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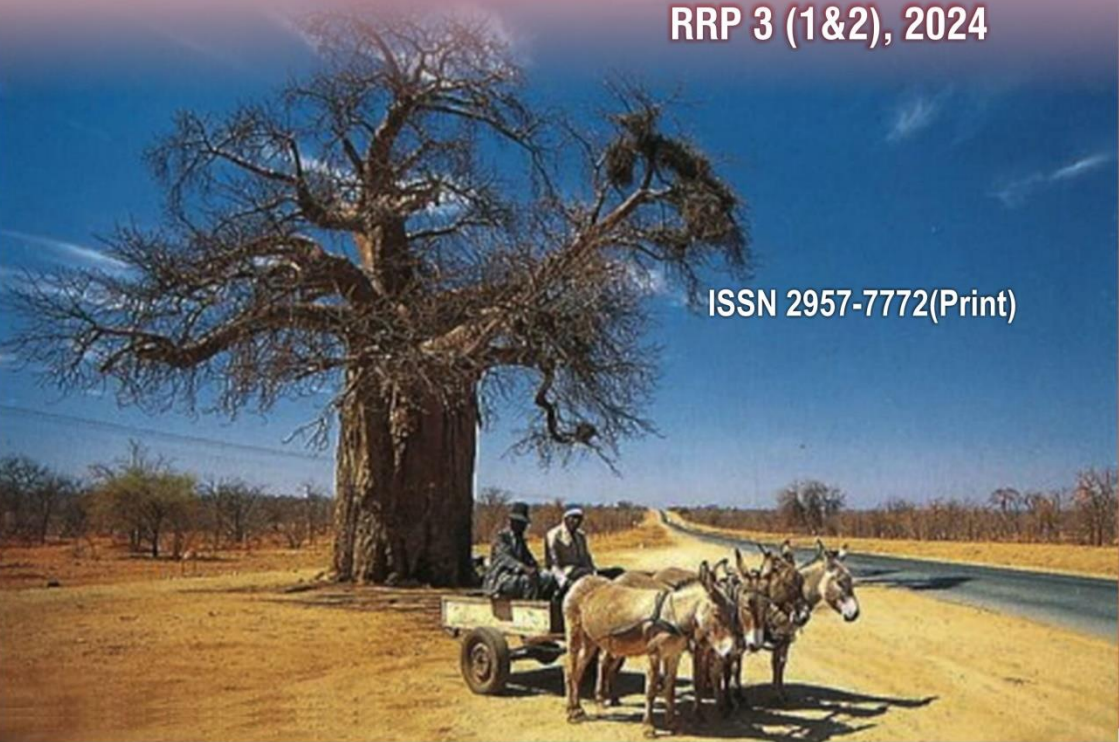

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About the Journal

JOURNAL PURPOSE

The purpose of the *Review of Rural Resilience Praxis is* to provide a forum for disaster risk mitigation, adaptation, and preparedness.

CONTRIBUTION AND READERSHIP

Sociologists, demographers, psychologists, development experts, planners, social workers, social engineers, economists, among others, whose focus is on rural resilience.

JOURNAL SPECIFICATIONS

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SCOPE AND FOCUS

In as much as the urban economic trajectory is increasing by each day, the rural economy, especially in many developing countries, still comprises a great proportion of the extractive and accommodation industries. Retaining some spaces as rural areas remains critical given the integral role rural areas play in providing ecosystem services to both wildlife and humanity. In this light, rural resilience as practice beckons for critical studies especially in the face of the ever-threatening extreme weather events and climate change that then impact on the livelihoods and lifestyles of the rural communities. Review of Rural Resilience Praxis (RRRP) comes in as a platform for critical engagement by scholars, practitioners, and leaders as they seek to debate and proffer solutions to the rural sectors' sustainable growth trajectory, which is resilient to the vagaries of climate change. This journal is also aimed at championing the philosophy of the right to be rural. The issue of conviviality between the different constituencies of the sectors, compiled with the competing challenges of improving rural spaces while also making the conservation, and preservation debates matter is the hallmark of this platform of critical thinking and reflection. The journal is published bi-annually.

Guidelines for Authors for the Review of Rural Resilience Praxis

Articles must be original contributions, not previously published and should not be under consideration for publishing elsewhere.

Manuscript Submission: Articles submitted to the *Review of Rural Resilience Praxis* are reviewed using the double-blind peer review system. The author's name(s) must not be included in the main text or running heads and footers.

A total number of words: 5000-7000 words and set in 12-point font size width with 1.5 line spacing.
Language: British/UK English
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Names of authors: beginning with the first name and ending with the surname
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Italicise *et al.*, *ibid.*, words that are not English, not names of people or organisations, etc. When you use several authors confirming the same point, state the point and bracket them in one bracket and in ascending order of dates and alphabetically separated by semi-colon e.g. (Falkenmark, 1989, 1990; Reddy, 2002; Dagdeviren and Robertson, 2011; Jacobsen *et al.*, 2012).

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Small Livestock Rearing as A Mitigation Against the Vagaries of Climate Change Impacts in Rural Zimbabwe

CHRISTINE CHIVANDIRE[1], FELIX MADYA[2], NYASHA NDEMO[3] AND HALLELUAH CHIRISA[4]

Abstract

This chapter critically examines the adoption of livestock rearing in Zimbabwe as mitigation measure against the adverse impacts of climate change in the rural areas. Climate change has proved to be a major challenge to the sustainability of rural livelihoods in Zimbabwe which are more dependent on agriculture hence the production of small livestock is a mitigation measure for sustaining rural households in the countryside where the effects of climate change are severe. This study is centred on how small livestock rearing can be a panacea to the impacts of climate change in the rural areas of Zimbabwe. Document and literature review was used to collect and gather information presented in this study. Various existing documents were reviewed for the purpose of this study and both qualitative and quantitative data was generated, presented and critically analysed. The results indicates that the adaptation of small livestock rearing has already began in the country as noted by their production in most parts of Matebeleland and Masvingo Province respectively. It can be argued that in as much small livestock rearing is a hedge against climate change effects in rural areas there is still limited information on how these are kept and their various breeds as well as the diseases that attack them and their treatment. Farmers still lack enough knowledge with regards to small livestock which is limiting its production and adaptation in the country. The study recommends the education of farmers on various diseases and the availability of medicines for treatment close to farmers. The study proposes coordination of the government, rural farmers and non-governmental organisation in raising awareness and fostering the adaptation of small livestock farming.

Keywords: *rural, resilience, livelihood, adaptation, sustainable and agriculture*

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INTRODUCTION

The rearing of small livestock is one of the most significant strategy used in the rural areas to meet various needs as well as the sustainability of rural livelihoods in most countries in the global south. Abbas, Ribeiro and Santos (2023) argue that developing countries are extremely susceptible to climate change due to their high dependency of their livelihoods on natural resources. It can be argued that in this time of crisis caused by climate change, the production of small livestock can be achieved as the main dominant livelihood for the socioeconomic upkeep of rural lives in the emerging countries like Zimbabwe. Animal husbandry is considered to be an important activity done in most developing countries within the agricultural industry as a way of reducing poverty and promoting rural livelihoods (Conteh, Sesay, Sheriff and Sesay, 2020). It is argued that the rearing of small ruminants have gained popularity and great attention in the developing world due to the continued and increased social, traditional and religious demand as they are used to fulfill various needs in these different dynamics (Conteh *et al*. 2020). Small ruminants are argued to contribute and play a critical role in the agricultural livelihoods among the poor and marginalised regions (FAO, 2022). Von Grebmer *et al* (2022) note that the global climate change crisis has exposed weaknesses of food and farming systems at local and universal scales which has contributed to the worsening of hunger crisis in emerging countries. This has proved true in Zimbabwe which is suffering severe crop failure as a result of climate change hence the need to foster alternatives such as the rearing of small livestock to reduce the huger risks imposed by climate change. Kontgis *et al*. (2019) affirms that climate change has affected rural livelihoods and food security due to the variation in cropping system and yields. It is in this regard that the rearing of small livestock is considered to be the solution in mitigating the problems imposed by climate change in the rural areas of Zimbabwe.

This study is based on a desktop review of scholarly literature where a number of secondary literature articles and documents were reviewed for the purpose of this study. Both qualitative and quantitative techniques were both used to present the descriptive and numerical data as analysed from the research. The study discovered that the rearing of small livestock is on an increase in Zimbabwe mainly in semi and arid regions such as Matobo, Gwanda and Bikita among others. In conclusion it can be argued that small livestock rearing has proved to be an effective and viable strategy for the rural areas as a measure towards climate change adaptation. It is argued that though small livestock keeping is been adopted there is still lack of knowledge on different breeds of sheep and goats to keep in various areas among the rural households.

Besides that the medicines are found far from their areas making it difficult for them to treat their livestock which they also struggle to identify the diseases attack. The study recommends water harvesting as a solution for water depletion for the livestock. The study proposed the investment in rainwater harvesting technologies as a way of collecting, storing and conserving water for the use in dry seasons. The study propose that farmers needs to be educated on various goats breeds and other breeds of poultry for them to know and choice the correct breeds that easily adapt in their areas.

LITERATURE REVIEW

This section critically reviews pertinent literature on small livestock farming as a potential mitigation measure against the adverse effects of climate which constitutes one aspect of the triple planetary crisis. On a global scale, the livestock sector is argued to have drawn international attention in the past decades sue to the rising concern about the environment and safety (Vermeulen *et al*., 2012). Conteh *et al*. (2020) argue that goats and sheep are fundamental to keep and can perform well even if they are poorly managed due to their unique adaptive characteristics that are natural. IFAD (2020) note that small livestock sector has huge adaptation potential to climate change. Climate change is argued to have given rise to various problem including the intensity of poverty on rural lives who rely on agriculture for their income. International Fund for Agriculture Development (IFAD, 2020) argue that small livestock sector has the potential to play a critical role in addressing direct and indirect challenges created by climate change. Small livestock are believed to adapt to a range of environments, and this makes them valuable to farmers who seek to optimize production and profit (et al. 2020). Bennett *et al*. (2018) argue that broiler chicken has become the most intensely cultivated animals across the globe. Among Asian countries, poultry is regarded as the most significant livelihood for rural households (Birhanu *et al*., 2023). IFAD (2015) argue that rural poultry is a solution towards poverty exerted by the effects of climate change on rural lives in most Asian and African countries. Chantalakhana (2000) asserts that the production of indigenous poultry is vital for climate change adaptation as they produce low carbon and water footprints due to their less requirement for land clearance and their manure nourishes the soil's health. Wong *et al*. (2017) support this view as they argue that village poultry have greater disease resistance and strong ability to scavenge and avoid predators which improves their rate of survival. It can be argued that poultry is a year round activity that can be used to meet food security among the people and these can adapt to various environments and have the potential to survive harsh conditions hence it should be taken more seriously in

Zimbabwe as a measure against climate change and a solution to food insecurity it is causing in rural areas.

IFAD (2020) mention that small livestock has the potential to provide adequate and reliable supplies of healthy and nutritious food, empowering rural women and young people and strengthening development through financial benefits and employment creation. It is argued that small livestock contribute to food accessibility and as well the income of smallholder farmers in the rural areas due to the sale of produce such as milk, eggs and meat among others (Wong *et al*., 2017; IFAD 2020). It is mentioned that small livestock contribute to human society through the provision of food, fiber and the necessities (Adams *et al*., 2021).

Gowane *et al*. (2017) note that small ruminants are climate resilient and possess unique characteristics which grounds their adaptation capacity and tolerance against rising temperatures. This fact is borne by the fact that around 50% of the world's goats and sheep are found in the arid regions of the world. This is a clear indication that with the changing climate in developing countries and the whole universe, the production of small livestock in Zimbabwe can be a well thought idea that can lead to the substance of rural livelihoods and the development of rural areas without the fear of distractive manner of climate change. Joy *et al.* (2020) argue that with regards to climate change adaptation, small livestock production have a great adaptive capacity as they can overcome both direct and indirect effects of heat stress due to their wide range of adaptive responses including rumination time, reduced feed intake and ability to maintain thermal equilibrium.

With regards to exerting stress on the environment, small livestock are argued to emit less greenhouse gases as compared to large livestock such as cattle (Opio *et al*., 2013). In this case it can be argued that besides their adaptive mechanism, small ruminants are advantageous to keep as they results in the reduced carbon emission which limit the concentration of greenhouse gases in the sky. Marino *et al*. (2016) argue that small livestock have the capacity to adapt well to water limited areas because of the increasing threats to water sustainability and availability imposed by climate change. It can be argued that with this argument and observation of the survival of small ruminant in low water supply areas, goats and sheep are a great investment among rural areas of Zimbabwe which are suffering from low rainfall and droughts caused by the change in rainfall patterns and seasons. Akinmoladun *et al*. (2019) posit that small ruminant have an increasingly vital role in enhancing the resilience of rural households to the effects of climate change due to their ability to tolerate

intermittent watering without heavily compromising production. Marino et al. (2016) assert that more than 56% of the world's small livestock production is dome in water-limited and dry locations in developing countries with approximately 27% and 21% temperature and humidity capacity. This indicate that with the raising temperatures and lowering rainfall in Zimbabwe, rearing of small livestock will bring preferred outcomes as they are recognized for their strength on adaptation. It can be argued that their capacity to withstand climatic shock indicate that they can be essential in reinforcing the resilience of rural agricultural systems and manage the risk of crop failure as well as a diversification strategy.

It is argued that animal production uses about 30% of the land area available and support 600 million livelihoods through employment creation (Thomton, 2010). It has been observed that in Asian and African regions, there are 59, 7% and 33.8% of goat population and 42% and 26.7% of sheep population respectively which could have increase by now due to the adoption of animal rearing as a mitigation measure towards climate change in these areas (Abdle, 2010). Small livestock production have been noted in Afghanistan with farmers in the rural areas rearing sheep, goats and over 12 million poultry (FAO, 2023). Henning *et al*. (2007) argue that poultry raising is more popular in rural areas in the developing countries as these can be quickly sold for income. In Afghanistan, the livestock sector is argued to contribute to the livelihoods of most rural population and a source of food and income (FAO, 2023). In as much as small livestock production is considered to be a way of mitigating climate change effects on rural livelihoods, in Afghanistan, the death of 98% of the goats and sheep have been recorded to be due to cold weather waves between 2022 and 2023, thus a numerous loss for the farmers (FAO, 2023). In other words, climate change has contributed to the reduction in small livelihood production in Afghanistan. Leal Filho *et al*. (2020) argue that climate change threatens small ruminant production due to changes in weather patterns and increased frequency of extreme events that increase the risk of the outbreak of diseases and limit production. In Southern Africa, it has been discovered that there is a shift in rural livelihoods from mixed crop livestock to pure rangeland systems. IFAD (2020) is of the view that small livestock strengthen rural people's resilience to climate change as it is a way of diversifying smallholders' assets and source of income in a way that reduces the emission of greenhouse gasses.

Climate change has impacted rural lives in various way which are direct and indirect as noted by many challenges being faced in these areas. Apraku *et al*. (2018) are of the view that climate change has made developing countries

more vulnerable and has worsened their rain-fed agricultural and free range pasture-fed livestock which they strongly depend on. Assan (2014) argue that livestock production in the face of rapidly changing climate can be the most sustainable livelihood for the rural people especially in arid regions in Zimbabwe. Phiri *et al*. (2020) assert that small livestock have the highest chances of surviving under climate change conditions such as the reduced land of grazing, droughts prevalence and the depletion of water and pastures. In southern parts of Madagascar, small ruminants are described as a support system for the households during the drought episodes due to their capacity to sustain while they quickly reproduce due to their resilience to harsh conditions compared to other livestock (World Bank 2018). Though the production of small livestock is applauded for its adaptation to climate change, in Ghana the production of sheep and goats is decreasing due to farmers opting to reduce the losses incurred from high maintenance cost of rearing them as the drugs are more expensive (United States Department of Agriculture (USDA) 2023). IFAD (2020) note that the small livestock sector is facing challenges such as transboundary diseases and emerging infectious diseases which are a threat to the rise of this sector for sustainable rural development and livelihood sustenance. On the other hand, IFAD (2020) argue that small livestock are the proper animals for rural farmers as they require few inputs and they are more prolific and offer faster returns on investment.

Besides livestock production being an important relief during droughts, it can also be regarded as an important function which meets the basic livelihood requirements of the people especially the vulnerable groups. Waters-Bayer and Letty (2010) is of the view that the rearing of goats and sheep is fundamental for poverty alleviation and food security which is a pillar to the achievement of sustainable goals. Nandini and Suganthi (2018) argue that livestock is the central due to its multiple benefits including nutrition, food security and organic fertilizer within the rural areas. Previous studies have shown interest in the examining the efficacy of small livestock rearing in Zimbabwe through studies in areas such as Matobo, Gwanda and Binga among others (Phiri *et al*. 2020). ZIMSTAT (2013) note that the effects of climate change are experienced in the rural areas where 60% of the people residing there depend on agriculture-based livelihoods. Makuvaro *et al*. (2014) argue that communal farmers in Zimbabwe have started to take action towards climate change adaptation as noted by the change in planting times, conservation farming, mixed crop livestock systems and crop diversification. Nyathi (2008) argue that Zimbabwe's communal famers are faced by numerous challenges that differ with agro-ecological region thus posing problems on cattle production thus the reason for the adoption of small livestock rearing. Masikati (2010)

assert that the major constraint to communal livestock production is the seasonal deficiency in quality of feed and its quantity and this call for alternatives such as the rearing of small livestock which are less demanding to keep.

METHODOLOGY

This study is based on literature and document reviews where secondary data sources were used to gather the information presented in this paper. A desktop review was done for this study and a number of case studies were reviewed from various regions to analyse how the rearing of small livestock is a solution towards the disastrous effects of climate change on rural livelihoods and their socioeconomic lifestyle. Various research articles, report documents, book chapters and news articles among others were used to collect the data scientifically presented in this study. A mixed approach to data gathering was done and both qualitative and quantitative research techniques were applied in this research as noted in the presentation of information. A thematic analysis to data presentation was used to present the findings of this study. This technique was used so as to present clear findings that are well documented with in-depth information on how the rearing of small livestock turns to be a relief on rural livelihoods and a coping mechanism against climate change in rural areas around Zimbabwe.

FINDINGS

Phiri *et al*. (2020) argue that livestock rearing is a most popular climate change adaptation strategy that is being employed in Zimbabwe in the district of Matobo and some parts of Matebeleland among others. It is discovered that districts including Beitbridge, Gwanda, Binga, Matobo, NKayi and Tsholotsho are most associated with small livestock farming especially goats due to their natural regions which are arid (Homman *et al.,* 2007). Gukurume (2013) discovered that small livestock production is on an increase in Bikita and other dry regions as an adaptation strategy towards the impacts of climate change and sustainable rural livelihoods. Homman *et* al. (2007) argue that goats are kept in most semi-arid regions in Zimbabwe due to their comparative advantage as compared to cattle as they are more drought resistant and feed from a wider variety of plants. Dube *et al*. (2018) note that rural citizens in Zimbabwe have not been passive victims of climate change as they portrayed to be action oriented in the adaptation of climate change variability. Due to the reduction in rain-fed crop farming in arid regions as a result of climate change, it has been observed that livestock production has become the most suitable strategy that protect food security and reduce poverty in rural areas in Zimbabwe. Homman *et al.* (2007) discovered that goats are increasingly used

to augment cash income and enhance food security for rural households in drought prone regions.

Phiri *et al* (2020) discovered that although livestock production in arid regions in Zimbabwe is yet to be endorsed by the government as an agricultural policy, the Livestock Production Department has increased its support for the uptake of livestock rearing. Gukurume (2013) argues that small stock such as goats, indigenous poultry and sheep have become more dominant in rural areas as people are merging the consequences of drought in areas receiving little rainfall. For instance it is evident that goats can survive in drier areas with various terrains as they have varied diet due to their eating habits as grazers and browsers as well as water scarce areas as they can survive for 2 days without drinking water (Phiri et al. 2020). It is noted that goats are more productive as compared to cattle hence they have a high rate of recovery hence the reason they are being adopted to curb the effects of climate change in the rural areas in zimbabwe (Homman *et al*., 2007)

Zimbabwe's National Climate Change Response Strategy (2014) observes that rearing of small drought resistant livestock such as goat has been adapted by vulnerable communities due to the adverse effects of climate change on rural livelihoods. It is argued that the government has influenced the investment in livestock in areas prone to increased dry spells as a measure against harsh weather conditions induced by climate change (Phiri *et al*., 2020). Gukurume (2013) discovered that various adaptation strategies are being taken in the rural areas of Zimbabwe by smallholder farmers as a way of coping against the effects of climate change on their livelihoods. In Matobo District, the rearing of sheep is practiced due to the belief that they protect the homestead against lightning which is another effect of climate change that comes about with lightning and terrifying thunder (Phiri *et al*., 2020).

The rearing of small livestock have been noted to have a couple of benefits to the community. Since rural citizens rely on the agricultural livelihoods as the source of income through the sale of surplus, the availability of small livestock is beneficial especially through the time of drought as they can easily sale or exchange for grain their goats, poultry and sheep for income and slaughter them for food (Phiri *et al*., 2020). Phiri *et al*. (2020) observed in Matobo District that small livestock rearing is taken as an alternative and a good insurance against crop failure for the rural residents as they are resistant to high temperatures and drought as compared to cattle. It is therefore discovered that small livestock rearing is an effective strategy for adapting to climate change and its effect on rural livelihoods.

CASE STUDIES

1. MATOBO DISTRICT

Matobo District is one of the districts in Zimbabwe that has adopted the rearing of small livestock as a measure to mitigate against the effects of climate change. Phiri *et al*. (2020) observes that the rearing of small livestock is a popular climate change adaptation strategy among farmers in Matobo District in Zimbabwe. Goats and sheep rearing has become the center of rural livelihoods in the Matobo District. Farmers in Matobo argue that small livestock are not affected by high temperatures and drought as compared to cattle which collapse and die (Phiri *et al*., 2020). World Vision (2015) discovered that the rearing of small livestock in Matobo District as a measure towards climate change is being pioneered by Khulasizwe (Non-Governmental Organisation) which has already distributed goats to 380 households. Households in this district have embraced goat keeping as their core livelihood with many people with herds over 50 goats (Kwulasizwe File Report 2018). The rearing of goats in the area has been applauded for its output which is said to be two to three times as compared to cattle as goats reproduce a multiple time in a year (Phiri *et al*., 2023). In a study carried out in the district, one of the respondents announced that they started with 5 goats which have Goat farming has been described as a viable livelihood during drought and disaster as they can be easily sold for cash and other food commodities hence the reason why most people opt for goats in Matobo District. Phiri *et al*. (2020) note that small livestock rearing in Matobo is viewed as a good insurance against crop failure as it becomes an alternative for the families with multiple benefits such as meat, milk and manure for gardening. The Matebele goat is commonly reared in the area and is described as a large framed animal weighing between 35 and 50 kg depending on their gender and can give birth to twins and triplets thus making it more economic and sustainable to keep in drought and heat prone areas (Khulasizwe File Report 2018).

Challenges have been noted in rearing other small livestock such as pig whose market and consumption are slim due to religious reasons (Phiri *et al*., 2020). It has been discovered that only 20 percent of the total households in the district rear sheep as an alternative livelihood. It is argued that though sheep are resilience to the impacts of climate change they require more labour and attention as the easily get lost because they can hardly re-track their way back home hence they require someone to look after them throughout the day (Phiri *et al*., 2020). Besides they are easily stolen or attacked by predators as they do not make noise as compared to goats thus the reason why goats have gained more popularity in the district.

2. GWANDA DISTRICT

The effects of climate change have been noted to affect Zimbabwe's rural livelihood production with some areas such as Gwanda being noted among other areas due to the poor rainfall patterns that already exist in the area. Gwanda District is claimed to be one of the hottest and driest regions in Zimbabwe with low and erratic rainfall (Mujaya and Mereki, 2006). It is claimed that rainfall patterns in the district of Gwanda are not adequate to support agricultural activities during the major cropping seasons due to the unpredictable weather patterns (Hove *et al*., 2022). The failure of rainfall has been noted to affect livestock production leading to droughts and the death of animals. Due to long dry spells in the area, people around Pulipeli Village argue that they travel a distance of 5km or even more in search of water for their livestock. It has been discovered that 90 percent of the people in Gwanda practice goat breeding which is their source of meat and milk (Hove *et al*., 2022). Besides the rearing of goats, poultry is another form of small livestock farming done in the district for the purpose of meat, eggs and income. Hove *et al*. (2022) argue that the rearing of goats in Gwanda is much preferred as compared to cattle as their grazing is seasonal and scarcity of feed is experienced in summer and winter thus leading to a higher cost of rearing cattle which needs expensive feed. It is argued that the purchase of feed is unaffordable to most farmers due to its high prices and as well unavailable at local markets. Chitongo (2019) argue that most households in Gwanda South have livelihoods which are heavily dependent on rain fed agriculture making them vulnerable to food insecurity due to the prevailing and anticipated climatic conditions.

3. MUDZI DISTRICT

The rearing of small livestock have become more common in the Mudzi District as recent statistics indicates that small livestock prodution have surpassed the production of cattle (Food and Nutrion Council 2022). Farmers in Mudzi have adopted small livestock production as a strategy to adapt from the effects of climate change whih affect crop prodution and large livestock such as cattle. Food and Nutrion Council (FNC) (2022) note that sheep, goats, pigs and poultry are the most common forms of small livestock prodution being done in Mudzi Distrit and an increase in production is noted as compared to the 2016 statistics. Due to the effects of climate change, water shortages is one of the most common challenge faced by livestock producers in Mudzi District that leads to large trekking distance which leads to water stress and death of livestok especcially attle hence the reson for shifting to small livestock which require less water as compared to cattle (FNC 2022).

Table 22: Livestock Populations

Ward	Cattle	Sheep	Goats	Pigs	Donkeys	Poultry
2016 data	75953	7767	36213	3950	740	104967
2021						
1	2253	143	2503		0	6509
2	7921	1720	10728		407	10637
3	11990	1567	16927		0	27506
4	9538	6064	11370		0	14654
5	8488	1367	15225		164	11336
6	5338	0	8541		0	10677
7	5980	0	6990		0	10407
8	4542	522	6271		0	15034
9	5750	392	12372		87	11545
10	6614	779	8528		0	9676
11	6238	480	6628		0	10972
12	8266	209	8906		0	16053
13	4711	44	4432		104	8201
14	6720	0	8467		403	8870
15	10921	84	13633		0	13413
16	3561	0	9200		0	8479
17	3597	0	5555		0	8273
18	7493	126	6669		52	12127
Totals	**119 921**	**13497**	**162 945**	**5221**	**1217**	**203692**

Figure 1: *Livestock distribution in Mudzi District* (Food and Nutrition Council, 2022)

DISCUSSION

Phiri *et al*. (2020) assert that despite the comparative advantage of small livestock in adapting to climate change over cattle, their production is beset by subtle challenges that threaten its viability and effectiveness. It is argued that though small livestock rearing has become the main strategy to curb the effects of climate change in rural areas, extreme temperatures, severe water scarcity and reduced fodder for the livestock resulting in poor production (Munhande *et al*., 2013).

Phiri *et al.* (2020) argue that though the adaptation of small livestock is significant for the mitigation against climate change effects, the farmers in Zimbabwe are not aware of the various breed of goats for instance which has an implication on the effectives of their adaptation as various breeds respond differently to different locations. Despite the adaptation ability of small livestock, farmer are finding challenges in keeping them as they get affected by various diseases that they fail to predict what they are due to lack of knowledge on various diseases and their symptoms in goats, sheep and chicks. This is supported by Phiri *et al*. (2020) who argue that though the farmers received training from the Veterinary Department, they still fail to identify and

state the diseases affecting their animals making it difficult for them to treat them with the right medicine due to their lack of disease knowledge. Besides the medicine are not available locally hence the farmers need to travel to towns to acquire them which are far distanced from their rural places thus the inaccessibility of the medicine is a great challenge in the rearing of small livestock in rural areas of Zimbabwe.

Though goats and sheep have been discovered to adapt and rely in dry regions, it can be argued that the scarcity of water is a major challenge that affect production. Phiri *et al*. (2020) is of the view that high mortality rates are being experienced in sheep and goats due to the drinking of stagnant water. Although small livestock rearing has proved to be an effective strategy for rural livelihoods to be sustainable, it can be argued that there are challenges faced by rural households in rearing these stocks. Phiri *et al*. (2020) argue that small livestock like sheep are hard to rear as they can easily get lost due to their inability to re-track their way thus requiring more labour and exposing them to predictors and as well, they cannot make noise hence they are easily devoured without the owner noticing. Phiri *et al*. (2020) further posit that goats are destructive animals with the capacity of causing reduced or loss of tree regeneration thus leading to deforestation. There is less support from various institutions to farmers thus leading to the unsustainable livelihoods. Phiri et al. (2020) note that the Veterinary are incapacitated and do not have enough resources to educate and supervise the rearing of small livestock in various rural areas hence leading to several challenges being faced by farmers which they are unable to solve themselves causing the loss of their livestock.

CONCLUSION AND RECOMMENDATIONS

In conclusion it can be argued that small livestock rearing has proved to be an effective and viable strategy for the rural areas as a measure towards climate change adaptation. The study recommends water harvesting as a solution for water depletion for the livestock. The study proposed the investment in rainwater harvesting technologies as a way of collecting, storing and conserving water for the use in dry seasons.

The study proposes that farmers need to be educated on various goats breeds and other breeds of poultry for them to know and choice the correct breeds that easily adapt in their areas.

The study also proposes the education and training of farmers on different diseases affecting their livestock and how to treat each of them for the sustainability of their livelihoods.

The study recommends that the government should give support to rural farmers through various parastatals and ministries that deals with livestock such as the Ministry of Agriculture and Veterinary departments. Government support should be in terms of financial aid, policies, training and medications required for these livelihoods. Government should ensure that the required resources are available for the farmers and are accessible in their respective rural areas to curb the loss of livestock due to unavailability of various resources such as information pertaining diseases and the required medicines.

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