Milk at this time was a minor by-product of a much larger beef industry, the growing demand for beef came from the workers and their dependents at the mines in the Copperbelt region. Milk was invariably used for home consumption and any surplus milk production was sold to the DPB or in most cases to the informal raw milk markets (Neven, 2006). In order to capture the nutritional and economic development advantages of a growing dairy sector, the government initiated several programs to support smallholders in the dairy sector. However, in most cases these programs were characterised by poorly chosen participants, insufficient extension staff, mismanagement, politicisation, inadequate access to markets, and low milk prices (Neven 2006, Mulemba 2009). As a result, these support programs generally dissipated, domestic milk production remained low and the formal dairy industry stagnated.

In 1991 as part of a broader debt restructuring program, the country transitioned from socialist state to democratic liberal state. Zambia adopted a Structural Adjustment Program which introduced market liberalisation and reform (Mulemba 2009). During this time the agricultural sector was commercialised and markets were opened up to privatisation, allowing free market policies to steer the economy (Ndandula, 2011). The privatisation, in turn, led to massive loss of public sector jobs which precipitated a massive migration of public sector employees into rural areas to begin farming (Ferguson, 1999). This counter-migration from urban to rural Zambia likely explains much of the government settlement schemes and land acquisition that occurred in the in the mid-1990s (see Sitko and Jayne, 2012). In order to improve the supply of milk for commercial sale, the Dairy Produce Board saw it as an opportunity to establish the Dairy Settlement Scheme (Kenny & Mather, 2008). This involved identifying land near the urban settlements of Lusaka, Kabwe, Ndola and Mpika for dairy cattle.

The privatisation of the economy encouraged supply and demand side factors which began to transform the dairy sector (Neven, 2006). On the supply side the process of liberalisation and structural adjustment exposed Zambia's dairy sector to open market forces. In the vacuum left by the state run Parastatals, new players in milk processing and agri-food retail emerged to gradually re-organise the dairy industry (Neven, 2006). On the demand side, increased urbanisation, increased income and a convergence of dietary patterns and food preferences significantly increased the importance of the formal market chain in the dairy sector. Today the commercial system is dominated by 4-5 comparatively large dairy processors. The dominant player Parmalat Zambia Ltd (Parmalat) accounts for over 50 per cent of the market share, and 14 per cent of whose raw milk is sourced from emergent farmers (World Bank, 2011). Public and private partnerships assisted in the establishment of numerous Milk Collection Centres (MCCs) and chilling facilities in the milk producing regions located near the peri-urban regions of the Southern, Central, Lusaka and Copperbelt provinces (Neven, 2006). Parmalat agreed to collect milk from MCCs which helped to develop modern value chains in the dairy sector.

The dairy sector in Zambia exhibits great potential to substantially expand production of milk, making the subsector an interesting case-study. Furthermore, Zambia has the potential to be a milk exporting country considering it is centrally located in Southern Africa and is richly endowed with resources that are required to stimulate the development of the dairy industry (Agricultural Consultative Forum, 2012). 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 rearing cattle (World Bank, 2011). Across the border, several high-density population centres lie close to the Zambian border, in southern Democratic Republic of Congo, Malawi, Zimbabwe, and in southern Tanzania. This results in significant potential dairy markets for the Zambian processor.

The entry of corporate processors combined with the large retail outlets such as Shoprite and SPAR have helped to stimulate the milk industry, introducing modern procurement methods, modern management practices, institutional, and technological changes in the entire supply chain (Neven et al., 2006). This has led to significant investments from processors in upgrading the facilities, establishing contracts agreements and quality standards with suppliers. At the same time government and NGO led initiatives helped to locate MCCs near large concentrations of dairy producers and organise farmers into co-operative groups. The location of the MCCs were geographically targeted as it was not economical viable to support dairy

farmers that could not be linked to markets (Swanson, 2009). The location of milk collection centres was typically dependent on adequate infrastructure (road network, electricity, water supply for MCC), sufficient dairy producers and where a surplus supply exists beyond what can be sold in the informal market (Swanson, 2009). The co-operatives and MCCs were able to establish formal linkages with the leading processors in Zambia. Processors such as Parmalat assisted the dairy farmers with the adoption of new technologies and practices at the production and collection stages (Neven et al., 2006). The MCCs and cooperatives have experienced cumulative growth with hub-and-spoke extensions of satellite depots expanding around collection points.

Over the past decade the dairy processors in Zambia have experienced growing domestic demand for dairy products resulting in a significant shortfall in the supply of raw milk. The processors in Zambia are currently unable to utilise their current processing capacity to its full potential (Mumba, 2013). The reasons for this under-utilised capacity is due to the regional disparities in the development of the dairy sector. The traditional dairy farmers have the capacity to produce according to the Dairy Association of Zambia (Ng'andu, interview, May 3, 2016) roughly 85% of the total milk requirements in Zambia or 380 million litres of milk per year. The milk produced by traditional farmers is either sold to the informal market or is lost through wastage. The traditional farmers are low productivity farmers which are constrained by the high cost of feeds, lack of market access and lack of improved livestock breeds. Nonetheless, the figure provided by the Dairy Association of Zambia (DAZ) indicated that 65 million litres of milk were produced for the formal market in 2015, steadily up from the 44 million produced in 2010. The production for the formal market is estimated to increase to 75 million in 2016.

The domestic market for milk products is currently small compared to other countries in the region. Until recently, 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 dairy products, particularly in the Northern Province. However, this has changed rapidly with reports from the dairy industry indicating that dairy consumption is increasing close to 10 per cent per year (World Bank, 2011). It was estimated in 2015 that the country's total milk requirement was approximately 445 million litres per year (Ng'andu, interview, May 3, 2016). In 2015 Zambia imported 12 million litres of ultra-heated long life milk in order to close the production deficit which is currently estimated to be 85 million litres.

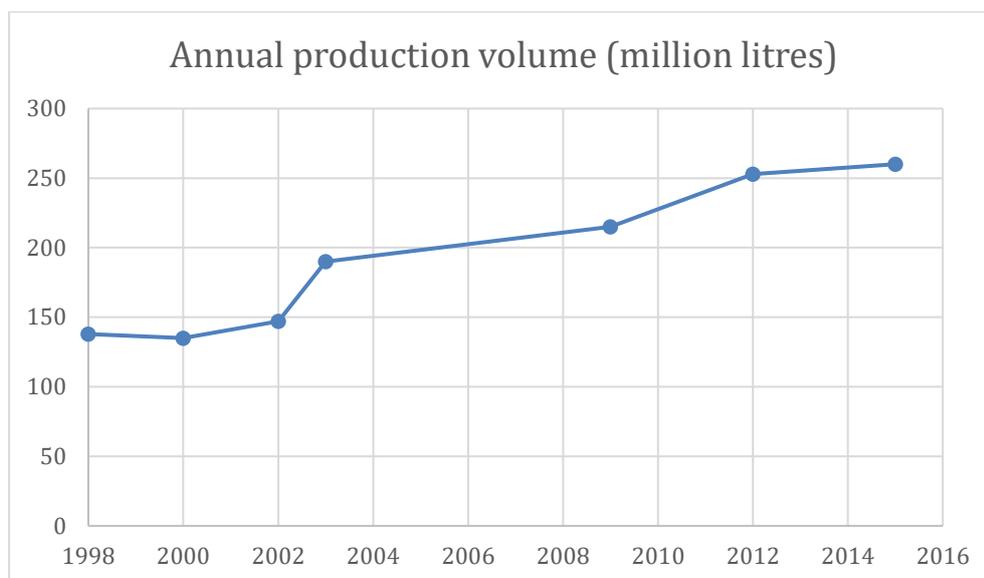


Figure 3: Estimated annual milk production statistics in Zambia 1998–2015 (Author’s construction based on Raw Production figures from Valeta et al., 2004; Agricultural Consultative Forum, 2012; Ng’andu, interview, May 3, 2016.)

The above figure illustrates the annual production of milk in Zambia, however, despite the potential, smallholder participation in market led dairy development has not been widespread in Zambia. Even in regions with favourable climatic conditions for dairy development, participation in milk markets by rural smallholders has been limited. Productivity of smallholder dairy is considerably low, producing primarily for subsistence on less than five hectares of land. The World Bank report (2008) notes that if smallholder farmers are to improve their incomes, they will require opportunities to develop market driven surplus production from domestic, national, and international market. However in the case of Zambia, the growth in market oriented production has been mainly driven by the growth of an ‘Emergent’ group of dairy producers, who are drawn by to centralised markets in order to exploit favourable market opportunities. This process of relocation which commenced the early 1990s is evident in the establishment of MCCs and dairy processing plants along the line of rail which forms an urban corridor in a pre-dominantly rural Zambia. The pattern of linear distribution in dairy farming is so conspicuous that one cannot avoid referring to it frequently while analysing the dairy sector. The causes and consequences of the remarkable growth of the dairy sector and in particular the emergent dairy farmers in Zambia warrants further investigation. These issues of production, commercialisation and dairy concentration will be explored further in the following sections of the paper.

3 Theory

Utilizing existing research and theories a theoretical approach to development is formed to enable generalisations of the development patterns over time and space. A major theoretical insight was that key commercialisation factors are both numerous and context dependent. Consequently, the study shapes the analysis in the theories of agricultural transformation.

3.1 Previous Research

3.1.1 The Role of Agriculture in the structural transformation

“The most opulent nations, indeed, generally excel all their neighbours in agriculture as well as in manufacturing; but they are commonly more distinguished by their superiority in the latter than in the former” (Adam Smith, 2007, p.4).

As early as Adam Smith, economists have recognised the significance of structural transformation in proliferating the decline in the share of agriculture in GDP and the greatest share of GDP is produced in industry and services (Lewis, 1954; Kuznets, 1957; Johnston and Mellor, 1961). Historians have argued, that increases in agricultural productivity are a necessary condition for economic development, based on the transformational experience of the industrial revolution in Britain between 1500 and 1800 (Rostow, 1960; Allen, 2009). The nature of this transition and the causal direction have drawn considerable discussion and instigated a surprising degree of controversy. The macroeconomic and sector level arguments suggest that structural transformation requires labour to transition from ‘low productive and subsistence agriculture to high production, based on greater specialisation’ and commercialisation, while implementing economies of scale (Lewis, 1954, p.433). However, Matsuyama (1992) notes that the positive effects of agricultural productivity on industrialisation only take place in a closed economy model, while in an open trading system comparative advantage in agriculture can impede industrial growth. Thus high productivity in agriculture may result in a migration of labour out of industry into the agricultural sector, reducing the size of industry, and the scope to benefit from external economies of scale (Matsuyama, 1992, p.319). While, the New

Economic Geography (NEG) literature has emphasised the importance of location in the development processes, highlighting the gains achieved in productivity through clusters by using agglomeration effects and increasing economies of scale (Krugman and Venables, 1995).

The NEG contains different models of general equilibrium that assist in explaining unequal spatial distribution of economic activity, under monopolistic conditions, increasing returns to scale, and importantly the significance of transportation costs (Krugman 1991; Krugman and Venables, 1995; Fujita et al., 1999). In the same light, in cases of bimodal land distribution, the purchasers have the option to obtain produce from a relatively small concentration of large-scale producers. The proponents of smallholder led growth suggest such changes to marketing chains would have the effect of reducing transaction costs for large-scale farmers at the expense of the smallholder (Hazell et al., 2006).

3.1.2 The small-scale vs large-scale debate

The development literature surrounding commercial transformation has been in the policy spotlight for many developing countries for some time now (Pingali and Rosegrant, 1995; Timmer, 1997; World Bank 2008). The literature offers dichotomous views on the role of agriculture in the development process, and in most cases the argument focuses on the extent of market orientation, and intensification. Agriculture in Sub-Saharan Africa (SSA) has for decades been characterised by smallholder farmers cultivating less than 2 hectares of lands in the region and living in endemic poverty. The expansion of smallholder farmers in more market oriented commercial enterprises is a fundamental driving force in the agricultural transformation process (Johnston and Mellor 1961). However, to date the smallholder-led development strategies have failure to transform agriculture in Sub-Saharan Africa (SSA) which has led many scholars to question the effectiveness of a smallholder approach in transforming SSA agricultural production systems from largely subsistence scale to more commercially oriented production systems (Sitko and Jayne, 2014; Chapoto et al., 2016).

Most agricultural economics since the 1960s has followed the ‘inverse productivity’ relationship, argued by the Russian economist Chayanov (1926), that small-scale farms achieve a scale greater than large-scale operations ‘when joined in co-operative associations’ (Chayanov, 1926, p.28). Likewise, the ‘small farm efficiency paradigm’ proposed by Schultz

(1964, p.37-38) argued for following a design strategy that supported the development of small farms. In terms of total factor productivity it has been argued that an inverse relation between the size of land holding and output per hectare exists which speaks in favour of the organization of a nation's agricultural sector into small operational units (Kilby and Johnston 1975, p.127). Johnston and Mellor (1961) argue agricultural production stimulates forward consumption linkages and backward production linkages. These growth-linkage effects are most efficient when agricultural growth is driven by 'broad-based' increases in productivity in an agricultural system dominated by small farms, as in much of Asia (Mellor, 1976). The smallholder led strategy is inspired by the view that most of the population in developing countries is rural based and hovering precariously on the margin of poverty, from this view point any strategy must aimed at smallholders targeted at poverty reduction (see, for example, Hazell et al. 2006). However, scholars have extensively criticised the relevance of the smallholder-led agricultural development model in the context of African development (Collier, 2008; Collier and Dercon, 2013).

Collier (2008, p.71) suggest that the smallholder mode of production is ill suited to agricultural development in a rapidly changing world in which 'scale is helpful'. Collier and Dercon (2013) propose that a development path sufficient for an economic transformation requires a significant reduction in the percentage of the population engaged in agriculture and their subsequent migration to economically active urban regions. They identify the substantial advantages of larger commercial modes of production which are in a better position to adopt new technologies, and access finance, and logistics. Furthermore, larger commercial systems are better able to exploit economies of scale, in trading, marketing, and storage. The proponents of this view have argues for a greater role to be played by large-scale farming operations in agriculture and have promoted the development of clusters of commercial farms in conjunction with private agribusinesses (World Bank 2008; Collier & Dercon 2013).

3.1.3 Agricultural Commercialization

The commercial transformation of subsistence agriculture is an indispensable pathway towards economic growth and development for many agricultural dependent developing countries (Johnston and Kilby, 1975; Mellor, 1976; Timmer, 1997; World Bank, 2008). Thus the commercialisation of agriculture becomes part of a market-oriented development, which encourages greater efficiency in the use of resources in accordance to their comparative

advantages (Timmer, 2005). However, in the face of high transaction costs and imperfect markets, small-scale farmers are unable to exploit the potential gains from commercialisation (Jayne, Zulu, and Nijhoff 2006). In the absence of mechanisms to overcome these constraints, smallholders are impeded from participating in markets or, in the case where they do, they fail to realise the full benefit of participation. Pingali and Rosegrant (1995) noted that the commercialisation process comprises of a move away from traditional self-sufficiency goals towards profit-oriented decision making. As an economy expands, farmers become more responsive to market trends in their decision making and there is a tendency to procure more of their inputs from the market.

According to a vast literature of research (Pingali and Rosegrant, 1995; Timmer, 1997; Pingali, 1997) highly specialised and large enterprises provide a number of advantages in exploring economies of scale in production and marketing, in effective investment, access to credit, and negotiation of contract enforcement. Davis (2006) has argued that the development of high value agricultural (HVA) products is an important part of the commercialisation process and the development of sophisticated agribusiness chains. The process of agricultural commercialisation is accompanied by economic growth; increased incomes; urbanisation; increased welfare; increased backward and forward linkages between the farmer and the service providers; and there is a gradual withdrawal of labour from the agricultural sector. Equitable growth, however, is difficult to achieve (Mellor, 1999; Jayne & Muyanga, 2011). A significant proportion of smallholder farmers will not directly benefit or be expected to transform into market oriented farmers, while other farmers are better positioned to become market oriented producers (World Bank, 2008). Barrett (2008) and Jayne et al. (2010) have posited that most small-scale farmers are unable to participate in markets because they very often have insufficient marketable surplus.

The appropriate development pathway varies across developing countries, but it includes several key developments in the structure of the economy, chiefly, both manufacturing and services absorb a greater share of gross domestic product (GDP) at the expense of agriculture, which simultaneously results in a migration of labour from rural-to-urban regions and a demographic transition to lower birth and death rates (Timmer 1988).

3.1.4 The 'Emergent' Farmers

Parallel to the debate on the right strategy for agricultural transformation in SSA is a silent but important change taking place in Zambia's farm structure (Sitko and Jayne 2014; Chapoto et.al, 2013). An increasing number of emergent farmers are taking part in the commercialisation process in Zambia over the last two decades. The number of medium-scale farmers has increased by 62.5% between 2001 and 2011, and in 2014 these farmers account for 18% of the total farming population while controlling 57% of the total farmland in Zambia (Sitko and Jayne, 2014). Moreover, this growth has mainly been driven by the urban elite with little evidence of growth via capital accumulation and expansion from smallholder farming (Sitko and Jayne 2012). Sitko and Jayne (2012) document the growth of the emergent farmers who have transitioned to cultivate anywhere from about 5 to 20 hectares of land, compared to the majority (70 percent), who cultivate 2 hectares or less. In their analysis, they find that those that are emergent (medium- or large-scale) farmers mostly used income and resources non-farm related employment to develop their agricultural enterprises. They also found that the initial farm size of the emergent farmers were considerably larger than the mean farm size in Zambia. This suggests that these farmers are not traditional smallholder farmers who transitioned to larger more commercially oriented farmers. Instead they are investors or entrepreneurs who entered laterally from the non-farm employment, and in Zambia a significant proportion derived from the public sector (Sitko and Jayne 2012).

It is proposed in this paper that the emergent dairy farmers formed an agglomeration in commercially viable farming areas, which were bestowed with favourable factor endowments in infrastructure and market access. The study will describe the presence of clusters of medium or large scale commercial farms that are more or less geographically contiguous in the regions under observation (Smalley, 2013). These farm clusters potentially constitute a new models of farming which could represent a distinctive patterns of agricultural investment and land use (Jayne and Sitko, 2012). This proposal can be explored and tested through empirical research.

3.2 Theoretical Approach

3.3 Path Dependence

In Zambia, most of the dairy production and consumption is concentrated around the major transport system along the line-of-rail, stretching from Livingstone in the south of the country, through the capital city Lusaka, then expanding north through the industrial region of Zambia's Copperbelt (World Bank, 2011). Not surprisingly, the emergent smallholder farmers are overwhelmingly concentrated along the line of rail and in the urban mining areas of the Copperbelt (Sitko and Jayen, 2014). In Zambia, the recent growth in commercialised dairy is largely attributed to the growth in the number of small-scale commercial or emergent farmers which number roughly 4,000, and produce approximately 17% of the milk sold to the formal market (Agricultural Consultative Forum, 2012).

The construction of the railroad led to the uneven geographical distribution of economic activity during the colonial period, and these effects have persisted to date (Lindqvist, 2009; Jedwab and Moradi, 2015). At the time Zambia gained independence in 1964, the line of rail was the main geographical and commercial focal point in Zambia, with 16 large urban centres containing around 92 per cent of the urban population of Zambia (Nag, 1990). Much of the prime fertile land was located close to the line of rail and the British administration allocated this 'crown land' to white settlers (Brown, 2005). After independence, the addition of numerous new urban centres developed either around railway sidings, or near mines, or large agricultural settlement, resulting in the tendency of clustering to more pronounced (Nag, 1990). With this in mind, a theoretical framework of path dependence will be utilised as an interpretive lens to examine why the dairy sector concentrated in certain locations but not in others; and it may help us to understand why regional disparities in the growth of the dairy sector persist.

The existing literature on path dependence has been divided. According to one argument the distribution of economic activity across space is determined by the importance of locational fundamentals such as the geographical endowments, while a second argument give greater weight to increasing returns resulting from localised historical shocks (Jedwab, Kerby and Moradi, 2016). Conversely, various articles have demonstrated that patterns of development in a given physical environment may be a consequence of historical shocks (Acemoglu, Johnson

& Robinson, 2001; Nunn, 2008). Researchers in various disciplines have used the concept (see David, 2007; Arthur, 1994; and Martin and Sunley, 2006), to focus on the dynamics which set in motion particular patterns of uneven economic development in time and space. Moreover, Martin and Sunley (2006, p.3) suggest that the evolution of the economic landscape is a path-dependent process, whereby the processes that allow for path dependence have a characteristically local dimension in their form and operation, and thus whether, in this sense, 'path dependence can be seen as a process or effect that is locally contingent and locally emergent, and hence to a large extent place dependent'. However, no clear and common definition is provided in the literature. It is necessary, then, to determine in what respect it can fulfil this purpose and whether and in what ways it may need to be adapted. Considering the development of the dairy sector in Zambia the theory of path dependence (see Jedwab et al., Jedwab & Moradi 2015) may play a key role in examining specific channels and mechanisms that lead to the development of the dairy sector in Zambia.

According to David (2007, P.6), path dependency enables the historian and economist to examine the possibility that, in place of an equilibrium seeking process, one should conceptualise a process that is seeking an 'evolving and historically contingent equilibrium.' Prominent researchers such as Krugman (1991a) and Matsuyama (1991) have analysed the respective role of historical accident on the long-term effects on the distribution of economic activity across space. The concept of path dependence lends itself as a useful toolkit to gain a greater understanding of the how and why particular patterns emerge in the world around us. Moreover, the case study regions are particularly conducive for the application of economic geography in historical perspective due to their large and persistent regional imbalances. This study will attempt to frame a theory regarding the economic development in which path dependency is likely to have appeared and where the consequences of historical events have exerted influence on that particular path. The next section will briefly outline the Canonical Model of Path Dependence.

3.3.1 The Canonical Model of Path Dependence

Following Page (2006) and Martin (2010) the path dependent process can be thought of in the following way. The outcome at time t is denoted as $x(t)$. In which case, $x(t)$ is the economic outcome of interest, for example, the number of organisations of a particular type in a region,

or a region's share of a particular national industry. Then the notion of path dependence can be expressed in the following way:

Path-Dependent Process: $x(t+1) = Fx(t)(h(t)x)$

Where $h(t)x = \{x(t), x(t-1)\dots x(0), y(t+1), y(t), y(t-1)\dots\}$ represents the historical outcomes of x from an initial point in time ($t = 0$), when the event in question first emerged, through to the present time t , and any other consequential factors, y , that also shape the development of x across time; and $Fx(t)$ is the 'outcome function' maps history $h(t)x$ into the next outcome. The outcome function is of key importance, since it determines the extent to which-and manner in which-the previous history of x conditions its future trajectory, that is, its evolution (David, 2007; Page, 2006).

Numerous researchers have adapted this model and its core concept, lock-in, to define and categorise the development of industrial districts, clusters, and other forms of local industrial specialisation (Ron Martin, 2010; Page, 2006; Martin and Sunley, 2012; Fuchs and Shapira 2005; 2006; North, 1990; Marshall, 1920). Page (2006) refers to equilibrium dependence as the limiting distribution over outcomes. A process is equilibrium-dependent if the evolved distribution over outcomes is dependent on past outcomes (Page, 2006:92). The emergent equilibrium pattern is dependent on the model's "initial conditions" (i.e. level of transportation costs, extent of labour and capital mobility, extent of knowledge spillovers, and initial regional distribution of economic activity; hence proponents of NEG posit that history is significant in their model's (Martin and Sunley, 2012, p.11). In view of this, the equilibrium influenced by the line of rail has led to regional concentration of the dairy sector in Zambia. The caption below highlights the influence of the line of rail on the distribution of settlement in Zambia over the course of 40 years spanning 1960-2000.

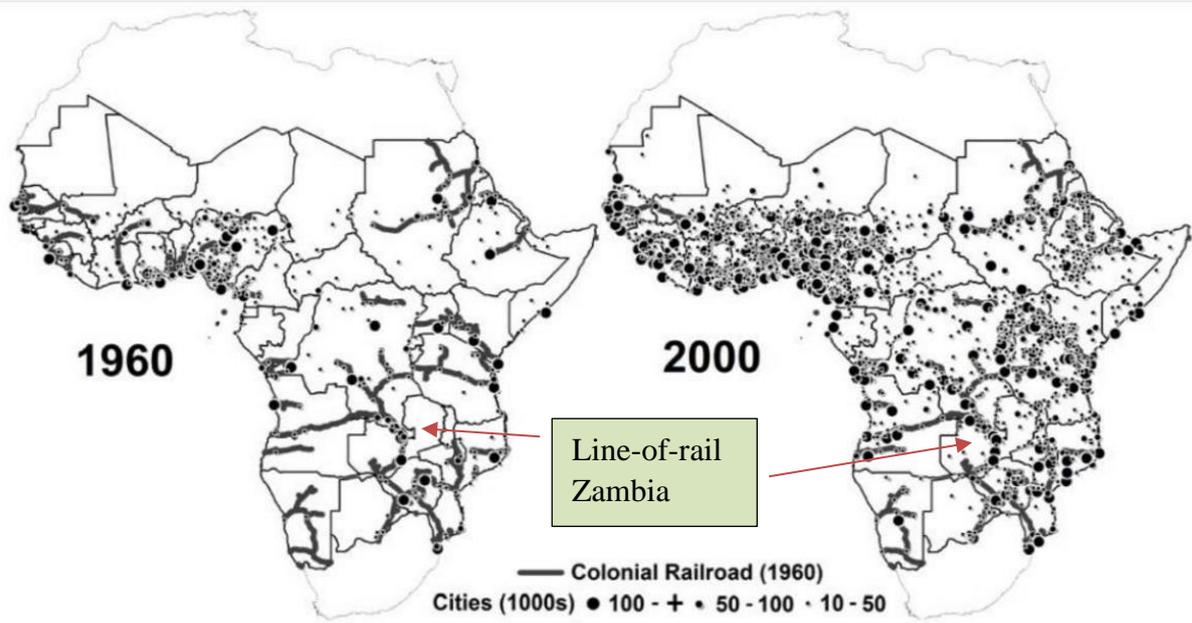


Figure 4: Colonial Railroad 1960/2000 (Kerby et. al., 2014).

4 Methodology (Data)

The major purpose of this study is to understand and analyse the ‘what, why and how’ dairy farmers in the Magoye dairy cooperative and Fisenge dairy cooperative have become commercially oriented. The emergent farmers are expected to operate in highly subjective realities that represent interpretations, respectively, constructs of their socio-economic, natural, and institutional environment. It was therefore necessary to examine questions regarding their perceptions and locality. In order to understand the dynamics of agricultural commercialisation in Zambia and the emergence of home-grown medium and large scale commercial farmers, the study conducted quantitative structured interviews with individual farmers that are members of two dairy co-operatives in Zambia. Additionally, several qualitative semi-structured interviews were conducted in order to gather data on the various nodes of the dairy value chain.

As Merriam (2002) has pointed out that the method for data collection should be designed in a way it gathers the most useful information in order to answer the main research questions. In this case all the empirical material was collected first-handed by the researcher of this study, focusing on the emergent farmers in Zambia. The research took place in Zambia, over a one month period in April and May 2016. The interviews were conducted amid the natural working environment of the farmers, which facilitated the gathering of further observational data (Merriam, 2002).

4.1 Research Approach

This study is conducted within a framework of theory building and interpretivism. As such, the study is informed by existing literature and theories. The aim is to draw meaning from contextual evidence, and thereby obtain theoretical insights as to the transition process as it is occurring within the Magoye and Fisenge districts. The aim does not include the testing of specific hypotheses. The emphasis is on building a theory, consequently, the dominant research paradigm can be described as qualitative and inductive, with an emphasis on seeking answers to questions of the ‘what, why and how’ type (Creswell et al. 2007). Although the dominant

research paradigm is qualitative in relation to the questions that are asked, much of the specific data is numeric. The numeric data is presented in a summarised format using descriptive statistics such as means and standard deviations, but consistent with the research philosophy. Accordingly, the generalisations are applied to the theory which has local and potentially broader application, rather than to broader populations per se.

Utilising the theoretical position of interpretivism, an exploratory case-study format was considered the appropriate methodological complement for a number of reasons. Firstly, exploratory case studies are tailored to the strengths of qualitative research to study a social phenomenon in its real-life context (de Vaus, 2001). Secondly, this analytic approach combines detailed description and presentation of the contextual conditions of the case (Creswell et al. 2007, p.245). Correspondingly, this study attempts to identify whether path dependency has influenced rural development and structural transformation in the case-study regions. Analysis of the cases was conducted at both of the co-operative and households levels and included quantitative and qualitative aspects. The focus in this analysis was to identify patterns or trend in order to complement existing theory, and also to build new theory as appropriate in regard to socio-economic characteristics.

4.2 Research process

Sampling

The first step in sampling was to contact academics and government representatives working in the field who could facilitate my access to farmer groups. An agricultural extension officer and an agricultural science student from the University of Zambia accompanied me into the field. The sample was restricted to the catchment area of collection centres, which is the area determined by a radial range of 30km around the milk collection centres. Cross-sectional data was collected from 30 smallholder farmers; 21 from Magoye, and 9 from Fisenge using structured questionnaires. With the help of the managers of the cooperatives, farmers were identified and selected based on their membership of the dairy cooperatives and consistently delivering milk throughout the year. The sample size was determined largely by the financial and time constraints.

At the Magoye co-operative contact was made by phone in order to arrange a meeting at their farm. The sampling process was guided by time restriction, resources, and accessibility; it was also necessary for the agricultural extension officer to contact and organise meetings with the groups. The exclusion of non-English speaking households was not perceived as an option. Within a case study there is a possibility to use purposeful sampling to select cases that can give different perceptions of the subject (de Vaus, 2001). For the interviews with individual farmers a balance of gender and a range of different ages has been attempted to achieve.

4.3 Sample Description of Dairy Farmers

It is important to note that samples are solely concentrated in districts that are in close proximity to the line of rail and the large urban centres near Lusaka in the Southern province and Ndola mining city in the Copperbelt province. In terms of the age and level of education of the head of the household, there is little difference between the two farmer groups. However, the farms differ quite starkly on other variables. The farm households in Magoye are 60% larger and have almost four times the per capita income of the Fisenge households. Relative to the Magoye households, the Fisenge farmers started later in dairy production but have over time become more specialized dairy farmers in terms of the importance of dairy in overall household income. The data collected from the interviews revealed distinct differences in the household characteristics among the smallholder farmers. It should be noted however that this sample of farmers was purposely sampled and hence may have represented the most resourceful farmers as the consistently produced and delivered milk to the MCCs. Moreover, the analysis is confined to this specific sample and will therefore not be representative of the wider population of smallholder dairy producers. The majority of the farmers in this sample can be classified as emergent smallholder farmers. However, they do not represent those emergent farmers which have transitioned from the traditional type of farming to increased modes of production (Sitko and Jayne, 2012; Chapoto et al., 2016).

The study focused on the milk collection centres (MCCs) in order to better analyse the response of producers to the development of the dairy sector. The farmers which reside outside of the catchment area of the MCCs are typically constrained to selling their milk unprocessed in informal rural markets. The study compares MCCs from two different agro-ecological regions in Zambia, the Southern and the Copperbelt provinces. Out of the 72 MCCs in existence in

Zambia in 2016 (Ng'andu, DAZ, interview, May 4th 2016), the two MCCs in the Magoye and Fisenge districts were selected for two reasons. First, in the catchment areas of these two MCCs there are sufficient farmers of the emergent type. In the case of these MCCs nearly all the dairy farmers in the catchments area supply the MCC. Both, the Magoye co-operative, Southern province and the Fisenge co-operative in the Copperbelt province, were visited. In total, 30 farmers were interviewed, 10 of whose farms were evenly distributed between the range of 20 to 100 hectares and 17 whom currently farmed in the range of 5 and 20 hectares. The former group are classified as large-scale farmers, while the latter can be categorised as medium-scale farmers. The remaining 3 farmers interviewed were smallholder farmers with a farm size less than 5 hectares. It is important to note that farmers interviewed for this study are concentrated in districts that are located on the line of rail which runs from Livingstone in the south, through Lusaka and on to the cities in the Copperbelt province.

4.3.1 Interviews

After careful sampling, the individuals selected for interview were mostly emergent farmers and were information-rich cases that knew a great deal about issues of central importance to the research. The study used triangulation in data collection through the use of different type of interviews. Alan Bryman (2004, p.454) states that that triangulation, “refers to the use of more than one approach to the investigation of a research question in order to enhance confidence in the ensuing findings”. By doing this, multiple view points and sources allow for greater reliability and accuracy. Numerous stakeholders with different opinions and experiences were interviewed, which contributed to the creation of an overview of multiple viewpoints. Assistance was received from the Zambian Ministry of Agriculture and Livestock extension officer and from the Treasurer to help identify commercial dairy farmers who were members of the Magoye and Fisenge Milk MCC respectively.

Thereafter, 30 structured questionnaires and interviews were conducted with the dairy producers at their farms. The structured interview method was chosen for the farmers in order to keep the data collection consistent. Further side notes were also taken during the fieldwork, mostly on observations and comments deemed important in the context of agricultural commercialisation in the visited districts. In addition to the above primary source of data, two focus group discussions took place with farmers, one in Fisenge and one in Magoye MCCs. This was to elicit qualitative data on the communities farming activities and on the spillover

effects the farmers experienced as a result of their membership in the co-operative. The method was perceived an accurate supplement, as it is able to capture a large number of perspectives and perceptions simultaneously. The interviews left scope for participants to explain and to elaborate on their perceptions, experiences, and behaviours (Merriam, 2002). At the Fisenge co-operative the interviews were conducted at the weekly meeting based on the willingness of particular farmers to be interviewed. There, the selection criteria were divided into three in order to represent each of the MCCs affiliated to the co-operative. Around half of the interviews were conducted in English, while the other half were conducted in the native Tonga dialect through an interpreter.

The third source of data consisted of three informal discussions; one with Mr Kasengele, the agricultural extension officer for Mazabuka region, another with Mr Moses, the district veterinary officer for Fisenge, and finally with the managers and chairpersons of the Magoye and Fisenge MCCs. The discussions provided background information on the formation of the co-operatives and further statistical data. The fourth source of data consisted of semi-structured interview with Dairy Development Officer from the Dairy Association of Zambia Victor Ng'andu, and the Director of Programs Nachimuka Cheepa from Heifer International Zambia. These interviews provided historical context to the development of the dairy industry in Zambia. The Dairy Association of Zambia provided extensive data on dairy production statistics in Zambia since its inception in 2010.

The semi-structured interviews lasted from 30-60 minutes. With the exception of the structured interviews, all other sources of data were audio recorded with the consent of the interviewees. Although there were some drawbacks, for example background noises, the recordings were of great assistance as there were only one interviewer present. Therefore, less focus was needed on taking detailed notes and instead concentrate on the interview.

4.4 Data Analysis

Considering the aim of this thesis, it was not necessary to capture all aspects in the interviews, nevertheless they are transcribed with as much details as possible. Following the fieldwork, the audio material was transcribed and the observational notes collated. In a first step, coding was

used to classify the information from the interviews into thematic categories (Ryan and Bernard, 2003). At this stage, the primary data was coded in accordance with the types of themes and issues that emerged, without considering theoretical concepts or research questions. At this point, the theoretical concepts were used as a means to discover relevant information. The study categorised the farmers based mainly on farm size and sociodemographic characteristics. The raw data used in the empirical analysis was coded in Excel which facilitated the identification of comparisons and links between the different variables. The predictions made in the resulting analysis are deduced from the theory. This type of research approach is subject to some controversy among the academic community.

Consistent with theory building philosophy, there is a focus on first finding patterns within the data (an inductive emergent process), then seeking explanations and interpretations in relation to existing theory (a deductive process), and then, as appropriate, modifying and further developing theory that can explain the new findings (a mix of induction and deduction) (Bendassoll, 2013). The research strategy, within which all of the above is undertaken, is case study analysis.

4.5 Reflexivity and Biases

It is important to point out the managers at the MCCs played a role in influencing the selection of farmers in the sample which may result in some form of biased. The sample selection may have been chosen out of convenience or from 'recommendations of knowledgeable people' (Tongco, 2007, p.153).

In my view, the comments made by the farmers in the presence of the agricultural extension officer were most likely biased with the possible exception of comments made by a few assertive farmers. For example, the interview question on whether the farmers received extension services, an assertive farmer indicated having received no extension services (technical advice; capacity building training) for dairy farming. Also the purposive sampling technique is highly susceptible to researcher bias as it is the sole responsibility of the researcher to make judgments on the reliability of participants. Also as a researcher, certain expectations and assumptions may influence the final outcome and effect the manner in which the research questions are designed. When deciding to take part in this study the assumption was made that

the respondents would be classified as small-scale subsistence farmers. However, on meeting the farmers it quickly became evident that they were medium-scale farmers which had previously been employed in formal employment. This resulted in considerable adjustments being made to the format of the questionnaire and the focus of the study.

5 Case Study and Empirical Analysis

5.1 Area Backgrounds – Magoye and Fisenge

The Magoye dairy region examined in this study, is located in the southern province is a two-hour drive south of the Zambian capital city, Lusaka. This used to be Zambia's most fertile region, the nation's maize granary, however, today the southern province is the milk shed region in Zambia (Mwakikagile, 2010). The southern province has the third highest concentration of rural households in Zambia, and the majority of smallholder farmers in the region are involved in dairy farming (Siegel and Alwang, 2005). The region is relatively abundant in land and water resources which make it favourable for dairy production. The terrain, the Tonga plateau between Lusaka and Livingstone, is at lies at an altitude of roughly 1200 meters above sea level and has a sub-humid tropical climate. The majority of the farming community in Magoye is engaged in mixed farming; mainly crop cultivation and cattle rearing (Hapeela, interview, April 18, 2016). Maize is the staple food used for household consumption, while milk is also used for home consumption and the surplus is sold as a source of income.

The second case study dairy cooperative at Fisenge is located in the mining district of Luanshya, in the Copperbelt Province. The Copperbelt province contains the highest population density in Zambia containing 15.1% of the total population, with around 63 persons per square kilometre (CSO, 2011). Small-scale farmers make up around 75 percent of the agricultural population in the province, however, 82 percent of the region's population lives in urban areas (CSO, 2011). The province receives high rainfall that can support the dairy enterprise. The Copperbelt falls within agro-ecological region III with high rainfall (1,000–1,500 mm per year) (Saasa, 2003). There is an abundance of natural rangeland for livestock feed or alternatively, farmers can plant pasture for their livestock. Copper mining has been the major economic activity for many years, however, the recent decline in international demand for copper has resulted in a substantial decline in mining activities in towns like Luanshya (Munona, interview, April 25, 2016). The region is increasingly characterised by food insecurity, wide spread and low employment levels (Weitz et al., 2015). This has left large proportions of the population have had to seek alternative livelihood means. Unlike crops or other farming enterprises, dairy offers the offers the greatest

opportunities for economic diversification as it provides a regular income. There is cluster of smallholder dairy farmers operating within a 30 kilometer radius in the Fisenge area on the Ndola/Luanshya road. Both of Magoye and Fisenge are located along a densely populated corridor which follows the old line-of-rail running from Livingstone in the south, through the Lusaka and Central provinces, and north to the Copperbelt cities. Given the Copperbelt/Southern Provinces' high population concentration in the urban centres Lusaka, Kitwe, and Ndola, there is very high demand for milk and other dairy products (Ng'andu, interview, May 3, 2016). The two areas are ideal for dairy farming given proximity to major markets and a good resource base.

The dairy sector in both regions is dominated by smallholder farmers, therefore, a broad based approach is can been understood as necessary for the transformation of the dairy sector in these areas. Previous studies (Haggblade, Hazell and Reardon, 2007) have suggested that smallholders provide the greatest potential in processes of change, contributing successful agricultural growth through technological change and market expansion. Participation in the dairy sector is not new to either region. The interview with Mr Ng'andu (May 3, 2016) at Dairy Association of Zambia (DAZ) indicated that the infrastructure was designed for commercial farming and has its roots in Zambia's colonial past. Chenoweth et al. (1995) also mention that the British administration initiated the development of the agricultural sector in order to support the development of the Copper mines and to provide food for workers at the mines and their dependents. Furthermore, the construction of a railway line through millions of acres of fertile agricultural land meant that the surrounding areas were especially suitable to commercial agriculture. The commission on land policy designated areas adjacent to the line-of-rail as crown land and the British administration endured that the best and most productive land was reserved for the exclusive use of European settlers (Chenoweth et al., 1995). The above underlines the importance of the line of rail and its significance of the evolution of the dairy sector in the crown land regions.

The chairman of Magoye Cooperative, Mr Hapeela (interview, April 18, 2016) as well as Mr Ng'andu (interview, May 3, 2016) at DAZ both described that shortly after independence in 1964, many of the European farmers left Zambia, and abandoned the large landholdings, a situation which contributed to the steady decline of marketed milk produced in the country. Realising the declining trend, the government embraced the policy of redistributing the land to indigenous people who wished to settle for agricultural purposes. However, as Chenoweth et

al. (1995) pointed out, the settlement schemes was used as a state patronage tool for rewarding retired or retrenched civil servants with titles land, a policy which persists as a key factor in Zambian agriculture. Large tracts of land were issued by the government in the Copperbelt province and the southern province through settlement schemes. Interestingly, Sitko and Jayne (2014) in their research on the growth of emergent farmers stressed that biased state policy decisions towards larger-scale operations contributed significantly to the conversion of 73 percent of the customary land to titled land for agricultural development in for agricultural the Lusaka, Central and Copperbelt provinces (p.197). The above mentioned studies support the finding gathered from the data on the emergent farmers in both Fisenge and Mazabuka dairy cooperatives. A large proportion of the farmers acknowledged that they had receive favourable land settlements on retiring from public sector employment in the early 1990s. The next section the characteristics of the farmers will be analysed before the study discusses the land acquisition in more detail.

5.2 Characteristics of Smallholder Participation in Commercial Dairy Farming

In this part, the general characteristics of smallholder dairy farmers are discussed. In addition, the study will examine three specific subjects that merit further attention: human capital, access to land, and production efficiency. Finally, the study will provide an overview of the barriers dairy farmers experience in their pursuit of productivity growth. First, the descriptive statistics table below will be discussed.

Table 1: Descriptive Statistics of Dairy Farmers

Descriptive Statistics			
	Median	Minimum	Maximum
Age (years)	55	40	86
Total household composition	3	1	7
Years of practicing dairy farming	10-13	1-3	20<
Milk productivity/cow/day - Rainy season (litres)	7-10	2-6	21<
Milk productivity/cow/day - Dry season (litres)	4-7	1-3	15-20
Yearly milk income (ZMK)	12096	2699	93000
Total farm size (ha)	21	2	98

The study revealed that the smallholder farmers in the sample practicing dairy farming are older with a median age of 55 years. The number of female interviewees was 9, while the male farmers accounted for 21 of those interviewed. The median age for females was 49 years, while their median farm size was 8 hectares. In contrast, the median age for males was 59 years, while the farm size had a median of 13 hectares. The higher range in the age of the farmers support the view that most of the farmers had previously worked in off-farm employment and had since retired, this will be discussed further in the following sections. The farmers highlighted that younger members of the community showed no desire to enter dairy farming. The majority of the farmers had raised their children who had since migrated to the urban centres of Ndola in the Copperbelt and the capital Lusaka to work in formal professions. The lack of engagement of younger generations in dairy farming is sure to have future implications for the development

of smallholder dairy farming. This process of structural change supports the assumptions made by Lewis (1954), regarding the migration of labour into urban areas in search of employment in manufacturing and service at the expense of agriculture.

The interviews with the women farmers yielded insights on gender and agricultural commercialization, particularly that they faced several gender-specific constraints in terms of access to land and productive assets, as well as labour constraints that limited their ability to expand their land and become large-scale commercial farmers. Also, it must be noted that all but one of the females interviewed came from the Fisenge co-operative. The reason for the smaller farm size in Fisenge is related to the fact that they are a relatively new organisation. Moreover, Munona (interview, April 25, 2016) described that the female farmers had received significant assistance from non-government organisations (NGOs) such as Heifer International (HI) and Green Living, suggesting that the support was critical for a woman to access resources. Although, the discussions with the female farmers in the Fisenge co-operative suggested that the traditional social setting are beginning to change, this was not always the case. While these insights are important in understanding the gender dimension of agricultural commercialization and land expansion, more data is required to better analyse the issues of gender in term of medium and large-scale commercial farming.

5.2.1 Human Capital

The Chairman of the Magoye cooperative Hapeela (interview, April, 18, 2016) indicated that the majority of dairy farmers, that are not members of any cooperatives in the region, practices traditional dairy farming. These farmers primarily produce milk for home consumption. Moreover, they are characterised as having low levels of technical knowledge and frequently experience issues of mismanagement which is an impediment to the farmers making sound on-farm decisions that translate into higher levels of productivity. This problem is also acknowledged by World Bank (2011), which agrees the shortage of know-how stems from ineffective extension services and is exacerbated by poor-quality infrastructure that restricts the flow of information. There is a specific lack of knowledge on how to provide adequate nutritional requirements for the animal which negatively affect the animal's productive capacity. The government runs extension services through the Ministry of Agriculture and Cooperatives, however, as the interview with a representative from the Dairy Association of Zambia (DAZ) (Ng'andu, interview, May 3, 2016), most of the agricultural extension officers

tend to focus on crop production, rather than dairy, creating a barrier to grow for farmers that practice dairy farming outside the cooperatives.

Contrastingly to the above, the dairy farmers interviewed for this study all belong to dairy cooperatives, and an analysis of their educational background underlined two main education groups; one consisting of farmers who had at least completed high school and the other that had tertiary education and had extensive professional work experience. This is in line with the observations of Lubunge et al., (2012) saying that majority of the household head in the sample tend to have a relatively high level of education which assumed to increase the household's ability to utilise market information, thereby utilising market opportunities. Moreover, it facilitates participation in training, access to credit, and understanding of written materials accompanying the introduction of various new management and operations tools. The data shows that over 50% of the farmers in the sample had attended secondary school, while 23% had some form of tertiary level of education (see figure 5 below).

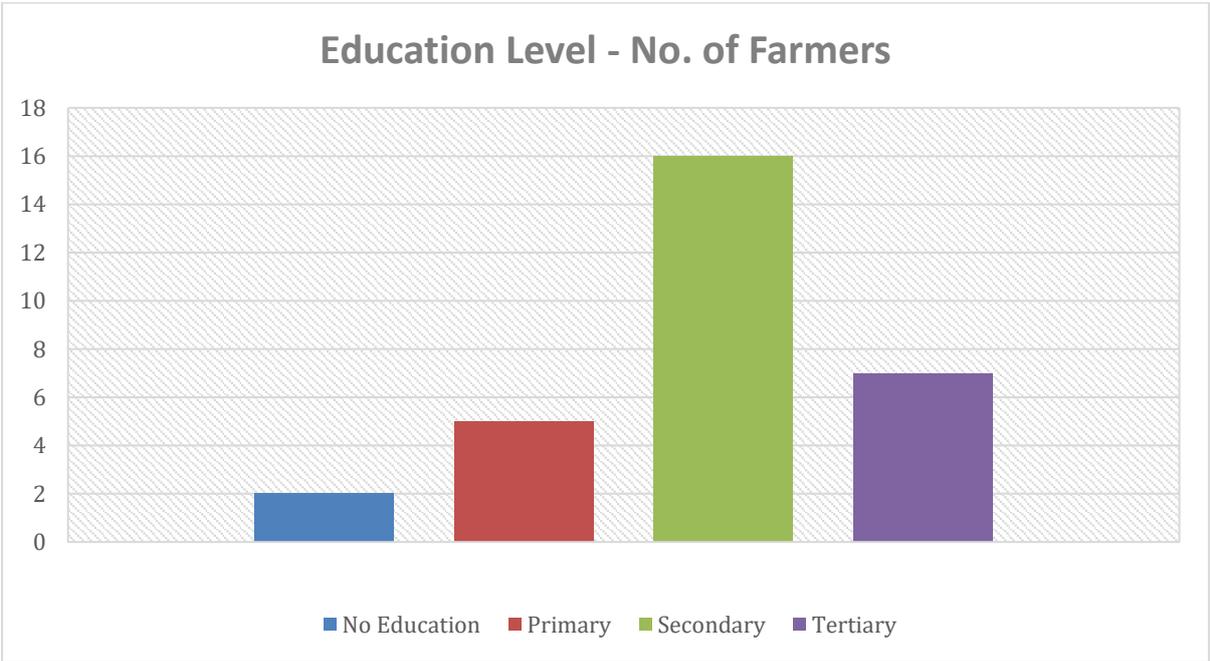


Figure 5. Educational Level of the Dairy Farmers

Being farmers residing in rural areas, one might make the assumption that they had a lower standard of education. However, the study indicates that the interviewed farmers were in most cases highly educated elite professionals who had retired from formal employment and migrated from the urban to the rural regions. The farmers were well informed on the operations

of their farms, such as the type of breed they used, the time period an animal was in lactation or the precautionary measures required in order to prevent infectious diseases affecting their animals. However, the small-scale farmers which produce milk for the cooperative benefit from access to relatively better infrastructure, higher use of inputs, and benefit from labour linkages and knowledge spillovers.

Ng'andu (interview, May 3, 2016) explained that many of the more intensive large-scale farmers have been able to acquire and transfer knowledge through collaboration with commercial farmers. The producers at MCCs also receive training, extension services and veterinary services. Dairy farmers affiliated to co-operatives and MCCs participate in capacity building opportunities by visiting commercial farms where they learn about new technology, improved work methods and techniques. However, Ms Matambo (interview, April 18, 2016), who is a farmer involved in dairy since 2001 in Magoye, intimated that the methods employed by the commercial farmers are not very conducive to their own farming methods as they are largely unaffordable. Recently, DAZ with the help of a Dutch non-profit organisation, SNV, Agri-profocus, and Agriterria have begun to train artificial inseminators at the co-operatives in order to improve the number of improved dairy breeds owned by small scale farmers (Ng'andu, interview, May 3, 2016). This should have the effect of increasing the milk volumes received at the MCCs.

5.2.2 Access to Land

Hapeela (interview, April 18, 2016) indicated that “the Zambian people were encouraged to go back to the land” by the first President in Zambia K.D. Kaunda who served from 1964-1991. Hapeela's explained that a significant proportion of the farmers in the Mazabuka region had benefited from a government scheme which redistributed large landowner farms to indigenous Zambians. Moreover, in the mid-1990s around two dozen farmers in the Magoye area collaborated in order to collectively start selling their milk produce to formal the formal market in order to receive a more favourable price. Finally, in 1997, they formed a Milk Collection Centre (MCC) with the help of the Zambia National Farmers Union, and four years later they established the Magoye Smallholder Dairy Farmers' Cooperative Society in order to make the enterprise economically and commercially viable. The manager of the cooperative, Mr Ndungu (interview, April 18, 2016), told that currently, the membership of the cooperative is 760 members with around 160 of those being female members. He estimated that in 2015-2016 the

cooperative supplied on average 150,000 litres per month. Furthermore, the cooperative has consistently increased the supply of milk produced year on year to become one of the largest milk providers in Zambia. The increase in membership and the resulting rise in milk volumes suggest that most farmers appreciate the viability of dairy farming which is seen as a business that could alleviate a number of problems in the community.

According to Sitko and Jayne (2012), the rapid growth of the emergent farmer population has coincided with both the promulgation of the 1995 Land Act and an economic boom period during the 2000s, and therefore there is a strong possibility that former public sector employees acquired titled customary land in these regions. Based on the interview questionnaires, it is clearly visible that the 1995 Land Act has a significant effect in the land acquisition strategies employed by the group of farmers at the Magoye cooperative. The analysis revealed farmers from both Magoye and Fisenge, were initially employed in the non-farm sector, with the majority of these being employed in the public sector. Many of them migrated from urban areas to the peri-urban regions located close to the urban centres. This profile fits with the analysis of Sitko and Jayne (2012, p.5), which suggests that an elite group of working professionals achieved their scale of operation through what they term 'lateral entry', whereby non-farm income combined with bureaucratic knowhow was used to purchase land and farming assets (see Sitko and Jayne, 2014; Jayne et al., 2014).

With the exception of four farmers who inherited land from family at the outset, the study found that the majority of medium-scale and large scale farmers either availed of the Government settlement scheme or purchased the land outright. In total, 50% of the farmers sampled indicated that after they retired from previous held off-farm employment they sought out investment opportunities and directed their resources to agricultural land. Up to 17% of those sampled had obtained the land through a settlement scheme which was channelled through the District Council on behalf of the Government. They had each received in the range of 20-40 hectares during a period in the early 2000s. This is aligned with Sitko and Jayne (2014) research that suggest much of the growth in the emergent farm sector appears to be attributed to individuals using off-farm income, particularly from public sector employment, to acquire land and enter the agricultural sector. This may support the notion that inherent limitations of small-scale agriculture prevent a widespread transition to larger, more commercialised production systems (Collier and Dercon, 2014).

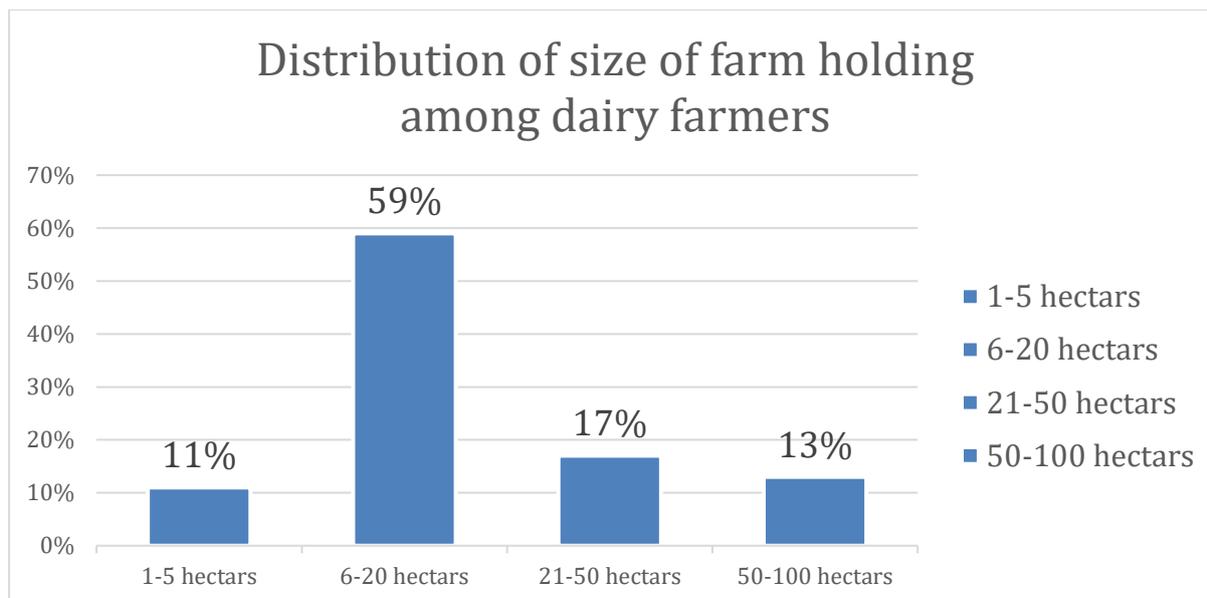


Figure 6: Distribution of size of farm holding among dairy farmers

The study revealed that 11% of the farmers had small scale farms, while 59% of the farmers are classified as medium sized farms, and 30% had emergent large-scale farms ranging from 21-100 hectares. In total close to 90% of farm sizes across all groups, exceed what is categorised as small-scale dairy farming.

5.2.3 Farm Productivity and Market Participation

The third main characteristics of the sampled farmers concentrates on the productivity and market participation. The two figures below specify the quantity of milk produced by each region during the rainy season and the dry season. The warm rainy season (December-April) and the cool, dry season (May-August), and the hot dry season takes place from September-November) (Ndungu, interview, April 18, 2016). These seasons experience considerable differences in grass and drinking water availability, resulting in a decline in milk yields during the dry season.

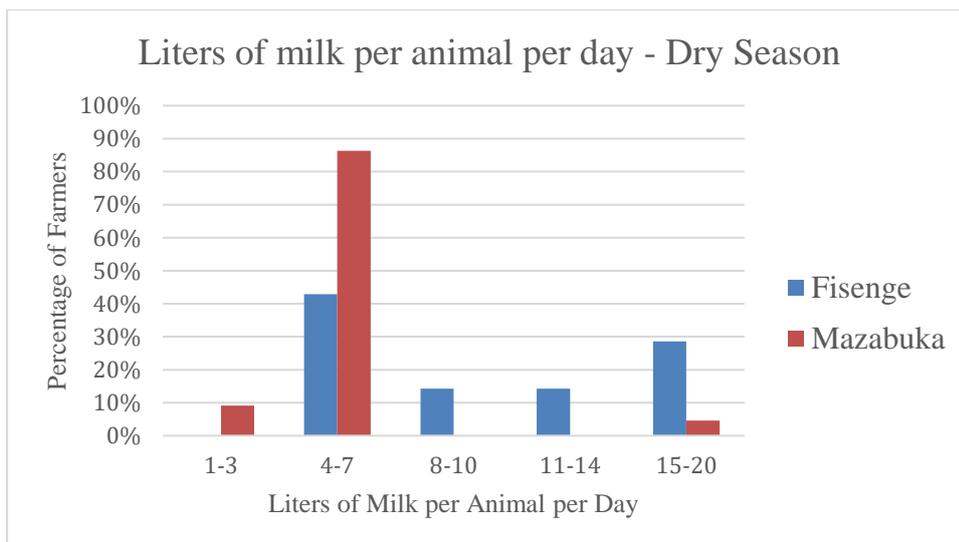


Figure 7: Litres of milk per animal per day – Dry season

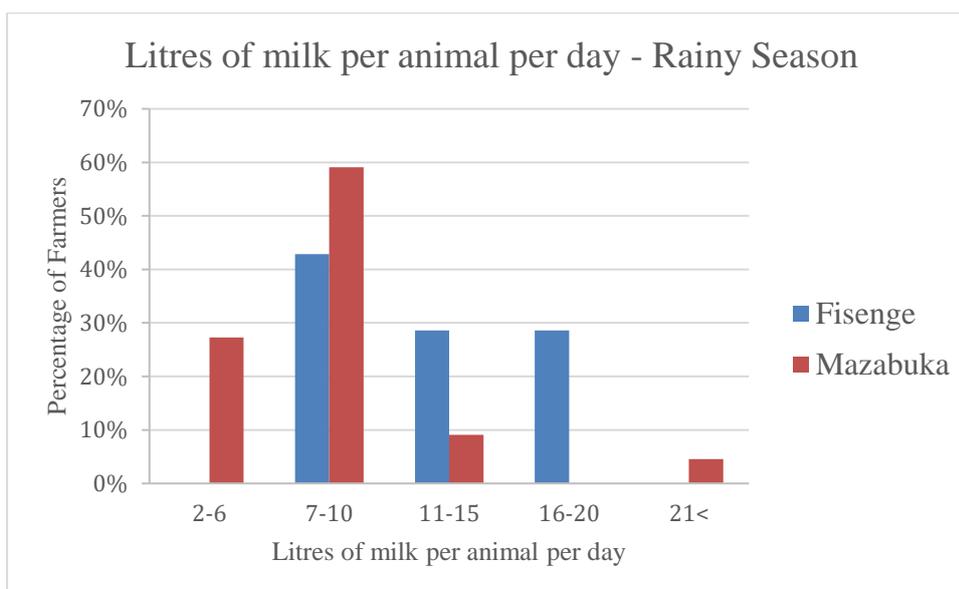


Figure 8: Litres of milk per animal per day – Rainy season

The above figures show that the volume produced per cow at the Fisenge co-operative is higher than that produced at the Magoye co-operative. The main reasons for this occurrence can be attributed to several factors, primarily the more efficient breed of the cow, and the favourable wet climate observed in the Copperbelt region (Ndungu, interview, April 18, 2016). Other factors that may account for the dichotomy in production could be the smaller farm size, greater access to family labour and smaller herd size prevalent among the Fisenge respondents. All of

the respondents from Fisenge had a land holding size less than 8 hectares, and a dairy herd size in the range of 2-4 animals. All of the respondents from Fisenge had also indicated that they used family labour. In comparison, the respondents from the Magoye co-operative were spread between 5-100 hectares, while the majority of the farmers had dairy herd ranging 5-20 animals. The respondents at the Magoye co-operative were also on average older in age and many of their children were adults and working in non-farm employment.

Total productivity among the smallholder dairy farmers ranges between 8 and 10 litres per day. Emergent farmers who keep both cross breeds and indigenous cattle produce between 17 and 21 litres per day, while the large-scale producers are between 40 and 50 litres. According to the interview with Ng’andu (May 3, 2016), an issue that affects productivity is the quality of the breeding stock that exists in these regions. Most of the farmers interviewed use indigenous cattle which yield low volumes of milk. Ng’andu explained that Zambia that the demand for higher yielding animals is extremely high and Zambia currently does not have an adequate amount of exotic breeding stock.

In the Magoye co-operative 50% of the dairy cows had a lactation length of between 251 and 300 days, while at Fisenge co-operative the animals had 60% of the dairy cows in the same range as shown in the below figure.

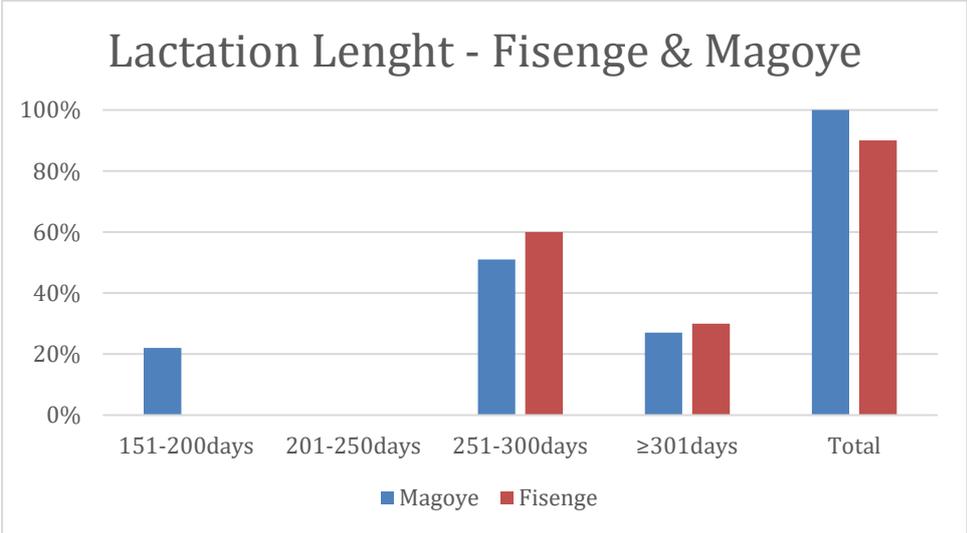


Figure 9: Lactation Length – Fisenge & Magoye

In some cases, farmers from Magoye experienced short lactation lengths, with 20% of the respondent’s animals drying up between 150 and 200 days. According to Mr Hapeela (interview, April 18, 2016), often this can be attributed to the breed of animal and the quantity

and quality of feeds being given to the animal. Mr Ng'andu (interview, May 3, 2016) explained that during the dry season which last anywhere from 4 to 5 months, the dairy farmers become dependent on dry rations. Moreover, a significant portion of the maize bran produced in Zambia is used for export to beef industries in neighbouring Botswana and Namibia and this has resulted in significant increases in the price of feeds which impacts negatively the dairy industry. The dairy farmers are unable to access liquidity until they receive payment at the end of the month, if the maize bran is required in the middle of the month then they do not have the liquidity to access the feed.

Processor – Producer relationship

The development of the dairy sector in Zambia reflects the trends of events in the country prior to independence. The dairy sector exhibits a dichotomous structure as a consequence of the commercial dairy sector developing along the line of rail, while the traditional dairy sector developed off the line of rail. The Dairy Association of Zambia, confirmed the network of milk collection centres, processing plants and the high geographic concentration of dairy production activity are mainly located along the line of rail dissecting the Southern, Central and Copperbelt. He also suggested that the majority of farmers in Zambia are traditional cattle owning households which invariably extend into the rural milk shed areas where much of the milk is wasted. The dairy sector in Zambia did not developed evenly in all areas due to regional differences influenced by both geographical and institutional factors. As explained, in the theory section, prime fertile grassland was allocated to settler dairy farmers in the Southern, Central, and Copperbelt provinces, in the early 1900s. After independence the state run dairy settlement scheme organised parastatal dairy operations on these former settler owned farms near Lusaka, Kabwe and, Ndola. These state organised schemes turned out to be largely unsuccessful and the majority of the milk produced in Zambia came from large scale producers. However, as Ng'andu indicated that state led Dairy Produce Board had begun to develop the infrastructure for the dairy industry, although this mainly benefitted the large scale commercial producers. He highlighted that subsequent structural adjustment programs in early 1990s led to the privatisation of dairy processing in Zambia. Today, the private sector milk processors, input services, financial and veterinary services, and livestock feed milling companies are located close to urban centres in the milk producing regions (Kenny, 2008). The infrastructure for milk collection is not developed in most rural parts of the country except for the South, Central, Lusaka and Copperbelt provinces. The major milk producing areas are located near the

periurban districts of Choma, Moza, Mazabuka in the Southern province, Lusaka, Kabwe in the central province, and Kitwe, Ndola and Luanshya in the Copperbelt. This fits into the idea that location matters, as Krugman (1991) demonstrates that such transportation hubs are favourable locations for industries subject to increasing returns, and that the location of a hub can be self-perpetuating, thus giving a role for historical shocks and path dependency. Mr Ng'andu of DAZ (interview, May 3, 2016) stated that these regions exhibited the greatest demand for milk, while province in the north and east of the country not have a market for dairy.

Ng'andu said raw milk was a highly perishable product and as such needs to be refrigerated within a short time of milking. He explained that in this regard, farmers were required to deliver the milk to the MCCs within a time constraint of no more than two hours. For this reason MCCs smallholder dairy farmers were assisted in organizing in associations around newly established milk collection centers. Collection center sites were typically chosen in locations where there are sufficient dairy producers and where there is a surplus supply beyond what can be marketed in the informal market. The milk collection centres or sheds are located about 8–30 km radius from small-scale dairy farmers and the major milk processors are located 60–160 km from the collection centres. The distance of milk collection centre limits the participation of periferal farmers. There is therefore a need to establish more milk collection centres to reduce on the distance.

Heifer International (Ms. Cheepa, Interview, May 4, 2016) indicated that the establishment of MCCs are targeted at clusters of farmers located in areas where permanent settled systems of agriculture are practiced. This has the effect of reinforcing the concentration of the dairy industry in the dairy producing regions. She highlighted the role of both the government and NGOs in facilitating linkages between the smallholders' and the modern dairy value chains. This successful approach organises suitable groups into cooperatives, providing them with improved technologies, extension services, improved animal breeds, MCCs with installed cooling and testing facilities. The subsequent organisation of producers into cooperatives and MCCs has encouraged processors such as Parmalat Zambia Ltd, Zambeef, and Varun Food & Beverages, input providers (feed and veterinary services), official financial institutions (Zambia National Commercial Bank, Micro Bankers Trust to collaborate with smallholders. The widespread proliferation of cooperatives and MCCs close to urban markets has been pivotal to increasing the scope for economies of scale in dairy marketing and distribution. Moreover, the reduction in transaction costs have increased the size of the market for processors and retail

outlets (Emongor et al., 2004). This corresponds to the analysis in previous research section (Holloway et al., 2000; Ehui et al., 2003; Lubungu et al., 2012), which suggest that households with lower transaction costs are more likely to participate in markets as they will most likely get back the marketing and production costs. In addition (Chapoto et al., 2013) suggests market incentives also play a critical role and motivate the high degree of intensification, both in terms of inputs and output, such that the profitability of different enterprises may shape the nature of farm intensification and commercialisation. On the demand side, the increasing urbanisation in the regions traversing the main transport line, along with the rising incomes and developing dietary preferences have increased the importance of the formal market channel in the dairy sector (Neven, 2006; World Bank, 2011).

Krugman (1991), argues that it is necessary to grasp the developments leading to the local and regional concentration of production. The above analysis provides an interpretation of how colonial infrastructure investments one century ago have shaped the trajectory of growth in the dairy industry in Zambia, as a result of cumulative agglomeration. The study finds that colonial railroads had a strong causal impact on settlement, commercial agriculture and urban growth. The line of rail was supplanted by road infrastructure, yet the economic concentration persists today. While such colonial investments in railroad influenced this pattern, railway cities mainly persisted because their early emergence served as a mechanism to coordinate investments (Jedwab et al., 2013). Furthermore, Jedwab & Moradi (2013) the lack of any significant infrastructure prior to the construction of the railway, means the impact is even more significant. The development of the dairy sub-sector could be seen as a consequence of path dependency, again amplifying the effects illustrated (Fujita et al 1999). However, the model sketched above only captures the impact of transport infrastructure. Institutional forces which have not been discussed here may well have reinforced the effect on the development of the dairy industry.

5.2.4 Constraints to increased commercialisation

Zambia's current milk production is suffering due to 'load-shedding', increased voltage, which ruined machinery for sterilisation and damaged milk production. According to DAZ (Ng'andu, interview, May 3, 2016), the production of fresh milk has been negatively affected by power outages across the country. The high cost of feeding dairy cattle is also having a negative impact on the dairy sector. Furthermore, it was explained by Ng'andu, that in order to enhance smallholders' participation in contractual agreements and modern value chains, it is important

that the government, private sector and other supporting agencies increase their efforts aimed at enhancing smallholders' productivity such as access to extension services, dairy marketing information and animal breeding programs. Specifically the government, probably with the help of other stakeholders, need to invest in infrastructure such as breeding centers, water and MCCs so as to bring production enhancing facilities closer to the communities. Ng'andu sees that cooperatives should not only focus on assisting members market their milk but also facilitate their acquisition of relatively cheaper stock feed by exploiting economies of scale through bulk purchases and transportation. Respondents argued that the collateral requirements for a loan from commercial banks prevent many households from utilising these loan services. Thus, enabling smallholders to commercialise might require credit services and products that are both accessible for and adjusted to their concerns.

6 Conclusion

This study combined qualitative case study analysis with household questionnaire data, to examine the characteristics of an emergent group of market oriented farmers. Secondly, it analysed the context within which this group of dairy farmers achieved their scale of operation. Lastly, this study devoted some attention to the concept of path dependence, and whether increasing returns (i.e. historical shocks) determined a particular pattern for the distribution of the dairy sector across space. Based on analysis from the data collected, the study has primarily argued that the significant rise in zambia of emergent smallholder farmers has largely gone unnoticed in the contemporary debate on the appropriate scale of production to promote growth in agricultural. This group of indigenous emergent farmers have achieved relatively large scales of commercialised production, and this has had significant consequences for the agricultural transformation taking place in Zambia. Overall, the vast majority of farms in Zambia are below 5 hectares, with median farm size near 1 hectare in most of the country (Sitko and Jayne, 2012), compared to the emerging farmers sampled in this study which cultivate anywhere between 5 and 100 acres of land. Typically the farmers interviewed were larger than smallholder farmers, were well educated, they possessed previous practical experience, and were growth oriented. According to Collier and Dercon (2013), the key benefit of size is that it is more conducive to commercialisation. The study identified three potential economies of scale that would suggest these farmers are more likely to increase their mode of production. These scale economies are intrinsic in their organisational form which is formal and institutionalised. They can be classified as: Human capital (skills and technology adoption), access to capital (off-farm capital, land acquisition), and organisation and logistics (cooperative, MCCs, markets). This study contends that particular dynamics provide emergent smallholder farmers with favourable strategies to increase production, and potentially expand into larger scale commercial farmers, as is argued (Coller and Dercon, 2013; Collier, 2008).

However, this study suggests there is little evidence that the rapid growth of the emergent farmers in the dairy sector in Zambia is a reflection of a widespread transition among small-scale farmers expanding into a higher scale of production. Instead, it appears that much of the growth can be explained by the 'latreal entry' (see Sitko and Jayne, 2012) of retired public

sector employees who initially invested in land and later entered dairy farming as a viable commercial opportunity. Moreover, this observation is consistent with the results found by Jayne et al., (2014) which suggests that access to land may have been afforded to those with social and political capital gained from their experience working in the public sector. As mentioned in previous sections the 1995 Land Act facilitated easier access to customary land for the emergent farmers who originally work in off-farm employment. This finding is also consistent with the case of Zambian emergent farmers (Sitko and Jayne 2012) that availed of numerous government settlement schemes. In terms of gender and inclusiveness, the study found that there were significant disparities in the size of female landholdings and those landholdings owned by men. Furthermore, a number of the female respondents were widowed suggesting that they may have inherited the land from their male counterparts. What was clear from the qualitative interviews was that gender discrimination was still prevalent in land acquisition, however, some farmers indicated it is improving.

The colonial era construction of the railroad in Zambia constituted as a shock to the economic and geographical equilibrium of Zambia. The railway today is almost exclusively used to transport raw materials to the coast of Africa. However, historically it had significant causal impact on the settlement of white dairy farmers located in the fertile plains of Zambia. The physical and economic endowments contributed by the line of rail have persisted in the long-term. The study contends that the railroad cities and sunk investments may have shaped the pattern of dairy distribution exhibited in Zambia today. Additionally, the study highlights that access to markets and infrastructure reduced transportation costs, which significantly contribute to the concentration of dairy producers, processors, input services, and retail outlets. Moreover, Zambia's infrastructure prior to the construction of the railroad was largely under developed, meaning any spatial shocks such as the development of the railroad takes on greater significance. Jedwab et al., (2013) would argue that this impact may be permanent if there are increasing returns in production.

6.1.1 Areas of Further Research

To help answer these questions more rigorously, it would be necessary to test the relationship characteristics variables of the emerging farmers, using regression analysis. In addition, it would greatly add to the findings had a quantitative comparison been made between the

emergent farmers and the traditional farmers which make up the majority of the farming population in Zambia. Another related aspect worth investigating is to examine dairy farmers that produce milk in regions located away from the line of rail. This would afford the researcher further insight into the influence of location on the development of the dairy sector. Also, it may be worth investigating whether these emergent farmers can sustain their commercial growth without external assistance, from processor, NGOs, or the state. Additionally, it is worth examining whether these farmers can be used as an example of agents of change in the process of commercial growth.

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