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CHINHOYI UNIVERSITY OF TECHNOLOGY

SCHOOL OF AGRICULTURAL SCIENCES AND TECHNOLOGY

DEPARTMENT OF ANIMAL PRODUCTION AND TECHNOLOGY

Assessing animal welfare challenges and farmer awareness in dairy farms in Harare province

BY

FAITH MUTEMARARO

C21144450M

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Supervisor: Dr Chakanya

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CHAPTER 1: INTRODUCTION

1.1 Background

Animal welfare describes the physical along with psychological condition of animals and their ability to display natural behaviors and preserve good health while living in positive states (Mellor 2012). According to (British and 2019 2019) animal welfare contains more than just experiencing negative-free conditions because it also means positive instances along with environmental sustainability.

The dairy sector in Zimbabwe faced major production changes from its 1990 peak of 262 million liters to under 37 million liters of milk in 2009, then experienced a moderate growth up to 91.6 million liters in 2022(Van Der Hoek et al. 2021). The global platform now looks to sustainable dairy farming as one of its primary drivers through this development. The current milk output fails to reach the estimated national consumption of 130 million liters so the industry remains open to enhance performance(Van Der Hoek et al. 2021). In Zimbabwe , the dairy sector is an important contributor to both agriculture economy and food security here are a number of practices that are not always followed in developing countries such as Zimbabwe due to lack of resources and knowledge which includes inadequate housing and shelter when it comes to dairy farming(Matore, Woods, and Mutibvu 2025). The dairy sub sector in Zimbabwe plays important role in the production of agricultural food products and income to the farmers.

Dairy animals produce better results in terms of milk quantity and quality as well as enhanced efficiency when their housing standards and feed management receive improvements along with health care practices (Agriculture and 2020 2020). The combination of positive conditions for dairy cattle produces reduced stress hormones alongside stronger immune response which creates improved yields of quality products according to(Koenneker et al. n.d.). Studies reveal that dairy sector management practices which have environmental advantages also solve productivity issues while reducing environmental impacts (Brkić, Manag, and 2024 n.d.).

Animal welfare assessment relies on an evaluation of body condition score together with prevalence of lameness and disease occurrences and behavioral observations and environmental conditions(Ali et al. n.d.) . Farmer understanding of animal welfare depends on their educational level together with the information they can access and trainings they receive and cultural beliefs alongside the economic boundaries they work under . Training farmers creates essential prerequisites for boosting awareness, which enables them to execute enhanced animal welfare practices in Zimbabwe (Fernandes et al. n.d.).

People who demonstrate better awareness about animal welfare, better comprehend the fundamental requirements for dairy cows. Dairy cow welfare depends on a combination of four core necessities: proper nutrition and clean water supply alongside good housing facilities and sufficient social space(Husb and 2024 n.d.). Early warning indicators of illness and stress and injury are easily recognizable to these farmers. Strong awareness of animal welfare enables farmers to comprehend how particular management elements like transportation methods and weaning practices affect animal welfare positively or negatively according to (Balzani and Hanlon 2020).

The current demand for milk in Zimbabwe stands at 130 million liters, and there is a national capacity for processing 400 million litres per anum. This growing demand places pressure on the dairy industry to increase production while maintaining or improving animal welfare standards. The historical development of dairy farming practices has evolved considerably, with technological advancements and economic pressures driving changes that raise questions about their impact on animal welfare (Chamboko, Development, and 2016 n.d.).

Research conducted in the Midlands Province of Zimbabwe found that 67% of stockpeople on large-scale dairy farms could not define animal welfare, highlighting a significant knowledge gap that affects animal care practices (Matore, Woods, and Mutibvu 2024). Many dairy farms in Zimbabwe are associated with several welfare problems including overcrowding, malnutrition, and lack of medical attention. These problems not only decrease milk production but also jeopardize the well-being and lifespan of dairy animals (Matore, Woods, and Kagler 2018)

Studies which provide complete assessments on Zimbabwean animal welfare practices remain insufficient to address present complications. When data about animal welfare is insufficient it becomes difficult for farmers and policymakers to develop proven solutions which improve animal well-being. The study seeks to identify the existing animal welfare issues while measuring farm owner understanding and pinpointing development opportunities. The study results will enable the establishment of efficient measures to better fulfil farmers' needs as well as their livestock requirements for sustainable dairy farming in Harare Province

1.2 Problem Statement

Animal welfare is a critical concern in dairy production, yet efforts to improve welfare standards are usually hindered by limited farmers knowledge on animal welfare. Many farmers lack access to up to date information on the best practices for animal care . This gap in awareness definitely contributes to the continuous practices of poor welfare .

Customers are demonstrating growing concern about dairy product ethical sourcing while they expect elevated global animal welfare requirements. Market trends are currently shaping the Zimbabwean market through increasing demands that force producers to enhance their practices . The production factors show that stressed cows which do not remain healthy end up generating less milk while requiring expensive veterinary treatments which ultimately shortens their lifespan negatively impacting farm stability (Aggarwal et al. 2013)

Dairy cattle survival depends on the care provided by dairy farmers because their awareness and the way they handle their animals controls animal wellbeing outcomes(Novák et al. 2005). A major challenge exists throughout farms which respect animal welfare because many farmers lack both the adequate knowledge and proper information regarding best practices. A few farmers choose to obtain quick profits through unsustainable practices which leads to unsatisfactory conditions in animal care. The Zimbabwean dairy sector faces diminishing international competitiveness alongside low productivity and reduced quality outputs unless urgent attention is given to address current issues according to.(Balzani and Hanlon 2020)

1.3 Justification

The world faces mounting challenges regarding animal welfare since public along with scientific communities show increasing concern for agricultural animals (Dawkins,

2017)(Matore et al. 2024). The studied research supports worldwide initiatives that benefit animal lives through sustainable dairy sector advancements. The global rise in animal welfare awareness has not produced extensive research about dairy farm challenges in Zimbabwe especially within Harare Province. Research must be carried out for gaining vital insights about present farm animal welfare conditions to establish necessary improvement measures. This study discovers crucial information to direct both policy-making and the execution of extension services and dairy farming training initiatives focused on dairy-welfare enhancement in Zimbabwe (Agriculture and 2020 2020)

The Zimbabwean dairy industry can build more market advantages through improved reputation in both local markets and international markets because it shows its dedication to animal welfare. The well-being of animals influences dairy product quality because stressed and ill cows deliver inferior milk and encounter increased risk of health-related pathogens that could harm human health. The study of animal welfare along with its enhancement delivers benefits for producing reliable food while maintaining high product quality (Matore et al. 2025)

The identified animal well-being issues will help create specific policies and training initiatives with support frameworks to improve dairy farm practices in Harare. The study aims to produce economic benefits that help dairy farmers increase productivity and deliver better products to consumers and create better living conditions for dairy animals .

1.4 Objectives

The main objective of this study is to assess animal welfare challenges and farmer awareness in dairy farms in Harare Province, Zimbabwe.

The specific objectives are:

1. To investigate the awareness and attitudes of farmers regarding animal welfare principles.

2. To identify the most common animal welfare challenges faced by dairy farmers in Harare Province.

1.5 Hypothesis

Objective 1

H_0: Farmers are not aware of animal welfare principles and do not have a positive attitude toward them.

H_1: Farmers are aware of animal welfare principles and have a positive attitude toward them.

Objective 2

H_0: Dairy farmers in Harare do not experience significant animal welfare challenges.

H_1: Dairy farmers in Harare province experience significant animal welfare challenges.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

Animal welfare in milk production is increasingly becoming a focus globally, more so among developing nations where such factors as lack of infrastructure, veterinary services, and farmer training still prevail. In Zimbabwe as well as much of sub-Saharan Africa, milk production is marked by smallholder production systems and differing levels of adherence to animal welfare principles. Literature is assembled in this chapter to provide conceptualization of typical animal welfare issues in milk farms, evaluate awareness and attitude among farmers, and establish research gaps covered by this study (Agriculture and 2020 2020)

2.2 Defining and Understanding Animal Welfare in Dairy Farming

Animal welfare is an ever-developing concept which deals with the physical, emotional, and mental comfort of the animals under our care(Matore et al. 2025). Welfare in dairy farming is not all about avoiding disease or productivity but about establishing conditions whereby animals may lead relatively stress-free lives, exhibit normal behavior, and experience good emotional lives. Therefore, welfare science today takes into account a wide range of biological, environmental, and ethical factors to evaluate the extent to which animals are flourishing in particular production systems (Fraser, 2020; Nguhiu-Mwangi, 2023).

Historically, the animal welfare concept was founded on the Five Freedoms model, initially implemented by the UK Farm Animal Welfare Council in 1993 and subsequently adopted universally. These are the lack of hunger and thirst; discomfort; pain, injury, or disease; fear and distress; and freedom to display normal behaviour. While this model was a good start, it has more and more come under fire for its negative formulation dwelling primarily on the lack of suffering and not on the existence of well-being. As M. A. (2019) proposes, the Five Freedoms, while influential, are too broad to capture positive experience or emotional resilience in animals, particularly in intensively produced systems such as dairy farms.

Due to these limitations, more recent researchers and welfare groups have proposed the Five Domains Model, which offers a more holistic strategy. The model accounts for four physical domains nutrition, environment, health, and behavior and a fifth, integrative domain: mental state (Mellor et al., 2020). Each of the physical domains contributes to the overall affective state of the animal, allowing for a more dynamic and integrated evaluation of welfare. For

instance, instead of merely guaranteeing cows are not hungry, the Five Domains encourage attention to whether animals are nutritionally satisfied in a way that is conducive to vigor and satisfaction. This is one of the major differences in dairy farming where dietary imbalance, accommodation, or loneliness may influence welfare as well as productivity.

Moreover, modern welfare science gives more importance to positive welfare that not only alleviates suffering but allows animals to perform rewarding behavior like grooming, social attachment, play, and exploratory activity (Boissy et al., 2018; Tadele et al., 2025). This change marks an increasing ethical imperative towards maximizing farm animals' welfare of life, with welfare science being brought closer to animal cognition and behavioral ecology. In the case of dairy cows, this involves provision of enriched housing, sufficient area for lying down and ruminating, human-animal interaction that is tame in nature, and exposure to herd dynamics allowing respect of social hierarchy.

In the case of sub-Saharan Africa, as well as Zimbabwe, integration of these new welfare paradigms remains in the developmental stage. The majority of smallholder systems, Njisane and Mukumbo (2019) claim, are preoccupied with survival and production at the bare minimum instead of emotional and behavioral needs, mainly because of economic constraints as well as lack of adequate training. But as welfare science continues to evolve, there is mounting pressure to reconcile global standards with economically and culturally sustainable methods that also respect animal sentience and welfare.

In total, the transition from the Five Freedoms to the Five Domains model is a conceptual step in welfare comprehension and assessment. For dairy farming, particularly in the smallholder or resource-poor setting, embracing a multi-faceted welfare approach is not only crucial for ethical purposes but also for productivity enhancement, consumer confidence, and sustainability within the livestock industry.

2.3 Animal Welfare Challenges in Dairy Production Systems

2.3.1 Housing and Physical Comfort Challenges

Animal housing plays a fundamental role in determining the physical comfort and well-being of dairy cattle. In Zimbabwe's smallholder dairy systems, housing is often inadequate, lacking proper flooring, roofing, and ventilation. This leads to discomfort, injury, and an increased risk of disease. Nguhiu-Mwangi (2023) observes that most sub-Saharan dairy cows are housed under unsanitary and crowded conditions, where hard flooring and crowding lead to lameness

and joint problems due to restricted space for movement and extended periods of standing on hard floors (Nguhiu-Mwangi, 2023). In the same vein, Paraffin, Zindove, and Chimonyo (2018) noted in Zimbabwe that most dairy farms lack sheltered resting places, subjecting cows to the weather and stressing them (Paraffin et al., 2018). Tagba, Puchooa, and Sina (2024) went a step further in noting that poorly ventilated sheds with no bedding are some of the causes of respiratory distress and lowering lying behavior among dairy cattle (Tagba et al., 2024). These conditions have a serious impact not only on welfare but also on productivity since stressed animals yield less milk and are susceptible to disease.

2.3.2 Malnutrition and Nutritional Restraints Risks

Nutrition is at the core of dairy animal welfare in terms of affecting growth, reproduction, immunity, and milk production. Zimbabwean and regional smallholder dairy farmers, however, frequently fail to offer equal and balanced diets. Chilambula (2025) reported that many dairy farms in Malawi and other similar agro-ecological settings are very dependent on seasonal grass and crop residues that have low protein and energy value, hence leading to emaciation and reproductive failure (Chilambula, 2025). A national KAP survey conducted by Caudell et al. (2020) found that Zimbabwean farmers lacked a clear understanding of the nutritional needs of high-yielding dairy cattle and underfed them because they could not afford to (Caudell et al., 2020). Likewise, Njisane and Mukumbo (2019) highlighted that nutrient deficiencies weaken immunity and make animals susceptible to parasitic infestations and metabolic disorders that further lower welfare levels (Njisane & Mukumbo, 2019). These are compounded during dry seasons when there is limited natural pasture and farmers must feed low-quality residues with no mineral supplementation.

2.3.3 Health Management and Disease Burden

Proper health management is necessary to ensure dairy cattle welfare but is not found in most smallholder systems without frequent veterinary care. Mastitis, tick-borne illness, and lameness are prevalent but not addressed due to unaffordable drug costs and lack of proper expertise. Paraffin et al. (2018) noted that Zimbabwean farmers access veterinary services later when disease conditions are severe, leading to increased animal suffering and unnoticed subclinical infections (Paraffin et al., 2018). In the same vein, Caudell et al. (2020) noted that the Zimbabwean and Zambian farmers did not know drug withdrawal times and biosecurity protocols, leading to antimicrobial resistance and the risk of zoonotic disease transmission (Caudell et al., 2020). Njisane and Mukumbo (2019) also identified the suboptimal

implementation of preventive strategies including vaccination, regular deworming, and disease testing as key to long-term health and herd welfare maintenance (Njisane & Mukumbo, 2019).

2.3.4 Handling and Restriction of Behaviors

Good or bad handling practices and restriction of natural behavior are key markers for impaired animal welfare. Most smallholder dairy farmers adopt forceful and stressful practices like beating, tethering, and sudden herding, which scare animals and lead to anxiety. Chilambula (2025) states that such practices are generally passed down through generations and seldom questioned due to poor formal animal welfare training (Chilambula, 2025). Njisane and Mukumbo (2019) reported behavioral indicators of cow distress, such as tail flicking, vocalization, and human avoidance of an individual getting closer, all stemming from aversive human-animal interactions (Njisane & Mukumbo, 2019). In addition, Nguhiu-Mwangi (2023) posited that deprivation behavior worsens in confinement systems where animals are deprived of proper space to graze, groom, or socialize, thereby intensifying stereotypic behavior such as pacing or tongue-rolling (Nguhiu-Mwangi, 2023).

2.3.5 Climate-Related Stressors and Infrastructural Limitations

Climate change has added new dimensions of welfare issues in dairy production, especially in the hot dry areas of Zimbabwe. Temperature increase and decreased rainfall affect feed supply and animal comfort. Tagba et al. (2024) revealed that heat stress greatly affects cow behavior, feed intake, and milk yield in African dairy farming, with limited farms adopting avoidance methods such as shading and sprinklers (Tagba et al., 2024). Musara et al. (2021) also noted that farmers in semi-arid Zimbabwe reported increasing difficulties in keeping animals healthy and hydrated during prolonged dry seasons, which often led to livestock dehydration and tiredness (Musara et al., 2021). In addition, Nguhiu-Mwangi (2023) noted that smallholders do not have money to invest in heat-tolerant infrastructure or cooling systems, which expose animals to thermal stress and related disorders like heat stroke or metabolic disorder (Nguhiu-Mwangi, 2023).

2.4 Farmer Knowledge and Attitudes Toward Animal Welfare

2.4.1 Understanding of Animal Welfare Concepts Among Farmers

One of the major problems of the enhancement of animal welfare in sub-Saharan Africa is that, generally speaking, farmers have very little overall knowledge of what "animal welfare" actually is. Most smallholder farmers only ever relate welfare to animal health or productivity,

i.e., milk production in specific, and do not even give consideration to key such as freedom of behavior, feelings, and reducing stress or fear to a minimal level. In a cross-country study conducted by Mwanga, Mujibi, and Yonah (2019), herd decision-making and breeding were mainly driven by economics, and animal comfort, pain avoidance, and behavior were infrequently taken into account. Routine health maintenance was practiced in the study of dairy farmers in four sub-Saharan African countries, but few farmers had knowledge of welfare procedures or animal signs of distress for behavior (Mwanga et al., 2019). Likewise, Meijer, Catacutan, and Ajayi (2015) established that welfare-oriented innovations were significantly affected by knowledge, attitudes, and perceptions, but they were not distributed equally among farming communities. In summary, the study established that forces beyond the farmer level of education, training exposure, and availability of advisory services were the determinants of welfare-sensitive attitude to livestock care (Meijer et al., 2015). Producers who were not exposed to this generally underestimated the effect of improper housing, rough handling, or malnutrition on cow behavior and long-term productivity.

2.4.2 Gender and Socio-cultural Dynamics in Welfare Perception

Farm populations, particularly gender and cultural dispositions, are strong predictors of welfare perception and response. Lunner-Kolstrup and Ssali (2016) conducted qualitative interviews with Ugandan dairy farmers and discovered that female farmers were more likely to experience a stronger empathetic relationship with animals and observed animal distress behaviors more strongly than male farmers. The researchers observed that women, in most instances, were more likely to adopt practices like gentle milking, grooming daily, and giving water and shade, especially when they could access extension services or community networks (Lunner-Kolstrup & Ssali, 2016). The observations are consistent with the argument that attitudes towards animals are most likely to be influenced by caregiving roles and domestic household responsibilities. In addition, Okeyo and Rege (2017) asserted that indigenous knowledge systems could potentially be utilized to frame animal welfare principles in a way that it resonates with local values. Okeyo and Rege's study of East and Southern African smallholder farms reaffirmed that culturally rooted practices, e.g., free roaming or cow self-selection of forage, are not only beneficial but also could be complemented by science-based knowledge to develop welfare-conscious hybrid systems (Okeyo & Rege, 2017). It is therefore the confluence of culture, gender, and education that forms the primary frame of reference by which farmer behavior and attitude need to be comprehended and enhanced.

2.4.3 Information, Extension Gaps, and the Role of Information

The spreading of correct animal welfare facts is still a fundamental bottleneck on most of the African continent. Even though the adoption of mobile technology has the potential to transform farmer training, patchiness is dominant due to infrastructural constraints, ignorance of digitization, and economic constraint. Kabbiri et al. (2018) had researched farmers' mobile phone adoption in Uganda and found that despite a significant percentage of young and urban-local farmers utilizing mobile services to access agriculture advice, numerous rural farmers remained behind. The research established that exposure to mobile-based advisory systems improved information on hygiene, disease management, and detection of animal distress in time (Kabbiri et al., 2018). Conversely, those farmers with fewer digital assets at hand were less likely to detect welfare issues or apply interventions, such as the provision of soft flooring or recurrent deworming. To justify this, Tadele et al. (2025) contend that digital agriculture technologies would be able to boost welfare monitoring via precision farming technologies such as real-time health monitoring and temperature regulation systems, but demanded localized adaptation as well as farmer-friendly interfaces to be achieved in a bid to maximize usability at literacy levels (Tadele et al., 2025). Without sound extension services or technology bridges, smallholders may be unaware of non-evident signals of animal suffering or even mistakenly attribute them as normal behavior.

2.4.4 Institutional Trust and Professional Influence

Veterinary practitioners and animal health operatives are primary sources of technical information to small-scale farmers, and their endorsement is what determines orientations toward welfare. However, they are unavailable and, where seen, are subject to questions around continuity as much as trust problems. Tebug et al. (2021) provided systematic review evidence concerning veterinary practitioners' use of antimicrobials in 20 African countries and documented systemic imperfections in incidental farmer engagement as well as passage of training. The authors demonstrated that despite awareness of best practice by professionals, this was undermined by workload, underfunding, and the unavailability of localized welfare materials adapted to fit smallholder systems (Tebug et al., 2021). Moreover, experience and cultural inclination may influence farmers' perceptions of veterinary advice. For example, some communities would rather continue traditional healing or generation-long livestock husbandry practices, sometimes in conflict with science-informed welfare programs. Bridging such divides calls for institutional trust establishment, facilitation of co-design of welfare procedures

together with transmission along with the involvement of communities, and embedding extension workers within rural networks instead of utilizing episodic outreach activities.

2.5 Institutional and Policy Environment

2.5.1 Legal and Regulatory Landscape

In Zimbabwe, the law governing animal welfare is that of the Prevention of Cruelty to Animals Act [Chapter 19:09], as enacted originally in 1960 and subsequently as amended. While this Act sets a minimum floor of protection from physical ill-treatment and abandonment, it is outdated and short on broad-gauged provision relevant to twentieth-century animal welfare science. Directly, it does not discuss matters particular to dairying, such as lameness, freedom of behavior, quality of accommodation, or heat stress. Okeyo and Rege (2017) reported that in most sub-Saharan nations, animal welfare is a peripheral aspect of livestock production, after food security and disease control (Okeyo & Rege, 2017). The same is true in Zimbabwe, where welfare enforcement is hampered by the absence of a specialized national body or uniform welfare audit system for dairy farms.

Despite Zimbabwe being a signatory to most regional and global conventions e.g., World Organisation for Animal Health (OIE) guidelines their operationalization at the farm level is weak. Chagunda et al. (2020) opine that most African nations have poor legal structures in place but few regulatory institutions and training schemes to support the operationalization of these effectively. Thus, legal intent and actual practices end up being far apart (Chagunda et al., 2020).

2.5.2 Extension Services and Farmer Education Role

Extension services provide an important link between policy frameworks and farmer practice. In Zimbabwe, AGRITEX and DVS perform this function primarily. Most extension officers, however, have been trained in crop production or general livestock health, and very little emphasis is put on animal welfare concepts. One of the studies, by Mwanga et al. (2019), indicated that very few sub-Saharan African farmers received formal welfare training and, even in cases where courses like these may have existed, it was invariably presented as an ad hoc or one-off workshop (Mwanga et al., 2019). Unavailability of structured, repeated courses for farmers related to welfare standards like the Five Freedoms or behavioral indicators curtails best-practice application. Tadele et al. (2025) have referred to the possibility of using digital extension platforms in substituting finite human capacity, especially in the form of mobile-

based advisory services and virtual farmer field schools. But, as their research illustrates, lack of digital literacy and access to infrastructure continues to be a prime constraint in isolated farming communities (Tadele et al., 2025). Welfare content not being available in multiple languages and locally contextualized further truncates the outreach of such initiatives.

2.5.3 Institutional Challenges and Enforcement Gaps

Even where welfare legislation exists, enforcement is typically hindered by weak institutional mandates and low political priority. For instance, Tebug et al. (2021) reported that in 20 African nations, veterinary officers and paravets often fought to deliver welfare-based messaging because of opposing public health mandates, non-alignment in policy, and lack of resources (Tebug et al., 2021). Enforcement responsibilities rest unequally on DVS and law enforcement agencies, both of which lack specialized animal welfare sections. This results in unequal response to neglect or cruelty complaints and inadequate follow-up on enforcement of compliance with training. In addition, privatization of veterinary services and the shift to cost-recovery structures have rendered professional services out of reach for resource-poor smallholder farmers. This has led to sensitivity to responsibility for welfare in a legal context existing but rarely manifesting as change of behavior on farms. No national animal welfare indicators or reporting systems exist to hinder benchmarking progress and not to include power to enforce on those who are lawbreakers.

2.5.4 Regional and NGO-Led Interventions

International organizations and global agencies such as the African Union Inter-African Bureau for Animal Resources (AU-IBAR) have covered most of the country-level institution gaps, including Zimbabwe. Organization interventions such as World Animal Protection, SNV Netherlands Development Organisation, and ZADF (Zimbabwe Association of Dairy Farmers) have initiated packages of training and outreach interventions to promote dairy system animal welfare improvement. Although such initiatives have yielded micro-local-scale changes, they are non-scalable and donor-dependent. Okeyo and Rege (2017) contended that effective institutional designs must include the convergence of top-down regulation strategies and bottom-up grassroots participation to allow for the sustenance of welfare enhancement. This involves investment in local leadership, farmer-driven monitoring of welfare, and producer-policymaker feedback mechanisms. Without the proper institutional framework, animal welfare will only be optional and never part of sustainable livestock development.

2.6 Research gaps and rationale

This chapter included a critical literature review of farmer perception and issues to animal welfare in dairy farm systems in the context of Zimbabwe and the sub-Saharan Africa region. Evidence from various studies confirmed that animal welfare on smallholder dairy farms is consistently under threat from multi-dimensional issues of poor handling, poor nutrition, limited veterinary coverage, and inappropriate housing (Nguhiu-Mwangi, 2023; Paraffin et al., 2018; Njisane & Mukumbo, 2019). Furthermore, climate-induced heat and drought stress continue to be neglected in low-resource environments in most instances due to its widely documented effect on feed, animal health, and behavior (Tagba et al., 2024; Tadele et al., 2025; Musara et al., 2021). These are against widely accepted welfare principles like the Five Freedoms and they have tangible impacts on productivity in animals and farming standards of ethically acceptable farming.

Apart from this, although Zimbabwe is a signatory to international welfare agreements like those of the World Organisation for Animal Health (OIE), its national legislative environment focusing on the Prevention of Cruelty to Animals Act [Chapter 19:09] remains outdated and has no dairy-specific laws (Okeyo & Rege, 2017). Enforcing mechanisms are under-funded and decentralized, with poor deterrence and low compliance of undesirable practices (Tebug et al., 2021; Chagunda et al., 2020). Concerning institutional support, extension agencies like AGRITEX and the Department of Veterinary Services provide negligible formal education about animal welfare. When training is provided, it tends to appear in an ad hoc manner and is not infused into continuing education systems, such as evident from Malawi, Kenya, and Zimbabwe studies (Mwanga et al., 2019; Chilambula, 2025).

Farmers' attitude and knowledge also came as a recurring theme. Many studies observed that farmers might care about productivity and overall animal health but are quite ill-advised to deal with behavioral and psychological welfare demands (Meijer et al., 2015; Lunner-Kolstrup & Ssali, 2016; Mwanga et al., 2019). Education level, gender, and access to extension services are central in defining welfare knowledge. For example, women farmers have been more responsive and sympathetic towards animal suffering in certain settings (Lunner-Kolstrup & Ssali, 2016), and farmer advice delivered through mobiles has been associated with enhanced animal welfare practices (Kabbiri et al., 2018; Tadele et al., 2025). However, digital divides and language limitations still inhibit the wider rollout of such technologies in rural Zimbabwe.

Methodologically, researchers employed a mix of methods to determine welfare status and farmers' attitudes. Some of these are Participatory Rural Appraisals (PRAs), Knowledge,

Attitude, and Practice (KAP) surveys, and direct observation of animal-based indicators such as lameness, body condition score, and behavioral signs (Chagunda et al., 2020; Mwanga et al., 2019; Njisane & Mukumbo, 2019). This multi-method methodology allows us to explore more extensively how attitudes, knowledge, and extrinsic influences interact with one another in the determination of welfare outcomes at the farm level. However, with the increased body of regional data, an equally vast research deficit still persists in Zimbabwe above all, in Harare Province relating to localized empirical literature capturing actual farmer attitudes and genuine farm-level welfare issues.

Although the literature offers a foundation on welfare in African dairy farming, it also reflects a familiar imbalance of policy application, farmer training, and locally initiated research. The review implications emphasize the necessity for comprehensive programs integrating policy change, formal farmer training, and systematic assessment of welfare. This research endeavors to address that gap by way of identification of high-profile animal welfare issues and determination of farmer opinions and awareness levels in Harare Province's milk industry. Hopefully, the outcomes will help guide practical interventions along with evidence-led learning opportunities to develop policy as well as practice.

2.7 Chapter summary

This review discovers that recurring themes across 2018 and 2025 in the literature are animal welfare concerns in smallholder dairy systems are long-standing and complex and will likely be exacerbated by low levels of farmer knowledge and institutional constraints. Zimbabwean research continues to be limited and blanket in scope, with a focus on context-specific analysis within Harare Province. This research fills that gap by combining welfare audits with farmer consultation to provide actionable outcomes.

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