Prevalence of mites and associated risk factors in village chickens *(Gallus gallus domesticus)* of Libode in Nyandeni Local Municipality, Eastern Cape Province, South Africa

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I further declare that I submitted the dissertation to originality checking software and that it falls within the accepted requirements for originality.

I further declare that I have not previously submitted this work, or part of it, for examination at Unisa for another qualification or at any other higher education institution.

25/08/2026

SIGNATURE DATE

DEDICATION

I dedicate this work to my children Yolanda and Sinobulumko, to all my brothers (Doctor, Mhlangabezi, Sakhile, Odwa and Cebo) and to the whole Hlubi Clan

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LIST OF ABBREVIATIONS

AHT	Animal Health Technician
CAHW	Community Animal Health Worker
CI	Confidence Interval
Co-Op	Co-Operative
LM	Local Municipality
NFM	The Northern Fowl Mite
PRM	The Poultry Red Mite
SLM	The Scaly Leg Mite
SPSS	Statistical Package for the Social Sciences
spp.	Species
TARDI	Tsolo Agricultural and Rural Development Institute
UNISA	University of South Africa
$\chi 2$	Chi-square

ABSTRACT

Background: Farming poultry chicken sustains the livelihoods in rural areas where chickens are used as source of proteins and to generate extra income. However, there is an increase of chicken-related health problems in rural poultry which are mostly caused by ectoparasite. Hence, there is a critical need to conduct comparative studies in rural villages to manage the spread of ectoparasite in backyard poultry systems. The study was conducted at six villages located in the Nyandeni Local Municipality (Nyandeni LM), which is part of the OR Tambo District Municipality. These villages are Coza, Ethumbeni, Luthubeni, Mjobeni, Mhlanganisweni-B and Phezukwamawa.

Methodology: A cross-sectional epidemiological questionnaire was done to assess the farmers' chicken farming system, knowledge of ectoparasite infestation and their remedies to treat mites and lice. Screening for mites and lice involved a thorough examination of the chicken's visible affected areas. Samples were identified following standard parasitological methods and examined under stereo microscope.

Results: About 197 chickens (70 males and 127 females) were examined from six Nyandeni villages in the Eastern Cape Province. The overall prevalence of mites recorded was 14.7% (95% Cl =39-46) among 197 poultry farmers examined. More than 15.7% of chickens were infested with lice while 14.7% infestation was due to mites. Of the insecticide used to control the mites and lice, 21% was Madubula followed by Bulala Zonke (15.5%), Blue Death (11%), and Karbadust (8%), and about 90% of farmers agreed that these remedies are reliable with no side effect. The lowest prevalence of mite infestation was in Mjobeni with the prevalence of 7.1% (95% CI = 0-23). The highest prevalence of mite infestation was in Coza with 25.0% (95% CI = 6-47). The difference in overall prevalence between male and female chickens was statistically significant ($p < 0.05$). In addition, the prevalence of mites and lice infestation was higher in female chickens (mites,18%; lice,18.7%) while male had lower mites (14.4%) and lice (10%) infestations. About 49 chicken farmers participated in the survey with male contributing to 73% and 27% were female. At the time of survey, 14% chicken farmers that were employed and 86% unemployed farmers were fully depending on farming chicken for sustenance and extra cash. Chicken farmers had clear knowledge of mites and lice and the use of alternative method to control the spread of ectoparasite.

Conclusion: The prevalence of these mites and lice in the rural villages is the confirmation of poor parasite control and management practices. This suggests the need to develop relevant

control strategies and train chicken farmers on how to prevent ectoparasite infestations in rural village chickens.

Keywords: Village chicken, Ectoparasite, Management practices, Eastern Cape

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CHAPTER 1

1.1 Introduction

Rural poultry production is an integral part of a balanced farming system that has a unique position in the rural household economy and supplying high-quality protein to the families (Refisa and Rebuma, 2024). *Gallus gallus domesticus*, more commonly known as chickens, have been domesticated for centuries and are among the most common birds found in farming and backyard settings (Permin *et al*., 1998). Backyard chickens does not only provide meat and eggs to the families, but they are also sold to the communities to generate income and used for cultural/religious purposes (Wangelu *et al*., 2021). In rural areas, poultry farming can provide a sustainable livelihood and income-generating opportunity, particularly because small-scale chicken production generally requires relatively low initial investment and labour inputs (Gunya *et al*., 2020). However, the productivity and profitability of rural poultry enterprises are constrained by several health and management challenges. These include infectious diseases, respiratory conditions, skin disorders, predation and parasitic infestations (Ndlovu *et al*., 2021). There are conventional methods that are used by farmers to treat parasite infections, but these drugs have been reported to be expensive and have side effects (Yadav *et al.*, 2016). For centuries, chicken farmers have been using traditional systems to treat their chickens and sustained food security (Kumarasingha *et al.*, 2014). However, the prevalence of parasites and diseases that afflict backyard chickens is still increasing rural areas.

Poultry infectious diseases can arise from microorganisms which includes parasite, bacteria, viruses, fungi, and protozoa (Mohammed *et al.,* 2018). In most rural areas, the outbreak of ectoparasite (mites, lice, fleas, fowl ticks) infestations is common in the background chickens. The prevalence of most parasitic diseases is due to risk factors such poor hygiene, inappropriate chicken houses and lack of parasite control. Mites and lice are among the most prevalent ectoparasites of village chickens, causing morbid effects on the health and productivity of these birds (Abebe *et al*., 1997). The most economically important poultry chicken mites are scaly leg mites (*Knemidocoptes mutants*), red chicken mites (*Dermanyssus gallinae*), tropical fowl mites (*Ornithonyssus bursa*) and northern fowl mites (*Ornithonyssus sylvarum*) (Onyekachi, 2021; Refisa and Rebuma, 2024;). These parasite feed on chicken blood and transmit pathogens that cause diseases such as Newcastle virus, fowl typhoid and chicken pox virus which decrease chicken production (Eslami *et al*., 2009; Gunya *et al*., 2020). Their bites can cause significant

discomfort and irritation to chickens, and lead to secondary infections, such as skin diseases and respiratory problems and further impacting poultry health (Lawal *et al*., 2017). Heavy ectoparasite infestation in rural chickens leads to tissue damage, blood loss, weight loss and lead to death.

Although ectoparasites are the major causes of decreased productivity of chickens in the backyard managed system, they are mostly neglected by the chicken farmers. So far, there are programs focusing on village chickens that conduct comparative studies concerning the prevalence of ectoparasites and their associated risk factors. For example, a cross-sectional study conducted by (Gunya *et al.*, 2020) reported the prevalence of poultry lice and mites from 150 housing in Centane and Mount Frere villages from Eastern Cape, South Africa. This data revealed that the major problem in the villages is caused by Newcastle disease (50.32%, Centane) and (66.02%, Mount Frere) which is mostly transmitted by the ectoparasite. In a cross-sectional study of 1,025 backyard chickens in Gombe, northeastern Nigeria, Lawal *et al*., (2017) reported an overall ectoparasite prevalence of 90.7%, with most birds harbouring one or more ectoparasite species. Lice were the predominant ectoparasites (85.8%), followed by mites (70.4%), fleas (27.3%), and ticks (6.2%). A study that Moretta et al. (2025) carried out in Italy confirmed that the mites' (*Ornithonyssus sylviarum, Dermanyssus gallinae*, and *Ornithonyssus bursa*d) does not only affect poultry chicken but also affect farmers that own chickens.

These studies highlight a significant lack of information regarding ectoparasite control in rural poultry production systems. Hence, there is a critical need to further conduct comparative studies in villages that own chickens to manage the spread of ectoparasite in rural poultry systems. Therefore, the chicken farmers in the rural areas of Libode have reported clinical signs in their chickens which are indicative of mites' and lice infestations. To provide appropriate advice on control measures to the chicken farmers, it is important to ascertain the primary causes of the clinical diseases. Therefore, this study aimed to provide the required information essential for developing relevant control strategies and training village chicken keepers on how to manage their chickens to reduce ectoparasitic infestations from village chickens.

1.2 Problem statement

Mites of veterinary importance infest chicken in one of the following ways: Some mite species feed externally on their host whereas others feed subcutaneously; forming scabs over the infested areas and other species invade their host internally. These may be found within the lung tissues, air sacs, and other various body cavities. Mites' infestation can result in various pathological effects on their host, including dermatitis, induced allergic reactions, loss of blood and transmission of pathogens or intermediate hosting of parasites (Williams, 2010).

Backyard chickens with mites' infestation cause health and economic problems and can be a source of infections for industrial chickens, wild fowls, and man (Eslami *et al*., 2009). Unfortunately, there are very few comprehensive morphological studies on the prevalence of mites in backyard chickens in South Africa. The chicken farmers in the rural areas of Libode have reported clinical signs in their chickens which are indicative of mites' infestations. To provide appropriate, advice on control measures to the farmers, it is important to ascertain the primary causes of the clinical diseases. It is hypothesized that there is a fairly high prevalence of mites among domestic chickens that is under-reported in the Libode rural villages. These mites' infestations could be associated with poor production of chickens and skin-related diseases or conditions, reduced egg and meat production.

Currently, there is a paucity of information regarding the prevalence of ectoparasite in local chickens in the study area. There is also a need to constantly assess the status of village chicken production constraints and the dynamic of their interactions. In addition, as cofactors for other poultry diseases, the knowledge of their prevalence is essential in understanding the epidemiology of such diseases and developing appropriate control measures. The current study is designed to investigate the prevalence of mites among village chickens in and around the Libode town of Nyandeni Local Municipality.

1.3 Aims and Objectives

1.3.1 Aim

This study aims to investigate the prevalence of mites and their associated risk factors in the village chickens of the communal area of Libode in Nyandeni Local Municipality, Eastern Cape Province.

1.3.2 Specific objectives

1.3.2.1 To determine the prevalence of mite infestation in domestic chickens.

1.3.2.2 To identify species of mites that are common in the study area.

1.3.2.3 To investigate the risk factors associated with mite infestations.

1.3.3 Research Questions

Below are the research questions to be addressed by this study:

1.3.3.1 What is the prevalence of mite infestation in domestic chickens of Libode?

1.3.3.2 Which species of mites are found in the chicken population of the study area?

1.3.3.3 Are their risk factors associated with the mite infestations?

1.4 Significance of the Study

The study aimed to establish knowledge on village chicken mite infestation and provide alternative interventions that can curb the emerging knowledge gap as well as reduce further emergence of poultry house mites in village chickens. The research objectives will determine the prevalence of mite infestation in village chickens and to investigate the effect of season and sex as exposure factors on mite predisposition. The response to mite infestation in village chickens can be influenced by several factors such as age, sex, site of control, and climatic conditions, but no single factor or the concurrent influence on mite prevalence in village chickens has been investigated. Knowledge about the relation between sex and age establishment of ownership has not been determined.

The study will assess the prevalence of mites' infestation and investigated their associations with sex and season in village chickens. Information obtained from this study can assist in the formulation of policy directives in louse and avian mite control and help in identifying accurate interventions. These methods will target the reduction of poultry lice and mite numbers in a culturally accepted way for indigenous chicken producers. The results of this study will also shed light on the present knowledge gap of chicken mite infestations affecting village chickens.

1.5 Structure of the dissertation

This dissertation is presented in six chapters. The outline of the thesis is provided below based on the various areas covered in this study.

- **Chapter 1**: This chapter presents the general introduction to the study. The research problem statement, aim, objectives and significance of the study are also described in this chapter.
- **Chapter 2**: This chapter presents a literature review ectoparasites as a research problem on rural chickens.
- **Chapter 3**: This chapter presents the materials and methods that were followed to collect the data shown in chapter 4
- **Chapter 4:** This chapter presents the main research findings from epidemiological survey, sample size determination and systematic random sampling.
- **Chapter 5:** This chapter presents the general discussion of the findings from Chapter 4.
- **Chapter 6:** This chapter presents the conclusive remarks, the limitations, and suggestions for further studies.

CHAPTER 2: Literature review

2.1 Overview of Village Chicken Farming

Village chickens are widely distributed across resource-poor households in Africa. These birds are reared by almost every rural household that is surviving below the poverty line (Gueye, 2002). Thus, poverty and hunger continue to adversely affect communal regions due to inefficient use of village chickens. So far, programs focusing on village chickens to alleviate poverty, hunger and create wealth have received little attention, yet they play vital roles in rural livelihoods (Gueye, 2000). The contribution of village chickens to rural households depends upon reasons of rearing which can be demographical, socioeconomic, and cultural.

Village chickens require limited amounts of inputs such as land, feed, vaccination, housing, and time. These birds can survive under poor management, produce meat and eggs that are used by farmers for various purposes such as income generation, basis of bartering, source of manure, and consumption. Village chicken products have also obtained preference from many people mainly for better taste, freshness, and colour of the carcass and yolk (Mtileni *et al*., 2009). In Kenya, Tanzania, and Ethiopia, rich households that do not own village chickens, but buy village chicken meat through food retail centres at premium prices (Aklilu *et al*., 2007). This indicates that resource-poor households should exploit advantages of rearing these chickens. Due to that backyard chickens have short generation intervals for rapid increase of flock sizes; thus, improvements can be realized in a short run.

2.2 Origin and species of Southern African indigenous chickens

Indigenous chickens (*Gallus domesticus*) are chickens that are adapted to harsh environmental conditions that include extensive small-scale village, free-range and organic production systems. Sometimes such chickens are referred to as traditional, scavenging, backyard, village, local or family chickens. The variations in local chickens mostly comprise plumage colour, body size, feather patterns, comb types and shank colour. In literature, local chicken populations are often described and grouped according to geographical location or phenotypic characteristics, while their classification into breeds or types is limited. Only a few of them have been classified into ecospecies based on their characteristics. South Africa comprises numerous indigenous chicken breeds which are recognised as a gene pool for significant traits including adaptability, hardiness and disease resistance (Alabi *et al*., 2012). Grobbelaar *et al*.

(2010), reports that the different carcass colour, the toughness of the muscle meat, shell colour and yolk colour are preferred by most consumers. The indigenous chicken breeds common in the Southern African region include Potchefstroom koekoek, Venda, Naked neck, and Tswana chicken (Mtileni *et al*., 2012; Idowu *et al*., 2018).

2.2.1 Potchefstroom Koekoek chicken breed

Potchefstroom Koekoek is an indigenous chicken breed that was produced in Potchefstroom Agricultural College by a researcher, Marais, and it is a crossbred of White Leghorn, Black Australorp and barred Plymouth (Grobbelaar *et al*., 2010). The Koekoek name refers to the barred colour pattern of the chicken. Potchefstroom Koekoek is a dual-purpose chicken breed reared for meat and egg production; it is highly adapted to free-range conditions (Dessie *et al*., 2011). It performs better than all the other indigenous chickens in South Africa (Heit, 2017).

2.2.2. Venda chicken breed

According to Norris and Ng'ambi (2006), the Venda chicken breed was discovered in Venda in the Limpopo province, South Africa, by the veterinarian and the breed was named after its origin. Venda chicken breed is multi-coloured with predominating colours as black, white and red. The breed is used for egg and meat production; the hens have good mothering ability and broodiness. They can survive well in harsh environments with minimum additional feed and are highly disease resistant (Ng'ambi *et al*., 2013).

2.2.3 Naked Neck chicken breed

The Naked Neck chicken is an African breed believed to have originated in Malaysia (Mtileni *et al*., 2011). Naked Neck chickens are divided into two types namely, purebred which has a fully naked neck and the one with a tassel on the front part of the neck, which is not purebred (Kingori *et al.,* 2014). The chicken has a diversity of colour designs, which help camouflage to protect them from ground predators (Amao, 2017). Naked Neck chickens can sustain themselves through scavenging for food and are well adapted to adverse conditions (Manyelo *et al*., 2020).

2.2.4 Tswana chicken breed

Tswana chicken is an indigenous breed that originated in Botswana and is the most widely spread domestic animal, which almost every rural family owns in Botswana. The Tswana chickens contribute more to rural households by providing meat and eggs for human consumption (Machete *et al*., 2021). They are categorised into five strains namely dwarf, naked neck, frizzled, rumples and normal, with the most common strain being the normal (Machete *et al*., 2017). Tswana chickens have good self-sustainment, and they are usually reared under an extensive farming system where they scavenge for feed and feed on insects with little or no feed supplementation (Badubi *et al*., 2006). These indigenous chickens can produce meat and eggs with minimal management (Magpantay *et al*., 2016).

2.3 Poultry Welfare

Feed resources, chicken housing, diseases and parasites are challenging issues that local poultry keepers face. Understanding the husbandry practices can assist greatly in the management of rearing local chickens. Local chicken production systems are normally practiced under free-range systems and the major proportion of the feed is obtained through scavenging. Normally these chickens are reported to depend more on insects, worms, and plant materials, with very small amounts of seeds and table leftover supplements from their keepers. Chicken farmers do not have a purposeful feeding of rural household chicken, and the scavenging feed resource is almost the only source of feed (Malatji *et al*., 2016). However, the type and amount of feed given to local chickens normally depend on the crops grown in the area as well as the seasons. The rearing of local chickens requires simple backyard housing systems mostly built with cheap and readily available materials. This can be achieved by not separating the chickens house from the yard of the family that own them. According to Fitsum and Ahmed (2015), lack of housing is one of the constraints of raising local chickens. Some use hand-woven baskets to shelter their chickens at night. However, a study by (Mengesha *et al*., 2011) reported that smallholder poultry farmers share the same house with the chickens but provide separate room for them.

Traditional chicken production is often expressed as a low input/low output system. The low productivity is mostly caused by diseases, lower management, and lack of supplementary feed (Muchadeyi *et al*., 2004). Ectoparasites (mites, lice, fleas, fowl ticks) are very common in free-range systems, and mites are considered important. Despite their small size, they may

negatively affect the growth and productivity of affected chickens. Mites' bites and feed on the blood of chickens, as a result they cause a range of symptoms, including discomfort, irritation, stunted growth, reduced egg production and hatchability, elevated mortality, and susceptibility to other infections (Lawal *et al*., 2017). Although ectoparasites constitute among the most prevalent and major causes of decreased productivity of chickens in the traditional managed system, they are mostly neglected (Wossene *et al*., 1997).

2.4 Ectoparasite in rural poultry

Ectoparasite (mites, lice, fleas, fowl ticks) have been reported in backyard chickens. However, mites and lice have been reported to be the common and widely spread ectoparasite that infest most of the rural chickens.

2.4.1 Infestation of mite in rural chickens

Mites are very small (barely observable without magnification) and appear like moving dark specks. Mites are wingless with generally rounded body shape and lack an obvious body segmentation. Adult mites have eight legs and not as host specific as lice with ability to parasitize many animal species (Permin *et al*., 1998). Some mite species spend their entire life on a single bird, while others only attach for feeding and are found on the host during active feeding periods, retreating to nearby protected locations after feeding (Sumners *et al*., 2011). Mite infestation is an increasing epidemiological and economical problem for the poultry industry worldwide (Cencek, 2003). There are two types of dangerous mites' species which include *Dermanyssus gallinae, Ornithonyssus sylviarum* and *Knemidocoptes mutans.*

2.4.2 The poultry red mite (PRM) (*Dermanyssus gallinae*)

According to Chauve, (1998) *D. gallinae* was first described by De Geer in 1778 and belongs to the subclass Arachnida. It is also known as the poultry red mite (PRM) due to its preference for feeding on poultry and the red colouration of its body after feeding. Adult mites are 0.75 to 1 mm long with long legs. The poultry red mite (PRM) rests during the day in any dark place, collecting in cracks and crevices provided by nest boxes or machinery in the poultry housing. Mites infests hens during the night and feed for approximately 90 minutes (Chauve, 1998). They then retreat to the dark hiding places to digest the blood meal after which they moult, reproduce and lay eggs (Van Emous *et al.,* 2006). This ectoparasite is a blood feeder and is responsible for egg downgrading and spotting, and anaemia in chickens. Poultry red mite in

general has also been implicated as vectors of several significant disease organisms such as *E.coli*, chicken pox virus, Newcastle virus and fowl typhoid. The bacteria *Erysipelothrix rhusiopathiae*, which causes erysipelas in wild and domestic birds, as well as pigs and other mammals, has been isolated from the integument as well as from the interior of red mites, implying that the mite is a potential vector and may act as a reservoir for the disease (Chirico *et al*., 2003).

2.4.3 Life Cycle

Adults mate off the host. After feeding to repletion on a host, at night, the females will migrate to crack and crevice areas off the host to lay their eggs. Eggs are typically deposited in groups of four to seven eggs at a time at approximately 1-2-day intervals (Fletcher *et al*., 1991)

From 20 to 24 eggs are produced by a female during her lifetime. Larvae hatch from eggs in 1 to 3 days and do not feed. Both protonymphs and deutonymphs require blood meals with both stages lasting approximately 1 to 2 days, depending on environmental conditions (Figure 1). Under suitable conditions, the entire lifecycle from egg to adult can be completed in 1 week. Adult mites can survive several months off the host without feeding. This enables them to survive for extended periods in abandoned bird nests and unoccupied poultry houses (Williams, 2010).

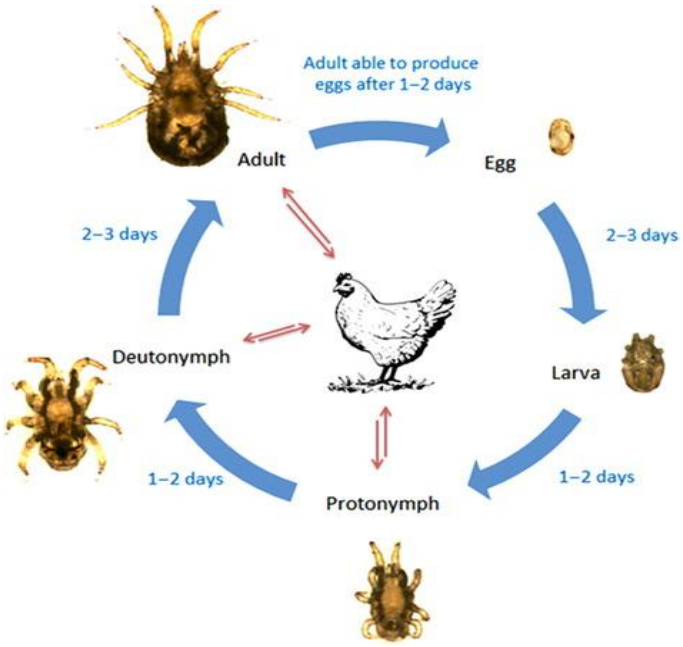

Figure 1. The life cycle of *D. gallinae.* (Maurer *et al.,* 1992)

2.4.4 The northern fowl mite (NFM) (*Ornithonyssus sylviarum*)

Ornithonyssus sylviarum was first discovered by Canestrini & Fanzago in Pisa, Italy in 1877. The northern fowl mite (NFM) is about 0.75 to 1 mm in length with relatively long legs. These vary in colour from light red to black. The NFM are permanent parasites of domestic chickens and wild birds throughout the temperate regions of the world. It has been shown to produce economic damage by causing anemia, lowering egg production, reducing weight gain, and causing chicken death (Belihu, 2009). NFM are active during the day, farmers often complain of picking up mites while handling eggs or birds. These external parasite bite farmers causing itching and irritation to the skin and allergic reaction. Unlike the red chicken mite (FRM), the NFM are found on chickens during the day and night (Calneck, 1997). These mites are abundant during cooler months and infest younger birds between 20 and 30 weeks of age (Williams, 2010).

2.4.5 *Life Cycle*

The entire lifecycle takes place on the host. Eggs are laid in masses at the base of the feathers that are primarily located around the vent area of the bird. Eggs hatch in about a day, and larvae molt to the protonymphal stage in less than a day without feeding. After the protonymphs feed on blood, they molt into no-feeding deutonymphs. These then rapidly molt into adults. The lifecycle can be completed in 5 to 12 days, and under favourable conditions, large populations can be developed rapidly on birds (Williams, 2010).

2.4.6 The burrowing mite/the-scaly leg mite (SLM) (*Knemidocoptes mutans*)

Knemidokoptosis, also known as scaly or chalky legs, is characterized by the appearance of extensive, rough crusts on the featherless part of the legs. Adult birds are generally affected. The lesions are secondary to an inflammatory reaction, in which the thickening of the cutaneous epidermis together with released exudate forms the crusts on the legs. The infection occurs by contact between birds (Dinev, 2007). It is uncommon to find these mites on birds in commercial operations because commercial poultry is generally young and because they rarely have direct contact with older birds infested with the mite (Sumners *et al.*, 2011).

2.4.7 Life Cycle

The entire life cycle takes place on a single host and takes between 14 and 21 days to complete. The mite is spread by close contact with an infected animal; however, it can survive for a limited time off the host. Mating occurs on the host; a mature male will leave its moulting pocket and seek a female either on the skin or in a moulting pocket. The females are ovo-viviparous meaning that they give birth to live larval young. Once fertilized the female will create a burrow in the upper layers of the epidermis, the larvae will be laid in this burrow and move to the skin surface (Williams, 2010).

2.5 Infestation of Lice in rural chickens

Lice are common external parasites of birds that belong to the order Mallophagia, the chewing lice, and are characterized by possession of chewing-type mandibles located ventrally on the head, incomplete metamorphosis, no wings, a dorsoventrally flattened body, short antennae with three to five segments (Waktole *et al*., 2023). According to Lawal *et al*. (2017) the chicken body louse, *Menacanthus stramineus*, is the most common and economically significant louse affecting both chickens and turkeys. It damages the host by puncturing soft feather quills near their base or gnawing the skin at the base of feathers to feed on blood. Chickens are also occasionally infested by other lice

Lice are usually introduced to poultry farms by infested equipment and unclean environments. Heavy population of the chicken body louse decrease reproductive potential in males, egg production in females, and weight gain in growing chickens. The skin irritation is also a site for secondary bacterial infections (Bala *et al*., 2011). Chicken lice are mostly controlled by insecticidal dust formations of permethrin and carbaryl. Also, ivermectin drops on the feathers of poultry chickens are very effective against lice (Refisa, *et al*., 2025)

2.6 Previous studies on mites and lice in Village Chickens

Kebede *et al*. (2017) conducted a study in Ethiopia on the prevalence of ectoparasites of poultry in and around Jimma Town. In this study, 8.85% of chickens were found to have mite on their body surface, subcutaneous tissue or legs. Two species of mite SLM (*K. mutans*) and PRM (*D. gallinae*) were found to be the most prevalent parasites in the study area. The occurrence of mites was less in adult chickens (4.17%) compared to young grower chickens, (4.68%). These

parasites had a higher frequency of occurrence in females (5.20%) than males (3.64%). It was higher in local chicken (5.98%) than exotic chicken (2.86%) as well as higher in intensively managed chicken (6.51%) than extensively managed chicken (2.34%) and the mortality rate (33.10%).

Lawal *et al*. (2017) conducted a cross-sectional study on the prevalence of ectoparasites of village chickens and its associated economic significance in Gombe, northeastern Nigeria. A total of 1025 village chickens were examined out of which 90.7% were infested with one or more ectoparasites species. Four types of ectoparasites genera were encountered in this study, 17.0% of the total chickens examined were infested with only one genus while 73.9% were infested with two or more different genera. Among the ectoparasites encountered, lice infestation (85.8%) was the most prevalent followed by mite (70.4%), Flea (27.3%), and tick (6.2%) in descending order of prevalent. They found four mite species, namely *D. gallinae, Epidermoptes* species*, Laminosioptes cysticola, Megninia* species. The findings of this study showed that ectoparasite infestations are highly prevalent among village chicken flocks, which may likely affect their optimum productivity. This may be associated with inadequate husbandry systems, poor hygiene practices, and inadequate control and preventive measures among others. Therefore, routine prevention and control of ectoparasites should be encouraged in the study areas. Moreover, campaigns to create awareness and educate poultry farmers on the economic significance of ectoparasites in village chicken productivity should be organized.

2.7 Risk Factors Associated with Mite Infestations

Mites and lice are common parasites that can infest domestic chickens, causing a variety of negative health effects. Understanding the risk factors associated with mite and lice infestations in domestic chickens is crucial in preventing and effectively managing these infestations. Several risk factors that contribute to mite and lice infestations in domestic chickens which can assist prevention and management of mite and lice infestation. One of the primary risk factors for mite and lice infestations in domestic chickens is poor hygiene and living conditions. According to a study by Mul *et al*. (2009), poor coop hygiene was identified as a significant risk factor for mite infestations in domestic chickens. Regular cleaning and disinfection of chicken coops, along with proper waste management, can significantly reduce the risk of mite infestations.

Another crucial risk factor for mite infestations in domestic chickens is the presence of wild birds and rodents in the chicken coop. These animals can introduce mites into the coop and act as carriers, leading to the rapid spread of mite infestations. As stated by Khan and Ashraf (2018), wild birds and rodents were identified as significant risk factors for mite infestations in domestic chickens and implementing proper control measures for these animals is crucial in preventing mite infestations.

The type of housing for chickens also plays a significant role in the risk of mite and lice infestations. Chicken coops with wooden walls and floors provide an ideal environment for mites to hide and reproduce, making it challenging to control infestations. In contrast, coops with wire or plastic floors make it easier to detect and remove mites. According to a study by D'Amico *et al*. (2018), coop materials were identified as a significant risk factor for mite infestations in domestic chickens, with wooden coops being more susceptible than those made of other materials.

Furthermore, the presence of other animals, such as pets and livestock, can also increase the risk of mite infestations in domestic chickens. These animals can act as carriers for mites and introduce them into the chicken coop, leading to the spread of infestations. According to a study by Kowalska *et al*. (2021), the presence of other animals was identified as a significant risk factor for mite infestations in domestic chickens and implementing proper biosecurity measures is crucial in preventing infestations.

Moreover, the age and breed of chickens can also impact the risk of mite and lice infestations. Older chickens and certain breeds are more susceptible to mite infestations due to their weaker immune systems and physical characteristics. As stated by Permin *et al. (*2002), age and breed were identified as significant risk factors for mite infestations in domestic chickens, with older chickens and certain breeds being more prone to infestations. Therefore, targeted preventive measures should be implemented for these chickens to reduce the risk of infestations.

2.8 Diagnosis

The first step in diagnosing mites in domestic chickens is to recognize symptoms of infestation. However, it is crucial to note that some symptoms may indicate other health issues. Once the symptoms of mite infestation are recognized, poultry owners can conduct various methods of

diagnosis to confirm the presence of mites in their chickens. Diagnosis of mites is based on clinical manifestation, visual examination and demonstration of mites or their developmental stages in host skin scrapings (Kettle, 1995).

2.8.1 Clinical manifestation

Mite-infested birds usually reduce feed intake, lose weight rapidly, exhibit a pale pink comb, and may have lower egg production by 10 percent or more (Williams, 2010). Heavy infestation may make birds more susceptible to other parasites and diseases that can result in death (Strother, 2019).

2.8.2 Visual examination

The most effective method is to perform a thorough visual examination of the bird's feathers, skin, and feet. This involves parting the feathers and inspecting the skin for signs of mites, such as live mites, eggs, and excrement. Scaly-leg mites, for instance, leave a crusty layer on chickens' legs, while red mites can be found in dark, hidden corners of the coop during the day (Shanta *et al*., 2006; Hobbenaghi *et al.*, 2012).

2.8.3 Demonstration by skin scrapings

Scrapings should be taken from the edge of the lesion, from visibly pruritic locations, with a scalpel blade or other sharp instrument at right angle to the skin and scraping off the skin's outer surface. The scrapings must be deep enough to cause a small amount of blood to ooze from the scraping site for the mite species that burrow into the skin. Samples should be promptly taken to the laboratory for processing and examination (Sam-Wob, 2003).

2.9 The common mites and lice control measures

Karbadust (Carbaryl 5%) is a commercial registered insecticide. In chickens, Karbadust is used to controls mites, tampans, lice, ticks and fleas and also be used in home gardens to control worms and grasshoppers (Botes *et al*., 2007). Dazzel Dip (Diazinon 30% m/v) from Bayer, is also commercial dip that is used to kill all ectoparasites in chicken, sheep, and cattle. Studies reported that commercial remedies tend to contaminate the environment, can be harmful to other non-target species and leave persistent residues (Rust, 2005; Yadav *et al.*, 2016). More so, the use of commercial remedies is very limited in rural areas because of costs and not because of effectiveness. Most farmers are unemployed, the costs of traveling to town and the

high prices of these remedies makes them unfordable. However, alternative remedies are always the first choice over commercial remedies in terms of mites and lice control. For example, Madubula and Jeyes fluid are widely used is alternative remedies. This product is used for household disinfectant; however, chicken farmers also use as a spray for mite and lice control. These disinfectors contain mainly tar acids-13% m/m (carbolic acid) and sodium hydroxide 1%). Carbolic acid is noted to be an antiseptic and disinfectant (Moyo, 2009). In addition, Jeyes fluid or Madubula is corrosive with a potential to cause adverse effects on skin and eyes. With prolonged and repeated skin contact it may result in irritation, skin dermatitis, blisters and burns (Moyo, 2009). As a results Madubula and Jeyes fluid should be used with care considering the aforementioned effects.

CHAPTER 3: Methodology

3.1 Study Area and Population

Libode is a small town of 5,000 inhabitants in the Eastern Cape province of South Africa. It is situated on the R61 road from Port St Johns to Mthatha under the Nyandeni Local Municipality (Nyandeni LM), which is part of the OR Tambo District Municipality. Application letters were submitted to the department of agricultural in the Eastern Cape province to obtain a permission to meet with village chicken farmers and organizing backyard chickens for sample collection. The study included 6 villages that were surveyed including Mhlanganisweni, Phezukwamawa, eThumbeni, Mjobeni, Coza and Luthubeni which they are all around Libode town (Figure 1).

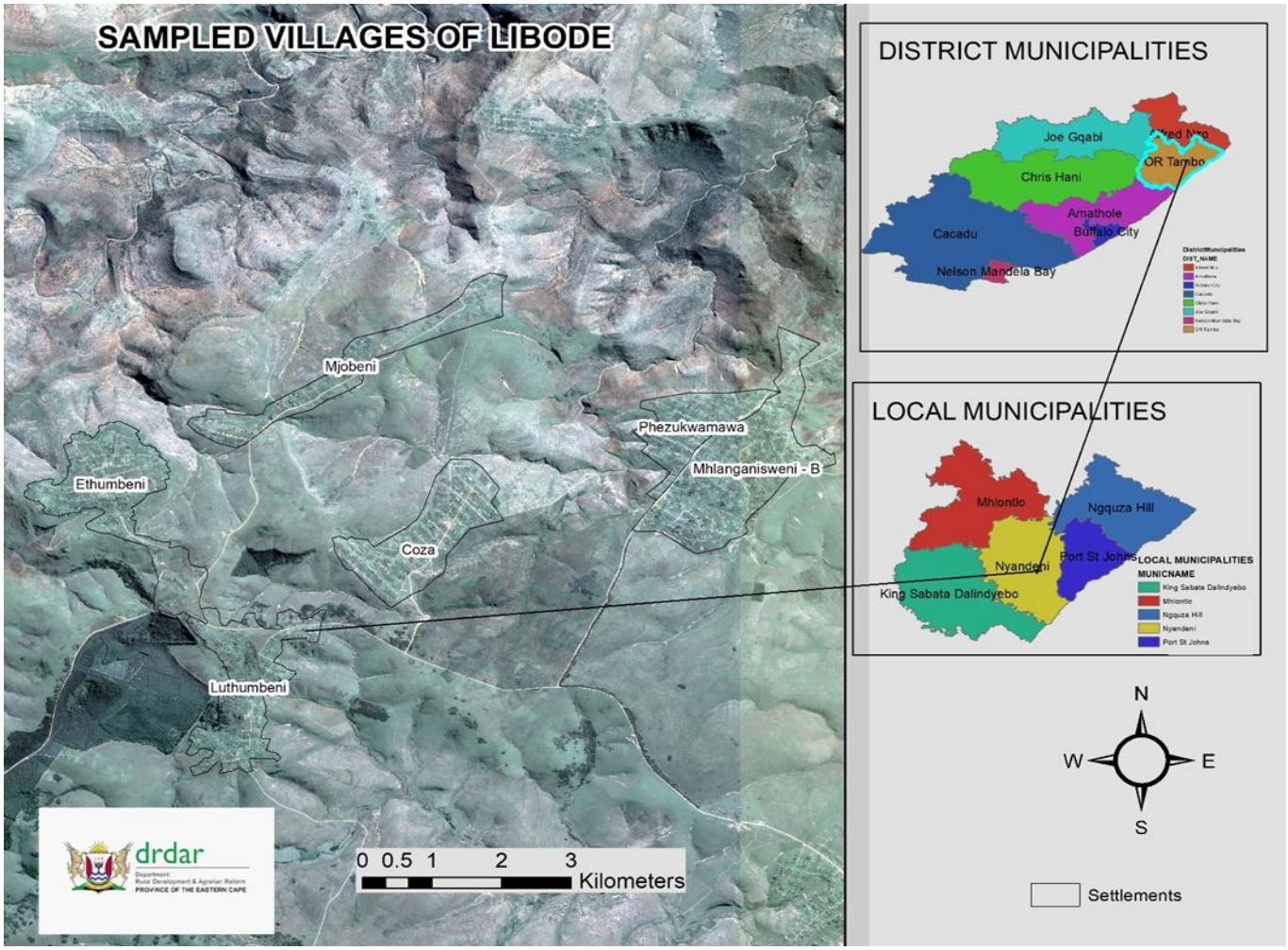

Figure 2: Sampled villages of Libode.

3.2 Study design

To realize the objectives of this study, a cross-sectional study design involving the 6 rural villages. Development and administration of the questionnaire was done to assess their chicken farming system, knowledge of ectoparasite infestation and their remedies to treat mite and lice. Collection of Ectoparasites was carried out, with households selected first and then randomly selected chickens within the flocks.

3.2.1 Epidemiological survey

The study was initiated by developing questionnaires that will assist in ascertaining the primary causes of the clinical diseases. The randomly 6 selected villages consist of 213 households and households that own chickens participated and shared their traditional chicken farming method. The questionnaires aimed to collect information regarding the demographic and socioeconomic profile of chicken owners. Chicken farmers were further asked about chicken sampled that include sex (hen or rooster), age group (adult or young chicks), animal health, chicken treatment using herbal medicine and husbandry practices. The completion of the questionnaire was expected to be about 60 minutes long and the questionnaire was administered during a face-to-face interview with the chicken owners that were selected for sample collections. Pre-test respondents were contacted and asked to participate in testing the questionnaire. After the pilot test, respondents were asked additional questions regarding the questionnaire to help detect any problems with the questionnaire design that caused misinterpretation of questions or the administration of the survey.

3.2.2 Sample size determination

The sample size was determined based on the formula given by Thrusfield, 2018, for random sampling.

$$n = \frac{Z^2 P(1-P)}{d^2}$$

$$n = \frac{1.96^2 P_{exp} (1- P_{exp})}{d^2}$$

Where:

n = sample size

P = expected prevalence = 50% d = desired level of precision = 5 %

z = Z statistic for a level of confidence (95%) = 1.96

50% expected prevalence was used since there is not published prevalence estimated for the area.

n = 3.84 x 0.5 (1-0.5)/0.052 = 1.92 x 0.5/0.0025

= 384 samples (estimated)

3.2.3 Systematic random sampling

Systematic random sampling methods was applied after the sampling interval is determined using the formula K=N/n. Where: N =represents the estimated total chickens for the backyard farm in sampling frames; n =represents the allocated sample size and K = interval of households to be sampled. Accordingly, at every 11 household intervals, the chickens were randomly selected for sampling. In an event that the eleventh household does not have chickens, the neighbouring households were to be selected.

Sampling interval calculation:

K = N/n

= 4260/384

= 11.1

3.3 Data collection

Screening for mites and lice's involved a thorough examination of the body of the birds including the visible affected areas such as head, cloacal, brachial, ventral, and femoral areas. After restraining, samples were taken from head, vent, leg, back, wattle, comb, and wing by using naked eye and hand lenses. The affected areas were examined by plucking out feathers and scraping the skin surface with scalpel blade onto a clean petri-dish. Each chicken examined was assigned a serial number on the sampling bottle for easy identification. Similarly, information of each chicken like sex, breed, age group, and predilection sites were recorded on a form. Each sample collected from individual chicken were put in bottles containing 70% alcohol. The scraped site in the chicken's body was marked with waterproof pencil. The samples were taken to a veterinary laboratory at Tsolo Agricultural and Rural Development Institute (TARDI) where they were prepared for examination under stereo microscope.

3.4 Economic Assessments

Economic assessments were conducted to determine the potential losses caused by mite infestation in village chickens. This was achieved by calculating the cost of treatment, reduced productivity, and potential mortalities. The data collected from interviews with chicken owners and laboratory analysis of mite samples were used to estimate the economic losses.

3.6 Statistical analysis

Data collected was entered on Microsoft excel spreadsheets and analyzed using the Statistical Package for Social Sciences (SPSS Version 26). Descriptive statistics in the form of frequencies (prevalence rates) of various species of mites and lice found were computed and presented in tables. The age group, sex, animal health and husbandry practices, and body conditions scores were independent variables, and mites' infestations were dependent (outcome) variables for this study. A binary logistic regression model was fitted to the data to assess the factors significantly associated with the occurrence of infestation (Kumsa *et al*., 2012).

3.6 Ethics approval

The study commenced only after ethics clearance was obtained from the UNISA CAES Research Ethics Committee (2023/CAES_AREC/023). The research was bound to be conducted in a manner that always consider the welfare of animals being sampled. The handling of chicken and sampling was conducted by veterinary professionals acquainted and skilled on sampling of chickens. The sampling procedure ensured that there is no cross-contamination and spread of diseases amongst the poultry during the collection of samples. The participants received a full disclosure regarding the of the study nature and its benefits. The poultry owners who express their consent to participate in the study were permitted to withdraw their consent if they wish to do so. The results of the study and the information of the poultry owners were kept confidential, and the anonymity of owners was kept by limiting the access of their particulars to the researcher. A report back will be presented to provide feedback to all the participating farmers about the outcome of the study.

CHAPTER 4: Results

4.1 Socio-demographic feature of the chicken farmers

The questionaries were distributed among 6 villages from Nyandeni LM and the total of 49 chicken farmers participated in the epidemiological survey both men and women. Most chicken owners kept backyard chickens for feeding purposes while others kept chicken for both feeding and extra cash purposes. The poultry chicken population in the villages were estimated from 500 to 900. Mhlanganisweni had the highest chicken's population of 900 while the Luthumbeni had lowest chicken population of 500. Overall chicken population in these 6 villages was estimated to be 4 260 (Table 1).

Table 1: Number of backyard chickens per Nyandeni LM village

Names of villages: Libode area	**Households per Village**	**Estimate chicken population per village**
Mhlanganisweni	45	900
Phezukwamawa	41	820
eThumbeni	43	860
Mjobeni	30	600
Coza	29	580
Luthubeni	25	500
Total	213	4260

The 49 population characteristics of the sampled village farmers were reported from the Libode rural villages. Chicken farmers were presented by 36 (73%) male farmers and 13 females (27%) and their average age was 45 years. The study revealed that most of the chicken farmers were unemployed 36 (73%) while the farmers that were employed during this survey were 7 (14%). However, the employed chicken farmers who employed/or requested villagers to look after their backyard chickens were 9 (18%). The survey further looks at the primary use of backyard chickens and the results shows that 90% of chicken farmers use their hard body chicken for obtaining eggs and meat while the other 10% was for extra cash and sharing eggs and meat with the other rural villagers.

4.1.1 The chicken housing and assessment of chicken condition in Nyandeni villages

The chicken housing differs from village to village as more than 45% of chicken keepers prefer to cage their chicken overnight as it requires little management as shown in Figure 3A. More so, the report also indicated that 35% chicken farmers do not cage their chickens allowing them to free range and less than 20% of chicken farmers cage their chicken's day and night for protection. Figure 3B shows how farmers assess their chicken condition if they are sick. More than 70% of the farmers observe changes in their chicken body and 13% check the infestation of ectoparasite. About 12% of chicken farmers observe their eating patterns while few farmers don't assess anything until their chickens die.

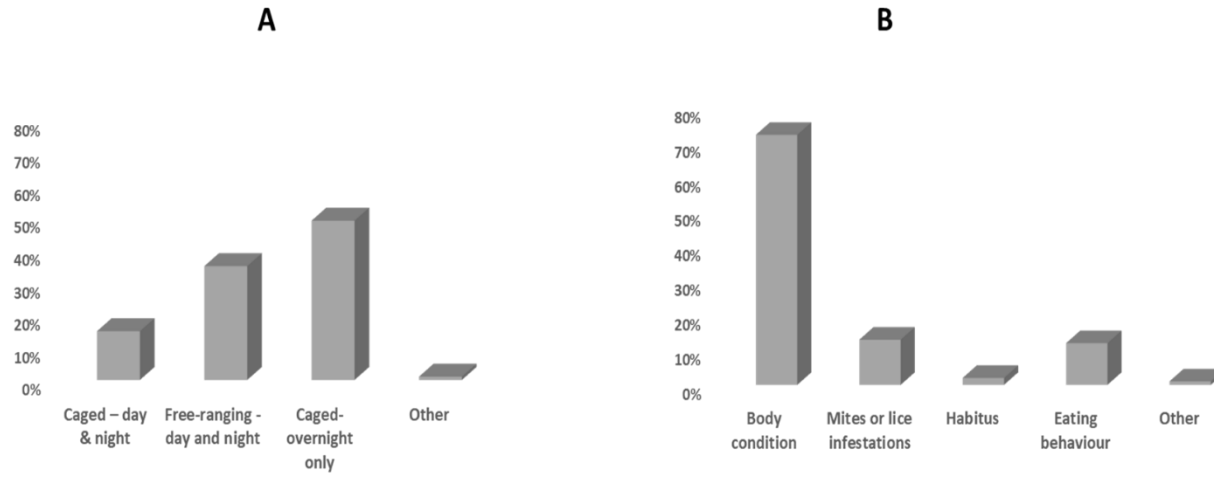

Figure 3: Chicken habitation and characteristics used by farmers to assess the general condition of their chickens. Chicken farmer responding on their methods on how they housed their chicken (Figure 3A) and assessment of chicken when they are exposed various diseases (Figure 3B)

4.1.2 Professional advice and ectoparasite control practices by village chicken keepers

Figure 4A shows that 45% of chicken farmers normally consult other farmers as a point of reference to understand how the dealt with a similar problem. About 35% visit a Co-Op and 20% of farmers will speak to Community Animal Health Workers (CAHW) or Animal Health Technician (AHT) for advice and professional help. Figure 3B shows the duration of treatment, 33% of chicken farmers treat their chickens daily, whereas 59% of farmers treat their chickens weekly and 8% treat them monthly.

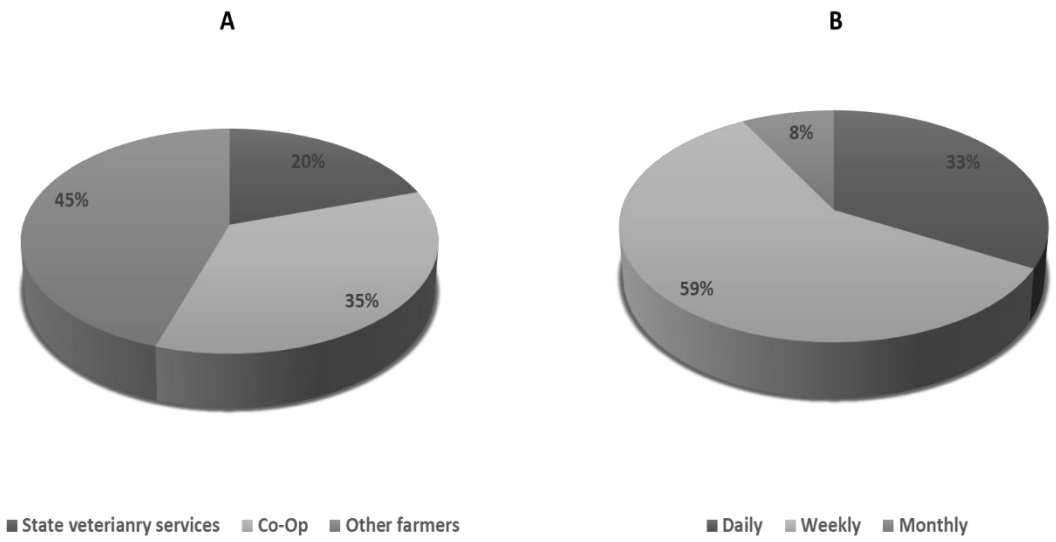

Figure 4: The percentage of chicken farmers who receive advice from other farmers and veterinary professional (Figure 4A) and the mites and lice control practices by rural chicken farmers with respect to duration (Figure 4B).

4.1.3 Commercial and alternative remedies used by Nyandeni LM

The household treatment shown in Figure 5A and commercial remedies in Figure 5B were reported by farmers to treat both mite and lice chicken infestation. In Figure 5A shows that 37% of farmers uses Bulala Zonke powder, followed by 34% of farmers which uses Blue Death powder. Chicken farmers (25%) use Madubula (household disinfectant) to spray the chicken cages to kill mite and lice, 2% farmers use petroleum jelly to treat chicken scaly leg, 1% of the farmers uses used engine oil and 1% shoe polish. Figure 5B shows the commercial medication used by farmers to treat their infested chickens. Most farmers (57%) are using Karbadust, followed by 21% using Dazzel dip and 12% of farmers are using Eradic 200 dip. About 5% of chicken farmers both use Delete X5 dip and Deca-tix dip for mite and lice control.

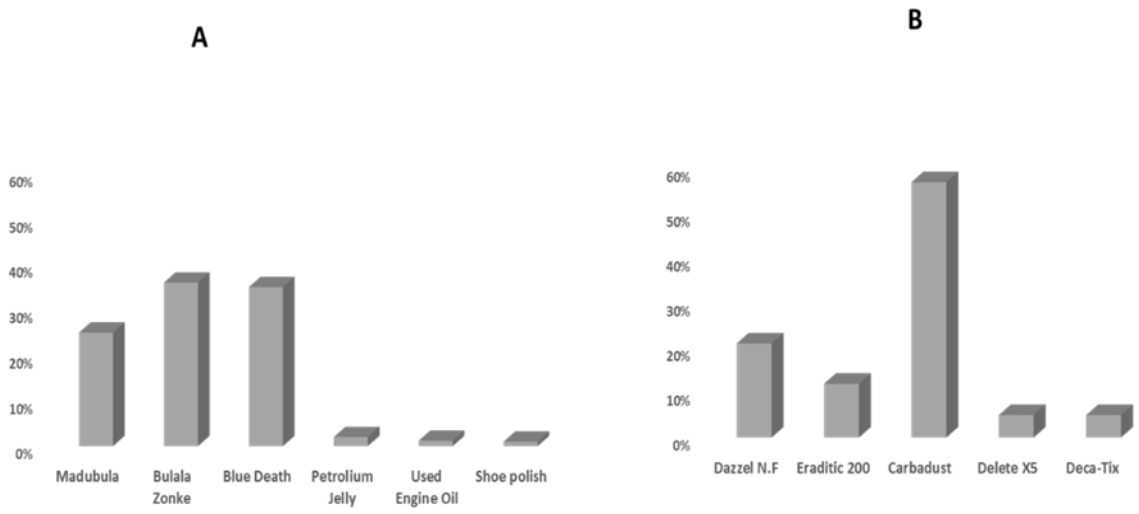

Figure 5: Common mite and lice control household treatment among rural chicken farmers (Figure 5A) and commercial treatment recommended by veterinary professional (Figure 5B)**.**

4.2 Overall Prevalence of Mites and Lice

4.2.1 Prevalence of Mites in Nyandeni LM rural villages

The overall prevalence of mites as shown in table 2 is 14.7% (95% Cl =39-46). A total number of 197 chickens were examined and about 29 were found positive of mites. Mites per village in order were as follows Mhlanganisweni (17.1%), Luthubeni (13.3%), Mbobeleni (13.6%), eThumbeni (9.7%), Mjobeni (7.1%), Coza (25%) and Phezukwamawa (21.1%).

Table 2: Overall prevalence of mites by village/location

chickens (n= 197)

Village	**No. of positives**	**Prevalence (%)**	**95% CI**
Mhlanganisweni	6	17.1	6-31
Luthubeni	8	13.3	5-22
eThumbeni	3	9.7	0-22
Mjobeni	1	7.1	0-23
Coza	4	25.0	6-47
Phezukwamawa	4	21.1	4-42
Overall/Average	**29**	**14.7**	**39-46**

4.2.2 Prevalence of Lice in Nyandeni LM rural villages

The overall prevalence of lice as shown in table 3 was 15.7% recorded from 197 chickens examined which translate to 31 number of positive lice. Lice per village were as follows Mhlanganisweni (31.4%), Luthubeni (13.3%), Mbobeleni (9.1), eThumbeni (12.9), Mjobeni (7.1), Coza (18.8%) and Phezukwamawa (10.5).

Table 3: Overall prevalence of lice by village/location

chickens (n= 197)

Village	No. of positives	Prevalence (%)	95% CI
Mhlanganisweni	11	31.4	16-48
Luthubeni	8	13.3	5-22
eThumbeni	4	12.9	3-26
Mjobeni	1	7.1	0-24
Coza	3	18.8	0-41
Phezukwamawa	2	10.5	0-25
Overall/Average	**31**	**15.7**	**39-46**

4.3 The prevalence of mites' infestations based on risk factors

The prevalence of mites' infestation based on risk factors as shown in table 4 indicated that a total of 70 male chickens were tested and 8 tested positive with a prevalence of mite infestation of 14.4%. A total of 127 female chickens were tested and 21 tested positive for mites, the prevalence of mite infestations was 18.7%. Adult chickens were more susceptible to mite infestation with a prevalence of 17.6% while young chickens at a prevalence of 10.3% young chickens. The lowest prevalence of mite infestation was in Mjobeni with the prevalence of 7.1% (95% CI = 0-23). The highest prevalence of mite infestation was in Coza with 25.0% (95% CI = 6-47). The difference in overall prevalence between male and female chickens was statistically significant ($p<0.05$).

Table 4: The prevalence of mite infestations on chickens.

Variables	Category	Animals tested	No. of positives	Prevalence (%)	95% CI	$\chi 2$	*df*	*P*-value
Sex	Male	70	8	11.4	4-0	0.937	1	0.333
	Female	127	21	23.0	10-23			
Age-group	Adults	119	21	17.6	11-25	2.050	1	0.152
	Young	78	8	10.3	4-17			

CI: Confidence intervals based on 1000 bootstrap samples.

4.4 The prevalence of lice infestations based on risk factors

The prevalence of lice infestation based on risk factors as shown in table 5 indicated that a total of 70 male chickens were tested and 7 tested positive. Therefore, the prevalence of mite infestation was 10.0%. A total of 127 female chickens were tested and 24 tested positive of lice, the prevalence of lice infestations was 18.9%. The difference in overall prevalence between male and female chickens was statistically significant ($P<0.05$).

Table 5: The prevalence of lice infestations in chickens

Variables	Category	Animals tested	No. of positives	Prevalence (%)	95% CI	χ2	*df*	*P*-value
Sex	Male	70	7	10.0	3-17	2.694	1	0.101
	Female	127	24	18.9	12-26			
Age-group	Adults	119	17	14.3	8-21	0.809	1	0.368
	Young	78	14	17.9	9-27			

CI: Confidence intervals based on 1000 bootstrap sample

CHAPTER 5: General Discussion

Rural chickens are subjected to ectoparasites infestation (mite and lice) which deprive chickens of adequate nutrients to sustain their growth and reproduction. Therefore, this study aims to confirm the present of mite and lice attacking chickens in 6 rural villages from Libode. About 49 chicken farmers agreed to partake to a questionnaire survey with high number of male famers (73%) participating which indicate that men are more active in chicken farming than women who were 27%. The observations are in line with reports from Kenya, Cameroon, Peru and Ghana which state that women have less information on chicken farming (Dumas *et al*., 2018; Valdivia, 2021). However, this study is in contrary with study of Opeyemi et al., (2020) which reported that 75.6% of women are chicken owners from Ilorin, North Central Nigeria. The average age of chicken farmers in this study was 45 years, this observation suggest that the youth of these villages are not involve in chicken farming which could be that they are not interested, employed, or they are not encourage by the older farmers to join them for farming. This problem can be solved by encouraging older farmers to educate their children about farming and control measures of chickens. Ndlovu *et al*. (2019) research promotes the community information-sharing platforms, mentoring and use of traditional remedies which preserve Indigenous Knowledge Systems (IKS).

This study reported high rate of unemployed chicken farmers (73%) that are heavily dependent on chicken farming for obtaining meat and eggs. These findings are confirmed by the numbers of chickens that are owned by these rural villages which ranges from 500 to 900. This indicate that these farmers have invested their time, energy, land, and money on backyard chicken farming and reproduction (Table 1). After the thorough examination of the chicken's body, the study revealed that the free-range chickens in these rural villages are infested by more than one type of external parasites. This confirmed the reported clinical signs from Libode chicken farmers which were indicative of mites' and lice infestations. Mhlanganisweni (31.4%), Coza 1(8.8%), Luthubeni (13.3%), eThumbeni (12.9%) were the leading rural villages with high prevalence of lice among the 6 reported villages. The higher prevalence of lice from these villages was contributed by chicken farmers who had shared a rooster infected with lice for breeding. The farmers reported that they were not aware that the roaster had lice and they did not quarantine it before introducing them to the rest of the chickens. The studies of Mirzaei *et al*. (2016), Zeryehun and Yohannes (2015) and Nnadi and George (2010) reported that lice are the abundant external parasite that affect the production of chicken almost all parts of the world.

However, the most common problem with chicken farmers is ignoring the husbandry practices which leads to serious infestation of both lice and mites. The three-study areas; Coza, Phezukwamawa and Mhlanganisweni had higher incidences of mite's infestations at 25%, 21.1% and 17.1% respectively. This higher prevalence might be associated with the location of these villages which is closer to the forest with many wild birds which are the source of infection. These areas also experience hot temperatures, mites, particularly red mites, thrive in warm conditions, and their numbers can increase quickly during warmer months. Luthubeni (13.3%), eThumbebi (9.7%), Mjobeni (7.1%) had moderate prevalence of mites when compared to the other three villages.

The overall prevalence of both mites and lice in this study villages is due to farmers failing to maintain clean chicken housing and lack of control measures towards such ectoparasites. Researchers reports that the majority of chicken infestation are associated with poor hygiene of chicken houses (Mungube *et al.,* 2008, Sabuni *et al.,* 2010). There was high infestation of mites on female chickens (23%) compared to male chickens (11.4%) and also females (18.9%) had high lice infestation then male chicken (10%) (table 5). The higher infestation could be related to the broody nature of hens. This is in contrast Ahaotu *et al*. (2019) from Nigeria, who reported that males had a slightly higher rate of occurrence of ectoparasites compared to female. The study also revealed a significant difference in the prevalence of ectoparasites infestation in village chickens when age was considered as one of the hypothesized risk factors. The findings revealed that young 17.9% village chickens are significantly more infested by ectoparasites than adult 14.3% chickens. This observation shows that younger chickens are more susceptible to ectoparasites because they lack a fully developed immune system and more vulnerable to parasite infestation (Kebede *et al*., 2017). Maintaining chicken feed and building proper chicken structures is still a challenge in the rural villages, hence, some farmers allow their chickens to roam around during day and night. This preference might sound good in terms of minimizing the feeding cost and protecting chickens from the ectoparasite. However, this indicate that more chickens might not have enough nutritious feed, exposed to predators and some are stolen. Malatji *et al*. (2016) and Ndlovu *et al*. (2019) reporter that most of the rural chickens scavenge for food and chicken theft and predators are mostly common in rural areas. More chicken farmers (49%) prefer their chicken to free-range during the day and only caged them at night while other farmers (15%) house them day and night. Farmers reported that chickens roam around to easily feed themselves and housing them during night and day protect their chickens. However, housing chickens' day and night might contribute to poor hygiene

practice which leads to the increase of ectoparasite infestation. Several studies have reported that the chicken structures and number of chickens in the cage can contribute to the mite and lice infestation (Cumming and Spradbrow, 1991; Silondae *et al*., 2022).

The study of Risna *et al.* (2024) reports that good cage design and clean comfortable cages encourage optimal chicken growth and production. During this study, the knowledge of chicken farmers to assess the general condition of their chickens was important in order to manage and control the chicken system and seek professional help. More than 70% farmers believe that when chickens lose weight is the first sign of sickness. More so, less than 15% farmers believe that the burden of external parasites and eating behavior are paramount in the general condition of the chicken. Mungube *et al*., 2006 and Nyoni and Masika, 2012, reported that the risk of infestation by ectoparasites (lice and mites) might contribute to abnormal feeding behavior of chickens and results in lack of nutritional requirements. This study also revealed that chicken farmers (45%) prefer to get advice from other farmers who once uncounted a similar problem. For example, chicken farmers share alternative remedies such are Bulala Zonke 37%, followed by Blue Death 34% and Madubula at 25% which farmers commonly used to treat chicken diseases. However, farmers confirmed that some of the remedies are pesticides that were not designed for chicken treatment, but farmers used them because they are cheap and readily available. In addition, chicken farmers reported that veterinary professional recommended commercial remedies such as Carbadust, Dazzel NF Dip and Eradic 200. Carbadust is most commonly used commercial insecticide because it controls mites, tampans, lice, ticks and fleas, however, it can also be used in home gardens to control worms and grasshoppers (Botes *et al*., 2007). The chicken farmers included that some of them, cannot afford commercial remedies and some have built their houses far from the main road with a lack of transport to get to town and get help from AHT offices or buy chicken remedies.

CHAPTER 6: Conclusion and recommendations

6.1 Conclusion

The results from the study indicate that the free-range chickens from Libode rural villages are highly infested by both mites and lice. The mixed infestation can increase the risk of constant ectoparasite infestation which will obviously affect the growth and productivity of the chickens. Hence, there is crucial need to educate farmers about the appropriate ectoparasites control measures which should be practiced in village chicken production system to curb the effect of ectoparasites infestations. Village chicken farmers should be enlightened on the economic importance of ectoparasites on the village chicken production and be encouraged to improved husbandry and management system as well as sanitation in and around their poultry houses. This current study was able to understand and confirm ectoparasite infestation in rural chickens and these findings can be useful in developing effective strategies to mitigate the infestation.

6.2 Recommendation

- Farmer awareness especially those of smallholder production about the infestation that chickens carry in term of mites and lice.
- Educate farmers on diagnosing the mites and lice from their chicken through extension service program. For example, they must always check the chicken legs, if legs are scruffy, crusty, or raised, it is Scaly Leg Mite (SLM) which was problematic under this investigation.
- Regular checks like remove all old bedding, nesting materials, and manure from the coop. Make use of hot water with soap to scrub the coop, or use a power washer to hit all cracks, crevices, and under roosts where mites hide.
- Apply a poultry-safe insecticide spray to reduce ectoparasite infestation.
- Dust chickens thoroughly with poultry dust powder usually containing permethrin, it works well in most cases.
- Due to 7–10-day egg-hatching cycle, a farmer must repeat the application of dust or spray to both the birds and the coop 10-14 days after the first treatment. This is highly recommended.
- As control measures, provide a dry area with a mixture of sand, wood ash, and a small amount of Diatomaceous Earth.
- As a rule of thumb, isolate new birds for 30 days before adding them to the flock.

- Further research to evaluate the impact of ectoparasites on health and production performance of chicken including cost effectiveness of control strategies should be conducted

CHAPTER 7: References

Abebe, W., Asfaw, T., Genete, B., Kassa, B. and Dorchies, P.H., 1997. Comparative studies of external parasites and gastro-intestinal helminths of chickens kept under different management system in and around Addis Ababa (Ethiopia). *Revue de Médicine Vétérinaire*, 148, 497–500.

Ahaotu, E.O., Akinfemi, A. and Okorie, K.C., 2019. Economic importance and widespread of ectoparasites infestation in indigenous chickens (Gallus gallus domesticus). A study from selected local government councils and states in Nigeria. *Sustainability, Agri, Food and Environmental Research,* 7(2), pp.17-31.

Aklilu, H.A., Udo, H.M.J., Almekinders, C.J.M. and Van der Zijpp, A.J., 2008. How resource poor households value and access poultry: Village poultry keeping in Tigray, Ethiopia. *Agricultural Systems*, *96*(1-3), pp.175-183.

Alabi, O.J., Ngambi, J. and Norris, D., 2012. Effect of Egg Weight on Physical Egg Parameters and Hatchability of Indigenous Venda Chicken. *Asian Journal of Animal and Veterinary Advances,* 7(2):166-172

Amao, S.R., 2017. Egg production and growth performance of Naked Neck and Rhode Island Red chickens crosses under Southern Guinea savanna condition of Nigeria. *International Journal of Agriculture and Earth Science*, *3*(2), pp.1-10.

Badubi, S.S., Rakereng, M. and Marumo, M., 2006. Morphological characteristics and feed resources available for indigenous chickens in Botswana. *Livestock Research for Rural Development*, *18*(1), pp.205-211.

Belihu, K., Mamo, A., Lobago, F. and Ayana, D., 2009. Prevalence of ectoparasites in backyard local chickens in three agroecologic zones of East Shoa, Ethiopia. *Rev. Med. Vet*, *160*, pp.537-541.

Botes, P., Mazibuko, A. and Viljoen, G., 2007. Animal production second edition Pearson Company, South Africa. 212 pages.

Calnek., BW, Barnes., HJ, Beard., CW, McDougald., LR, Saif., YM. 2003. Diseases of Poultry. 10th edition. Iowa State University Press, Ames, Iowa. pp.131-140.

Cencek, T.O.M.A.S.Z., 2003. Prevalence of Dermanyssus gallinae in poultry farms in Silesia region in Poland. *Bulletin-Veterinary institute in Pulawy*, *47*(2), pp.465-470.

Chauve, C., 1998. The poultry red mite Dermanyssus gallinae (De Geer, 1778): current situation and future prospects for control. *Veterinary parasitology*, *79*(3), pp.239-245.

Chirico, J., Eriksson, H., Fossum, O. and Jansson, D., 2003. The poultry red mite, Dermanyssus gallinae, a potential vector of Erysipelothrix rhusiopathiae causing erysipelas in hens. *Medical and veterinary entomology*, *17*(2), pp.232-234.

Cumming, R.B. and Spradbrow, P.B., 1991, October. Village chicken production: Problems and potential. In *Proceedings of an international workshop on Newcastle disease in village chickens, control with thermo stable oral vaccines 6â* (Vol. 10, p. 21â).

D'Amico, G., Cito, F., Paolo, F., Magistrelli, G., Maronti, L., Mazzoni, M., Russo, R., 2018. Mite infestations: which are the main risk factors for hens? *Annals of parasitology*, 64(1), pp. 85-88.

Dessie, T., Taye, T., Dana, N., Ayalew, W. and Hanotte, O., 2011. Current state of knowledge on phenotypic characteristics of indigenous chickens in the tropics. *World's Poultry Science Journal*, 67(3), pp.507-516.

Dinev, I., 2007. *Diseases Of Poultry, A Colour Atlas*. Ceva Sante Animal.

Dumas, S.E., Maranga, A., Mbullo, P., Collins, S., Wekesa, P., Onono, M. and Young, S.L., 2018. "Men are in front at eating time, but not when it comes to rearing the chicken": unpacking the gendered benefits and costs of livestock ownership in Kenya. *Food and Nutrition Bulletin*, 39(1), pp.3-27.

Eslami, A., Ghaemi, P. and Rahbari, S., 2009. Parasitic infections of free–range chickens from Golestan Province, Iran. *Iranian Journal of Parasitology*, 4(3), pp.10-14.

Fitsum, M. and Ahmed, K.M., 2015. Population dynamic production statistics of horse and ass in Ethiopia: *A review. Journal of Biology, Agriculture and Healthcare*, 5(1), pp. 57–62.

Fletcher, M.G., Axtell, R.C., 1991. Susceptibility of northern fowl mite, Ornithonyssus sylviarum (Acarina:Macronyssidae), and chicken mite, *Dermanyssus gallinae* (Acarina: Dermanyssidae) to selected acaricides. *Experimental and Applied Acarology*, 13, pp. 137–142.

Grobbelaar, J.A.N., Sutherland, B. and Molalakgotla, N.M., 2010. Egg production potentials of certain indigenous chicken breeds from South Africa. *Animal Genetic Resources/Resources génétiques animales/Recursos genéticos animales*, 46, pp.25-32.

Guèye, E.F., 2000. The role of family poultry in poverty alleviation, food security and the promotion of gender equality in rural Africa. *Outlook on agriculture*, 29(2), pp.129-136.

Guèye, E.F., 2002. Family poultry research and development in low-income food-deficit countries: approaches and prospects. *Outlook on Agriculture*, 31(1), pp.13-21.

Gunya, B., Muchenje, V., Gxasheka, M., Tyasi, T. and Masika, P., 2020. Management practices and contribution of village chickens to livelihoods of communal farmers: The case of Centane and Mount Frere in Eastern Cape, South Africa. *Biodiversitas Journal of Biological Diversity*, *21*(4), pp. 1345–1351.

Hobbenaghi, R., Tavassoli, M., Alimehr, M., Shokrpoor, S. and Ghorbanzadeghan, M., 2012. Histopathological study of the mite biting (Dermanyssus gallinae) in poultry skin. In *Veterinary research forum*, 3 (3), p. 205.

Idowu, P.A., Mpayipheli, M. and Muchenje, V., 2018. Practices, housing and diseases within indigenous poultry production in Eastern Cape, South Africa. *Journal of agricultural science*, *10*(11), pp.111-122.

Kebede, A., Abebe, B., Zewdie, T., 2017. Study on prevalence of ectoparasites of poultry in and around Jimma town. *European Journal of Biological Sciences*, 9(1), pp.18–26.

Khan, S.Y., and Ashraf, S., 2018. Risk factors associated with mite infestation in backyard poultry. *Pakistan Journal of Agricultural Sciences,* 55(4), pp. 839-844.

Kingori, A.M., Wachira, A.M. and Tuitoek, J.K., 2014. Influence of energy intake on egg production and weight in indigenous chickens of Kenya. *International Journal of Poultry Science*, 13(3), p.151.

Kumarasingha, R., Palombo, E.A., Bhave, M., Yeo, T.C., Lim, D.S.L., Tu, C.L., Shaw, J.M. and Boag, P.R., 2014. Enhancing a search for traditional medicinal plants with anthelmintic action by using wild type and stress reporter Caenorhabditis elegans strains as screening tools. *International Journal for Parasitology*, 44(5), pp. 291-298.

Kumsa, B., Geloye, M. and Beyecha, K., 2012. Ectoparasites of sheep in three agro-ecological zones in central Oromia, Ethiopia. *Onderstepoort Journal of Veterinary Research*, 79(1), pp.1-7.

Lawal, J.R., Yusuf, Z.B., Dauda, J., Gazali, Y.A. and Biu, A.A., 2017. Ectoparasites infestation and its associated risk factors in village chickens (Gallus gallus domesticus) in and

around Potiskum, Yobe State, Nigeria. *Journal of Animal Husbandry and Dairy Science*, 1(1), pp.8-19.

Machete, J.B., Kgwatalala, P.M., Nsoso, S.J., Moreki, J.C., Nthoiwa, P.G. and Aganga, A.O., 2021. Phenotypic characterization (qualitative traits) of various strains of indigenous Tswana chickens in Kweneng and Southern districts of Botswana. *International Journal of Livestock Production*, 12(1), pp.28-36.

Machete, J.B., Nsoso, S.J., Kgwatalala, P.M., Moreki, J.C. and Aganga, A.O., 2017. Phenotypic characterization of Tswana chickens based on quantitative traits in Kweneng and Southern Districts, Botswana. *Livestock Research for Rural Development*, 29(7).

Malatji, D.P., Tsotetsi, A.M., van Marle-Koster, E. and Muchadeyi, F.C., 2016. Population genetic structure of *Ascaridia* galli of extensively raised chickens of South Africa. *Veterinary Parasitology*, *216*, pp.89-92.

Manyelo, T.G., Selaledi, L., Hassan, Z.M. and Mabelebele, M., 2020. Local chicken breeds of Africa: their description, uses and conservation methods. *Animals*, 10(12), p.2257.

Mengesha, M. and Tsega, W., 2011. Phenotypic and genotypic characteristics of indigenous chickens in Ethiopia: A review. *African Journal of Agricultural Research*, *6*(24), pp.5398-5404.

Mohammed, A.A., Jacobs, J.A., Murugesan, G.R. and Cheng, H.W., 2018. Effect of dietary synbiotic supplement on behavioral patterns and growth performance of broiler chickens reared under heat stress. *Poultry science*, *97*(4), pp.1101-1108.

Moretta, I., Principato, S., Brustenga, L. and Principato, M.A., 2025. Poultry Mites Contributing to Human Dermatitis: A Retrospective Study in Italy (2010–2024). *Poultry*, *4*(2), p.21.

Moyo, S., 2009. Alternative practices used by resource-limited farmers to control fleas in free-range chickens in the Eastern Cape Province, South Africa. MSc dissertation. Alice: University of Fort Hare.

Mtileni, B.J., Muchadeyi, F.C., Maiwashe, A., Chimonyo, M. and Dzama, K., 2012. Conservation and utilisation of indigenous chicken genetic resources in Southern Africa. *World's Poultry Science Journal*, 68(4), pp.727-748.

Mtileni, B.J., Muchadeyi, F.C., Maiwashe, A., Chimonyo, M., Groeneveld, E., Weigend, S. and Dzama, K., 2011. Diversity and origin of South African chickens. *Poultry science*, 90(10), pp.2189-2194.

Mtileni, B.J., Muchadeyi, F.C., Maiwashe, A., Phitsane, P.M., Halimani, T.E., Chimonyo, M. and Dzama, K., 2009. Characterisation of production systems for indigenous chicken genetic resources of South Africa. *Applied Animal Husbandry & Rural Development*, 2, pp.18–22.

Mul, M., van Niekerk, T., Chirico, J., Maurer, V., Kilpinen, O., Sparagano, O., Thind, B., Zoons, J., Moore, D., Bell, B., Gjevre, A.G. and Chauve, C., 2009. Control methods for *Dermanyssus gallinae* in systems for laying hens: results of an international seminar. *World's Poultry Science Journal*, 65(4), pp. 589–600.

Mungube E.O., Bauni, S.M., Muhammed, L., Okwach, E.W., Nginyi, J.M. and Mutuoki, T.K., 2006. A Survey of the Constraints Affecting the Productivity of the Local Scavenging Chickens in the Kionyweni Cluster, Machakos District, *Kari Katumani, Annual Report* 2005.

Ndlovu, W., Mwale, M., Iwara, I.O., Kabiti, H.M., Obadire, O.S. and Francis, J., 2021. Profiling village chicken predators, parasites and medicinal plants used to control the parasites. *Brazilian Journal of Poultry Science*, , 23(2), pp.1-9.

Ng'Ambi, J.W., Thamaga, M.W., Norris, D., Mabelebele, M. and Alabi, O.J., 2013. Effects of egg weight on hatchability, chick hatch-weight and subsequent productivity of indigenous Venda chickens in Polokwane, South Africa. *South African Journal of Animal Science*, *43*(5), pp. S69-S74.

Nnadi, P.A. and George, S.O., 2010. A cross-sectional survey on parasites of chickens in selected villages in the Subhumid zones of south-eastern Nigeria. *Journal of parasitology research*, *2010*(1), p.141824.

Norris, D. and Ngambi, J.W., 2006. Genetic parameter estimates for body weight in local Venda chickens. *Tropical Animal Health and Production*, *38*(7), pp.605-609.

Nyoni, N.M.B. and Masika, P.J., 2012. Village chicken production practices in the amatola basin of the Eastern Cape Province, South Africa. *African Journal of Agricultural Research*, *7*(17), pp.2647-2652.

Onyekachi, O. (2021). Prevalence of Ectoparasite Infestation of Chicken in three poultry forms in Awka, *Asian Basic and Applied Research Journal*, 3(2): 1-13

Opeyemi, O.A., Shittu, O., Kadir, R.A., Kayode, A.E. and Yusuf, K., 2021. Lice infestation in village chicken and management practices of keepers in Ilorin, North Central Nigeria. *Sri Lankan Journal of Biology*, *6*(1).

Permin, A., Esmann, J. B., Hoj, C. H., Hove, T. and Mukatirwa, S., 2002. Ecto-, Endoand Haemoparasites in free range chicken in the Goromonzi District in Zimbabwe. *Preventive Veterinary Medicine,* 54(3), 213-224.

Permin, A., Magwisha, H., Kassuku, A.A., Nansen, P., Bisgaard, M., Frandsen, F. and Gibbons, L., 1997. A cross-sectional study of helminths in rural scavenging poultry in Tanzania in relation to season and climate. *Journal of Helminthology*, 71(3), pp.233-240.

Rebuma, T., Girma, W., Regassa, M., Gemechu, Z. and Pal, M., 2024. Prevalence of parasitic infestation of poultry presented at Guder Mamo Mezemir Campus Veterinary Teaching Clinic, Guder, Oromia regional state, Ethiopia. *International Journal of Livestock Research*, 14(9), pp.20-26.

Refisa, N. and Rebuma, T., 2024. Review on importance of ectoparasites in backyard chicken production systems in rural Ethiopia. *International Journal of Medical Parasitology and Epidemiology Sciences*, 5(4), pp.125–132.

Refisa, N., Firouzivand, Y., Chanie, M., Garedaghi, Y. and Rebuma, T., 2025. Prevalence of Ectoparasites on Poultry Managed under backyard system in and around Ambo town, central Ethiopia. *International Journal of Medical Parasitology and Epidemiology Sciences*, 6(2), pp. 46–52.

Risna, Y.K., Fadli, C., Fitra, D., Al Adam, K. and Fatmala, N., 2024. Performa produksi ayam broiler pada sistem closed house di Kabupaten Bireuen-Aceh. *Jurnal Ilmiah Fillia Cendekia Vol*, *9*(1).

Sabuni, Z.A., Mbuthia, P.G., Maingi, N., Nyaga, P.N., Njagi, L.W., Bebora, L.C. and Michieka, J.N., 2010. Prevalence of ectoparasites infestation in indigenous free-ranging village chickens in different agro-ecological zones in Kenya. *Livestock Research for Rural Development*, *22*(11), pp.1-4.

Sam-Wobo, S.O. and Mafiana, C.F., 2003. Prevalence and identification of helminth parasites of local chickens of Abeokuta, Nigeria. *ASSET- An International Journal* Series B 2 (2): 141-147. Published by the University of Agriculture, Abeokuta. Available online at www.unaab.edu.ng

Shanta, I.S., Begum, N., Anisuzzaman, A., Bari, A.S.M. and Karim, M.J., 2006. Prevalence and clinico-pathological effects of ectoparasites in backyard poultry. *Bangladesh Journal of Veterinary Medicine*, *4*(1), pp.19-26.

Sikes, R.K. and Chamberlain, R.W., 1954. Laboratory observations on three species of bird mites. *The Journal of Parasitology*, *40*(6), pp.691-697.

Silondae, H., Muzayyanah, M.A.U., Sulastri, E. and Guntoro, B., 2022, December. The Role of Household-Scale Local Chicken Farms in Providing Family Food in Minahasa Regency. In *IOP Conference Series: Earth and Environmental Science* (Vol. 1105, No. 1, p. 012009). IOP Publishing.

Strother, G.R., 2019. *Poultry pest management*. ANR-0483. Alabama Cooperative Extension System, Auburn University, Alabama. ANR-0483-Poultry-Pest-Management_051719L-copy.pdf.

Sumners, L.H., Miska, K.B., Jenkins, M.C., Fetterer, R.H., Cox, C.M., Kim, S. and Dalloul, R.A., 2011. Expression of Toll-like receptors and antimicrobial peptides during Eimeria praecox infection in chickens. *Experimental parasitology*, 127(3), pp.714-718.

Thrusfield, M., Christley, R., Brown, H., Diggle, P.J., French, N., Howe, K., Kelly, L., O'Connor, A., Sargeant, J. and Wood, H., 2018. *Veterinary Epidemiology*. 4th ed. Hoboken, NJ: John Wiley & Sons.

Van Emous, R.A., Fiks-van Niekerk, T.G.C.M. and Mul, M.F., 2006. Red mites in theory and practice. Praktijkrapport Pluimvee 17. *Animal Science Groupe, Lelystad: The Netherland*.

Waktole, H., Muluneh, T., Miressa, Y., Ayane, S., Berhane, G., Kabeta, T., Borena, B.M., Amenu, K., Ashenafi, H. and Antonissen, G., 2023. Quantitative assessment of major biosecurity challenges of poultry production in central Ethiopia. *Animals*, *13*(23), p.3719.

Wangelu, K., Walkite, F. and Debela, A., 2021. Investigation of major ecto-parasite affecting backyard chicken in Bishoftu Town, Ethiopia. *Journal of Medical Health*, *3*(1), pp.1-9.

Williams, A.G., Audsley, E. and Sandars, D.L., 2010. Environmental burdens of producing bread wheat, oilseed rape and potatoes in England and Wales using simulation and system modelling. *The International Journal of Life Cycle Assessment*, *15*(8), pp.855-868.

Wossene, M., Booth, R.E., Hunn, D.L., McGlaun, L.N., Miranda, J.H. and Twaddle, S., 1997, March. A comparison of cadmium electroplate and some alternatives. Proceedings of the *CORROSION 1997. CORROSION 1997*. New Orleans, LA. (pp. 1-7). AMPP.

Yadav, A.S., Gautham Kolluri, G.K., Marappan Gopi, M.G., Kumaragurubaran Karthik, K.K., Malik, Y.S. and Kuldeep Dhama, K.D., 2016. Exploring alternatives to antibiotics as health promoting agents in poultry-a review. *Journal of Experimental Biology and Agricultural Sciences,*4(3), pp.1-16.

Zeryehun, T., and Yohannes, Y., 2015. Ectoparasite infestation of free scavenging chickens reared under traditional backyard production system in Wolayita Zone, southern Ethiopia. *Ethiopian Veterinary Journal,* 19(2), pp.55-66

APPENDICES

A1: Questionnaires

External parasite of poultry

Date:	**Name of Interviewer:**
Name of farmer:	**Farm/Diptank:**
Contact numbers	**Village:**
Province	**District:**

Part 1: DEMOGRAPHIC INFORMATION (*Please mark (with x) the appropriate answer)*

1.1. Age in years				
1.2.Race				
1.3. Gender	Male	Female		
1.4 Education	No School	< Grade 12	Grade 12	Tertiary
1.5 Household size				
1.6 Farming experience (years)				
1.7 Estimated annual household income?	R			

Part 2: SOURCES OF LIVELIHOOD

1.1. Indicate your main source/s of income	
Livestock sales	
Wage income/ salary	
Social grants	
Payment	

Other (specify):

PART 3: Chicken facilities

3.1 Rearing	Caged – day & night	Free-ranging - day and night	Caged- overnight only	Other:

3.2 Type of cages or houses:

_____

_____

PART 4: LIVESTOCK ACTIVITIES

4.1 Do you keep any of the following livestock?

Animal	Yes/ No	How many?
Cattle		
Sheep		
Goats		

4.2 What characteristics do you use to assess the general condition of your chickens ?

Characteristics	Rank/Importance in classification (5-high & 1-least)
Body condition	
Ticks or lice infestations	
Habitus	
Eating behaviour	
Other, specify…….	

Part 5 – ANIMAL HEALTH, PRODUCTION AND MANAGEMENT PRACTICES

5.1 What are the most common diseases of chicken in your area? List.

Diseases	Rank 1-5 (1- least common & 5 - most common)	Do you have treatment or vaccine for it?

5.4 Do you usually vaccinate your chicken ?

Yes	No

If yes, please fill the following table.

Name of disease	Name of the vaccine	Why do you vaccinate?*

5.5 Have your chicken been affected by external parasites before?……

5.6 Can you please explain the clinical signs that you observed…….....

……

……

……

……

……

……..

5.7 How long (days or weeks) do they suffer from the these parasites?

……
……

5.9 Did you treat them when suffering from the parasite ?

……

5.10 What did you use for
treatment?……

5.11 For how long (days) do you treat?

…….

5.12 Did they get cured after treatment? .....

5.13 Do you seek specialist (e,g. AHT, Vet, Etc,.,) advice when you chickens are affected?
.....

5.14 Whom do you consult and how much do you pay?

…….

5.24 What (product/s) do you use to treat external parasite

……...

5.25 How much do you spend on tick control per year (estimated cost)?

.....

5.26 Who pays for your tick control on your farm or community?

…….....
.....

Table A2: The following is used to treat or control external parasites with their active ingredients

Remedy	Percentage (%)	Active Ingredient
Dazzel N.F	21%	Diazinon 30%
Karbadust	8%	Carbaryl 5%
Madubula	21%	Ta Acid
Petrolium Jelly (mainly vasselin)	2%	Hypoallergenic
Blue Death	11%	Permithrin (Pyrethroid) & Carbaryl (Carbamate)
Bulala Zonke	15.5	Mercaptothion
Used Engine Oil	1.2%	Gasoline, metal additives and a range of aromatic and aliphatic hydrocarbons

UNISA university of south africa

UNISA-CAES HEALTH RESEARCH ETHICS COMMITTEE
UNISA-CAES ANIMAL RESEARCH ETHICS COMMITTEE

Date: 20/02/2023

NHREC Registration # : REC-170616-051
REC Reference # : 2023/CAES_AREC/023
Name : Mr M Ngombane
Student #: 41960858

Dear Mr Ngombane

Decision: Ethics Approval from 17/02/2023 to 31/01/2024

Researcher(s): Mr M Ngombane
41960858@mylife.unisa.ac.za; 083-941-7977

Supervisor (s): Dr S Mbizeni
mbizes@unisa.ac.za; 011-670-9580

Prof N Nyangiwe
Nyangiwe1@gmail.com; 076-299-9424

Working title of research:

Prevalence of mites and associated risk factors in village chickens of Libode in Nyandeni local municipality, Eastern Cape province

Qualification: MSc Agriculture

Thank you for the application for research ethics clearance by the Unisa-CAES Animal and Health Research Ethics Committees for the above mentioned research. Ethics approval is granted for one year, **subject to further clarification**.

Ethics clearance is renewable on a yearly basis until completion of the project. **Renewal will be issued upon submission of yearly progress reports.**

Failure to submit the progress report will lead to withdrawal of the ethics clearance until the report has been submitted.

Due date for progress report: 31 January 2024

The progress reports are available on the college ethics webpage:
https://www.unisa.ac.za/sites/corporate/default/Colleges/Agriculture-&-Environmental-Sciences/Research/Research-Ethics

Open Rubric

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Reference: 12/11/1/1/23 (2743ZY)

Responsible person: Mvelisi Ngombane
Institution: Department of Rural Development and Agrarian Reform, State Veterinary Services, OR Tambo District Municipal, Nyandeni Local Municipality, Libode
Email: Mbizes@unisa.ac.za

Dear Mvelisi Ngombane

PERMISSION TO DO RESEARCH IN TERMS OF SECTION 20 OF THE ANIMAL DISEASES ACT, 1984 (ACT NO 35 OF 1984)

Title of research project / study: "Prevalence of mites and associated risk factors in village chickens of Libode in Nyandeni Local Municipality, Eastern Cape province."

Your application, received 2022-10-31, requesting permission under Section 20 of the Animal Diseases Act, 1984 (Act No 35 of 1984) to perform the research project or study stipulated above, refers.

1. Based on the information provided in your application, the Director of Animal Health has no objection to this study. The study may continue if statement 1.1 to 1.6 hereunder (as applicable) are, and remain, accurate. Should the scope of your research project change in any way you are required to inform the Section 20 Secretariat and may not proceed with any activities until written permission to do so have been granted by the National Director: Animal Health.

    1.1. No work will be done with controlled and notifiable animal diseases (list can be obtained / requested from this office), which includes any animal diseases which do not occur in South Africa;
    1.2. No imported material of animal origin or imported animal pathogens will be utilized in the study;
    1.3. No samples that originate from a biobank will be used in the study;
    1.4. No clinical studies will be performed in the target species, either in a laboratory or in the field;
    1.5. The areas where the samples are to be collected are not under restriction for controlled or notifiable diseases to which the species of animal, from which the samples are obtained, is susceptible;
    1.6. No samples or products that have not been passed as fit for human consumption will be obtained from an abattoir.

2. In addition to the conditions mentioned in point 1, you are responsible for ensuring that your research project or study complies with all or part of the following, as applicable: