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# DETERMINANTS OF SMALL- SCALE DAIRY FARMING PROFITABILITY IN GOKWE DISTRICT: A CASE STUDY OFGOKWE DAIRYCOOPERATIVE

BY

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**Abstract**

Small-scale dairy farmers constitute the bulk of dairy farmers in Zimbabwe, but they contribute very little to the total national milk intake in the country. The sector continues to record slow growth, amidst the market potential and concerted revival efforts by various stakeholders. Additionally, the exodus of well-experienced large-scale farmers after the land reform program left a huge gap that could be filled by small-scale farmers. It has become apparent that 15 years after the effects of the land reform, small scale dairy farmers have remained contributing a modest 2% of the total national milk intake required. Many of the small-scale dairy farmers still face viability challenges even after receiving support from development partners, private sector, and the government and this is quite worrying. It is upon this background that this study was conducted to determine the factors that influence profitability in this sector and ascertain major constraints being faced by small-scale farmers at both individual farmer level as well as cooperative level. A cross sectional study was conducted in Gokwe District targeting 30 participants who were given questionnaires to fill in and this was complemented by interviews and focus group discussions. The collected data was analysed using descriptive statistics, gross margin analysis and binary logistic regression model. The results suggest that tertiary education, marital status, household and dairy cowherd size were significant in determining the profitability of small-scale dairy farmers in Gokwe District. The study concluded that access to and quality of information provided to marginalized and poor farmers had through a wide range of reform initiatives in agricultural extension services. Farmers' access to institutional services had a significant positive effect to profitability. The fact that land is managed under a traditional system, with most small-scale farmers not having title deeds has led to overstocking and overgrazing, which ultimately lead to limited herbage production throughout the year. Most farm sizes are small, such that priority is on crop production rather than fodder production. Absence of leases for land has resulted reluctance by most small-scale farmers to have long-term investments and improvement, which is required to increase dairy production. Recommended policy actions, therefore, should be directed towards the construction of more milk collection centres (markets) near the farmers to reduce the distance to the market; establishment of breeding centres for dairy animals for farmer to increase their herd size; and knowledge transfer through provision of extension services to educate the farmers on dairy management. There is a need for policy actions towards strengthening market access through upgrading milk collection centres (markets) or constructing new ones to reduce the distance to the market; establishment of breeding centres for dairy animals for increased herd size; and increased knowledge transfer through provision of extension services to educate the farmers on dairy.

**Key Words:** Profitability, Milk Collection Centers

**Declaration Page**

I declare that this dissertation is my original work except where sources have been cited and acknowledged. The work has never been submitted, nor will it ever be submitted to another university for the award of a degree

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## Copyright

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## Dedication

I dedicate this research to my family for without their support I would not have made it this far.

## List of Acronyms and Abbreviations

| | |
|---|---|
| DDP | Dairy Development Program |
| EADD | East Africa Dairy Development |
| FAO | Food and Agriculture Organization of the United Nations |
| GDP | Gross Domestic Product |
| IDC | Industrial Development Corporation |
| MCC | Milk Collection Centers |
| NFIFO | Net Farm Income from Farming Operations |
| NFI | Net Farm Income |
| NI | Net Income |
| NGOs | Non-Governmental Organizations |
| PSDP | Peasant Sector Development Program |
| SNV | Netherlands Development Organization |
| ZADF | Zimbabwe Association of Dairy Farmers |

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# CHAPTER 1 INTRODUCTION

## 1.1 Introduction

Agriculture is the backbone of Zimbabwe's economy and will most likely continue to be, so. According to World Bank (1997), smallholder agriculture is likely to remain one of the major sources of rural growth and livelihood improvement in Zimbabwe. Although agriculture contributes only 11-14% of GDP of Zimbabwe, the sector offers employment to a greater percentage of the country's' population, precisely 70 percent of the population, and about 60 percent of all raw materials for the industry. About 45 percent of the exports in Zimbabwe are from agriculture (Ministry of Foreign Affairs and International Trade, 2018). It is important to note that the dairy sector is a crucial component of the Zimbabwean agricultural structure. Dairy farming and the production of milk by smallholder farmers improves rural employment and increases incomes while at the same time also helping in diversifying, intensifying, and stabilizing agricultural production (Ngetha,2000).

According to the Industrial Development Corporation (IDC) (2018), Zimbabwe used to be ranked among the biggest milk producing countries in Africa and had a very structured dairy industry before the land reform programme, which was effected a1round the year 2000. The small-scale dairy farmers in Zimbabwe are uniquely set apart from others in the region. They have small indigenous breeds on small land sizes, milking an average of 4 to 6 litres of milk per day per cow, whilst on the other hand the large-scale dairy farmers have large herds milk an average of 30 litres a day (Munangi, 2006).

Various non-governmental partners to revitalize small- scale dairy farming so that they can fill up the role that used to be filled by commercial farmers supported the

government of Zimbabwe. Despite all the effort afforded to smallholder dairy sector, its contribution to the national milk intake has remained low at 2% (SNV Dairy Subsector study, 2016). It is upon this background that this study aims to determine the factors that influence profitability in this sector, and ascertain major constraints being faced by small- scale farmers at both individual farmer level as well as cooperative level in Gokwe district. The results of this study will add to existing literature on small-scale dairy farming in Zimbabwe.

## 1.2 Background to the Study

The Zimbabwe Dairy sector is dual in nature, and is characterized by the quality and quantity of land, gross income realized and wealth inequalities among agricultural sub-sectors and the population (Karunaratne & Wagstaff, 2013; Marecha, 2009;Ngongoni *et al*, 2006). Since attaining independence, the Government of Zimbabwe has made so many strides in trying to stimulate production in the small- scale dairy farming sector through policy formulation and various programs. To be precise, the government has come up with specific programmes to encourage commercial dairy production within the small-scale sector. For example, in 1983 the government set up the Peasant Sector Development program (PSDP) now known as the Dairy Development Program (DDP) to stimulate commercial milk production among the smallholder dairy farmer. Recently the government launched a special livestock program in 2017 worth US$300 Million as part of its concerted effort towards supporting small- scale dairy farmers to participate in commercial milk production. The loan scheme had very favorable conditions and was strictly for smallholder dairy farmers.

Apart from the government-initiated programs, several stakeholders have been instrumental in providing development support to small- holder dairy farmers through establishing Milk Collection Centres (MCCs) and resources to commercialize the smallholder dairy farming sector in general. Such stakeholders include International NGOs and Donors, namely, Land O Lakes, EU, Stabex, Fintrac, SNV, NADF, DANIDA, WeEffect, SDC and so on. In addition, private sector companies such as Nestle Zimbabwe and Dairibord Zimbabwe Limited have also come up with out-grower programs to support small-scale dairy farmers. The upsurge in support by the development organizations as well as private sector companies came because of a huge gap in milk supply in the country realized after the effects of the land reform, coupled with the restrictions of milk imports into the country.

The smallholder dairy membership has grown from 800 to 2000 since independence; (SNV, 2016). According to ZADF (2018), the national dairy herd has since declined from 100 000 to 25 000 despite the increase in membership. Small-scale dairy farmers in Zimbabwe have faced a myriad of challenges, which include, depleted grazing, high costs of production, inadequate drinking water and lack of de-worming facilities. These poor resourced farmers have no ownership to their land, which is communally owned. To add to that, this group of dairy farmers has weak institutional linkages to processors, which makes them have less bargaining power.

Small-scale dairy farmers are contributing only 2-3 percent to the total national milk production in the country. Zimbabwe is producing just over 50% of the required milk volume for the nation, which is 67 million liters against a national demand of 120 million liters (ZADF,2018).The government put strict measures on dairy imports by the after the call for protectionisms of the dairy sector. It is therefore paramount for the local dairy farmers to cover the deficit of milk requirement for the country that was

previously being covered by imports. There is potential in the dairy sector to increase production since there is a huge gap. Additionally, due to the government policy on land reform, policies have been put in place to encourage small-scale farmers to venture into farming enterprises.

Despite all efforts towards capacitating the small -holder farmer, this sector continues to be less productive, contributing only 2 percent to the national milk intake. Both development organizations and scholars have conducted research to establish the factors that affect profitability and productivity of the smallholder farmers and most of these studies dwelt more on these factors per individual farmer. Noteworthy, little or no attention has been given in also determining the factors that affect the profitability of the dairy smallholder farmer at Milk Collection Centre (MCC) level or at cooperative level. This research apart from focusing at individual farmer level will therefore give a special focus on collective action and establishing those factors that drive or hinder profitability at cooperative level and how these usually cascade down to individual level.

## 1.3 Statement of the Problem

Small-scale dairy farmers constitute 70% of dairy farmers in Zimbabwe (Mugweni & Muponda, 2014), but they contribute only 2% to the total national milk intake in the country. The sector continues to record slow growth, amidst the market potential and concerted efforts by various stakeholders. Additionally, the exodus of well-experienced large-scale farmers after the land reform program left a huge gap that can filled by small-scale farmers. It has become apparent however that 15 years after the effects of the land reform, small -scale dairy farmers have remained contributing a modest 2% of the total national milk intake required. Many studies have been conducted to determine the factors affecting productivity of small -scale farmers in

Zimbabwe. Other studies have also been conducted to establish the economic viability of small-scale dairy farmers; most of these have been conducted at individual farmer level only. This study therefore aims to determine the factors influencing profitability of small -scale dairy farmers at both individual and cooperative or at group level.

## 1.4 Research Objectives

The following specific objectives guided the study:

1. To determine the factors that affect profitability of small-scale dairy farmers at farmer level and cooperative level.
2. To establish the constraints that has been hindering functionality of Milk Collection Centres.
3. To assess if collective action is of benefit to the individual dairy farmer.

### 1.4.1 Aim of the Study

The aim of the study was to determine the factors affecting profitability of small-scale dairy farmers in Zimbabwe looking at farmer level as well as cooperative level. The study specifically focused on a case study of Gokwe Dairy Cooperative.

## 1.5 Research Questions

1. What factors affect profitability of small- scale dairy farmers at farmer level and cooperative level?
2. What are the constraints that hinder functionality of Milk Collection Centres?
3. Does collective action by small -scale dairy farmers have an economic benefit to individual farmers?

## 1.6 Assumptions of the Study

1. All the targeted dairy farmers are going to agree to participate in the research as respondents.

2. All dairy farmers and MCC will have clear and complete records in place
3. The information to be given by respondents is going to be correct

## 1.7 Significance of the Study

The research findings and recommendations will assist actors in the dairy sector to take heed of determinants of profitability in dairy farming at small -scale level. It will help actors in the dairy industry to implement strategies that will counter some of the negative factors. The research findings will also help the small-scale farmers to compile a checklist of best practices at both farmer level and cooperative level.

## 1.8 Delimitations of the study

The area of study for this research was Gokwe Dairy Cooperative, situated at Gokwe centre in Gokwe District of Midlands Province. The sampled population was all the members of Gokwe Dairy Cooperative, some ex-members of the Dairy Cooperative and MCC workers.

## 1.9 Limitations

The need to observe COVID 19 regulations was the only limitation as this prolonged the time and process for data collection. It was not possible to meet participants as a group but the researcher had to go to each household and conduct interviews.

# CHAPTER 2 REVIEW OF RELATED LITERATURE

## 2.1 Introduction

This chapter is centered on an assessment of related literature. It outlines the base upon which the concepts, theoretical framework, the thesis prototype, and the issue sunder investigation (small-scale dairy farming profitability or economic viability) are built. The chapter content provides a critical analysis of available studies in attempt to provide evidence that will assist in formulating an informed assessment of literature on the concept of profitability or economic viability of small-scale dairy farming. The study particularly reviewed literature on measures of economic viability in the dairy farming, which are divided into financial and non-financial measures.

## 2.2Theoretical Framework

Theories are interpretive lenses, which serve to influence the capacity of researchers to appreciate phenomena (Aldrich & Martinez, 2007). The theoretical framework of this study derived from prior experiential research as well as experiences and observations of behavior and attitudes that provide viewpoint for analysis. Central to this study are factors affecting the profitability of Small-Scale Dairy Farmers in Zimbabwe. The researcher identified profit maximization theory as the most relevant theory out of several theories that are related to this study.

The conceptual framework being adopted in this study was derived from the profit maximization theory. This theory assumes that small-scale dairy farmers are profit maximizing economic agents who are profitable in their farming enterprises. Defining profit in economic terms is the difference between total revenue and total cost. The main supposition for this study is that the overarching goal of the small-scale dairy farmer is to increase profits, hence (Profit (P) =Total Revenue (TR) – Total Cost (TC)). This then means that farmers will maximize profit either by increase in revenue or

reduction in costs, in other words if there is a surplus above production cost.

## 2.3 Relevance of the Theoretical Framework to the Study

The objective of any business is to maximize profits. The profit maximization theory relates to how business maximizes profitability by increasing revenue and reducing costs. This study focused on factors affecting the profitability of small-scale dairy farmers in Zimbabwe. Profit maximization theory was found relevant in this study as it sets the basis upon which the objective on profitability of small-scale dairy farming is built. It is supposed that the main objective of every entity that is in business is to maximize profits. One of the key factors that influence economic sustainability of any firm is profitability. Providing small-scale dairy farmers, development partners and public extension officers with information on factors affecting profitability of small-scale dairy farming will go a long way in enhancing dairy farming enterprises. Business profitability was discussed at a greater length because it is at the essence of this research. It therefore forms the basis of this research, as it is where the dependent variable of the study emanates from.

## 2.4 International and Regional Perspectives on Small-Scale Dairy Farming

The study drew reference from dairy farming in the US, and paid explicit attention on the Northeast dairy sector. It can be noted that profitability in this region is measured in three forms: Net Farm Income from Farming Operations on an accrual basis (NFIFO), Net Farm Income (NFI) after taxes, and Net Income (NI). These profitability measures, which are NFIFO, NFI, and NI forms a function of input/output prices and production constraints, which depends upon farm and farm operator characteristics. An example of studies conducted before such as (Mishra & Morehart, 2001; Short, 2000; El-Osta & Johnson, 1998), brings forth the notion of how constructing an economic model can explain factors that influence dairy farm profitability. The results

of these studies were then fulfilled by using a multivariate regression analysis.

Most governments in developing countries have promoted small-scale dairy farming since it has proven to be instrumental in promoting rural development. (Bennett et al., 2006; Dube, 2008). There is need to devise strategies that generate rural employment by focusing on high value agricultural production. (World Bank, 2008; FAO, 2014).

Countries such as India, Kenya and Malawi were the pioneers of the smallholder dairy scheme model. This model has the bulk of milk coming from smallholder farmers (Marecha, 2009). India had the biggest dairy development programme named Operation Flood, India a formerly milk-deficient nation is now milk one of the largest producer in the world. It increased milk production from 17 million tons in 1951 to 84.6 million tons by 2001 (Verghese, 2007).Market and profit oriented small scale dairy production is one way to increase household income, reduce losses and increase profit and create employment and it serves as a viable tool for productivity (Bennett *et al*., 2006)

There are current and new opportunities for small-scale dairy producers, which are projected on towering opportunities emanating from global increased demand for milk and dairy products. There are expanding markets for high-value food products, which offer opportunities to expand farming systems and develop a profitable smallholder dairy sector (FAO, 2014). There are changes happening in economies in Asia, Latin America and Sub-Saharan Africa, which are now housing a rapidly growing population of affluent consumers with either a strong tradition of dairy consumption. Milk production in the Asia-Pacific region is estimated at 217 billion litres of liquid milk equivalent (LME), while demand and consumption is about 240 billion litres LME (FAO, 2014).

Attention can be drawn from dairy farming in the tropics, in this region, small-scale dairy production systems are regarded as sharing common characteristics while remaining diversified, so they then become heterogeneous rather than homogeneous in traits. There are some studies that were conducted in Asia, Sub Saharan Africa and Latin America, where Devendra (2001) classified small-scale dairy production approaches in the tropics into three different types which are; (I) traditional, these have adhoc marketing arrangements which is common in most peri-urban smallholder dairy farms, (ii) cooperatives these have foundations of natural aggregation or concentration of farms, and lastly (iii) intensive production systems which have herd sizes of up to 200 dairy cows. According to Moran (2005), small-scale dairy systems can also be classified according to physical factors such as (magnitude of scale, stock type, forage and feeding systems), farm characteristics  such as land and stock ownership, labour, farm income, and institutional factors such as marketing channels, farmer support systems.

Profit level distinguishes all tropical smallholder dairy production and rapid growth in an environment characterized by growth in urban demand and emerging income generating opportunities.

It is fundamental to note that small-scale dairy farmers are contributing much into the required economic production and opportunities for tackling the recurring problem of poverty in rural area by transferring income from urban households to poorer rural counterparts, this therefore helps in improving food security for rural and urban dwellers (FAO, 2014). It's good to note that, profitability can be realized in both settings through export exchange as long as local products are competitive in areas such as quality, safety and price. Small-scale dairy industries are likely more sustainable based on environmental efficiencies than the mono-cultural industries of developed countries (Falvey & Chantalakhana, 2001).

## 2.5 General factors Influencing Small-Scale Dairy Farming Profitability

Markets are crucial and key in the profitability of small-scale dairy farmers, however there has been notable difference in market accessibility, and this has affected profitability of dairy farmers to a greater extent (Mburu *et al*., 2007). There has been a myriad of problems when it comes to marketing of milk by small-scale farmers. On the hand, large- scale dairy farmers have had good access to markets and have managed to sell their milk intake. Small-scale farmers end up off taking their milk at the available market and are often left without a choice. It is often realized that small-scale farmers seem to be profitable given the fact they usually use family labour and little or no supplementary feed. The challenge often arises when you try to measure profitability. The lack of a specific model to measure

profitability of small-scale farmers presents a challenge. There is need to use different models to measure profitability for small scale and large-scale dairy farmers because they operate in completely different environments. In a study of dairy performance conducted in Kenya, Gloria(2008) opines that the costs of production, processing and transportation coupled with poor infrastructure have affected the profitability of dairy farmers.

Notably, dairy farms in most developing countries face exactly the same challenges. Generalizing findings of factors that affect small-scale farmers and large-scale farmers can pause as challenge if one looks at the fact that small-scale dairy farmers usually sell their milk unprocessed and face transport challenges since buyers usually use their own transport. If these dynamics are considered, they can bring out several dimensions to the dynamics in the profitability of small-scale dairy farmers

Management is another key factor that affects profitability of dairy farming (Ford &Shonkwiler, 2004). This study emphasized that the scale of the dairy farm is usually not important when it comes to the effects of management on its profitability. Profitability largely relies on three key areas of management, which are production management, management of finances and human resource.

If a small-scale dairy farm is managed well, it can be more profitable than a large-scale farm. It remains unproven however if there is a correlation between the management of small-scale dairy farm and its profitability in Zimbabwe. A contextual appraisal of Gokwe can help in bringing out this dynamic, clarify, and establish whether profitably hangs around profitability of there are other factors.

However, despite the huge potential for profitability through small-scale dairy farming, in reality they have been characterized by low productivity due to viability challenges. For example, in Bangladesh, small-scale dairy farming has been recorded to being greatly affected by unavailability of feed and fodder and the cost of bought-in feeds stock feed as well as the lack of technical knowhow (Khan *et al*., 2010). The farming system, breeding policy and veterinary services have influenced profitability and performances between small-scale dairy farming households and non-farming households in the Philippines (Uddin *et al*., 2012). Of late, smallholder dairying has witnessed growth as a source of income (Moran, 2005; Khan *et al*.,2010; Uddin *et al*., 2012). FAO (2014) stated that there has been a reduction in prices of dairy products due to an influx of cheap imports from advances nations.

The dairy stakeholders in Philippines have tried to lobby the government to have the influx of these cheap products. The effect of the reduction in prices of local products caused by stiff competition of imports has affected the profitability of dairy farming in the country.

In other nations such as the UK, New Zealand, Canada and the USA , viability problems on small scale dairy farms have farmers exit the sector leading to fewer dairy farms or increased the scale so as to drive up efficiency and enjoy economies of scale (Levitt, 2014; Woodford, 2014). Intensive small-scale dairy production is also affected by unavailability of good quality and nutritious feed as well as poor infrastructure and lack of access to markets. In addition, there is also poor institutional support and poor disease control and low uptake of technology in developing countries (Moran, 2005).

Mexico adopted a multi-criteria approach in organizing small-scale dairy farmers and came up with a forage strategy based on alfalfa, ryegrass and corn silage, which are high in nutrients, and meets the nutritional requirements of the cows. (Val-Arreola *et al*., 2006). Assam, India adopted an initiative to improve milk handling among traders and this resulted in a new governance institution, improved risk mitigation, improved milk quality and subsequently high sales and customer satisfaction. There has been an economic impact in the capital district estimated at USD 5.6 million annually (Ballantyne, 2014).

## 2.6 Emerging Issues in Small-Scale Dairy Farming in Sub Saharan Africa

In Sub-Sahara, there are varying stories of success. There exists untapped potential as well as challenges resulting from structure, conduct and performance.

In Kenya, 90% of the milk supply comes from the smallholder sector, comprising of business hubs that add value to the milk as well as offering other services to the farmers such as animal health care products, inputs, access to finance, and linkages (TechnoServe, 2012).

In West Africa, production settings are characterized by milk production within mixed crop-livestock farming method. Some studies in The Gambia, Guinea and Guinea Bissau highlighted that there are lack of genetic merits in traditional cows, poor farmer group structures with poor resources and this limits reinvestments capacity (Somda et al., 2004) and affects profitability. The East Africa Dairy Development (EADD) project reviews done in Kenya, Rwanda and Uganda, revealed that the use of artificial insemination services gave a huge boost to production (Sewunet, 2011).In Kenya, Tanzania and Uganda, the uptake of well-grown feed has increased profoundly. However, small-scale dairy farmers have had problems in accessing land for subsistence and fodder crop

farming due to fragmentation of holdings (Orodho, 20I6).

## 2.7 Key Elements Influencing Small-Scale Dairy Farming Profitability

Constraints affecting profitability of dairy farming such as technology development and innovation, productivity, and viability are best understood after looking at on their adaptability and adoptability. Adaptation is simply described as any change or modification in technology advancement, productivity measures and economic viability of dairy farming approaches from available technologies. Adaptation also considers existing techniques and traditional approaches or new approaches and is dependent on the challenge to be addressed or opportunity that exists. On the other hand, adoption spells out the decision by an economic unit to either use or not use a certain improvement, strategy, or new farming technology (Oladele, 2005).Concisely, adaptation is a process and not an event and it emphasizes on the importance of knowledge and information for productivity hence boosting viability.

### 2.7.1 Innovation Platforms

These can be either physical or virtual and sometimes it's a virtual network of interested parties who are put up around something of mutual interest to collaborate and mutually focus so as to generate innovation around it. (Adekunle&Fatunbi, 2012). According to Makini*et al*. (2013), innovation platforms forms a forum which has a number of stakeholders sharing mutual interest and they gather so as to come up solutions that are mutually beneficial. Examples of such stakeholders who may form the forum of innovation are private sector player, NGOs, farmers, processors, wholesalers, policy makers, traders etc.

### 2.7.2 Productivity

Productivity is defined as a measure of economic performance that compares the how effective and efficient an effort by an individual or a group of them is in producing goods and services. In other words, productivity is the measure of how specified goods and services are managed to produce quantity and quality. You may also define productivity as an indicator of goods and services produced relative to the amount of input used to produce the goods and services. Within the context of this study, productivity was measured in terms of milk yields and milk. Productivity of small-scale dairy farming considers how innovation and available resources are used to improve value addition. Profitability of small-scale dairy farming largely also considers relies heavily on innovation.

### 2.7.3 Viability

Viability relates to a practicable capacity for success or continuing effectiveness. In a business sense, it means a state in which a business is able to survive. Survival in is terms of financial position and performance. The ability of a business, product, or service to competitively stand against other products at a commercial level is known as viability. In agriculture, viability is measured based on a calculation of gross margin and this determines the enterprises profitability. A gross margin is defined as return realized after covering direct costs related to production, and it gives a good indication of profitability. (Cavatassi *et al*., 2009).

## 2.8 Rationale for Productivity and Viability on Profitability

There has been worldwide research on food crops and animal technology, which have turned out successful. On average crop-yields and animal output in most developing

nations have seen a sharp increase of 71 percent between1961andthe millennium, with a sharp increase in grain production (World Bank, 2006). There are studies that have been conducted which realized that a small increase in the productivity of the farming sector in developing nations leads to a 0.8 percent reduction in the number of people who are experiencing poverty (Thirtle et al., 2003). This then means that there is a correlation between agricultural productivity, an assumed viability and profitability. One strategy adopted to augment this phenomenon is the value chain approach.

However, there have been some challenges. Population continues to increase within small-scale farming areas against the available land and other resources hence expansion of agricultural activities has been stifled, (SADC, 2010; ZimVAC, 2014). To add to that the ever-controversial issue of land tenure, limited mechanization, labour bottlenecks and shortages of inputs has greatly affected growth and expansion of small-scale farming activities. It remains critical in this sector that technological and managerial innovation be adopted as one of the ways to improve profitability. Just like other value chains within the global village, agricultural producers are engaging in value chains that are have high in value to a diversity of consumers, especially urbanites (Cavatassi *et al*., 2009).

There is a gap that exists to expand agriculture markets, which will provide incentives improving productivity and ultimately profitability. It is worth to note that production patterns are changing regularly, but yields remain suppressed, prices are ever fluctuating and access to viable market remains limited, and there is a situation where the bulk of smallholder producers continuing to be marginalized (Cavatassi *et al*., 2009). As a result, innovation platforms that improve productivity, product quality and efficiencies remain essential.

## 2.9 Empirical Studies on Small-Scale Dairy Profitability, Productivity and Viability

An economic analysis was done in Thailand on ten small-scale dairy farms that had dairy cows of between 6 to 30, milking between 6 to12 litres per day, and production costs averaging USD0.32 against income revenues of USD0.26. This Gross margin analysis made it clear that small-scale dairy farming was not profitable in this country. (Skunmun & Chantalakhana, 2000; Moran, 2005). In South Vietnam, a comparative study on the profitability of small-scale dairy farming in rural and peri-urban areas showed that small-scale dairying, was not quite viable with a gross margin of 0,04USD per litre in rural areas whilst in peri-urban areas it has a gross margin of 0.01USD per litre(Caietal.,2000; Moran, 2005).

In Bangladesh, daily milk yield per cow was very low in a study conducted by (Khan et al., 2010). This study discovered that crossbreeds had low milk yield of around4.27, whilst indigenous breeds even had much lower yield of 1.78litres. The gross cost of maintaining a dairy milking cow was established as USD1.09 for crossbreds per unit per day and USD0.23 indigenous cows per each cow. An economic viability assessment was conducted in Gambia, Guinea Bissau and Guinea for resource-poor dairy farmers and it revealed a gross margin of US911,USD203,andUSD42respectively (Somda et al., 2004). In East Africa, a study based revealed that exotic dairy breeds stock that are fed on grass had a high gross margin, and farmers who adopted improved technology even had higher returns, (Orodho, 2006).

The production cost of smallholder dairy farmers in Zambia is estimated at USD0.14perlitre for cross breed and for pure breeds about USD0.20 per litre (Pandey *et al*., 2007). It is interesting what the study established in Zambia that commercial dairy farmers realized low gross margins than small scale dairy farmers even though they enjoy economies of scale it seems the high production costs outweighs it.

Studies conducted in India have revealed that a farmer with less than ten dairy cows realizes better profits and more efficiency. (FAO, 2014b). Another study conducted in Pakistan showed that small-scale dairy's' knowledge and educational level play a critical role in the performance of the dairy enterprise. (Mumba *et al.,* 2011)**.**There is a difference between knowledge and educational level of farmers. Hands on experience and knowledge acquired platforms like workshops and seminars can be very instrumental and at times more beneficial than tertiary education. It remains untested whether the level of education affects profitability of small-scale dairy farms in Zimbabwe particularly Gokwe in Zimbabwe, literature on small-scale dairy production has shown that the average dairy herd within the smallholder dairy subsector is six animals.

Whilst the average number of milking cows at a given time in Zimbabwe small-scale sector has been established to be two from past studies, the milk intake per day has been established to be 6.8 litres per cow (Dube & Hanyani- Mlambo, 2012). In Zimbabwe, the net gross margin is uneconomic and has been calculated as a negative USD0.13. In order to get a net return of USD1.23 one needs six milking cows. Other studies conducted in Zimbabwe revealed a number of factors that were affecting viability of small scale-farmers, these are smaller sizes, low productivity and reduced economic

efficiency in larger herds (Hanyani-Mlambo et al., 1998; Zvomuya, 2007; USAID, 2010; Kagoro & Chatiza, 2012).

A survey conducted by Chinogaramombe et al., (2008) for smallholder farmers who reside in semi-arid areas of Zimbabwe, identified that tick one diseases, short supply of feed and transportation were the major factors that hindered the growth and performance of smallholder dairy production.

A study conducted in Chikwaka and Marirangwe area by Mugweni & Muponda (2015) revealed that the herd size amongst the small-scale dairy farmers were the most important factor to consider when looking at factors affecting profitability. Though Mugweni & Muponda (2015) found out that there is a correlation between the herd size and milk sales, it is however problematic to establish the direct relationship between size of the herd and profitability and small-scale farmers can maximize production and reduce costs by using family labour, which can contribute to profitability. The above-mentioned study having carried out in areas around Harare cannot be used as a generalization of the whole Zimbabwe. Therefore remains pertinent to explore further if the herd size directly affects small-scale farmers far from the capital city as they have a very different market and conditions of business.

## 2.10 Milk Production in Zimbabwe

Milk production become key in Zimbabwe as the demand the gap between milk supply and demand continue to be felt. Washaya & Chifamba (2018) noted that the demand for milk and milk products in Zimbabwe has been growing overtime in sync with the growth in population. With current production being 54.3 million litres against the demand of 120

million, Zimbabwe remains highly in demand for milk and milk products (Washaya & Chifamba, 2018).

A mass exodus of commercial farmers that was experienced in Zimbabwe from the dairy sector since the land reform programme, has seen small scale dairy farmers providing an alternative or back up to the lowering levels of milk production in the country. Despite the decrease in the production of milk in the commercial or large-scale sector caused by mass exodus of commercial farmers, the small scale dairy farmers have not been spared with production fluctuating from 2.7 million litres in 1999 to 1.13 million in 2011 (Livestock and Meat Advisory Council, 2018). Worrying as the trend has been, the small-scale farmers have not stopped complimenting and meeting the gap left by large-scale farmers after the land reform programme.

At the attainment of Zimbabwe's independence in 1980, large-scale commercial farmers supplied all the milk that entered the formal markets, whilst the milk produced by smallholder farmers was mainly for subsistence purposes (Chavhunduka, 1982).

The government of Zimbabwe established the Dairy Development Programme in a bid to elevate small-scale dairy production into commercial. This programme saw the government establish about 20 smallholder dairy schemes which are located in various parts of the country. These schemes have provided an avenue through which smallholder farmers participate in dairy production and marketing. A milk collection centre is a distinct feature of these dairy schemes and they operated by farmer managed marketing cooperatives. The milk collection centers are responsible for ensuring bulking of milk-by-milk producers are equipped with cooling facilities.

Some dairy schemes have had their milk collection centre equipped through the support received from government and donors. These milk collection centres can now process milk into fermented milk (Amasi) and yoghurts. Some smallholder dairy schemes are not adding value to the milk but rather deliver the milk to established urban-based processors. These processors then go on to process the milk into various products such as Ultra-high temperature processing (UHT) milk, cheese, yoghurts, and dairy related which are sold to consumers in the urban areas. The dairy schemes that deliver milk to processors participate in a formal value chain. The smallholder dairy value chain in this case is comprised of the semi-formal and the formal dairy value chains.

It is now more than three decades since the smallholder dairy schemes were established by the government, and the milk production and supply at these centres have not contributed meaningfully to the national milk intake, contributing less than 5% of the national milk requirement.

In trying to compare with other countries such as Kenya, where 80 percent of the national milk intake comes from the smallholder sector (Moll, Staal & Ibrahim, 2007). Zimbabwean smallholder sector could be doing much more given that there is so much room for that growth. According to Muriuki & Thorpe (2002), in Eastern and Southern Africa, with the exception of Zimbabwe and South Africa, dairy production is dominated by smallholder farmers and smallholder farmers contribute significantly to the national milk intake.

There are a number of studies that have been conducted in Eastern and Northern Africa to understand milk market participation and volume of supply to markets (Demissie, Komicha & Kedir, 2014 in Ethiopia; Balirwa, Nalunkuuma & Serunkuuma, 2016 in

Uganda). These studies have shown that there are socio-economic factors that are pertinent in informing the development of interventions to improve market participation and productivity and ultimately supply. There studies conducted in Southern Africa, which have contributed to literature on milk market participation and milk supply. The objective of this study therefore is to assess the determinants of milk production profitability, assessing of constraints at milk collection centres of the smallholder dairy value chain in Zimbabwe in order to inform the development of appropriate interventions that can enhance smallholder farmers' profitability in milk market participation and improvement in the volume of milk sales.

### 2.10.1Econometric Models for Assessing Profitability, Productivity, Viability and Impact

The art of measuring performance of certain interventions and innovations involves quantitative and process analysis in literature (Hall *et al*., 2001; Hall *et al*., 2003). The quantitative analysis, comes from neoclassical economics, and shows a direct link between what has been invested in research, and the development of agricultural technology and its adoption by farmers then its ultimate effect on profitability. This conceptualization has been greatly prioritized by researchers with financial allocation being based on return on investment. It has been realized that the qualitative approach was process oriented rather than being oriented towards the overall outcome, which is profitability and impact. The qualitative approach has mainly used econometric tools, which has mainly focused on assessing the effect of different factors on adoption (Doss, 2003). A dependent variable usually explains the independent variable and they include the OLS, Tobit, Probit and Logistic Regression. There are a number of limitations that have been identified such as the absence of adequate input and output data on the

process of research and the change that makes it difficult to attribute past, current or future outcomes to research investments (Alston *et al*., 1995)

## 2.11 Measures of Profitability in Farming Enterprises

There are different ways of measuring profitability that exists in literature. Profitability maybe defined as the expression of the result obtained by an organization because of the activity of transformation/exchange (Pavaloaia, *et al.*, 2010).According to Burja (2009), when measuring profitability there are two components involved that are expenses incurred in carrying out activities and the income earned. The Asian Development bank (2009) stipulates that economic viability and profitability be seen as two sides of the same coin simply because economic viability measures the return accruing to entities and this means that an entity can only be termed economically viable if it is financially sound and economically efficient

It is worth to note that if a project is profitable, there will be no economic benefits and this makes the two measures complementary. Similarly, Cain *et al*. (2007), summarizes measures of economic viability as a firm's net margin, gross margin and net profit.

Therefore, it can be derived economic viability can be defined basing on the enterprises profit and margin ratios. It is worth to note however, that there is no harmony regarding one approach that can be adopted in measuring profitability in farming enterprises. There are varying methods and opinions from different scholars. Notably, the gross margin as well as the net margin have been identified as good measures of farm enterprises in many studies (Argiles & Slof, 2001; Chantal Khana, 2005; Rushton *et al*., 2000

### 2.11.1 Measures of Dairy Profitability

Diane, Polson, Oelker & Gary (2008), specified that there are 15 measures of profitability in dairy farming which can be classified into 11 management areas and these are, rate of production, costs control, capital efficiency, liquidity, profitability, repayment schedule, mission, solvency, capturing dairy manure nutrients, families' standard of living and motivated labour force.

#### *2.11.1.1. Gross Margin Analysis*

Gross margin is defined as the difference between the gross output and the variable cost of production. Gross margins area common tool adopted to measure the performance of an enterprise (Johnson, 1982).

There was a study conducted by Gambia, Somda *et al*., (2005) which had 90 dairy farmers. This study used the Gross Margins to assess the profitability to assess the profitability as well as economic viability of smallholder dairy farming. The outcome from this study was that smallholder dairy farming in Gambia was viable, although profitability varied amongst the dairy farmers by scale. It is clear that gross margin analysis can also be used when comparing different farming enterprises. In order to assess if there was a difference in profitability between farmers who borrowed and those who did not, Chindime (2007) had to apply the gross margin analysis to estimate returns from smallholder dairy for in-kind credit in central and northern milk shed areas of Malawi. The outcome of the study indicated that small -holder dairy farming was profitable for both borrowers and non-borrowers.

### 2.11.2 Break-even Point Analysis

Rushton et al. (2009) brought suggested that the strength of an enterprise can also be deduced by finding out the "break-even" level of activity that is calculated by looking at the units of output or revenue. Break-even point is therefore to be used in addition to other measures of profitability. It then verifies the findings from other measures of profitability. The break-even is derived when fixed costs are divided by total sales minus cost of making a product, which indicates the contribution of each unit produced to the recovery of the fixed costs of the business.

### 2.11.3 Cost-Benefit Analysis

Another measure of profitability is Cost-benefit analysis, which can also be used in addition to other measures. It is a financial appraisal of an activity that compares all cost and benefits that go into a production process. If a farmer wants to assess if they are making profit, measuring the cost and benefits of production becomes paramount. This measure can also be used to compare return on investment. Wine, Omore & Githinji, (2017) conducted a cost-benefit analysis to estimate returns to smallholder dairying in the Kilimanjaro region of Tanzania. Results of the analysis estimated the returns on dairy activities to be 20%.Given these results; it becomes clear that the cost-benefit analysis can be useful in assessing performance of a dairy enterprise.

## 2.12 Non-Financial Measures of Profitability in Farming Enterprises

There are various studies conducted by other researchers, which have revealed non-financial measures of economic viability. There is a particular study by Mburu *et al*. (2007) & Zvinorova, (2010) that was done in Zimbabwe, which concluded that there are differences in economic viability amongst small-scale farmers and these differences were influenced by the ability of the farmer to access markets and related services. A strong positive correlation was derived between profitability and the number of milking cows. It came out that farmers who were highly resourced were relatively profitable and enjoyed their returns on investment. These findings can be supported by other studies such as the study by (Shoemaker *et al*., 2008; Kaitibie *et al*., 2008; Kavoi *et al*., 2010) which used the total cost invested in a dairy cow to measure farm viability and this was conducted with the assumption that the dairy investment per cow allows a farmer to determine the efficiency of the money put in the dairy farm.

Labour investment is another m non-financial measure of viability. This non-financial measure of viability is determined by the size of family labour. Ngongoni *et al*. (2006) in their study examined the correlation between household size and profitability. This study concluded that profitability was determined largely by the labour that was invested in that particular enterprise and ultimately influenced productivity. Herd size is another non-financial measure of profitability that was found to be highly correlated to profitability. In their studies Mburu *et al*., (2007) &Zvinorova (2010) concluded that farmers who had invested highly in their herd size enjoyed higher return on their investment.

## 2.13 Conceptual Framework for Profitability Analysis

At the core of this study is the conceptual framework classifying several factors that affect profitability of small –scale dairy farmers. According to Bioca (1997), farmers differ according to their farm and physical characteristics. These characteristics impact on the farmers' profitability resulting from the volume produced, price perceived and cost structure of the farming enterprise.

This concept is depicted in Figure 2.1

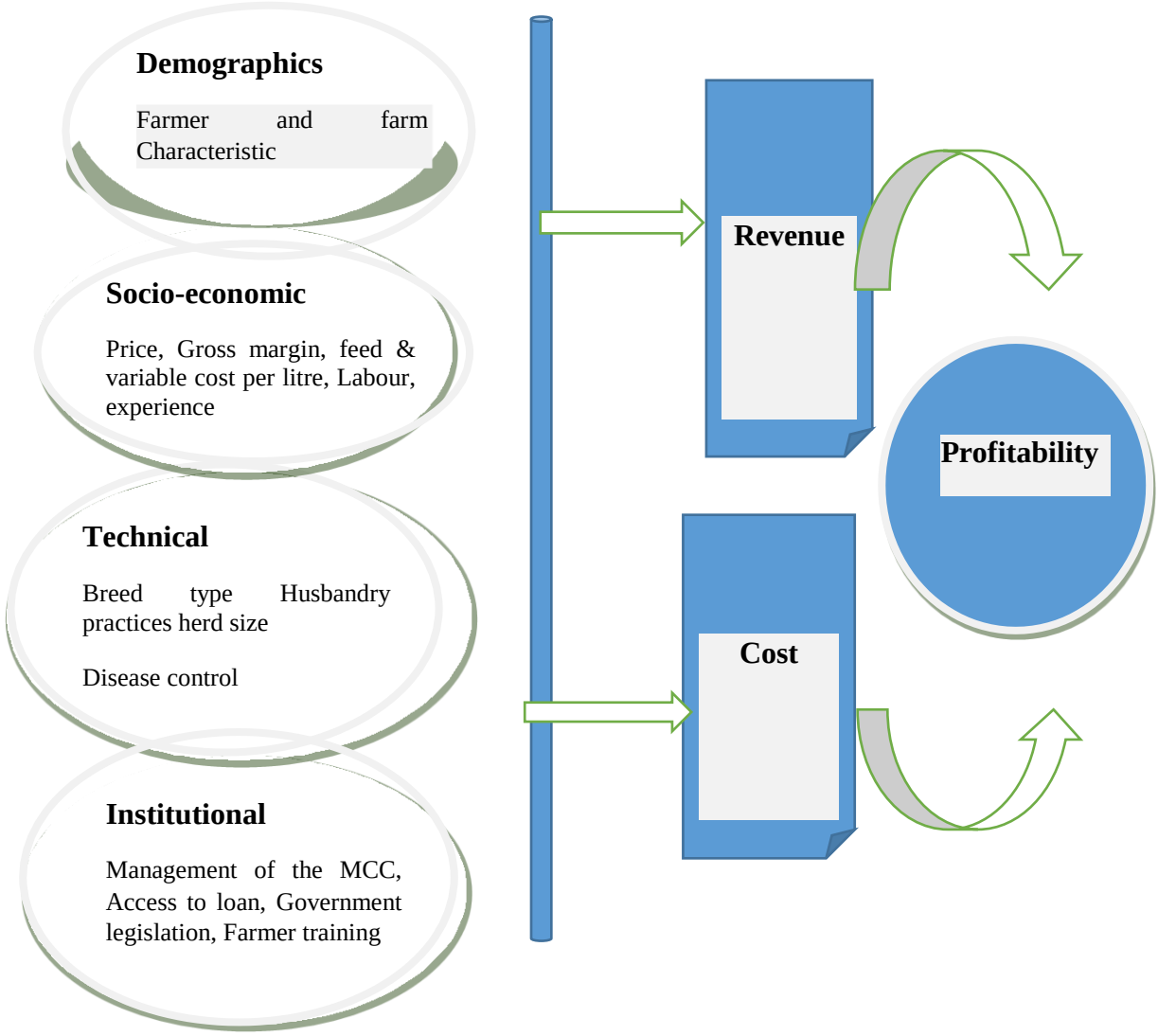


**Figure2.1: Conceptual Framework, Source: Engel (2000)**

Profitability varies amongst farmers in the same enterprise due to varying characteristics such as aversion to risk and uncertainty, social networks and organization, age, gender, good agriculture practices, mechanization, household size and education, access to loans, ability to control costs.

## 2.14 Summary

This literature review provided an insight into the nature of small-scale dairy farming, its characteristics, factors influencing its profitability, which include among other the issue of technology and innovation, productivity and viability. The other factors are identified as financial and non-financial factors. It is imperative to note that profitability is also highly determined by labour investment for enterprises. Herd size is another non-financial measure of profitability that can also be highly correlated to profitability.

# CHAPTER 3 METHODOLOGY

## 3.1 Introduction

This chapter gives an outline of the research methodology, which includes research design, population and sampling technique, research instruments, data collection procedure and analysis as well as the summary. The research instruments selected for this study were questionnaires that were distributed to participants as well as interviews that were conducted by the researcher.

## 3.2 The Research Design

The research design forms the essential framework for the research action, minimizes the danger of collecting harp-hazard data and ensures that the data collected meets research objectives. The researcher used both descriptive and exploratory research designs for this study. It was descriptive because descriptive data was collected using a structured questionnaire and it was explanatory because the researcher explained the relationship between dependent and independent variables. Descriptive research designs are structured and designed to measure the characteristics described in a research question. Hypotheses, derived from the theory, usually serve to guide the process, and provide a list of what needs to be measured (Hair, *et al*., 2006). Explanatory studies are designed to test whether one event causes another (Hair *et al*., 2006)

The study utilized a cross sectional research design where the interaction between several variables were compared in terms of relationships and how they interact (Cresswell, 2007). Study variables like Dairy profitability, farmers mean size household, farmers level of education, experience in dairying, farmers agricultural training, the number of dairy cattle owned by a farmer and the average milk intake, and the monthly feed and pasture were

analyzed in order to determine whether all affect the profitability of small-scale farmers or some are more predominant than others among farmers in Gokwe Dairy cooperative.

## 3.3 Population and Sampling

### 3.3.1 Study Area

The study area was Gokwe District, which is situated in the Northern part of Midlands Province, north-west of Zimbabwe. The study was conducted in and around Gokwe Centre. The area was chosen as an area characterized by many small-scale daily farmers and the researcher's proximity to the area.

### 3.3.2 Study Population

The population of the study comprised of small-scale dairy farmers in and around Gokwe Centre. These are small-scale farmers who are members of the Gokwe Producer cooperative and are delivering milk to a Milk Collection Centre (MCC). At the time of the study the number population size of the small-scale dairy farmers was between 30 and 40 in Gokwe.

### 3.3.3 Sampling Procedure and Sample Size

In this study, the researcher used purposive sampling which is a non-probability technique. Dornyei (2007) states that in non-probability sampling technique there are qualifying and disqualifying criteria that are usually used. The researcher used purposive sampling because the researcher already knew the characteristics of interest from the study population. Therefore asamplesizeof30respondentswasdrawnfrom the study population. For this study, the sampling frame comprised of individual dairy farmers who are members of the Gokwe Dairy Cooperative, and some ex-members who were chosen as these presented the same socio- economic conditions.

## 3.4 Data Collection Instruments

### 3.4.1 Data Sources

The researcher used both primary and secondary data sources.

#### 3.4.1.1 Primary Data

Primary data gathered during this research was collected through interviews and questionnaires administered to the research participants.

#### 3.4.1.2 Secondary Data

The researcher also reviewed secondary source documents to ascertain the quantity and amount of milk delivered to the MCCs. This information was assessed using data of schedules containing milk volumes recorded at the MCC which are captured nationally at Zimbabwe Association of Dairy Farmers. The researcher also reviewed some studies previously conducted on the viability of small-scale dairy farmers to compare findings.

#### 3.4.1.3 Questionnaire

Questionnaires are documents that ask the same questions from all individuals in the sample (Maree, 2010). The following points were considered regarding the design of the questionnaires as outlined in (Adams & Cox, 2008). The questionnaire was kept as short as possible to encourage respondents to complete it. Most people are not willing to spend much time filling out a questionnaire. The questions themselves were kept short, as well as being simple and clearly worded, to enable respondents to answer quickly, correctly and without ambiguity. A pilot study was carried out to address these issues. As suggested by (Creswell, 1994), the questionnaires started off with simple demographic questions to help respondents familiarize and to become comfortable quickly. Dichotomous questions (questions with only two possible responses such as “yes” and “no”) were also used because of their simplicity. There were follow-up open-ended questions to provide an

opportunity to express opinions fully.

Thirty (30) questionnaires were administered to collect information such as demographics and socio-economic data such as herd sizes, milk volumes, income sources, veterinary costs, feed costs, breeding costs, labor costs, marketing and extension services.

## 3.5 Data Collection Procedure

A survey was used to collect data. A survey was preferred because it is linked to deductive logic and is a regular method of collecting data by employing a questionnaire that collects data from a sample then statistically analyzing the data (Saunders, *et al*., 2009). Furthermore, it has become accepted as a scientific and accurate way of collecting data to quantify gathered information (Zikmund, *et al.*, 2010).

Data collection tools were pre-tested to check their validity before engaging in full data collection. Data was collected at a rate of 2 dairy farmers per day. Three enumerators were engaged to assist the researcher in data collection. Data quality was reviewed every time when coming from the field. In view of COVID-19 pandemic, the researcher mostly collect data through one on one interviews and where it was necessary, focus group discussions were organized at MCCs limiting participants to a maximum of 8 farmers, observing social distancing and all protocols as recommended by Ministry of Health and Child Care and WHO.

**Table 3.1Description of Variables Measured in the Study**

| | Variable | Description of the Variable | Hypothesis | Source of the Data |
|---|---|---|---|---|
| Dependent Variable | | | | |
| | Small Scale dairy Profitability | Gross margin Profitability analysis and ratio analysis | | Primary and secondary data sources i.e. MCCs reports and schedules |
| Independent Variables | | | | |
| **Demographics** | Mean household Size of small- scale dairy | Labor available | + | Questionnaire |
| | Dairy training for small scale farmers | Basic, intermediary, higher level | + | Questionnaire |
| **Technical** | Number of dairy cattle | Number of milking cows | + | Questionnaire |
| | Average milk intake | Quantity of milk produced | + | Questionnaire |
| | Monthly feed and pasture for dairy cattle | cost of feed | _ | Questionnaire |
| | Monthly drugs and vaccines | Cost of animal health | _ | Questionnaire |

**Table 3.1 (cont'd)**

| | **Variable** | **Description of the Variable** | **Hypothesis** | **Source of the data** |
|---|---|---|---|---|
| **Socio –economic** | Price per litre of milk | Cost of selling a litre of milk | + | Questionnaire |
| | Experience in dairying | Number of years in dairy farming | + | Questionnaire |
| | Agriculture training | Basic Intermediary Higher level | + | Questionnaire |
| **Institutional** | Access to loan | Access credit (yes or no) | + | Cooperative reports |

## 3.6 Analysis and Organization of Data

The data collected from in-depth interviews was transcribes into English followed by thematic analysis. A thematic analysis offers an accessible and theoretically flexible approach to analyzing qualitative data. Furthermore, the researcher closely followed up all data by reading through the notes several times to aid in understanding the perspectives, views and opinions of the participants. Statistical calculations on Gross margin and ratios were used to assess the profitability of the dairy enterprises. The study adopted the Linear Regression model for econometric analysis. This model involves analysis of the relationship between a dependent variable and one or more variables of interest. It is used to predict the value of a variable based on the value of another variable. The linear regression fits the fits a straight line or surface that minimizes discrepancies between predicted and actual output.

The relationship between a specific variable and the outcome of the probability is interpreted by means of the marginal effect, which accounts for the partial change in the probability. The marginal effect associated with continuous explanatory variables on the probability, holding the other variables constant, can be derived from where the assumption of this study is, where Profitability is calculated from (P=TR-TC), meaning profitability is a result of Total Revenue Less Total costs. The marginal effects provide insightsintohowtheexplanatoryvariablesshifttheprobabilityoffrequencyofproduction factors to affect profitability. Data was cleaned first, entered on Excel and importedtotheSPSSv25wheremarginaleffectswerecalculatedforeachvariablewhile holding other variables constant at their sample mean values.

### 3.6.1Profitability Analysis

The gross margin is defined as the difference between gross income and total variable costs. The gross margin was used because it is a relatively accurate indicator of the performance of an individual dairy farmer and it allowed a comparison of the performance of different dairy farmers (Dube *et al*., 2014).A positive gross margin indicates viability (Dube *et al*.,2014).

The Gross margin was calculated as follows:
GM = TR – TVC
Where:

GM – gross margin

TR – total revenue calculated by multiplying selling price by total sales TVC – total variable costs incurred in the business

### 3.6.2Multiple Regression Analysis

Theeffectofvariouscostcomponentsongrossmarginforthestudysitewasevaluated using the multiple regression analysis of the form:

$y = \beta_o + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4$
where: y is the gross margin ($) /

$\beta_o$ is the intercept.

$\beta_1$ – demographic factors affecting profitability
$\beta_2$ - Socio-economic factors affecting profitability

$\beta_3$ -Technical factors affecting profitability

$\beta_4$ -Institutional factors affecting profitability

## 3.7 Formulation of Solutions for Recommendations

Resultsandopportunitiesresultingfromeconometricanalysisinformedthe formulation of solutions that the researcher recommended to all interested stakeholders

## 3.8 Ethical Considerations

Ethical issues were addressed before going into the field to gather data. As the study involved human participants, it therefore brought about ethical issues like right to privacy, confidentiality, personal autonomy, respect and dignity. To address this, participants were initially briefed about the purpose of the research and were assured that the information that was collected was to be used for educational purposes only and that no names were to be mentioned in the writing up of the thesis. Participants were also given the right to opt out of the study when they felt that the issues being discussed were against their conscience. The research had invaluable respect on the rights, dignity and worth of all respondents. Anonymity among the participants was assured. Participants were also asked to read and voluntary sign the informed consent form.

## 3.9 Summary

This chapter outlined the research methodology that was used for this study. The research design, data collection instruments, study population and sampling methods, the research instruments used, analysis as well as ethical considerations have been described. Chapter four present results and discusses the findings of the study.

# CHAPTER 4 DATA PRESENTATION, ANALYSIS AND INTERPRETATION

## 4.1 Introduction

The previous chapter presented the research methodology adopted to achieve the research objectives. This chapter presents, analyses, and interprets the data collected. Firstly, the chapter presents the response rate analysis followed by results of the reliability test and the socio-demographic and background characteristics of the respondents to the study. Thereafter, the data relating to the research objectives is presented, analyzed and discussed.

## 4.2 Data Presentation and Analysis

### 4.2.1 Response Rate

Questionnaires were administered in person to 31 dairy farmers who are in the cooperative. The study population comprises of the farmers who are in the cooperative thus a non-probability sampling technique was selected as all members in the cluster were selected. The selection of the study site was purposively selected as it is the one in the area involved in Dairy production at small scale. However, only 30 questionnaires were filled and returned back to the researcher representing a response rate of 96.7%. This response rate was adequate for data analysis and interpretation. This high response rate was attributed to rigorous follow-ups made by the researcher.

### 4.2.2 Socio-demographic

The participants to the study were firstly asked to indicate their socio-demographic and background information. In doing so, the information collected included gender, age, level of education attained, marital status, dairy farming experience, agricultural training of household head, and occupation of household head, household size, herd size, farm size and average monthly income. The results are presented in the following sections.

### 4.2.3 Gender of household head

Most of the respondents were males (63.3%) and the remaining 36.7% were females as indicated by Figure 4.1. This is an indication that most of the dairy farmers in Gokwe district are males. In a study by Nkonki-Mandleni *et al*., (2018) their results indicated that majority of the respondents were male farmers (63.3%) while only 36.7 percent were female farmers. The implication was that smallholder cattle production is more popular among male than females. Females are still expected to cook and perform house chore duties while males are expected to do jobs that require lots of energy such as certain farm operations involved in herd management (Moyo, 2010). Baltenweck & Staal (2000), from his study derived that households that were headed by a female were most likely to have limited access to information on the use of new dairy technologies.

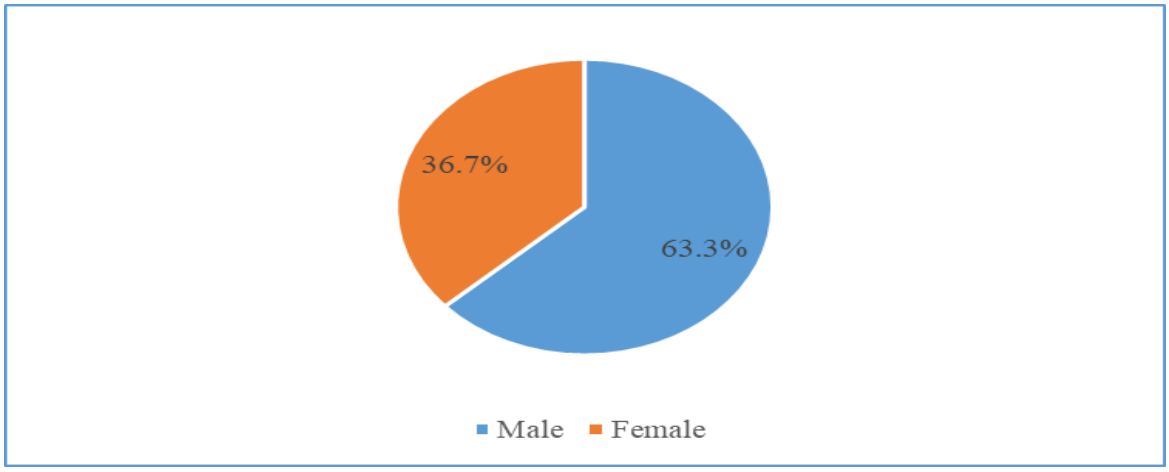


**Figure 4.1: Gender of household head**

### 4.2.4 Age of respondents

Most of the household heads were aged between 41 and 50 years (60%) followed by those aged above the age of 50 years (30%) (Table 4.1). This showed that majority of the dairy farmers were above the age of 40 years indicating they had detailed information regarding dairy farming based on their life experiences. Most farmers in the study were adults above 40 years of age. It can be derived that there are a few young farmers in dairy farming in

Zimbabwe. It is worth noting that dairy farming is generally capital intensive. The requirements at start-up needs many resources, one requires purchasing heifers, equipment, and sizeable amount of feed. These may not be easily available to younger farmers (Pantoja et al., 2009). It can be likely that there are a few financial institutions offering credit that can be accessed by poorly resourced young farmers due to prevailing financial condition in developing nations (SNV, 2016; Salami et al., 2010). Therefore, challenges hindering the youth to participate in dairying farming need to further exploration.

The finding that the older farmers, aged 40 years and above, had poor milk hygiene which affected milk quality could have been influenced by the farmers' exposure, knowledge, and experience in dairying. Older farmers could have seen how poor hygiene affected productivity and profitability, hence their lineage towards practicing good hygiene compared to younger farmers who have less dairy experience.

This seems to suggest that people mainly practice smallholder dairy farming in the old age as these are the ones targeted by donor funded projects on the assumption that they have had experience of cattle rearing from their traditional cattle breeds. There is need for these smallholders' dairy donor funded projects to also engage the youths so that there is continuity upon the demise of their parents in the older age group.

**Table 4.1: Age of household head**

| Age category | Frequency | Percent (%) |
|---|---|---|
| Less than 30 years | 1 | 3.3 |
| 31-40 years | 2 | 6.7 |
| 41-50 years | 18 | 60.0 |
| Above 50 years | 9 | 30.0 |
| **Total** | **30** | **100.0** |

### 4.2.5 Educational qualifications of household head

According to Omiti *et al*., (2006), older farmers are typically less efficient and farmers with more years of formal education tend to be more efficient. Eighty percent of the household heads of the dairy farms in Gokwe district had secondary educational qualifications whilst 13.3% had primary education (Figure 4.1). Those with tertiary and no formal education had equal proportions of 3.3%. The findings imply that majority of the household heads of the dairy farms were literate. Level of literacy is also important among small-scale dairy farmers. Whilst on the other hand those who are less educated struggle to understand and ultimately implement best practices without assistance from experts. In this regard, it becomes clear that literacy level contributes positively to productivity in dairy farming. Education is also vital when considering the pricing and marketing of the produce.

Most farmers had acquired secondary education. According to Mburu *et al*. (2014), the level of literacy is related to the rate and level of adoption of new technology. With this level of formal education, farmer training on current and better farming activities would enhance their efficiency. According to Karanja (2003) lower levels of education greatly

affects the adoption and use of new practices by dairy farmers which results in low milk production. Education improves makes a person be more aware of their environment and surroundings and subsequently their ability to access information. This study supported the notion brought forth by Bhola *et al.*, (2006) that generally people with low education level had difficulty finding employment hence end up opting for farming as a source of livelihood. Nyangito, (1986) showed that the adoption of new and improved technologies in agriculture was positively related to education. Most dairy farmers were retired professionals who had some capital to invest in improved dairy cattle, hired labour and the construction of standard milk shed. Thus, most of the households viewed dairying as a more specialized enterprise than keeping ordinary multipurpose cattle or growing of crops.

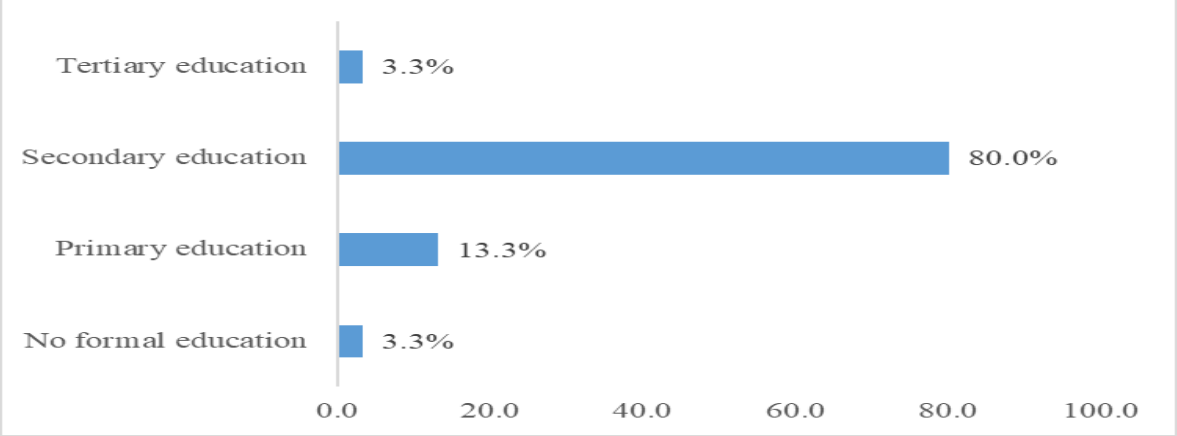


**Figure 4.2: Educational qualifications of household head (N=30)**

### 4.2.6 Marital status of household head

Most household heads (83.3%) were married whilst 10% were widowed and 6.7% were divorced/separated (Figure 4.3). In a study by Nkonki-Mandleni *et al*., (2018) indicated that 80.8% of their respondents were married while the remaining 19.2% were single, divorced or window, this result is in line with the study findings. This implied that most

of the farmers were stable in their places of residence and had access to more family labour.

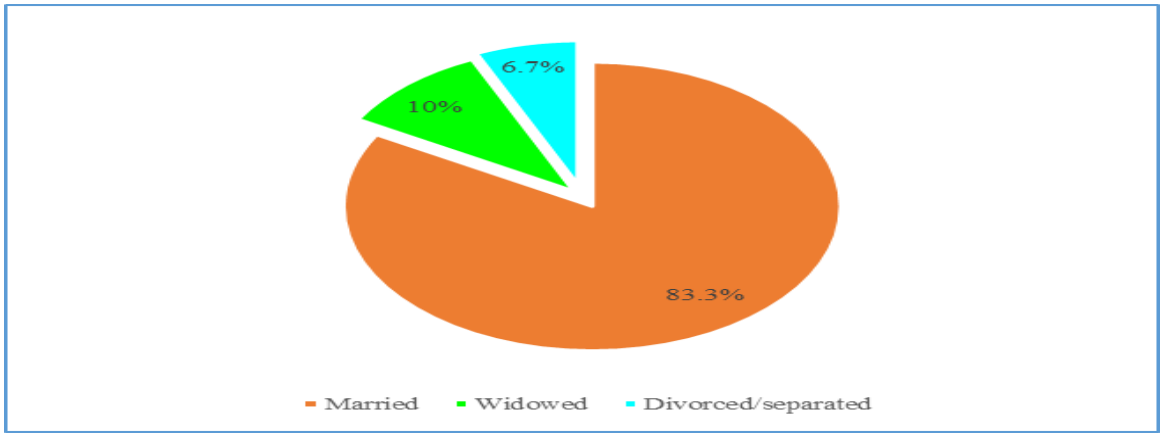


**Figure 4.3: Marital status of household head (N=30)**

### 4.2.7 Farming experience of household head

This variable sought to determine the period or number of years that respondents had been in dairy production. The assumption was that if the farmer was more experienced, then they were likely to apply best practices and consequently increased production. Most of the respondents (50%) indicated that the household heads had been engaged in dairy farming for 10 years plus, followed by 33.3% who indicate 6-10 years of dairy farming experience (Table 4.2). The smallest proportion of the respondents indicated that the household heads had dairy farming experience of less than 5 years. The findings indicate that majority of the respondents had adequate information based on their farming experience. The study results are contrary to that of Nkonki-Mandleni *et al*., (2018) who cited that the majority of their respondents had between seven and twelve years of experience while 38.8% had more than 12 years of experience. The majority of the respondents had quite a number year of experience in dairy production

**Table 4.2 Years of dairy farming experience**

| Years of dairy farming experience | Frequency | Percent (%) |
|---|---|---|
| 1-5 years | 5 | 16.7 |
| 6-10 years | 10 | 33.3 |
| Above 10 years | 15 | 50.0 |
| Total | 30 | 100.0 |

### 4.2.8 Agricultural training of household head

More than two-thirds of the respondents indicated that the household heads have undergone agricultural training (Figure 4.4). This implies that the small-scale dairy farmers have acquired information relating to dairy farming. The study reveals that the amount of training the farmer receives correlates to knowledge and level awareness and this ultimately influences productivity. When farmers are trained and have knowledge they tend to adopt mew ideas and implement them better. The study results are in support by that of Nkonki-Mandleni *et al*., (2018) who cited that training related factors are fundamental to the success of dairy farming. If farmers are more knowledgeable, then they network with other farmers and get more avenues for sharing knowledge and ideas in dairy farming. They also share lessons learned in dairy farming, which brings improvement (Muriuki *et al*., 2004).

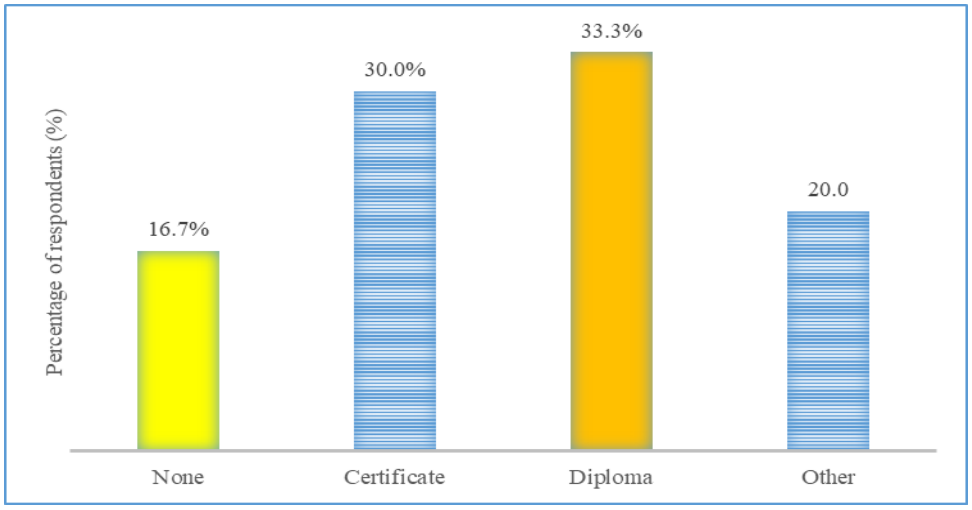


**Figure 4.4: Agricultural training of household head (N=30)**

### 4.2.9 Occupation of household head

Majority of the respondents (50%) indicated that the household heads were self-employed, followed by 33.3% who indicated that household heads were formally employed, and 10% indicated that household heads were unemployed (Table 4.3). This is an indication that most of the dairy farmers in Gokwe district are self-employed.Nkonki-Mandleni *et al.*, (2018) found that 77.2 percent of their responds were fulltime farmers while 12.8 percent were employed, and 10 percent having run their own businesses.

**Table 4.3: Occupation of household head**

| Occupation | Frequency | Percent (%) |
|---|---|---|
| Unemployed | 3 | 10.0 |
| Formally employed | 10 | 33.3 |
| Self-employed | 15 | 50.0 |
| Informally employed | 2 | 6.7 |
| Total | 30 | 100.0 |

### 4.2.10 Household size

The most important determinant of labour provided on a farm is the family size. (Bartlett, 1980). In this study, household size was considered important because in addition to being a source of labour, the size of the family may also influence the need for increased milk production for home consumption as well as for the market. Table 4.4 shows that the majority of the dairy farmers had household sizes (60%) of 4 to 6 members. The mean household size was found to be 5 members. Nkonki-Mandleni *et al*., (2018) found that the majority (76%) of the respondents had up to five occupants per household, 22 percent of them had between six and ten occupants per household. Only about 1.6 percent of the respondents had more than ten occupants per household. This showed that some of the household members were likely to provide family labour for farm activities. Successful herd management for maximum profit requires family labour from certain members of household (Majekodunmi, 2011; Omotoso et al., 2018; Daud*et al*., 2018).

**Table 4.4: Household Size**

| Household Size | Frequency | Percent (%) |
|---|---|---|
| 1 to 3 | 6 | 20 |
| 4 to 6 | 18 | 60 |
| 7 to 9 | 3 | 10 |
| 10 and above | 3 | 10 |
| Total | 30 | 100.0 |

### 4.2.10 Herd size

Table 4.5 shows that the majority of the dairy farmers had a herd size (50%) of 4 to 6 beasts. The mean herd size was also found to be 5. This is an indication that most of the dairy farmers had on average 5 dairy cows on their farms. Human population is ever

increasing, coupled with concurrent urbanization requires efforts be geared towards increasing milk production and offset any deficits. Breed improvement programmes increases milk production. For breeds to be improved there is need for precise and accurate knowledge of genetics and phenotypic parameters. (Kahi *et al*., 2004). Regular reviews should be conducted to identify optimum efficiency and prefigure rates of improvements.

**Table 4.5: Herd Size**

| **Household Size** | **Frequency** | **Percent (%)** |
|---|---|---|
| 1 to 3 | 3 | 10 |
| 4 to 6 | 15 | 50 |
| 7 to 9 | 9 | 30 |
| 10 and above | 3 | 10 |
| Total | 30 | 100.0 |

### 4.2.11 Average monthly income

More so, the respondents were asked to indicate that their average monthly income of the small-scale dairy farmers and the findings are presented in Table 4.6. A significant proportion of the respondents (43.3%) indicated that the average monthly income for the farmers was less than US$100 followed by 33.3% who indicated average monthly income of over US$300. Twenty percent indicated average monthly income of US$101 to US$200. Farms that have dairy farming as their main source of income are more likely to try and improve their dairy milk production (Mumba, 2012). The distance to the milk collection centre helps to determine whether the farm incurs any transportation costs.

**Table 4.6: Average monthly income**

| Monthly average income | Frequency | Percentage |
|---|---|---|
| Less than $100 | 13 | 43.33% |
| $101-$200 | 6 | 20.00% |
| $201-$300 | 1 | 3.33% |
| Above $300 | 10 | 33.33% |
| Total | 30 | 100.00% |

### 4.2.12Sources of Income

More so, the respondents were asked to indicate that their main sources of the income of the small-scale dairy farmers and the findings are presented in Table 4.7.

**Table 4.7: Sources of income**

| Source of income | Frequency | Percentage |
|---|---|---|
| On-farm income | 19 | 63.33% |
| Off-farm | 9 | 30.00% |
| Both | 2 | 6.67% |
| Total | 30 | 100.00% |

### 4.2.13 Classification of the dairy farms

Milk production of a cow is governed by the management system, feeding method, inherited genetic characteristic of a cow and the breeding method. It was deduced that different breeds do not produce the same amount of milk even if they are under the same condition (McDonald *et al*., 1998).In a similar study to that of Ngigi (2004) improved breeds were realised as a factor that can vary the amount of milk being produced. The researcher cited that the widespread introduction of highly productive dairy breeds of has

resulted in increased productivity in dairy sector. The study also sought to understand the various ways in which the small-scale dairy farmers are classified. The findings are shown in Table 4.8.

**Table 4.8: Classification of small-scale dairy farmers in Gokwe district**

| | | | | | | |
|---|---|---|---|---|---|---|
| By management system | Zero grazing | 50.0% | Paddock system | 33.3 % | Free/open range | 16.7% |
| By feeding method | Natural pasture | 53.3% | Forage | 33.3 % | Silage/hay | 13.4% |
| By dairy breed | Pure breed | 26.7% | Cross breeds | 66.7 % | Indigenous breeds | 6.7% |
| Breeding method | Artificial insemination | 30% | Bull | 60.0 % | Both | 10% |

The results presented in Table 4.8, indicate that majority of small-scale dairy farmers in Gokwe district use the zero grazing system as indicated by 50% of the respondents. More than 50% of the respondents (53.3%) provided that the dairy farmers employed the natural pasture grazing feeding method. As also indicated by the findings in Table 4.8, majority of the small-scale dairy farmers in Gokwe district have cross breeds and they use the bull method of breeding.

## 4.3 Discussion and Interpretation

### 4.3.1 Profitability of Dairy Farming

Mugweni & Muponda (2015) found that the size of the dairy herd among small scale farmers is one of the factors affecting profitability. ZADF (2018) also reported that small-scale dairy farmers faced the challenge of limited access to credit or agricultural loans. Moran (2005) also found that sustainability of intensifying small-scale dairy production

systems is also threatened by poor institutional support. These factors affecting profitability of small-scale dairy farmers were also mentioned by the interviewees to the study. Some of the factors obtained from the interview responses included low supply from farmers due to dynamics of the economy, high costs of feed and centre running costs, high cost of commercial feeds, mortality rate of dairy herds, poor management, lack of capital to diversify into other milk products, high cost of water bills and high costs of electricity.

### 4.3.2: Profitability analysis of small-scale dairy farmers

The study also sought to understand the profitability of the small-scale dairy farmers in Gokwe district. Firstly, the respondents were asked to indicate their rating on the profitability of the small-scale dairy firms. As shown in Figure 4.5, majority of the participants (90%) rated the profitability of the small-scale dairy farmers as poor whilst the remaining 10% rated it as poor. This is an indication that that the profitability of the small-scale famers in Gokwe district is not yet satisfactory. One of the interviewees also stated that only 25% of dairy farmers are running their business as profitable meaning that majority of the dairy farmers are operating at losses. This finding is supported by the statistics of the ZADF (2018) report which indicated that high costs of production negatively affected the profitability of dairy farmers in Zimbabwe.

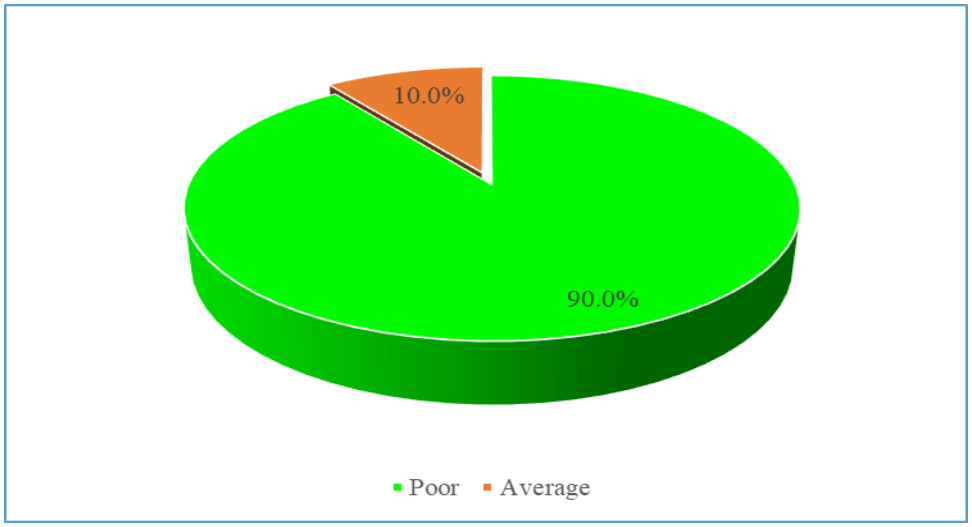


**Figure 4.5: Rating for profitability of small-scale dairy farmers in Gokwe district**

### 4.3.3 Gross Margin Analysis of Small-scale Dairy Farming

**Table 4.9: Gross Margin of the small-scale dairy farmers**

| Gross Margin analysis | Low Performers | Average Farmers | High Performers |
|---|---|---|---|
| Average monthly milk volume produced (litres) | 3300 | 4575 | 6600 |
| Average milk price for local customers (US$/litre) | $0.50 | $0.50 | $0.50 |
| Gross Income | $1,650.00 | $2,287.50 | $3,300.00 |
| Monthly total costs for purchased stock feeds | $434.00 | $598.00 | $1,154.00 |
| Monthly total costs for home-grown feeds | $400.00 | $461.00 | $630.00 |
| Monthly total veterinary costs (drugs + vaccines) | $71.25 | $90.00 | $99.38 |
| Monthly breeding cost | $60.00 | $75.00 | $101.25 |
| Monthly costs for hired labour | $115.00 | $150.00 | $195.00 |
| Monthly costs for family labour | $60.00 | $86.25 | $116.25 |
| Monthly transport costs | $355.00 | $450.00 | $540.00 |
| Monthly cooperative subscriptions | $10.00 | $10.00 | $10.00 |
| Average monthly total costs | $1,505.25 | $1,920.25 | $2,845.88 |
| Average monthly gross margin | $144.75 | $367.25 | $454.13 |

### 4.3.4 Factors hindering functionality of milk collection centers

The study also sought to determine factors hindering functionality of milk collection centres. The descriptive statistics relating to this objective are shown in Figure 4.9 and Table 4.8. Firstly, the respondents were asked to rate the functionality of milk collection centres in Gokwe district. As indicated in Figure 4.6, majority of the respondents (50%) indicated that functionality of the MCCs in Gokwe district was moderate whilst 40% indicated that the functionality of the MCCs is poor. Only ten percent of the respondents indicated that the functionality of the MCCs was good. From these findings, it is clear that MCCs in Gokwe are not functioning to their best.

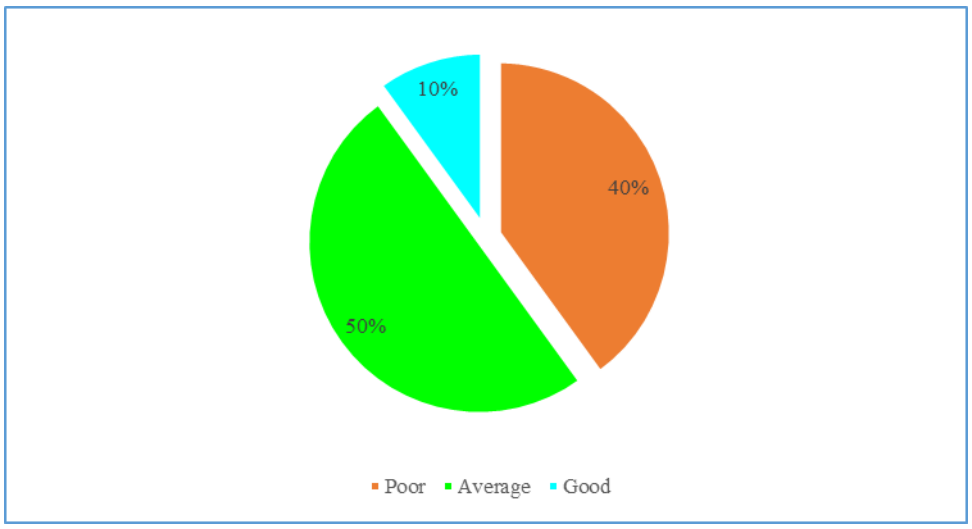


**Figure 4.6: Functionality of the MCC in Gokwe district**

Similar findings relating to the functionality of the MCC were also obtained from the in-depth interviews. Majority of the participants to the interviews also indicated that the MCC is not very operational. Some of the interviewees made the following statements:

"*The MCC in this district is not as operational as expected by the farmers and other stakeholders. A lot need to be done*"

"*Honestly, the Gokwe MCC district needs upgrading. The storage facilities are not so*

*satisfactory…In short the MCC is functioning below accepted standards"*

"*The status of most of MCCs is poor compared to MCCs in other districts. I once had an opportunity to visit one of the MCCs at Watsomba Business Center in Mutasa District and in Rusitu, Chimanimani in Manicaland province and noted that the MCCs were in better conditions compared to the ones we have here in Gokwe district. The MCCs in other parts of the country have a new look compared to the ones here which I feel there is need for revamp of the centers*"

*"I have come to notice that most of the MCCs in Gokwe are in a dilapidated situation as most of them have been in existence for over two decades without any huge changes made to them thereby compromising the hygienic status of them. Some require to have constant supply of running water and constant supply of electricity for example solarizing the centers as what has been done to other centers in other districts"*

Thereafter, the respondents were asked to indicate the extent to which they agreed or disagreed to the factors affecting functionality of the milk collection center in Gokwe district. The findings are presented in Table 4.10

**Table 4.10: Factors hindering functionality of MCC**

| **Factor** | **Mean rank** |
|---|---|
| Government legislations and policies | 1 |
| Poor institutional support | 2 |
| Poor management | 3 |
| Lack of appropriate infrastructure | 4 |
| Lack of appropriate dairy research | 5 |
| Lack of modern technology | 6 |
| High storage and transportation costs | 7 |
| Lack of funding from government | 9 |
| Lack of consistency in milk supply | 8 |
| Lack of machinery | 10 |

Out of the ten factors, government legislations and policies was ranked the most factor hindering functionality of MCCs. As shown in Table 4.3, majority of the respondents. Government policies were also found by Engel (2000) to be factors that affect functionality of MCCs. Poor institutional support was found to be one of the factors also hindering functionality of the MCC. Moran (2005) also found that the sustainability of intensifying small-scale dairy systems is threatened by poor institutional support.

The participants to the study also agreed that the other major factor influencing functionality of the MCC. FAO (2010) also cited poor management as one of the factors constraining small-scale dairy development in Sub-Saharan Africa. The other factor influencing functionality of milk collection centre cited by majority of the respondents was lack of appropriate. This is an indication that there is shortage of appropriate infrastructure at the MCCs in Gokwe district. The issue of poor infrastructure has also been cited by a number of previous studies for instance in a study of dairy performance in Kenya, Gloria (2008) opines that the costs of production, processing and transportation coupled with poor infrastructure affects the profitability of dairy farmers.

Lack of appropriate dairy research was also mentioned by majority of the participants. The mean score of 4.40 indicate that majority of the respondents agreed that there was lack of dairy related research at the MCC in Gokwe district. This factor ranked the fifth main factor influencing functionality of MCCs. Lack of appropriate dairy research was also cited by Moran (2005).

Other factors cited by majority of the respondents include lack of modern technology, high storage and transportation costs, lack of consistency in milk production and supply by farmers, lack of funding from government and lack of machinery. These factors are also supported in the existing body of knowledge for instance Kiziba, (2012) cited factors such as use of outdated storage facilities and high marketing and transportation costs as factors hindering functionality of MCCs. These factors were also cited by several participants to the interview. Other factors hindering functionality of the MCC provided by the interviewee respondents include lack of motivated personnel at the MCC, few milk storages tanks and failure to pay the farmers in time.

### 4.3.5: Economic benefits of collective action for individual small-scale dairy farmers

Furthermore, the study aimed to assess if collective action is of benefit to the individual small-scale dairy farmers in Gokwe district. Firstly, the respondents to the study were asked to indicate whether there are any economic benefits for individual small-scale dairy farmers who are members of dairy cooperatives. As shown in Figure 4.7, majority of the respondents (83.3%) indicated that there were benefits associated with being a member of dairy farming cooperative in Gokwe district whilst the remaining 16.7% were not very sure of the benefits. However, in overall, it can be seen that collective action has brought some notable benefits to the small-scale dairy farmers in Gokwe district.

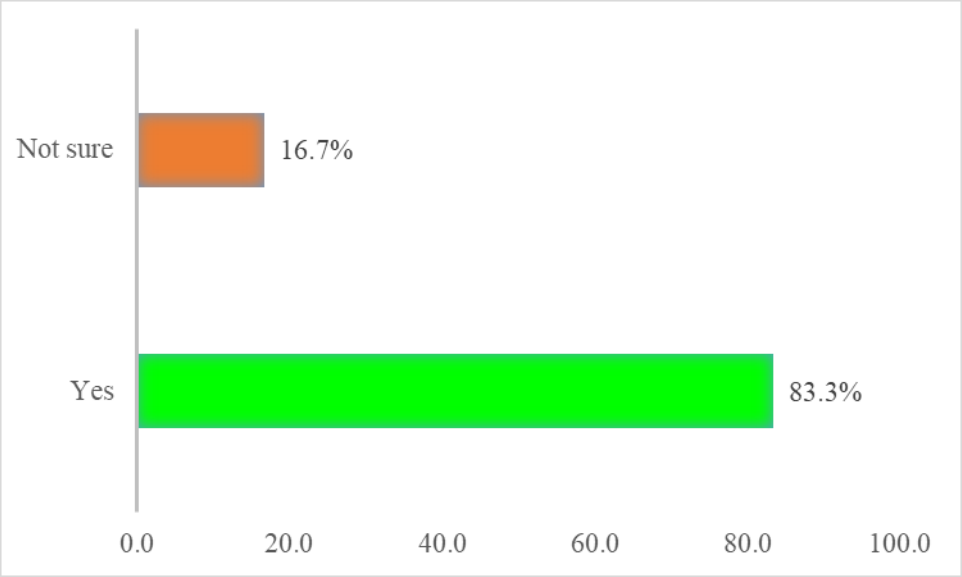


**Figure 4:7: Economic benefits from collective action for small-scale dairy farmers**

Furthermore, the respondents were asked to indicate the benefits associated with collective action for the small-scale farmers. The findings are shown in Table 4.11.

**Table 4.11: Economic benefits derived from collective action**

| **Economic benefits** | **Mean rank** |
|---|---|
| Improved productivity | 1 |
| Enhanced access to credit | 2 |
| Improved financial management | 3 |
| Reduced costs of production | 4 |
| Improved access to markets | 5 |
| Increased knowledge level | 6 |
| Low marketing costs | 7 |
| Access to farmer training programs | 8 |

The findings in Table 4.11 indicate that the major economic benefits of collective action for the small-scale dairy farmers in Gokwe district include improved productivity; enhanced access to credit; improved financial; reduction in costs of production; improved accessibility to markets; increased knowledge level; low marketing costs and improved access to farmer training programmes. The quantitative results indicate that there are several economic benefits associated with cooperative membership for individual small scale dairy farmers in Gokwe district. These benefits were also mentioned by some of the participants to the interviewees. Some of the benefits mentioned include improved bargaining power for example all donors are willing to accept farmers in groups / cooperatives, centre running costs are spread amongst farmers, cooperatives search for milk markets, farmers get access to credit facilities such as Heifer revolving fund and purchase of drugs and stock feeds in bulk.

### 4.3.6 Inferential Statistics

Lastly, the study sought to determine the determinants of profitability of the small-scale dairy farmers in Gokwe district. The factors affecting profitability of the small-scale dairy farms were categorized into demographic factors, socio-economic factors, technical factors and institutional factors affecting profitability and their mean values were used for regression analysis. On the other side, the profitability and cost information collected was used to calculate the average gross margin for the small-scale dairy farmers. The regression results are presented and discussed in this section.

### 4.3.7 Model Summary

The model summary is presented in Table 4.11. As shown, the R-squared has a value of 0.45 which means that approximately 45% of the variations in profitability of the small-scale dairy farmers are explained the institutional factors, demographic factors, socio-

economic factors and technical factors. Other factors not included in the study account for the remaining 55% in variations of the gross margin.

**Table 4.12: Model summary**

| Model | R Square | Adjusted R Square | Std. Error of the Estimate |
|---|---|---|---|
| 1 | 0.4563[a] | 0.2232 | 0.372 |
| a. Predictors: (Constant), Agricultural training, Farm size, Gender, Access to credit, Age, Marital status, milk price, Education, Herd size, Farming experience | | | |

### 4.3.8 ANOVA analysis

At the F-value of 1.96 statistically significant at p-value 0.050, the results demonstrate that the model is statistically of good fit. The model for the study is statistically significant because the p-value of 0.05 was achieved and it is significant at 5%. Hence, it is an appropriate prediction model for predicting the determinants of profitability of the small-scale dairy farmers.

### 4.3.9 Regression analysis

There was no statistically significant relationship between profitability and gender, age, agricultural training, dairy farming experience, milk price, farm size and access to credit of the farmer. Thus, profitability of smallholder dairy farming does not depend on gender, age; agricultural training, dairy farming experience, milk price, farm size and access to credit of the farmer, respectively see Table 4.13. All the farmers regardless of age had equal chances of making profit. *A priori*, we would expect eco-efficient to be positively related to age (i.e., older farmers should be more eco-efficient) and positively related to specific professional training and the expectation that the farm continue. This result is contrary to that of Reinhard *et al*., (2002) who found that younger farmers are more likely to be more knowledgeable about environmentally friendly technological progress. This

can be because there are more elderly farmers in dairy farming that the younger generation.

Size of land owned was found to have a positive influence on the profitability of the farms. According to Mburu *et al*., (2014), small farms tend to use land more intensively in an attempt to ease land constraint. The results from this study show that as the size of owned by farms increased, the farms' gross margins.

**Table 4.13: Regression analysis results**

| **Gross income** | **Coefficient** | **Std. Err.** | **T value** | **P>t** | **95% Confidence Interval** | |
|---|---|---|---|---|---|---|
| **Gender** | | | | | | |
| Female | -41.7482 | 74.47274 | -0.56 | 0.579 | -192.936 | 109.4395 |
| Age | 0.236286 | 3.227769 | 0.07 | 0.942 | -6.31643 | 6.789006 |
| **Education** | | | | | | |
| Primary | 243.4279 | 199.9799 | 1.22 | 0.232 | -162.553 | 649.4086 |
| Secondary | 193.3022 | 183.9325 | 1.05 | 0.3 | -180.101 | 566.7051 |
| Tertiary | 586.4939 | 271.009 | 2.16 | 0.037** | 36.31633 | 1136.671 |
| **Marital status** | | | | | | |
| Divorced | 446.7092 | 161.5451 | 2.77 | 0.009*** | 118.7552 | 774.6632 |
| Married | 249.459 | 102.3922 | 2.44 | 0.02** | 41.59176 | 457.3263 |
| Household size | -90.9993 | 33.12612 | -2.75 | 0.009*** | -158.249 | -23.7497 |
| **Agricultural Training** | | | | | | |
| Certificate | 6.719871 | 80.03529 | 0.08 | 0.934 | -155.76 | 169.2001 |
| Diploma | -35.3886 | 71.76819 | -0.49 | 0.625 | -181.086 | 110.3086 |
| Experience in dairy | -0.86291 | 7.264482 | -0.12 | 0.906 | -15.6106 | 13.88477 |
| Milk price | -268.657 | 274.0491 | -0.98 | 0.334 | -825.007 | 287.6919 |
| Herd size | 22.93623 | 13.21014 | 1.74 | 0.091* | -3.88178 | 49.75424 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Farm size | 32.98014 | 50.88459 | 0.65 | 0.521 | -70.3211 | 136.2813 |
| **Access to credit** | | | | | | |
| Yes | 38.36332 | 53.17267 | 0.72 | 0.475 | -69.583 | 146.3096 |
| Constant | 716.9465 | 499.3437 | 1.44 | 0.16 | -296.775 | 1730.668 |

Institutional factors are primarily known to enhance small-scale farmers' efficiency (Kavoi et al., 2010). The factors considered in this study is access to credit, though not statistically significant, this could be some of the borrowed funds are not directed to dairy farming. Chindime (2007) found that the adoption of new technologies in dairy farming was greatly associated with access to credit. The farms within dairy groups most likely share production and marketing information, and in so doing, the economic efficiency could be enhanced.

Herd size had a positive and statistically significant effect ($p<0.1$) on livestock numbers the OLS regression result in Table 4.13. a unit increase in herd size leads to 23-unit change in gross margin of dairy farmers. Similarly, the results from the surveys carried out by the UK's agricultural department in December 2012 show that the total number of cattle and calves in the UK increased in 2012, (DEFRA, 2013).

Those who had a certificate in agriculture had an insignificant but positive effect on livestock numbers, while those who hold diplomas had a negative effect. Those farmers who hold tertiary qualification showed that they improve their gross margin by $586.49 and this is significant at 5%, while those who have primary and secondary qualification was positive but statistically insignificant. Various extension services in agriculture have been designed to provide services, advice and training to smallholder farmers. Despite wide-ranging reform initiatives in agricultural extension, the access to and quality of

information provided to marginalized and poor farmers is still uneven (Glendenning *et al*., 2010). Some of the reasons why provision of agricultural services, advice and training may fail are general lack of capacity to provide the services in terms of staff and resources; lack of appropriate management of the service to make it effective and focus on outcomes; lack of political priorities to provide the services; and lack of knowledge about the relevance of the wellbeing of the farmers (Mogues *et al*., 2009).Farmers sometimes had knowledge and resources for treatment and control because of timely availability and updating of veterinary services. Vithanage *et al.* (2014) observed that poor institutional support is the major production constraints faced by dairy farmers. Marital status had a significant effect on improving farmers' gross income, divorced couples showed that their incomes improves by $446.71 and $249.46 for married couples.

Household size had negative and statistically significant effect ($p<0.01$) on livestock numbers in2008. This result is contrary to literature as household size is said to be the key factor in driving the labour availability for farming practices; timely completion of tasks by family labour is important in small-scale agricultural practices(Moyo, 2010; Omotayo, 2016). Successful management of large herds for the maximum benefit of the household requires the labour from certain members of the family of both genders (Majekodunmi, 2011).

## 4.4 Summary

The results suggest that tertiary education, marital status, household and dairy cow herd size significantly affected the profitability of smallholder dairy farming in Gokwe District. Recommended policy actions therefore, should be directed towards the construction of more milk collection centres (markets) near the farmers in order to reduce the distance to the market; establishment of breeding centres for dairy animals in order for farmer to increase their herd size; and knowledge transfer through provision of extension services in order to educate the farmers on dairy management.

Conclusions were that access to and quality of information provided to marginalized and poor farmers had through a wide-range of reform initiatives in agricultural extension services. Farmers' access to institutional services had significant but positive effect profitability.

Overstocking and overgrazing was found to be very common under a traditional system where farmers usually do not have title deeds, this factor influenced stifling of production that was experienced yearly. Additionally, grazing is communal, without proper management and control over livestock numbers. Farm sizes are very small and are firstly used for crop production. This then results in limited land for fodder production. On the other hand, the issue of land tenure hinders long -term investment on the farm, hence affects dairy productivity. To overcome shortage of feed, households will have to rely on communal feed supplies.

# CHAPTER 5 SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

## 5.1 Introduction

The previous chapter presented and discussed the findings of the research. This chapter provides the summary of the findings, conclusions reached, recommendations for policy as well as areas for further research.

## 5.2 Discussion

The main aim of the study was to determine the factors affecting profitability of small-scale dairy farmers in Zimbabwe. The specific objectives of the study were to determine the factors that affect profitability of small-scale dairy farmers at farmer level and cooperative level, to establish the constraints that have been hindering functionality of Milk Collection Centres and to assess if collective action is of benefit to the individual farmer. To achieve the objectives of the study, both quantitative and qualitative data was collected using questionnaires and interviews. The research objectives were successfully achieved using both descriptive and inferential statistics.

The factors affecting profitability of the small-scale dairy farmers in Gokwe district were determined. The results of the descriptive analysis indicated that there are several factors affecting profitability of the small scale farmers and these include market accessibility, age of farmer, gender of farmer, farming experience, farmer's literacy, access to credit, farm size, breeding method, herd size, institutional support, breed type, costs of production, low milk prices, centre running costs, high cost of commercial feeds, mortality rate of dairy herds, poor management, lack of capital to diversify into other milk products, high cost of water bills and high costs of electricity. The regression results indicate that the major determinants of small-scale dairy farming in Gokwe district are technical

factors, institutional factors, and socio-economic factors. The results suggest that tertiary education, marital status, household and dairy cowherd size were significant in determining the profitability of small-scale dairy farmers.

The study aimed to establish the constraints that have been hindering functionality of Milk Collection Centres in Gokwe district. There are several factors hindering optimal functionality of the MCCs and these include lack of appropriate dairy research, lack of modern technology, government legislations and policies, lack of appropriate infrastructure, poor institutional support, high storage and transportation costs, poor management, lack of funding from government, lack of consistency in milk supply and lack of machinery.

The study also aimed to assess if collective action is of benefit to the individual farmer. There are many economic benefits derived from collective action by the individual small-scale dairy farmers in Gokwe district. The major economic benefits established by the study include improved access to markets, improved productivity, enhanced access to credit, increased knowledge level, improved financial management, low marketing costs, reduced costs of production, access to farmer training programmes, increased bargaining power and centre running costs are spread amongst farmers.

## 5.3 Conclusions

Based on the findings of the study, we can conclude that there are various factors influencing profitability of the small-scale dairy farmers in Gokwe district. The leading factors affecting profitability are high costs of production, transport costs, hiring of labour, and milk price. Dairy production has shown to be profitable with the low performing farmers registering a gross margin of $144.75, average farmers having a margin of $367.25 and the highest performers with a gross margin of $454.13.

Education had a significant but positive effect on gross margin. Majority of the smallholder farmers had access to services, advice and training they required to improve on desired farming practices. Access to and quality of information provided to marginalized and poor farmers had through a wide range of reform initiatives in agricultural extension services.

From the findings of the study, we can also conclude that there are so many factors behind the low rated functionality of the milk collection centre in Gokwe district and the major ones were found to include government legislations and policies, poor institutional support, poor management, lack of appropriate infrastructure and lack of appropriate dairy research. Other factors cited by majority of the respondents include lack of modern technology, high storage and transportation costs, lack of consistency in milk production and supply by farmers, lack of funding from government and lack of machinery.

The assumption that the level of training that the farmer receives correlates to the level of knowledge amongst small-scale farmers was proven wrong as it was statistically insignificant. New ideas on dairy farming receive better implementation when farmers are trained. The dairy farmer would more likely apply best practices if they were experienced

in dairying and this resulted in increased productivity. The study also concluded that most of the small-scale farmers in Gokwe district are operating at a profit. More so, guided by the findings, the study concluded that there are so many economic benefits associated with being a membership of milk cooperatives.

## 5.4 Implications

This research forms the basis upon which several other studies can be conducted to understand factors affecting the profitability of Small-Scale Dairy farmers in Zimbabwe. It should be noted that this study is one of the few studies conducted to have a better understanding of the environment in which small scale dairy farmers operate in. This study tried to unpack factors that affect profitability of Small-Scale Dairy farmers in Zimbabwe. Findings of this research can be used to guide Small Scale Dairy farmers in modelling their businesses to make them profitable in the long run. The findings of this study can better inform the model that should be adopted by NGOs and government to for interventions required to make Small Scale Dairy farming profitable. With profitable dairy farming livelihoods can be transformed and more people in the communal areas can be attracted to venture into dairy farming.

## 5.5 Recommendations

Recommended policy actions should be directed towards the construction of more milk collection centres (markets) near the farmers in order to reduce the distance to the market; establishment of breeding centres for dairy animals in order for farmer to increase their herd size; and knowledge transfer through provision of extension services in order to educate the farmers on dairy management. From the findings of the study the following recommendations were made. First, the study established tertiary education plays a vital role in improving farmers' income therefore, it is recommended that the small-scale dairy farmers who are have the highest level of education should be the lead farmers as this will help other farmers in being advised or trained through their dairy farming cooperatives to enjoy the benefits. This is so that some of drugs used in dairy production requires proper training and that they will be also be able to educate their peers on breeding and its advantage.

Second, the small-scale farmers also need to treat dairy farming as a business, hence practicing proper financial management. Good record keeping by the small-scale dairy farmers in Gokwe district will assist them on keeping their costs on track and check the trend of revenue. This is evidenced by those with tertiary education as they keep their records.

Third, the study recommends that household labour has a negative effect on dairy production as they don't take this serious and therefore recommends that hiring of labour will be ideal.

Fourth, there is a significant effect on marital status, the study also recommend that the more couples should be involved in dairy farming as there will be sharing of ideas as

household level, while this can be true the results also show that those divorced also have higher gross margins, therefore the study recommend that those single or widows should also practice dairy farming as a way improve their gross margins.

Fifth, small-scale dairy farmers in Gokwe district also need to adopt modern dairy farming practices such as artificial insemination so as to improve their herd size, profitability, and viability. An improvement in the herd size is very critical this will have a significant effect on the gross margin.

## 5.6Areas for Further Research

The study was confined to small- scale dairy farmers in Gokwe district hence the results could not be a true reflection of the problem across the country. Therefore, there is need for further research to focus on small-scale dairy farmers in other districts in Zimbabwe. The sample size for the study was small such that the findings cannot be generalized to the entire population. Therefore, future studies should consider using a large sample size. Advanced methodologies such as factor analysis and correlation analysis may also enhance the findings of this current study, therefore studies interested in conducting a replica of the study must also consider the use advance methodologies. Further research also needs to be conducted targeting both large- and small-scale dairy farmers and make comparisons on the factors affecting profitability.

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# APPENDICES

## Appendix A: INFORMED CONSENT GUIDE

My name is **Tandiwe Mugombi**, a final year Masters in Agribusiness student from Africa University. I am carrying out a study on **the Determinants of Small- Scale Dairy Farming Profitability in Gokwe District. A Case Study of Gokwe Dairy Cooperative**

I am kindly asking you to participate in this study by answering questions.

*What you should know about the study*:

Purpose of the study is to explore and analyse the **Determinants of Small- Scale Dairy Farming Profitability in Gokwe District. Study of Gokwe Dairy Cooperative**

*Procedures and duration*

If you decide to participate your assistance, keen sense and understanding will be greatly appreciated. It is expected that this will take about 45 minutes of the interview/discussion.

*Risks and discomforts*

In this study, there are no foreseeable risks, discomforts or inconveniences to the subject/participant including legal, health, economic or psychological.

*Benefits and/or compensation*

There are no monetary or any other benefits in this study.

*Confidentiality*

Any information that is obtained in the study that can be identified with the participant will not be disclosed without their permission. Names and any other identification will not be asked for in the questionnaires.

*Voluntary participation*

Participation in this study is voluntary. If you decide not to participate in this study, their decision will not affect their future relationship with the Researcher. If you chose to participate, you are free to withdraw your consent and to discontinue participation without penalty.

*Offer to answer questions*

Before you sign this form, please ask any questions on any aspect of this study that is unclear to you. You may take as much time as necessary to think it over.

*Authorisation*

If you have decided to participate in this study, please sign this form in the space provide below as an indication that you have read and understood the information provided above and have agreed to participate.

---------- ----------

Name of Research Participant (please print) Date

----------

Signature of Research Participant or legally authorized representative

If you have any questions concerning this study or consent form beyond those answered by the researcher including questions about the research, your rights as a research participant, or if you feel that you have been treated unfairly and would like to talk to someone other than the researcher, please feel free to contact the Africa University Research Ethics Committee

**Appendix B: QUESTIONNAIRE FOR SMALL SCALE DAILY FARMERS**

My name is Tandiwe, a Masters in Agribusiness student at Africa University. I am conducting a study of the **DETERMINANTS OF SMALL- SCALE DAIRY FARMING PROFITABILITY IN ZIMBABWE: A CASE STUDY OF GOKWE DAIRY COOPERATIVE.** The information you will provide here is purely for academic purposes.

| **SECTION A** | | | |
|---|---|---|---|
| Date: | | | |
| Province: | District: | Name of Milk Producer Association: | |
| Delivering to MCC? | | | |
| 1.Classification by Management System | 1=Zero Grazing | 2=Paddock system | 3=Free/open range |
| Classification by feeding methods | =natural pasture | 2=forage | 3=silage/hay |
| Classification by Dairy Breeds | 1=Pure Breeds | 2=Crosses | 3=Indigenous |

| | | | |
|---|---|---|---|
| **B. SOCIO-ECONOMIC CHARACTERISTICS** | | | |
| 5. Household Size: | Number of HH members active (providing labour) in dairying: (Age 18-64) | | |
| Age of Household Head | Age of Household head | | |
| IaritalStatusof Household Head | 1=Married | 2=Single | 3=Widowed |
| ighestLevelof Education of H/Head | 1=Primary | 2= ZJC/Std 6/secondary | 3= tertiary |
| 10. Occupation of H/Head | 1=No formal employment | | 2= Employed |
| AgriculturalTraining of H/Head | 1=None | 2= Certificate | 3= Diploma |
| 12. Experience (number of years in smallholder dairying): | | | |

**INCOMESOURCES**

Rank the sources (1-5)

| Income Source | Rank |
|---|---|
| Dairy | |
| Horticulture | |
| Formal Employment | |
| Informal Sector | |
| Pension | |
| Tobacco | |
| Other (specify) | |

| | | | |
|---|---|---|---|
| **C. Technical** | | | |
| 5. Dairy Breed Type | Pure | Cross | Hard Mashona |
| 7. What type of feeding do you use? | Zero grazing | Free range | Both free range & supplementary |
| 8. Herd Size | 0-3 | 4-6 | 6 plus |
| 9. How often do you deworm & vaccinate per year? | Once a year | Twice year | Three times plus |
| 10. Breeding methods | Artificial Insemination | Bull | Both |
| 11. Training of Agricultural H/Head | 1-None | 2-Certificate | 3-Diploma |
| 12. Experience (number of years in smallholder dairying): | | | |

**D Institutional and Management**

Circle the number that represents your level of agreement with each of the following statements using the five-point Likert scale provided.

5= Strongly Agree, 4= Agree, 3= Neutral, 2= Disagree, and 1=Strongly Disagree

| Statement | 5 | 4 | 3 | 2 | 1 |
|---|---|---|---|---|---|
| Level of education of the farmers | | | | | |
| Poor financial management | | | | | |
| Size of herd | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| Lack of access to reliable and consistent Market | | | | | |
| Cost of production | | | | | |
| Lack of support from government and Banks | | | | | |

6. From the list below, circle 3 most important constraints that have been hindering functionality of Milk Collection Centres:

a) Lack of funding from government

b) Poor management

c) Poor infrastructure

d) Lack of consistency in milk production by the dairy farmers

e) Lack of machinery to store and process milk.

6. What other challenges are you facing as a dairy farmer besides those stated above?

_____
_____
_____

7. What opportunities are available for dairy farmers in this area?

_____
_____
_____

8. What do you think you need to do as a dairy farmer to improve your business production and profit making?

_____
_____
_____

9. Do you think the collective action by small scale dairy farmers have an economic benefit to individual farmers?

_____
_____
_____

10. If yes, how have this benefited you economically?

_____
_____
_____

11 .What best practices should small -scale dairy cooperatives adopt to be economically viable?

5= Strongly Agree, 4= Agree, 3= Neutral, 2= Disagree, and 1=Strongly Disagree

| Statement | 5 | 4 | 3 | 2 | 1 |
|---|---|---|---|---|---|
| Increase knowledge level by participating in educational programmes about dairy farming | | | | | |
| Improve on financial management | | | | | |
| Increase Size of herd to increase Production | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| Finding reliable and consistent market | | | | | |
| Build capacity to process and store milk in bulk | | | | | |

**Section E**

| **GROSS MARGIN ANALYSIS** | | | |
|---|---|---|---|
| **1. Dairy Income (Cumulative January 2020 – June 2020).** | | | |
| | Quantities Sold (litres) | Unit Price (US$/litre) | Total Income (US$) |
| Value of milk sold to the milk collection centre | | | |
| Value of milk sold locally | | | |
| Gross income from dairy livestock sales | | | |
| **Total Gross Income for dairy enterprise** | | | |
| **2. Variable Costs (January 2020 – June 2020)** | | | |
| Total costs for purchased feeds (stock feed) | | | |
| Total costs for home-grown feeds (forage seed, fertilizer, hay/ silage) | | | |
| Total veterinary costs (drugs + vaccines) | | | |
| Breeding cost (AI/Bull hire) | | | |

| | | | |
|---|---|---|---|
| Total costs for hired labour | | | |
| Total costs for family labour | | | |
| Total transport costs | | | |
| **Total Variable Costs (January 2020 – June 2020)** | | | |
| **3. Gross Margins** | | | |
| Gross Margin (US$) | | | |
| Gross Margin per Cow (US$) | | | |
| Gross Margin per Total Variable Costs (US$) | | | |
| Gross Margin per Feed Costs ($) | | | |
| Gross Margin per Litre ($) | | | |

## APPENDIX C. KEY INFORMANT INTERVIEW GUIDE FOR MILK COLLECTION CENTRE OFFICIALS

1. What was the rationale behind the creation of Milk Collection Centres?
2. Generally, how significant has been the supply of milk by small –scale dairy farmers to your overall output?
3. What challenges have you been facing as the Milk Collection Centres in undertaking your role?
4. How do you think the challenges that you face as the Milk Centre's affect the profitability of small-scale dairy farmers?
5. What do you think are the factors that affect profitability of small-scale dairy farmers at the farm level?
6. What do you think are the factors that affect profitability of small-scale dairy farmers at the cooperative level?
7. Do you think the collective action by small -scale farmers through cooperatives can be of economic benefit? Explain.
8. What best practices can small -scale dairy cooperatives adopt to become economically viable?

**Appendix D. Key informant guide for extension officers and development practitioners**

1. First, what is the status of dairy farming in Gokwe?
2. What has been the general performance of small-scale dairy farmers in Gokwe as compared to large-scale dairy farmers?
3. Generally, how frequent has been the supply of milk by small -scale dairy farmers to your overall output?
4. Can you describe your working relationship with small -scale dairy farmers and how has this impacted the production of milk in the area?
5. What factors do you think affect the profitability of small-scale dairy farmers in Gokwe?
6. What is your take on the way that small-scale dairy farmers in the area are engaging themselves to ensure profitability of their businesses?
7. Understanding that dairy farmers have formed a cooperative in Gokwe, how important is the cooperatives to the individual farmer?
8. What are the present statistics on the functionality of Milk Collection Centres?
9. What challenges do you think Milk Collection Centre's are facing with small scale dairy farmers?
10. What is the impact of challenges faced by the Milk Centre on profitability of small-scale dairy farmers?
11. What best practices can small -scale dairy cooperatives adopt to be economically viable?

Thank you

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# AFRICA UNIVERSITY RESEARCH ETHICS COMMITTEE (AUREC)

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Ref: AU1839/20 3 December, 2020

Tandiwe Mugombi
C/O CHANS

Africa University

Box 1320

**Mutare**

**RE:DETERMINANTS OF SMALL- SCALE DAIRY FARMING PROFITABILITYIN GOKWE DISTRICT: A CASE STUDY OF GOKWE DAIRY COOPERATIVE**

Thank you for the above titled proposal that you submitted to the Africa University Research Ethics Committee for review. Please be advised that AUREC has reviewed and approved your application to conduct the above research.

The approval is based on the following.

a) Research proposal
b) Data collection instruments
c) Informed consent guide

- **APPROVAL NUMBER** AU1839/20

This number should be used on all correspondences, consent forms, and appropriate documents.

- **AUREC MEETING DATE** NA
- **APPROVAL DATE** December 3, 2020
- **EXPIRATION DATE** December 3, 2021
- **TYPE OF MEETING** Expedited

After the expiration date this research may only continue upon renewal. For purposes of renewal, a progress report on a standard AUREC form should be submitted a month before expiration date.

- **SERIOUS ADVERSE EVENTS** All serious problems having to do with subject safety must be reported to AUREC within 3 working days on standard AUREC form.
- **MODIFICATIONS** Prior AUREC approval is required before implementing any changes in the proposal (including changes in the consent documents)
- **TERMINATION OF STUDY** Upon termination of the study a report has to be submitted to AUREC.

AFRICA UNIVERSITY
RESEARCH ETHICS COMMITTEE (AUREC)
APPROVED
P.O. BOX 1320, MUTARE, ZIMBABWE

**Yours Faithfully**

**MARY CHINZOU – A/AUREC ADMINISTRATORFOR CHAIRPERSON, AFRICA UNIVERSITY**
**RESEARCH ETHICS COMMITTEE**

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