INDIGENOUS KNOWLEDGE SYSTEMS AND LIVESTOCK PRODUCTION UNDER SMALL- HOLDER FARMER MANAGEMENT IN THE FACE OF CLIMATE CHANGE: A CASE OF GURUVE DISTRICT

By

Tapson Mashanyare

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Department of Sociology, University of Zimbabwe

Supervisor: Dr S. D Chingarande

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Dedication

To my wife Nothando and daughter Nokutenda, I am proud of you.

Abstract

Indigenous knowledge systems of livestock care and health care is the only asset in the hands of the small holder farmers to mitigate the impact of climate change on livestock production. This study explores the role of indigenous knowledge systems of livestock care and veterinary care in the face of climate change. Developing countries such as Zimbabwe bear the brunt of climate change due to poor mitigation capacity. Small holder farmers are more affected by climate change than large scale commercial farmers because it is difficult for them to diversify to other livestock species which are tolerant to climate shocks. However ethno-veterinary knowledge is not evenly distributed in society. Gender, age and social class are major determinants of the amount of knowledge that one has. The elderly have more knowledge on ethonoveterinary practices because the knowledge is experiential. Specialists like ethno veterinary herbalists also have more knowledge on ethno veterinary methods because of their specialized skills. Government departments like the department of Veterinary Services are stumbling blocks to the development and utilisation of ethno veterinary medicines because they dismiss them as unapproved and based on mythology. Instead, farmers are encouraged to use modern veterinary medicines. However, the use of ethonoveterinary methods persists because of their ready availability and affordability. Climate change has increased the number of disease in livestock; this makes ethonoveterinary medicine more relevant and useful to adapt livestock production to climate change. This study exposes the need for adaptive mechanisms if small livestock production is to remain viable under the growing threat of climate change.

Introduction and Background

More than just climatologists are now talking about climate change. We do know for certain that the amount of carbon dioxide in the atmosphere is rising, (it is now higher than what it has been in the last 20 million years), that changing the chemistry of the atmosphere changes the energy transmission, that the climate in cities is different from rural areas and that changes in landscape results in change in climate. We have evidence of changes in growing seasons, global temperature changes (climate models suggest that there will be a 1.5 degrees Celsius increase in global temperature over the next 100 years), and weather extremes that cannot be explained only by natural forces. Climate change is certain we are just now seeing the fall-outs and the victims. However, the rate of change is unprecedented, and adaptation needs to be strongly considered. This is a global issue and the impacts are felt in local livelihoods (Phillips 2001).

According to Smit (2001) adaptation involves, adapting the nature of agriculture so that changes are less of a problem and opportunities are realised. According to Stokes (2009) livestock production is the world's dominant land use, covering about 45% of the earth's land surface much of it is harsh and variable environments that are unsuitable for other users. Climate change could impact the amount and quality of produce, reliability of production and the natural resource base. Although, there will be direct effects on livestock, the majority of influences will be through changes in plant growth and the timing, quality and quantity of forage available. Geographic patterns have shown that the interior of continents and the Northern hemisphere is heating up faster than anywhere else. The effects of greenhouse gases are several decades behind, meaning that even if no greenhouse gases entered the atmosphere from today onwards; global warming will continue for several decades behind, meaning that even if no greenhouse gases entered the atmosphere from today onwards, global warming will continue for several decades. Unlike the effects of carbon dioxide in the atmosphere, the effects of rising temperature will for the most be negative and offset will have decreased digestibility as a result of lower nutrient and protein content, forage quality will be substantially poorer. There will be greater

induced heat stress for livestock and water demand will be vital to the location of livestock systems.

Evidence from the Intergovernmental Panel on Climate Change (IPCC) is now overwhelmingly convincing that climate change is real that it will become worse and the poorest and most vulnerable people will be affected (IPCC 2007).

IFAD acknowledges climate change as one of the factors affecting rural poverty and as one of the challenges it needs to address (IFAD 2007) while climate change is a global phenomenon, its negative impacts are more severely felt by poor people in developing countries who rely heavily on the natural resource base for their livelihood.

In pastoral and agro-pastoral systems, livestock are key assets for poor people, providing multiple economic, social and risk management functions. The impacts that climate change will bring about are expected to accelerate the vulnerability of livestock systems. (Gill and Smith 2008)

Heat distress on animals will reduce the rate of animal feed intake and cause poor performance. (Rowlinson 2008). Lack of water and increased frequency of drought in certain countries will cause a loss of resources. Among the direct effects of climate change for example, there will be higher temperatures and changes in rainfall patterns translating in an increased spread of vector-borne diseases and micro parasites as well as the emergency and spread of new diseases these effects will be felt by developed and developing countries, but developing countries will be most impacted because of their lack of resource, knowledge, veterinarian and extension services and research technology development (FAO 2008).

The basic component of any country's knowledge systems is its indigenous knowledge. It encompasses the skills, experiences and insights of people, applied to maintain or improve their livelihood (World bank, 1997). Significant contributions to global knowledge have originated from indigenous people for instance in medicine and veterinary medicine with their intimate understanding of their environments. Indigenous knowledge is developed and adapted continuously to gradually changing environments and passed down from generation to generation and closely interwoven with people cultural values. Indigenous knowledge is also the social capital for the

poor, their main asset to invest in the struggle for survival to produce food, provide food, shelter or achieve control of their own lives. According to Mararike (1999), for people to survive, one of the strategies required is the application of appropriate indigenous knowledge. Such knowledge should give people confidence to tackle life threatening problems and enable them to meet internal and external challenges.

In this study indigenous methods of livestock health care are sometimes referred to as ethno veterinary medicine (EVM). According to Kohler-Rollefson and Brauning (1998), ethno veterinary medicine (EVM) considers that traditional practices of veterinary medicine are legitimate and seeks to validate them. Ethno veterinary medicine was defined by McCorke (1995) as the holistic, interdisciplinary study of local knowledge and its associated skills, practices, beliefs, practitioners, and social structures pertaining to the healthcare and healthful husbandry of food, work and other income-producing animals, always with an eye to practical development applications within livestock production and livelihood systems, and with the ultimate goal of increasing human well being via increased benefits from stock raising. Knowledge about ethonoveterinary medicine is not documented and it is passed from generation to generation orally. Indigenous knowledge of veterinary care in Zimbabwe and other developing countries are used as adaptations and coping strategies to the adverse climates in resource poor areas in which they live. According to Duri and Mapara (2007) IKS for these communities are important because they provide farmers and households with the ability to survive and produce under risk among other climate, environmental constraints and incomplete market structure.

Because knowledge on ethno veterinary medicine is not documented and experimental, the elderly people are rich sources of this knowledge because of their experiences. Ethno veterinary practices are rooted in African mythology and cultural practices. This knowledge risks extinction because of the attention that scientific knowledge systems of modern pharmacy are receiving. This leads to the negation of ethno veterinary practices as backward. Farmers are not encouraged to use ethno veterinary medicines because they are not scientifically proven.

The effects of climate change like the increase in the frequency of droughts and some changes in the timing of rain affect livestock production in many parts of Zimbabwe because of the increase in livestock diseases and poor health of livestock due to lack

of enough water and forage. Ethno veterinary medicine has become more relevant in dealing with the effects of climate change because of accessibility and affordability of these medicines.

Despite the advantages that ethno veterinary medicine have, very little has been documented in developing countries and ethno veterinary knowledge has no place in mainstream veterinary medicine. According to McCorke (1995), in recent years, however, increasing attention has been paid to ethno veterinary knowledge and local veterinary practices because of increasing costs of veterinary medicine which makes it difficult for poor farmers to access veterinary medicine. There is a growing acceptance that some of these practices have therapeutic value and should be documented before this knowledge is lost.

Statement of the problem

Livestock production has been severely affected by climate change. The rainfall patterns have been altered resulting in large scale crop failure. Livestock production like poultry and piggery depends on good crop yields for stock feeds. Under harsh weather conditions, the health of livestock has been affected and drought conditions leads to loss of livestock. There has been very little research on climate change and its impact on livestock production. Though indigenous knowledge systems are often negated, they contain rich sources of knowledge which have been practiced by generations. This study seeks to explore the various indigenous knowledge systems practiced in livestock production by small holder farmers in Guruve district. The study also seeks to understand how this knowledge is distributed among the farmers in terms of gender. According to FAO (1994), rural women often have considerable indigenous knowledge about many aspects of animal husbandry, veterinary medicine and range management. Women in most societies are responsible for the daily care of animals, their reproduction and doctoring. The study also purposes to see how livestock production, is adapting to the changes in weather and the various coping mechanism that have been practiced by the farmers in Guruve district with the purpose of adding value to the knowledge base on climate change and indigenous knowledge systems.

Objectives

The objectives of this study are to:

-Establish the local knowledge on livestock production.

-Assess the mechanisms to deal with climate change as it relates to livestock production.

-Assess the role of government and NGOs in alleviating the impacts of climate change on livestock production.

-Explore the stocks of knowledge available to farmers by gender.

Theoretical Framework

This study explores the various indigenous knowledge systems of livestock production used by farmers in Guruve to cope with climate change. It also demonstrates the contestation between the indigenous knowledge systems that the farmers has practiced for generations and scientific knowledge systems that are imposed by institutions, NGOs and government departments that work with the farmers in livestock production. In order to fully explore the relationship between the farmers and institutions like the Veterinary Service Department and NGOs the study used the Structuration Theory proposed by Giddens (1984). Giddens views human agency and social structure not as separate concepts but as two ways of considering social action. Structure is somewhat more specific and detailed and refers to practices which are structured along certain lines. These include procedural rules, how practice is performed (University of Regina 2000). In this view, the department of Veterinary Services represents structure because it has rules that the farmers must observe in livestock production and health care. It recommends certain medical practices that are linked to modern pharmacy. According to Sewell (1992), social structures are the rules and laws and agencies that enforce these laws. Government departments like LPD and Veterinary Service department represent structure as they impose certain rules that govern livestock production. The department of Livestock Production and Development (LPD) promotes small stock production arguing that they have a high turnover and are resistant to climate shocks than large stock. To the farmers, the LPD is structure because it constrain them by choosing for them which livestock species to keep without any input from the farmers. Giddens (1984) characterized structure as

rules and laws that constrain the behaviour of agents hence the activities of LPD represents structure as they set rules for livestock production. As government departments, LPD and Veterinary Service Department have legal instruments that help them to force people to compliance. Dipping of cattle is compulsory failure to comply attracts a heavy fine. According to Giddens (1984) agency is human action and to be human is to be an agent though not all agents are human. Human beings are not passive recipients of authority from structures but the possession of agency allows them to act freely. Human action is not always predictable because of the possession of agency, human beings do not always follow the normative ways of behaviour, and sometimes they break from the normative ways. Applying this theory to indigenous knowledge systems of livestock production, the farmers in Guruve uses a variety of ethno veterinary medicines to treat diseases in livestock. Though this is not encouraged by the veterinary service department, farmers continue to use the unapproved medicines because they are cheap and locally available.

Cohen (1968) noted that at its most extreme, then structuralist sociology treats society as an autonomous entity composed of structures and institutions that impose themselves upon and control the actions of members of society by organizing themselves in terms of their own logic, which is dictated by economic and cultural factors that have produced it and are extra individual. Thus the degree to which members of society are agents of their own existence and their relationships with one another is quite minimal, since not only are actions determined by their position within structures and institutions but so too are their thoughts, values and interests, then the only agent of social action is structure itself. Walsh (1998) rejects this to be a dehumanized version of the social world through an illegitimate reification of society which completely objectifies structures and institutions and divorces them from actual activities of the members of society is not an immutable and determining force which externally conditions the life of its members of society as individuals within it. From this perspective, society is not an immutable and determining force which externally conditions the life of its members but rather they are agents who produce and sustain it. Human beings can and do make themselves into what they are, they are able to take charge of their own lives and to shape their social world into forms that meet their own needs. The use of indigenous knowledge systems in livestock production confirms the possession of agency that enables individuals to develop their own local

medicine with the available resources like trees. Waburton and Martin (1999) noted that indigenous knowledge of animal health empowers local people and increases the local capacity to experiment and innovate.

According to Jenks (1998) the problem of the issues of structure and agency in social life, then is clear even if the resolution of it is not.

On the one hand, society is not a system of immutable and refined structures and institutions operating as a law like systems of objectivity organised relationships that determines all action within it. Human beings are not simply cogs in a machine or puppets on a string because they can and do make sense of their social environment, exercise choices in relation to it and modify it is a whole variety of ways which makes them the agents in the social world and creators of social structure. This balanced position is what Giddens (1986) referred to as the duality of structure institutional properties of social systems are created by human action and in turn shapes future actions. Social structures are both enabling and constraining, the laws that various rules and guidelines that are set by the department of livestock production and the department of veterinary services may seem to be constraining but on the other hand they actually enable the farmers to raise livestock in harsh climate conditions. Farmers rely on these departments for technical services. Climate change also represents structure as it constrains the farmers in livestock production. Due to climate change, there is an increase in livestock diseases like red water and heart water. However the possession of agency enables farmers to pursue ethno veterinary practices in order to mitigate the impacts of climate change on livestock.

Though social institutions may constrain the farmers by imposing rules and regulations that govern animal care and health care, these same innovations are a product of human action and it is human beings who make the regulations that constrain other social groups. Institutions are made up of people, so people are both enabling and constraining. Duality of structure makes clear the distinction between structure and agency, yet recognizing them as dependent upon each other. The application of this theory recognizes that the structural properties of social systems impose themselves as influencing mediums and at the same time outcomes of the social practices they recursively organise (Giddens 1986).

Definition of key concepts

Indigenous knowledge systems

Indigenous knowledge systems are the basic component of any country's knowledge system. It encompasses the skills, experiences and insights of people, applied to maintain or improve livelihood. (World Bank 1997)

Livestock

For the purpose of this study, livestock refers to domestic animals that are raised for food or labour. This includes chicken, goats, pigs, sheep, cattle and donkeys.

Livestock production

Livestock production in this study refers to the various ways of animal care including breeding, feeding, watering, doctoring and the general care of animals.

Climate change

Climate change is defined as a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods. (The United Nations Framework Convention on Climate Change 1994) In this study, climate change is defined as the change in weather and rainfall patterns.

Methodology

The study area

This study was carried out in ward 22 which is one of the 24 wards in Guruve District. The choice of the ward was influenced by its proximity to Guruve town and it is located within 150km from Harare. The ward also has a diversity of livestock species such as cattle, donkeys, goats, chicken and piggery.

Sampling

Six villages were chosen randomly from 19 villages in the ward. Random sampling gave each village a fair chance of being selected because in every village there are farmers who are in to livestock production. Purposive sampling was used to select the farmers to be interviewed. This was important because there are some famers who do not own livestock and it was pointless to include such farmers. Purposive sampling enabled the researcher to interview farmers who are into livestock production and this saved time. Information was obtained from government departments such as the department of livestock production and veterinary services using purposive sampling. This sampling method enabled the researcher to visit the relevant departments hence relevant information was obtained. Purposive sampling was also used to select the non-governmental organisation which deals with livestock production in the district (Lower Guruve Development Association).

Ethics

To gain entry into the district the researcher followed the local government hierarchy that is going through the District Administrator, the respective Councillor for the ward and the village heads to get their permission. Some village heads were also interviewed to get their views on indigenous knowledge systems of livestock production and the changes in rainfall patterns. To gain entry in to the government departments like the department of veterinary services and livestock production, permission was sought from the District Heads. The researcher also obtained

permission from the programme manager of Lower Guruve Development Association to interview staff from the organisation.

Research Methods

In order to meet the objectives of the study, the research used the case study method, incorporating several research techniques such as in-depth interviews, unhurried and unstructured conversations and observation.

In depth interviews were conducted with officers from the veterinary department, the department of livestock production and Lower Guruve Development Association which is implementing a poultry project in the ward. This is in line with the objectives of the study, to establish what each of each of these departments is doing to lessen the impacts of climate change on livestock production. Lower Guruve Development Association is working with FAO in implementing the poultry project. The interviews with one of the managers of this organisation were important in that it shows the role of nongovernmental organisations in alleviating the impacts of climate on livestock production.

In-depth interviews were used to obtain rich data from village heads, the elderly and officers form the veterinary department, the department of livestock production and Lower Guruve development Association. According to Maxwell (2005) and Webber (2010) in-depth interviews use open ended questions to uncover information on a subject of interest and allow interviewees to express opinions and ideas in their own words. This technique allowed the researcher to note emotions and facial expressions. This helped the researcher to realise that climate change is a very emotional subject to some farmers who have lost their livestock to droughts and diseases. Some of the words which farmers used showed bitterness on the unpredictability of their environment. Personal opinions were also expressed freely without interruption.

In-depth interviews conducted with the officers from the veterinary department and the department of livestock production allowed the researcher to get the position of the government on climate change and indigenous veterinary methods.

In depth interviews also gave the farmers a voice. Some of the interviews were conducted with women farmers which made the voice of women audible. According to Mararike (1999) knowledge however we define it represents a form of power.

In depth interviews allowed the farmers to explore their various ways of veterinary care. The possession of such knowledge is power to the people hence the method in a way made the people to realise their power. Unhurried and unstructured conversations allowed the researcher to get rich and sometimes emotional information about the effects of climate change on livestock production especially from farmers who have lost their livestock to diseases. As noted by Blumer (1997:234), interviews allow the interviewee to express his or her inner feelings, thoughts and intentions.

The researcher also used observations and this technique was very useful because it gave the researcher the opportunity to see the difference between what the farmers say and the actual situation. The researcher observed the rivers, one dam, pastures and the cattle, goats and chicken, the cattle pens and the methods of fodder preservation. Some farmers also plant trees like *custard apple* on their yards because it cures many livestock diseases and the researcher observed the trees in some households. Observation also allowed the researcher to ask relevant questions based on what he would have observed.

The various methods which the researcher used had their own shortfalls. The researcher discovered that using unhurried and unstructured conversations was time consuming as it allowed the respondent to narrate their experiences with little interruption. Therefore some irrelevant issues would be narrated and the researcher had to be patient as it is disrespectful according to Shona tradition to interrupt an elderly person in the midst of a conversation.

Observations also had the danger of misinterpretation by the researcher. The researcher observed trees like *custard apple* which were planted at many households. The researcher had initially misinterpreted the purpose of the trees for shade yet these trees had a medical purpose for both humans and livestock.

PRESENTATION OF FINDINGS

Case A: Cain Mbira (not his real name)

Mr Mbira is 64 years old, he lives in Katsiru village and he never worked outside the agricultural sector. He used to work as a supervisor at a certain farm in Darwendale since he was fifteen, a job he left at twenty nine upon marriage to build his own home in the village. The job gave him enough experience in poultry, goats and cattle production which he supervised. Mr Mbira and his wife started a very viable chicken project and they also kept cattle, and goats. Like the other villagers, they also grow maize and other food crops which can be used as stock feeds. This became their source of livelihood and they were able to educate their six children through selling goats, chicken and cattle, some of them went to boarding schools at average, they used to keep fifteen cattle, twenty goats , forty free range chicken and hundred broiler chickens at any given time. Now Mr.Mbira is left with only four cattle, six goats and fifteen free range chickens, the broiler project has been abandoned ten years ago but a large fowl run is evidence of Mr. Mbira's enterprising mind.

The common diseases in cattle that Mr Mbira named are red water, three day sickness, black leg, lump skin and foot-and-mouth. He also pointed out Anthrax which is not common but has killed a number of cattle in the past. These diseases have reduced the number of cattle in the area in recent years Red water is the most common disease and it is caused by ticks. The Veterinary Service Department is to blame for the failure to control tick borne diseases which could be eliminated if consistence in dipping cattle is maintained. The dipping calendar is not clear and farmers have to wait for an announcement from the dip attendant for the next dipping date which is subject to the availability of chemicals. The dipping intervals are between three weeks to a month. In the past, there were very few diseases and it was very rare to find cattle that were sick. When this happened, they would fetch the leaves of *bottania thonnigii* and crush them, mix with water and make the sick animal to drink. The mixture would be used on all diseases because there was little knowledge on the specific names of diseases.
Since the advent of modern veterinary medicines, natural ways of curing livestock were ignored and shunned as inferior and backward. Their utilization greatly declined as people favoured the veterinary medicines. *Ruzivo rwedu rwechivanhu rwakabva*

rwangosiyiwawo nekuti rwavakuonekwa serwekumashure'. (Our knowledge was negated as primitive). However, modern veterinary medicines are too expensive for most rural farmers hence they are resorting to natural ways of animal health care. The increase in the number of diseases that is being experienced makes natural veterinary practice more relevant alternative for most poor farmers who cannot afford modern veterinary medicines.

Apart from diseases, the seasons are changing and there are significant changes both in the amount of rainfall and in the timing of the first rains which affects the health of cattle. The amount of rainfall is very low and the rains are coming a bit late, towards the end of November. In the past droughts did not occur as often as they do now. Due to low rainfall, rivers are drying up and cattle have to move long distances to find water, this affects their health. Low rainfall also means that grass will not grow well and the cattle are getting thin."*Sora re mombe rava kuita shoma mwanangu*'. (There is no enough grass for our cattle my son)Although these dry spells do not necessarily kill cattle, they greatly affect their health and reproduction and that is why the herds do not grow to significant numbers.

Mr. Mbira keeps chicken on free range production where the chicken are not confined but are allowed free movement. This gives the farmer some advantage because the burden of care is reduced unlike cattle which require herding. Common diseases in chicken that Mr Mbira named include wounds in the eyes, new castle, coccidiosis and flu. The traditional medicines that are used for treating chicken are not disease specific hence one medicine cures a number of diseases. The aloe vera plant is the commonly used natural medicine for chicken. It is crushed and put in drinking water; it is very effective and in some cases it is mixed with *phlegmostomium* (soot) which gathers in the thatched kitchens. He noted that the Veterinary department helps with vaccination of chicken when there is an outbreak of diseases like new castle.

Mr. Mbira noted that there are very few diseases in goats as compared to cattle. The care of goats is also easy as they can be tied around trees and they feed around the confined area when the farmer is busy. The leaves of the Aloe-Vera plant are used to treat goats, they are crushed and mixed with water and the goats are made to drink the mixture. The mixture is effective for bacterial infections and diarrhea.

Mr. Mbira maintains that older women and men have similar amounts of knowledge as the knowledge is experiential, owing to the decades of experience which these elderly people have of using these medicines. However he fears that the younger generation does not have the knowledge that their elders had due to modernization and the subsequent abandonment of some of the cultural ways of sharing knowledge. *'Kare vakomana nana baba vaienda kudare manheru ega ega kwaikurukurwa nhau dzakawanda dzeuchenjeri'.* (In the past, men and boys would meet every evening; these meetings were an important platform to share wisdom.) Mr. Mbira noted that nowadays scientific knowledge systems have taken the centre stage and therefore a lot has to be done to teach young men and women.

CASE B: **Tirivanhu Utete** (not his real name)

Mr Tirivanhu Utete is an ethno veterinary herbalist who stays in Gezi village. He maintains a well-watered herbal garden at the back of his house with a variety of indigenous plants like the aloe vera, *meliaazearach* and *solanuminducum*. The sixty year old man inherited this unique knowledge from his late father who was a well-known herbalist. Herbal gardens are not common in the village Mr Utete's garden is the only herbal garden in his village. He pointed out that such gardens are easy to maintain and it is also a way of making available even the seasonal plants throughout the year. In the dry season there are more incidences of veld fires which destroy a lot of vegetation including the plants used for ethno veterinary medicines. Herbal gardens are an important way of preserving these useful plants. Mr. Utete has worked in the herbal garden since he was seven where he used to help his father with manual labor, this gave him an opportunity to learn as much as possible.

The changing rainfall patterns have resulted in depleted pastures and livestock production under these conditions is very difficult as it is both risky and laborious. Overgrazing is also one of the unfortunate consequences of poor rains. The water for the animals is becoming insufficient especially during the dry season due to drying of rivers. Irrigation of gardens is also disturbed and this affects livestock because part of the harvest is reserved for livestock, therefore if the yield from the gardens is poor, nothing will be spared for livestock.

The common diseases in cattle that Mr Utete named are heart water, red water and lump skin. The farmer uses indigenous medicine to cure all the diseases that affects his cattle. Some diseases like lump skin are caused by ticks therefore the farmer blames the veterinary department and sees the harnessing of knowledge on indigenous medicine as a lasting solution.

'*Tinoenda musango totora mushonga tobonyabonya tosanganisa nemvura'.* (We go into the bush and fetch the medicine we then crush it and mix it with water.)

The commonly used herbs are *solanuminducum,* (*aloe Vera, pauzzozia mixta, venonia amygdalina, meliaazearach,* and *bautania thonnigii.*

These herbs are crushed and mixed with water. The roots, bark and leaves of these trees are used in preparing ethno veterinary medicine. Sometimes, the roots, bark and leaves are combined to prepare certain mixtures or they may be used separately. After preparing the mixture one should wait for about an hour for the mixture to settle and soften. It is put it in a 300ml bottle and shaken. The cow is tied by the horns on a tree or pole and forced to drink the mixture. *'Takambopa mombe mushonga uyu pakaitachirwere chaiomesa mhuno chichitadzisa mombe kufura.*'(We once administered the medicine when there was a certain disease which made the cattle not to graze and their nose became dry). Mr Utete observed that after administering the medicine, it took just two hours for the cattle to show signs of recovery. Lumpskin is another dreaded disease that affects cattle in the area from time to time. The farmers also utilize ethno veterinary medicines to cure lump skin. Mr Utete explained one of the methods in which the leaves of the *pauzzozia mixta* are crushed and mixed with water in a 300ml bottle, shaken and given to the sick animal to drink. *'Tinorigira mombe pasi toishamisa muromo, toinwisa mushonga'* (we force the cow to the ground, open its mouth and make it to drink the medicine). He maintained that It also take about the same time for the animal to recover after administering the modern veterinary medicine or a little longer.

The farmer treats red water by using *aloe vera*, *pauzzozia mixta* and custard apple. When a cow is infected with red water, it passes out bloody urine. To Mr Utete, these traditional mixtures are just as effective as the injections for red water that are used by the veterinary department. Only those who do not know the traditional medicines rush to the veterinary office when they observe some symptoms of diseases. Farmers like Mr Utete have always used traditional medicines and he sees buying veterinary medicines as a waste of money because they see traditional medicine as equally effective. '*Hatingarasi mari tichikwanisa kungorapa ne mushonga wedu wechibhoi*,

zvinoitwa nevasingazive' (we cannot waste our money when we can use our African medicine only those who do not know traditional medicines do that). In 2010 two of Mr. Utete's cattle were attacked by a strange disease that made the nose of the cattle dry. The disease had killed ten cattle in this village in 2008. He used the traditional medicine and the cattle recovered, from that time onwards, the other villagers respect him for his knowledge on traditional medicine and they consult him when their cattle are sick. Traditional medicines are readily available therefore treatment is given without any delay and this saves livestock from possible death as the diseases are treated before they spread to most body parts. Veterinary medicines have a disadvantage in that people walk long distances to the veterinary office and sometimes the livestock inspector delays and the condition of the animal will be worsening. Every morning, Mr.Utete inspects the cattle pen to check on the health of his cattle and if signs of diseases are noted treatment is given immediately. The villagers help each other with traditional medicine in the event of disease outbreak. *'zvazvinoita manje ukaona kuti mumwewako mombe yake yarwara kutomutsvagira mushonga unorapa womupa kuti azame kushandisa'* (what normally happens is that when your neighbour's cow is sick, you fetch traditional medicine and give him or her to try). '*Vamwe vanombouya vachibvunza kuti chirwere chakati munorapa nei? Ndichivabatsira.'*(Some people come to ask me how I treat certain diseases and I help them).

Mari iyezvino irikunetsa kuti munhu ugare unayo asi nekuona kuti munhu ungarasikirwa nechipfuyo chako, kwava kutomhanya kumushonga wechibhoyi'

(Money is a problem these days, we do not always have it, and we cannot lose our livestock because of failure to buy veterinary medicine, so we now turn to traditional medicine.)

Goats are easy to take care of because they do not require a lot of supplementary feeds compared to cattle and chicken. They also multiply faster than cattle because a goat can have two or more kids at the same time. They do not require a lot of water hence one can water them from a bucket; this is an advantage especially in recent years due to unreliable rainfall patterns which causes the rivers and dams to dry up early. Mr Utete contends that there are very few diseases that affect goats besides tapeworms and some stomach infections which cause diarrhoea. The *aloe vera* plant and soot are

used to treat the stomach disorders, the leaves are crushed, mixed with soot and coarse salt and the goat is made to drink the mixture.

Chicken also multiply easily especially during the rainy season because there will be a lot of green plants to take cover from the predators like eagles. Chicken requires the least attention as they gather their own food and they always come back at in the evening unlike cattle and goats that requires constant monitoring. Most of the diseases in chicken are treated using the aloe Vera plant's leaves which are crushed and put in water for the chicken to drink. Chicken may also die from flea bites, these fleas are found in the walls of the fowl run. They can be killed naturally by burning grass in the fowl run. This is more effective than spraying chemicals which may affect the chicken.

Mr Utete noted that knowledge on ethno veterinary medicine is shared at household level. Men share their knowledge with their wives because they are not always around and the wife assumes the responsibility of livestock care during the husband's absence. Ownership of livestock is one of the major determinants of the amount of knowledge on indigenous livestock health care that men and women have. Though Mr. Utete and his wife have a joint ownership of cattle, usually cattle belong to the husband while other small stock belongs to the wife. *'Zvinonzi huku ndedzanamai kashoma kunzwa kuti baba vane hukudzavowo'* (it is said chicken belongs to women, it is very rare to hear that men have chicken). *'Ruzivo rwemishonga yekurapa huku nembudzi rwakawandira kunanamai asi vana baba ndivo vane ruzivo rwakawanda rwemombe, mushonga yekurapa mombe vana baba ndivovanotsvaka'* (Women have more knowledge about traditional medicines to treat diseases in poultry and goats but men have knowledge on medicines for cattle.) Small stock belongs to women and large stock belongs to men hence women knows about small stock more than men and men knows more about large stock.

In general, men have more knowledge on ethno veterinary practices than women because they are exposed to the public sphere than women. Men interact in places like beer parties more than their female counterparts. *'zvino vanamai vashoma vanomwa, muhwahwa munokurukurwa zvakawanda*. (There are very few women who drink beer and they miss out a lot because at beer parties we discuss a lot.) Ideas and experiences are shared when a group of people meet and a beer party provides a good platform for discussions on various subjects. '*Munhu kana akorwa anenge avakutaura twese*

anenge ava kubudisa dzimwe nhau dzakadzama. (When a person is drunk he tells everything and deep secrets are shared when someone is drunk)'*Kana munhu adhakwa anenge asisina kuomera.'*(A person who is drunk is not mean with information they share their knowledge and experience)

However, knowledge of traditional medicine is not evenly distributed even among men. Sometimes those who know about traditional medicines make you pay so they can tell you the medicines. If a person's animal is sick, the medicine is fetched for them but they are not shown the tree from which the medicine is extracted,*'vanongokucherera chete'* (they just dig the medicine for you)*'unotomupa huku kuti chindiratidzawo*' (you sometimes have to give them chicken for them to show you the medicine.)*'Zvemadzinde kashoma zvinovanzwa'* (it is very rare to show someone the medicine, it is a secret.)*'Asi kana munhu ane uroyi hwakaipa unobhadhara oenda newe musango okuratidza madzinde acho pakudzoka anobva ati ufambe mberi ,akangokunongedza kugotsi chete unobva wakanganwa madzinde aunenge waratidzwa.'* (But if the person who knows about the traditional medicine have witchcraft and they take you to the bush to show you the trees if on your way back they make you walk in front and they point you at the back you immediately forget the bushes and have to pay them whenever you want to treat your animals). Mr Utete concluded that ethno veterinary knowledge can be used as a means to earn money and those who have this knowledge will try to keep it to themselves for financial gain.

CASE C: Amos Moyo (not his real name)

The Veterinary Service Department appoints dip attendants who takes care of the dip tank including regular monitoring of the supply of water and chemicals to the dip tank. Mr. Amos Moyo is one of the dip attendants for ward twenty two. This is an envied job that earns him respect in Gwaze village. Moyo has sixteen cattle which is the largest herd in the village; other villagers have an average of five cattle a factor which is attributed to diseases and lack of enough grass. He also keeps five goats and fifteen chickens.

Mr Moyo argued that during the rainy season there are more livestock diseases so cattle dip weekly or once every two weeks. Sometimes there are challenges of shortage of chemicals, this disturb the dipping calendar. During the dry season diseases are few so dipping is carried out once in three weeks or monthly. People who fail to comply with dipping are made to pay fines as a way of encouraging dipping. Another challenge that he noted is on water required for dipping. Due to low rainfall, many streams that used to flow throughout the year are drying up soon after the rain season. People now have to walk long distances to fetch water for dipping.

He also noted that the health of cattle has been deteriorating in recent years. During the dry season cattle get very thin due to lack of enough grass and water. The drying of rivers in Mr Moyo's opinion is due to the unreliable rainfall patterns and this affects the drinking systems of the cattle. He also noted that the size of the herd in the area is decreasing. In the past decades the number of cattle in the area was higher as compared to recent years. This is due to diseases that are killing cattle and the changes in the rainfall patterns that have resulted in a long dry season and a very short rain season. Dams and rivers are drying up due to these changes and livestock is affected hence the herd is shrinking. He also noted that the reproduction of cattle in the area has been very low in recent years, a factor that he attributes to the changes in weather and rainfall patterns.

'*Kana takohwa tinochengeta mashanga echibage tozopa mombe muchirimo aposora rinenge ravashoma' (*After harvesting, the maize stover is gathered and stored as fodder and it is given to cattle in the dry season when the grass is insufficient.) During the dry season the grass does not shoot and natural fodder becomes very necessary as it supplement the animal feed requirements. Giving cattle maize stover is also a way of controlling their movement, during the dry season cattle travel long distances in search of grass and water. If a farmer gives his cattle Stover they will always come back home expecting the more. Stover is given with salt to make it more nutritious and this improves the health of the animals. This bonds the farmer and his cattle as they will not go away from home.'*Utano hwemombe dzinopiwa mashanga hurinani panedzisingapiwi mashanga.*'(Cattle which are given fodder appear healthier than those which are not given supplementary feeds.)

Mr. Moyo built a very big pen which can be subdivided into three, cattle need fresh air and a large pen allows free air circulation and this is good for the health of the cattle.'*Mombe hadzidi kufemerana dzinofa'* (cattle need good aeration if they are overcrowded they die.) *'Mashanga anobatsirawo panguva yekunaya nekuti mombe hadzidi kugara pakanyorova, tinoisamashanga mudanga kuti mombe dzigare pakaoma.'* (The maize stover also helps in the rain season when the pen is so dump, we put the maize plants in the pen to create a dry surface for cattle.)

The aloe vera plant is used to treat diseases in goats and chicken. Aloe is a plant which is very common in the area and the advantage of using it lies in its ready availability. Mr. Moyo uses only the medicines approved by the veterinary services department to treat diseases in cattle.
'*Dambudziko rine mishonga yedu yechibhoyi nderekuti hauzive kutiwawandisa here kana kuti waita mushoma*' (The problem with traditional medicines is that we are not sure of the dosage whether you have given too much or too little.) It is therefore wise to use approved medicines with direction for use. Some people use barks and leaves of trees such as custard apple and *meliaazearach* are used to treat diseases in cattle. Cattle and other livestock needs proper care this reduces their chances of catching diseases. He argued that in the past people used to take good care of their livestock but nowadays livestock is neglected. Livestock was a measure of wealth; nowadays it is how much money in the bank account that determines one's wealth. Mr. Moyo's cattle do not suffer from diseases as other cattle in the village due to proper management and the use of modern veterinary medicines which he access by the virtue of being an employee of the veterinary service department.

CASE D: **Grace Mhepo** (not her real name)

This case illustrates that some single women have in-depth knowledge on the various ways of caring for livestock including their doctoring. Grace is thirty two, she have two children who are aged six and four. Her husband left her four years ago, he is now married to another wife and they are staying in Mutoko. Grace accepted her fate and took over the care of the children as well as the overall responsibility of the household. She has two cows, four goats and eight chickens. She performs some of

the tasks that are considered as men's tasks like maintaining the cattle pen and dosing cattle.

She noted that cattle are not reproducing as fast as they used to do due to some changes in the rainfall patterns that have affected the watering and feeding systems of the livestock. When cattle do not get enough grass and water their health is affected and this affects their reproduction as well. Calves also die from diseases and so the herds remain very low. The health of the calves is also affected when the cows do not eat enough and if they lack adequate water. This would mean low production of milk and the health of the cows is compromised.' *Mukaka unodzivirira kuzvirwere zvakasiyana siyana, kana mhuru ikashaya mukaka utano hwayo hunenge hwavapanjodzi*. ' (Milk contains antibodies which help the calf fight diseases, if a calf does not have enough milk it is at a high risk of contracting diseases .) Changes in rainfall patterns have increased diseases in goats they also get thin due to lack of enough grass. Chicken production is also disturbed when there is crop failure because the harvest will not be enough to support the farmer as well as sustain chicken production. Chickens are sold to buy food for people hence their production is greatly reduced when there is a drought.

Grace uses ethno veterinary medicines to treat diseases in livestock like most farmers in her village though they are not encouraged by the veterinary department. *'Mishonga yekuvhetinari ndiyo yatinonokurudzirwa kumadhibha nekumisangano'* (we are encouraged to use medicines from the veterinary department when we go for dipping and at meetings.) The problem with veterinary medicines is that they are very expensive especially for people in the rural areas who do not have an income base. *'Ko tinoiwanepi mari mwanangu muno mumaruwa* '(where do we get the money my son here in the rural areas?)

'Pane mushonga yechibhoyi yekurapa mombe yakaita se godzongo, munhanzva ne muroro inobatsirachaizvo' (There are some traditional medicines that cure diseases in cattle such as *aloe vera, pauzzoziamixta* and *custard apple* that are very helpful.) However Grace noted that the problem with traditional medicines is that they are known by individuals, the knowledge is not evenly distributed. There are some people who know a lot of herbs and trees that cure livestock diseases but they monopolize that knowledge. *'Unogona kufirwa nemombe asi mumwe achiziva mushonga asingadi kukutaurira.*' (Your cow may die when you have a neighbour who knows about traditional medicines) Most people just know of common plants like *aloe vera* yet

there are many plants which cure diseases in cattle, those who know more keeps it to them. On the other hand veterinary medicines are also very expensive hence the farmers like Grace cannot rely on them, very few people afford veterinary medicines. *'Dambudziko rinozouya paunenge usina mari usina kana sendimuhomwe, ndipo panorwara chipfuwo.Kuti utore mazuva uchitswaga mari mombe inobva yafa.* '(Problems often come when we have no money, your cow can get sick and if you delay to get medication looking for money the cow may die.) Grace practices other traditional methods of livestock care to cope with the drought conditions that are often experienced in the area. She stores maize stover after harvesting and also cut grass soon after harvesting when the grass is long and store it for his cattle. These are natural methods of supplementing food for cattle in the dry season. Although these methods had been forgotten, people are now reintroducing them in recent times because of changes in weather and rainfall patterns. Many people had stopped storing the maize plants and grass for cattle but nowadays it is now necessary and almost every farmer is doing it because of the changes in rainfall patterns. Farmers are now realizing that the rainfall patterns have changed thus the rains are becoming more unpredictable. This affects livestock and therefore they have reverted to the natural ways of fodder preservation to maintain the good health of their cattle. *'Taimboita majana ekufudza mombe asiiyezvino takaregedza nekuti mombe hadzichaguti.*' (We used to take turns to herd our cattle in groups but we have stopped this system of herding a large group of cattle because the cattle are not getting enough grass.) Grace also argued that even the methods of herding livestock are being transformed in favour of small groups or individual herding because of the shortage of pastures.

Grace argued that the production of goats has not been affected much by the changes in weather and rainfall patterns. Goats do not suffer from many diseases but when the rain is too much their hooves are affected and they have problems in walking. They easily multiply as they can have more than one kid at a time. Grace could not name any specific diseases in goats. She argued that goats do not succumb to diseases as often as cattle. However soot and aloe are used to cure diseases in goats. A mixture of Coca-Cola (coke) and soot may also be used to cure diarrhoea and bloat in goats.

Chicken production is easy for Grace because she keeps them on free range and they gather their own food like locusts, plants and grains. Free range chicken production is labor free as there is no herding, the chickens gather their food around the homestead

and they know when it is time to get back home. '*Huku hadzisikanganisiwe nekusanaya zvakanaka kwemvura*.' Chicken is more draught resistant as compared to cattle which may die when there is a draught. *'Huku dzinorapwa negodzongo nechina'i asi vamwe ndivovanotenga mushonga yemisitoro sana* ESB3.' (*Aloe vera* and soot is used to treat diseases in chicken but some people buy medicines from the shops such as ESB3*)Aloe vera* is very effective and has an advantage of curing all diseases in chicken. The leaves of the plant are cut and squashed and put in water for the chicken to drink. Another advantage with African medicines that Grace noted is that one plant can cure diseases in all livestock species. *Aloe* is used for cattle, goats as well as chicken and it can also cure certain diseases in human beings. *'Mishonga yechirungu iyi kana uriwe huku unongopa huku chete kana mombe ikarwara kwava kutotswaga mari yekutenga mushonga wemombe. Haukwanise kupa huku mushonga wemombe*.' (With these modern medicines one cannot give cattle the same medicine that you give to chicken.) She argued that modern veterinary medicines are species and disease specific hence this waste more money whereas African medicine can work for all livestock species.

CASE E: Jessica Vambe (not her real name)

Mrs Vambe is fifty three years old, has lived in Guruve for the past thirty three years, she was born in Mt Darwin and she came to Guruve when she got married to Cliff Vambe a resident of Mutova village. Mrs Vambe and her husband keep six goats, forty chickens and ten cattle and they also grow maize and sorghum. Part of their harvest is preserved for stock feeds which they also supplement with other natural methods like storing grass and maize Stover

'Mamiriro ekunze arikushanduka, gore ne gore rinemamiriro aro sakavarimi hatichazive chekuita.' (The climate is changing, we are observing changes every year therefore it is difficult for us to make any predictions.) She noted that the rainfall patterns are becoming unreliable and most rivers and dams are drying up, this poses a challenge to livestock production. She attributed the increase in livestock diseases to the changes in the seasons. They are now experiencing long winters and, goats and chicken are affected by the prolonged winter and sometimes death of livestock occurs. *'Chando chacho chava kunonoka kupera , kunomuka kuchitonhora iyezvino muna*

September zvaisaitika kare ,kwaifanira kutopisa tobva taziva kuti mvura yava pedyo kunaya zvino zvemakore ano hapachina achaziva' (The winters are becoming very long , in the morning it is very cold though we are in September now this never used to happen in the past. Instead it must be very hot so that we are sure that the rains are about to fall.) The rain season have been altered, the rains are coming very late from mid-November onwards. This affects the health of cattle, goats and donkeys as fresh grass is enjoyed for a short time. Even cattle and goats which browse are affected by the length of the dry season as some shrubs and trees will be dry for long periods. She also argued that the health of cattle does not improve much during the rainy season as they are overworked in the fields. Cattle used to enjoy the carefree season when there will be no ploughing going on but these days it is the most difficult season for livestock because of depleted pastures and the drying of water sources. Livestock also depends on good crop yields and their health is affected when there is crop failure because there will be less maize stover for cattle. Mrs Vambe observed that for the past five years their harvests had been very low and this meant that livestock did not have enough food.

Mrs Vambe noted that the farmers have developed some coping mechanisms to the problem of depleted pastures. People are now herding their cattle in faraway places and hills because the pasture has been depleted and some pastures were cleared to create land for farming and building houses. They also travel long distances to water the livestock because rivers and streams are drying up early. Under these conditions, the production of cattle is declining and supplementary feeds becomes a necessity. There has been an increase in diseases in recent years which are attributable to the changes in rainfall and weather patterns. Common diseases in this area are black leg, heart water and red water. Custard apple's leaves and bark are crushed and given to sick animals to drink. '*Takatanga tichishandisa mushonga ye vetinari chete asinekuwanda kurikuita zvirwere zvemombe takapedzisira totsvaga mishonga yedu yechibhoyi isingadimari*.' (At first we were using veterinary medicines only but with the increase in livestock diseases we ended up looking for African medicines which do not cost us money.)

Goat production has not been affected much by the climatic shocks that has been experienced in the area in recent years. Mrs Vambe contends that there is very little ethno veterinary knowledge on goats because of their strong immune system. She added that the farmers in the area had little knowledge about ethno veterinary care of

goats than cattle. '*Kashoma kunzwa kuti mbudzi yarwara'* (It is very rare for goats to succumb to diseases). This is the reason why people do not know a lot about the diseases that affect goats; if they are given proper care they do not easily get diseases. Goats do not need supplementary feeds as do cattle so goat production has less labour for the farmer.

'Padzinenge dzichidya tukwenzi dzinodya mushonga saka dzinenge dzichitozvirapa' (When they browse they eat some shrubs with medicinal properties that cure diseases). Mrs Vambe also argued that goats are drought resistant because they eat so many things, even dry leaves hence they are not easily affected by droughts as cattle do. Soot, aloe and coke are used to treat stomach disorders in goats. Aloe is crushed and mixed with water and the goats are made to drink. Coca cola (coke) is effective for diarrhoea, a 300ml coke is mixed with soot and shaken, it is left to settle for about fifteen minutes and it is the sick goat is made to drink. After six to seven hours, the goat would have recovered.

Chicken is produced under free range management where the chickens move freely in search of locusts, some edible plants and grains. They are given some small grains like Sorghum and crushed maize. The fowl run is constructed in a way that allows free air circulation. Chicken needs good ventilation, lack of proper ventilation results in deaths. The common diseases in chicken that Mrs Vambe noted are coccidiosis and Newcastle. The veterinary department warns us if there is an outbreak of diseases like Newcastle in the area. This is important as it helps people to avoid eating the chicken which dies from the disease which may put their health at risk. Mrs Vambe uses traditional medicines to cure diseases in chicken. She usually uses *aloe vera* and soot to treat diseases in chicken. These medicines are very effective for many diseases in chicken. Chicken also have an advantage in that when they feed they often pick some grains of sand and eat some plant leaves which enhances their immunity to diseases.

On the distribution of ethno veterinary knowledge on gender lines, Mrs Vambe maintained that that men know more about large stock such as cattle and donkeys but women have more in-depth knowledge about goats and chicken which are considered as stock for women. However when the husband is in town, the women takes over the care of cattle and women whose husbands are away, widows and single women knows a great deal about care for cattle. '*Kana baba varipo tinenge tichingoti ndezvevarume hatina basa nazvo asi kana vasipo tinotomira-mira'* (When the

husband is there we ignore about caring for cattle because it is a men's area but when they are not there we take over.) Women have more knowledge about care and doctoring of goats and chicken because they are considered as stock for women. The women have knowledge on the care of small stock than men and most of the things that men know about the health care of these livestock were learnt from women. Naturally women know more about chicken because they spend most of their time at home than men and so they observe the health of chicken. *'Kufudza mombe ibasa rechirume, vanamai tinongoitawo kana pasinavana baba nevakomana'* (Herding cattle is men's duty women do it when men and boys are not around.) This explains why they know a great deal about the trees that are used to cure diseases in cattle. They spent more time in the bush herding cattle than women and so they are bound to have more knowledge about the care of cattle.

CASE F: **Thomas Kondo** (not his real name)

Mr. Kondo is the Animal Health Inspector for Guruve District in the Veterinary Services Department. He has worked in Guruve for the past fifteen years; he has also worked in Manicaland and Masvingo which makes him familiar with livestock production in various farming regions. There are only four animal health inspectors who work in the twenty four wards of Guruve, which undermines the effectiveness of their work. The inspector's job involves visiting farmers and inspecting various livestock projects. They also hold some workshops to educate farmers on various aspects of livestock production.

The changes in rainfall patterns are evidence of climate change and this affects the production of livestock because of lack of feeds and adequate water. '*Panenzizi dzanga dzisingaperi dzavakupera mvura, mombe dzava kunwakure*'(There are some rivers which used to flow all year round but they are now drying up and cattle now travel long distances to get water)

The planting season delays and it quickly cuts, Mr Kondo noted that it never used to be like that. In the past, the first rains would come in October, which is when ZJC students were writing their examinations. The ZJC students helped their parents with planting because the first rains were experienced in October.*' Kanadai fomu2 yainyorwa nhasi uno vana ava hapana chavanenge vachiita nekuti mvura yavakunonoka kunaya mazuva ano'* (Even if the ZJC examinations were to be re-

introduced the candidates will be idle after the examinations because the rains are coming very late.) If the season delays, cattle become very thin their health is already disturbed due to lack of grass and water. Low rainfall means poor harvest and there is not enough grain to spare for livestock. If there is a bumper harvest part of the harvest is reserved for livestock and their health is improved.

If the rain season is long, quality grass will be enjoyed by livestock for long. Green grass is nutritious and because of climate change cattle spent long time grazing dry grass which is not very nutritious and this obviously impacts on their growth; weight and general wellbeing. Cattle are getting very thin and this is the situation in many parts of Guruve.

The farmer is now forced to limit the number of livestock that he /she keep because of the changes in rainfall patterns that have contributed to dry spells. Farmers are now forced to look for alternative water sources. Milking cows die if rains delay because they need more food to produce enough milk for their calves the calves also die due to lack of enough milk. Livestock relies on crop yields especially poultry and piggery. If there is crop failure, projects of livestock such as poultry and piggery are disturbed and in some cases such projects stop and livestock is sold for the survival of the farmer.

Crop failure also affects livestock production in the sense that the value of livestock drops. The farmer resorts to barter trade to survive. A bull may cost half a tonne of maize and a bird of chicken may be exchanged for a tin of maize. '*Unogona kuwana huku ichichinjiswa negaroni rechibage*.' For example in 2008, the value of livestock was greatly reduced because of the draught. There is also a shortage of stock feeds and they are very expensive because what is normally considered as food for livestock is taken by people. '*Muna 2008 makireshi aigaiwa vanhu vachiita sadza*.'(In 2008 some of the stock feeds were converted into food for people).

The livestock inspector also acknowledged that some herbs with therapeutic value are used by farmers for ethno veterinary medicine. Aloe vera plant, snail shell is used to treat eyes; soot and pumpkin leaves are used to cure various diseases in livestock. The snail's shell is used to treat eyes in cattle, goats, pigs and donkeys. Pumpkin leaves are used for stomach related problems in pigs. The aloe vera plant is used for various diseases in most livestock species. Some of the traditional medicines like aloe vera are very effective. The inspector also noted that livestock diseases are increasing; with

new diseases like heart water and *dematophilisis* claiming a number of livestock in the district. The advantage of indigenous knowledge of animal health care lies in their ready availability and affordability of such medicines.

The government is promoting small livestock like goats and chicken. Small stocks have better chances of survival in the event of droughts. He referred to previous experiences like in 1992 when there was a severe drought which killed a lot of cattle and donkeys; only about 5% of the cattle survived the drought in areas such as Masvingo, most large cattle died leaving calves. Goats and chicken survived the drought because of their low feed requirement. The Department of Veterinary Services is promoting small stock production because of the increased frequency in droughts due to climate change.

The department also encourages of fodder preservation. *' Tavakukurudzira kuti kana varimi vakohwa vaunganidze mashanga vomachengeta. '* (we are now encouraging farmers to preserve maize stover after harvesting.)This ensures that cattle will have supplementary food in the dryer season. Maize stover is the commonest type of natural fodder the farmers can use. Forage is sold in shops but very few communal farmers affords it hence it is necessary to gather maize stover which is readily available.

The Veterinary Service Department does not encourage the use of traditional veterinary medicines because of lack of clear standardized dosage instructions. The withdrawal period of such drugs is also not clear. Drugs take various periods to leave the blood stream of an animal and there are times when it is not allowed to eat the meat of that animal. Since there is no clear period in traditional medicines, the lives of people may be put on risk. Side effects of such medicines are not known, the overdose or under dose are not known also. '*Kungoitira murima'* (they just dose unknowingly.)
In case of overdose there is no remedy to reverse the side effects and so the veterinary department does not encourage such medicines. Overdose may kill the animal and under dose does not kill the bacteria or infection, this may result in resistance and a more powerful drug will be required. Therefore the Veterinary service department recommends prescribed medicines that are approved. Farmers can get the medicines from various hardware shops. Farmers are encouraged to visit the veterinary office if they see symptoms of diseases and the officers will advise them accordingly. Farmers

are also encouraged to dip their cattle; this will reduce the spread of tick-borne diseases. The department has introduced fines to make the farmers comply with the dipping calendar.

CASE G: **Servious Mano** (not his real name)

Mr Mano is the district livestock specialist for Guruve in The Department of Livestock Production and Development. He has worked in Guruve for the past eleven years which makes him more familiar with climate change in the district. His job involves training farmers on various ways of livestock care and monitoring livestock projects like dairy, piggery and chicken projects. He also visit communal farmers to inspect on the various methods of livestock care and gives them technical support. A motor cycle helps him to cover the large district which stretches to Dande valley.
Small stock production is encouraged because they require less food compared to large stock. He observed that climate change has reduced the feeds for animals due to variations in rainfall patterns and temperature levels. The grass for livestock is becoming insufficient due to low rainfall. Droughts are being experienced more often than in the past. In case of a drought, small stocks have a higher possibility of survival.

Goats graze and browse hence they can survive even when the pasture is depleted. They also require less water compared to cattle. One can water goats from a borehole but it is laborious to do the same for cattle. Disease tolerance of small stock is higher and hence survival under unfavorable conditions higher. Goats multiply quickly; a goat may have 3-4 kids at once. The gestation period for goats is also shorter, 5 months versus 9 months or so for cattle. Goats browse some trees which are not browsed by cattle. This naturally improves their immunity, *'kana nyoka ikaruma mbudzi inogona kurarama asi nyoka ikaruma mombe inogona kufa'* (if a snake bites a goat it can survive but if that same snake bites cattle it may die.)
Small stock also provides a quick source of meat for example goats can be slaughtered at three months while it may take a long period for a cow to be slaughtered. It is easy for people to sell a goat to meet the immediate needs of the household like food, while it is more of a taboo to dispose large stock because of their cultural significance. Management of small stock is not demanding than that of large

stock. They do not require dipping, even if goats not given medication, their health will be good. '*Ukatodzidhoza unogona kutodziuraya*.'(Dosing may kill the goats). The Department of Livestock Production and Development acknowledges the value of traditional veterinary medicines. Due to the drug policies of the country, the Department can not recommend unapproved drugs for the farmers hence it cannot openly recommend ethno veterinary medicines. He also contends that there have been little research on indigenous knowledge of animal health care and as a result this area is neglected.

When goats browse they take a lot of herbs and even if the veld is depleted goats can survive and even in dry conditions they can also survive for example in natural regions four and five goats do well there but there are drought conditions in these areas like Dande and Matabeleland. Mr Mano acknowledged that some of the traditional medicines for animal health care really work. The farmers argue that they have always used them though some may prove fatal. LPD encourages the farmers to use modern veterinary medicines and natural medicines. From his experiences with the farmers, Mr Mano argues that the farmers want small stock projects because they are experiencing climate change. However there are is some resistance because of the value that is traditionally attached to cattle and other large stock like donkeys. Traditionally cattle have the highest value due to its role in traditional Shona culture. The Shona people believe that every home should have a bull for the ancestors which protect the home. There is also a belief that to be man enough, one must own cattle. Men think that small stock is for women, '*mbudzi nehuku ndedzaamai mombe ndedza baba'* (goats and chicken belong to the wife and cattle belong to the husband) In terms of decision making the women make decision for small stock whilst man make decision for large stock. It also follows that women are responsible for the care of chicken and goats including their doctoring while men are responsible for large stock like cattle and donkeys. Naturally men tend to know more about methods of indigenous veterinary care for cattle and donkeys as women are more familiar with chicken and goats and they have considerable knowledge about their health.

CASE G: Owen Popera (not his real name)

Lower Guruve Development Association is both an individual and group membership organization representing the interests of the poor in Guruve district. Its activities

were mainly in the Zambezi valley but now it has spread to other parts of Guruve. It was registered in 1991 as a private voluntary organization. Mr. Popera is the Project officer for the chicken project that Lower Guruve Development Association is implementing in partnership with FAO and the Department of Livestock Production and Development which provides technical support. Lower Guruve Development Association has implemented other projects like the livestock project in Mbire aimed at improving the health and feeding systems of livestock. The cattle would be sold at higher prices and they provide draught power.

Lower Guruve Development Association is working with FAO in implementing a project for layers. FAO is funding the project and LGDA is involved as implementing partners because LGDA have other projects in the district. Each ward is given 50 layers at the point of laying, concentrate feeds for the lifespan of the chicken and medical kits. The advantage of chicken production over other livestock species is that it is the lowest cost stock which even the poor can afford. There are very few households which do not keep chicken. Mr Popera argues that chicken production is not new to anyone in the district as almost every household is keeping chicken or have done so in the past. Though he admits that the layers project will be different to the free range chicken production that most families practice, the advantage is that the people already have some knowledge on chicken production. This project is a little bit different as the chicken are caged and fed in the fowl runs that have been constructed to LGDA and FAO specifications. The farmers will be capacitated with knowledge to keep chicken including feeding and doctoring them.

The project was well received by the community because of the benefits it offers to them. Their income base will be expanded as they begin to sell the eggs. The project is a way of empowering the farmers not only in terms of financial gains but the knowledge of poultry production is a very useful asset. However, there may be some resistance because the people have their own ways of curing diseases in chicken like using *aloe vera* and *china'i* (soot), using tetracycline or ESB3 may be strange to them hence Mr Popera feared that the medical kits might not be used. The farmers supported the project because most of their income generating sources has been disturbed by poor rainfall. Small scale irrigation projects are disturbed by the drying of rivers leaving the farmers without an income base. Some farmers used to earn some

money through selling milk; this was also disturbed by the depletion of pastures and lack of enough water which reduced the production of milk.

He also noted the problem of knowledge imposition as the project does not take into account local knowledge, experiences or culture. It is a one size fits all for example the farmers are asked to build standardized fowl runs with the same size and dimension in the whole district. This has caused some problems with other farmers. There is also a challenge of coordination of the major stakeholders, as representatives from FAO and LPD fail to attend crucial meetings with the farmers. Some of the questions that the farmers ask are not answered because the technical staff from the department of livestock production and development will not be available.

DISCUSSION OF FINDINGS

This section explains the research findings on climate change, adaptation, livestock production and ethno veterinary practices using the structuration theory to fully explore the relationship between the farmers and the government departments and NGOs in adapting livestock production systems to climate change.

Climate change, adaptation and ethno veterinary practices

The farmers interviewed in this study demonstrated an understanding of climate change. The effects to livestock production were also understood. Though the farmers were not taught about climate change the changing trends in rainfall patterns gave them enough evidence that the climate is changing. Most farmers acknowledged some changing trends in weather and rainfall patterns. According to Giddens (1984) structures constrains individuals' behaviour and they are beyond their control. Therefore one may argue that climate change represents structure as it constrains the farmers, at the same time these farmers cannot control the environmental changes. Jesca Vambe commented on extreme weather conditions like prolonged winters. According to Heltberg et al (2008) the earth's climate is changing and extreme weather events like hurricanes, storms, heat waves, flooding and droughts are likely to become more common. Though the farmers do not know about green house gases and technical terms like global warming, CFC, they certainly know about aspects of climate change which infringes on them most that is the change in rainfall patterns. *'Mamiriro ekunze ari kushanduka'* (the weather patterns are changing.) These were the words used by farmers for climate change. Local knowledge, according to Ryle (1949:60) appears to be about 'knowing how' than 'knowing that'.

The relationship between greenhouse gases and climate change is not very useful to the farmers, what they know is that the weather and rainfall patterns are changing. It takes some education for one to know the terms like climate change but every farmer understood the impact it had on livestock. Grandin and Young (1994) assert that indigenous knowledge is not always explicit, farmers may not always be able to articulate what they know, and they just practice it (tacit knowledge). Therefore, the

farmers may not be able to explain the causes of climate change but they can are observing some changes and they are ready to mitigate the effects of these changes on livestock production. Various answers ranging from two to ten years were given when the researcher asked the farmers how long they had observed the changes in rainfall and weather patterns. This demonstrated that some farmers were quick to observe changes in weather and rainfall while it took some time for others to realize that the climate is changing. The various responses that were given on the length of time the farmers had observed changes in climate also shows that people do not interpret events in the same way, but if the trends occur for some time people will have consensus in interpreting the events in a uniform way.

The farmers did not know about the causes of climate change. Stokes (2009) noted that greenhouse gases such as methane and nitrate are both primarily increased through agricultural practices such as land clearing, soil degradation, fires and ruminants. Lack of knowledge about the causes of climate change increases the vulnerability of the farmers to climate change as they may continue with some agricultural practices that cause climate change. Cain Mbira, Grace Mhepo and Jessica Vambe maintained that the rainfall patterns are changing and the timing of the first rains have changed. The rainfall season is becoming shorter and this impact on livestock production as grass and water for livestock is reduced. They also observed that these changes also increase diseases in livestock a point noted by Thorton et al (2008). 'Changes in rainfall patterns may influence the expansion of vectors during the rainy season leading to an outbreak of diseases.' According to FAO (2008) 'Among the direct effects of climate change for example there will be higher temperatures and changes in rainfall patterns, translating in an increased spread of existing diseases and micro parasites in animals as well as emergence and spread of new diseases.'

Some respondents attributed the reduction of their herds to climate change. Tirivanhu Utete used to keep many cattle but his herd was reduced to four due to various diseases. Amos Moyo who is a dip tank attendant said the number of cattle in the area is decreasing. Seo and Mendelsohn (2006) also made a similar observation 'in general all spells will be burnt by warming and so there will be fewer animals per farm. Beef

are especially vulnerable it is predicted that climate change will cause beef cattle to decrease, sheep and goats to increase.'

Among the respondents only one farmer, Amos Moyo does not use ethno veterinary medicine for his cattle. Being a dip tank attendant one may conclude that he is an employee of the veterinary department hence his bias towards veterinary medicines. This confirms Long's assertion that even when individuals are confronted with similar structural circumstances, with conditions that appear to be relatively homogenous Long (1992:21) they still had differential responses. The utilisation of ethno veterinary medicines therefore is not the same among the farmers. There are some like Mr Moyo who because of their background distances themselves from ethno veterinary practice. It would be wrong to assume that all the small holder farmers are the same because they are affected by similar conditions. Accessibility of veterinary medicine becomes an important issue. Veterinary medicines are not accessible to most farmers because of their cost. Moyo as a dip tank attendant could have access to veterinary medicines hence he uses it for his cattle only and nothing else. He admitted that plants like *aloe vera* are effective in curing most diseases especially in small stock like chicken. However he was quick to point out that traditional medicine does not have clear dosage instructions, a point that was also emphasized by the veterinary inspector. This shows that various actors have their own perceptions about ethno veterinary practices which are influenced by their background. Farmers like Mr Mbira advocated for a return to traditional ways of animal health care arguing that traditional methods had been practiced effectively by their fathers. The same herbs could be used to treat many diseases. Jessica Vambe noted that traditional medicine had an advantage in that herbs like aloe could be used on many livestock species like chicken, cattle, pigs and goats. Traditional medicine is often dismissed on the grounds of testability however the researcher noted that these methods were tested over many years from generation to generation. This is similar to the clinical tests that are done on modern veterinary medicine. Mr Moyo dismissed traditional medicine as unapproved, yet these medicines are approved traditionally.

Mr Tirivanhu Utete an ethno veterinary herbalist demonstrated that there are dosage instructions that are followed when administering traditional medicine. He explained how they measure the mixture in a 300ml bottle when treating lump skin. This

contrasts with the popular assumption held by the veterinary department that there are no clear dosage instructions followed in traditional medicine. Mr Utete's case clearly demonstrates that there is knowledge of overdose and under dose and their effect on livestock hence the medicine is measured. This suggests that the local people have knowledge on many aspects of animal health including the correct dosage. According to Mararike (1999),'for people to survive one of the strategies required is the application of relevant and appropriate knowledge. Such knowledge should give people confidence to tackle life threatening problems and enable them to meet internal and external challenges.' The knowledge of ethno veterinary medicine is used by farmers in ward 22, Guruve to cope with livestock diseases under climate change. As noted by Mr Mbira, indigenous knowledge had been negated, but it is now very useful because of the threat that climate change is posing to livestock production. Some farmers are using ethno veterinary medicine exclusively because of lack of money. The prices of some of the veterinary medicines are too high and they have to walk very long distances to the veterinary office. This has pushed most farmers to utilize what is both cheap and locally available. Guruve has a variety of trees and herbs that can be used to treat a number of livestock diseases plants like aloe are spread throughout the ward. The farmers are planting some of the trees at their homesteads to make them more readily available and to protect these plants and trees from veld fires. As noted by Mararike (1999) knowledge represents a form of power. Modern veterinary medicines are supported by government institutions like the department of Veterinary services. They impose to the farmers what they perceive as the right ways of caring for animals. On the other side, there are no institutions that openly support ethno veterinary medicine. The drug policy of this country does not allow the prescription of unapproved drugs. This in a way suppresses indigenous knowledge and it will not grow. There is very little research on indigenous knowledge despite the several advantages that IKS has over modern scientific knowledge. Some of the modern veterinary medicines are manufactured by transnational companies like Pfizer which are profit driven. It is clear that ethno veterinary medicines are good for the farmers because they are cheap. However farmers are discouraged from using ethno veterinary medicines which they can afford and are locally available. This amounts to what Chang (2002) termed kicking away the ladder. Thus by discouraging ethno veterinary medicines the veterinary service department is deliberately hindering small holder livestock production. Mr Cain Mbira noted that indigenous knowledge is now

being shunned as primitive and backward. Poverty and climate change is pushing the farmers to reintroduce ethno veterinary practices which had been neglected. For Giddens (1986), social structures are not only constraining the behaviour of agents but they are also enablers. The maintaining of this balanced view is the duality of structure. In line with this view, poverty and climate change are structures which are over and above the farmers. However, climate change and poverty also enabled the farmers to reconsider ethno veterinary practices which most farmers admitted were facing extinction due to decades of neglect. Most farmers are constrained by lack of money to buy modern veterinary medicines as evidenced by the over use of the phrase 'unenge *usina mari'* (you won't be having any money) in the majority of the cases. If these farmers had money, they could be using modern veterinary medicines exclusively. This shows that some farmers are still viewing modern veterinary medicines as superior. The rural elite like Amos Moyo who earn some money from his services as a dip attendant do not use ethno veterinary medicines. Though all the farmers interviewed had some knowledge on ethno veterinary medicine, the utilization of that knowledge is determined by one's financial status. Those who had some financial base used modern veterinary medicine because they afford the high costs of such medicines.

The advent of modern veterinary medicines has in a way contributed to the decay of the use of ethno veterinary medicine ,and traditional medicines have been substituted by pharmacy, remedies, however, the costs, the inaccessibility and other factors associated with veterinarian system has contributed to the persistence of ethno veterinary medicine. Guruve district is endowed with a variety of trees and herbs that are used for ethno veterinary medicine. According to Matekaire and Bwakura (2004), ethno veterinary base differs from region to region and also among and within communities. It implies that each society has its own ethno veterinary base which is determined by the diversity of the trees that are found in the area. Ethno veterinary medicines are based on local resources; this gives them a comparative advantage over pharmaceutical drugs whose availability is not always guaranteed. Tirivanhu Utete tends a large herbal garden; this is local knowledge of preserving the stocks of traditional medicines from veld fires that destroy many plants in the dry season. Herbal gardens also make these medicines more readily available as they are often situated at the backyard.

Other methods of livestock care like fodder preservation are used by farmers in Guruve to cope with climate change. According to Ginat and Khazanov (1998) over the last century rangelands have been stressed by overuse, the infringement of cultivation and unfavourable policies. Coping mechanisms becomes very necessary for sustainable livestock production under depleted pastures. Most farmers preserve maize stover after harvesting as supplementary feed for the dry season when grass will be dry and insufficient. Amos Moyo believes that giving his cattle maize stover improves their health. Nathan Mhepo agrees with Moyo that giving cattle maize stover reduces the labour of looking for cattle, if cattle are conditioned to receive stover at a certain time , which is mostly in the evening., they always return home in expectation of more food. A bond is created between the farmer and his/her cattle by giving them maize stover. There are a lot of cases of stock theft during the care free season, but cattle which are given maize stover do not go very far away from home, this reduces the risk of stock theft. Farmers also cut the long grass during the rainy season and preserve it for fodder during the dry season. Three resection kraals are very common in Guruve, during the rainy season, the cattle kraal becomes very damp and there is need for the farmer to move the cattle to the other sections which will be relatively drier. The risk of diseases is reduced when the kraal is drier.

Chicken and goats and sheep do not require a lot of supplementary food. Jessica Vambe noted that goats can eat dry leaves hence they can survive under drought conditions. Chicken feeds from locusts and other plants which increase their chances of surviving even the most severe drought. The farmers ensure that the kraal for goats is properly roofed. Goats are easily affected by rain and they die if they are continuously exposed to damp conditions. Proper care of livestock therefore is more important to livestock production than knowledge of doctoring. Creating a healthy environment for livestock reduces their chances of getting diseases. The importance of livestock care in ensuring good health is also emphasized by Forse (1998) who noted that sheep and goats in some villages in West Java Indonesia are now free from intestinal worms because of how the animals are kept. They are kept in bamboo sheds and their droppings fall through the gaps in the slatted floor of the shed and the life cycle of the worms is broken. There are some indigenous ways of controlling flees that the farmers use, they burn grass inside the fowl run. This is a way of killing the

fleas; this method is both cheap and safer than spraying chemicals which may kill the chicken.

The ways of herding livestock are transforming in order to adapt to climate change. In the past, the farmers in ward 22 used the traditional method *majana* (taking turns to herd livestock). Today this method of herding livestock in large groups is no longer applicable. It had several advantages as it gave farmers more time to do other things, one would herd cattle for one week in a month. Despite the advantage that this method had, it was abandoned to adapt to the changes in rainfall patterns. The grass is becoming insufficient for livestock; the increase in population also means a reduction in grazing land to create more land for cultivation. Herding livestock individually makes it possible to graze on limited areas between farm land, and on strips. Smaller groups of livestock are easy to drive to the mountains where they browse a variety of trees as well as graze. Watering of few livestock becomes easier due to the limited water sources as many rivers are drying up. This shows that the livestock care systems are dynamic; they transform to suit the prevailing conditions hence they are adapting to climate change.

The role played by the government and NGOs in improving livestock production under climate change

The department of veterinary services is encouraging farmers to dip their cattle regularly as a way of fighting the spread of tick borne diseases. Servious Mano the veterinary inspector for Guruve district admitted that there has been an increase in livestock diseases. The department has introduced some fines as a punitive measure for farmers who neglect dipping cattle. Giddens (1984) noted that all human action is performed within the context of pre-existing social structure which is governed by a set of norms and laws. The department of veterinary services therefore is one of the social structures that govern livestock production it operates with the aid of punitive measures against noncompliance like fines. The department also helps the farmer with information of any outbreak of diseases. Information dissemination is very important as it empowers the farmers to take preventive measures against the prevailing diseases. The department also stocks various drugs and medicines which are sold to farmers whenever they need them. The inspectors from the department are available

to farmer's consultations. However, the farmers are not satisfied with the service they receive from the veterinary department. This confirms Khazanov (1994)'s point that communities which utilises range resources are predominantly poor and have been persistently overlooked by planners and policy makers. Cain Mbira blamed the department for the loss of livestock in the area. The inspectors from the department do not attend to reports by farmers in time. This results in the death of livestock and the subsequent loss of faith in the department.

Farmers also raised concern that the department is understaffed to meet the needs of the community. The inspectors operate from their district office in Guruve town. The farmers have to walk long distances to reach the district office and as many farmers concurred, the availability of the staff is not guaranteed. Farmers suggest that decentralizing to ward based staff could ensure efficiency and effectiveness in the work of the veterinary department in the community. Though the department keeps stock of medicines the farmers do not benefit much from these medicines as they are very expensive and most farmers hardly afford them. The farmers advocated that the department should give these medicines free to the poor farmers as a way of improving livestock production in the district. According to FAO (2002) the lack of drugs to treat diseases and infections causes losses of 30 to 35 % in the breeding sector of many developing countries where poor animal health remains the major constraint to breeding.

The department of veterinary services also encourages fodder preservation. Mr Mano noted that we are experiencing climate change and so the rainfall patterns have been altered. This has resulted in a very short rain season and a very long dry season. Farmers are therefore encouraged to store fodder after harvesting. The fodder will be given to cattle during the dry season when the grass is not enough for the livestock. The department also encourages good livestock care practices like well ventilated pens which allow free air circulation. Proper care of livestock is highly encouraged by the department as a preventive measure to diseases.

Though the inspector knew of some of the ethno veterinary medicines that are used by farmers, the department does not encourage the use of such medicines. This confirms Shore (1997)'s assertion that policy serves as a mechanism for disguising decision

makers. Not only does policy legitimately outlines the course of action to be taken, it fixes that course within the wider and universal set of goals and principles. In view of Shore's assertion, the veterinary department's failure to legitimise ethno veterinary medicine is based on policy. These policies robs the local people of their decision making power and decisions on the best medicines to use are made by outsiders. Hobard (1993:2) noted that 'the knowledge of the people being developed is ignored or treated as mere obstacles to rational progress.' Though the veterinary department is operates in the community, they do not recognise the knowledge of the local people with whom they work. Knowledge therefore reflects power dynamics as noted by Foucault (1971), Ritzer (1992). Mano the veterinary inspector noted that there is a lot of mystery and superstition around some traditional medicines of animal health care. Some are just mere beliefs, as argued by Kumar (2006), 'Some of these have enough potential to cure diseases while others are based on superstitions and mythological religious faiths or there is hardly any basis to be considered as effective treatments.' The department of veterinary services have done very little to improve livestock production in Guruve. Farmers argued that they are losing cattle to diseases such as lump skin because their cattle are not dipping regularly. Cain Mbira noted that sometimes they go for more than a month without dipping as the departments are short of chemicals. The veterinary medicines are very expensive for most farmers who opt for ethno veterinary medicines. Giddens (1984) asserts that agents' knowledge of their society informs their action. Habermas (1968) also asserted that knowledge is a historical product imbedded in experience and action. The farmers are not passive recipients of authority the possession of agency liberates them to pursue ethno veterinary practices which are both cheap and locally available. The knowledge on ethno veterinary practises is part of the society's knowledge base which is passed orally from one generation to the other. Flavier et al. (1995) defined indigenous knowledge as the information base of a society which facilitates communication and decision making. According to Kumar (2006) ethno veterinary medicines are often cheap, safe, time tested and based on local resources and strengths. They can provide useful alternatives to conventional animal health care. By discouraging farmers to use ethno veterinary medicines and continuing to charge high prices on veterinary medicines the department is demonstrating lack of commitment to improve livestock production under climate change.

The department of livestock production and development is another government department that is working with the community in Guruve in the area of livestock production. The district livestock specialist revealed that very little research had been done on climate change hence there is need to do more research to improve the adaptive capacity of communities to climate change. The department is promoting the production of small stock like goats, pigs, and chicken as these have high chances of surviving under climate change conditions like increased droughts compared to large stock like cattle and donkeys. The feed and water requirements for small stock are very low as compared with large stock like cattle. The shift to small stock is also argued on the grounds that grazing lands are so limited under climate change. Large stock like cattle is more affected by the depletion of pastures than small stock such as goats. In support of this view, Adams et al. (1999) noted that beef cattle are especially vulnerable, it is predicted that climate change will cause beef to decrease and sheep and goats to increase. The department of livestock production and development is promoting small stock because climate change has resulted in the depletion of pastures; the fodder has been greatly reduced under climate change so moving from large stock to small stock will reduce the loss of livestock due to diseases. Large stock also requires more medication than small stock. There are more diseases in cattle than in goats. In view of this LPD is encouraging small stock which has a relatively higher disease tolerance compared to small stock.

The time taken before one may get returns from large stock is higher than in small stock. Chicken may be slaughtered at six weeks and goats at three months but cattle take more than a year before they can be slaughtered. Therefore small stock provides a ready source of meat compared to large stock.

Unlike the department of veterinary services that does not encourage ethno veterinary medicines, LPD encourages the use of ethno veterinary medicines because of their availability and affordability. Though little research has been done on ethno veterinary medicines the officer from the department of livestock production acknowledges the use of ethno veterinary medicines by farmers. However the transition from large stock production to small stock production is not smooth because of the value and significance of large stock. Mr Mano noted that there is some resistance as men feels that they would be stripped off their manhood. Traditionally

large stock is for men and a men's wealth was determined by the number of cattle that he had. On the other hand small stock is regarded as women's stock. Men professed very little knowledge on doctoring goats and chicken. Small stock can be disposed easily than large stock; in the event of a drought farmers may sell small stock like chicken and goats to meet the family food requirements. On the other hand it is difficult to make a decision to dispose cattle due to its cultural significance. The pastures are limited because of the increase in human population as more land is cleared for farming and building houses. Small stock production under these conditions becomes a viable option as they can be produced under backyard farming for example 200 birds of chicken can be produced on a few square meters but it is not possible to do the same for cattle. The reproduction cycle for small stock is shorter than that of large stock. Chicken for example takes about twenty one days to hatch, small stock may have more offspring than large stock, and a goat may have two to three kids at a time. Pigs may have multiple pregnancies and this means they multiply quickly than cattle which have one offspring at a time and its gestation period is about nine months. LPD also encourages small stock because there is low input and high output. However, the farmers feel that the department of livestock production and development like its sister department of veterinary services is not doing enough to improve their adaptive capacity to climate change. Thirty three point three percent of the respondents who were given questionnaires felt that the government is doing nothing to lessen the impacts of climate change on livestock. This implies that the efforts by the department of livestock production and development to alleviate the impacts of climate change are either insignificant or theoretical with little action. Thirteen percent of the female respondents were not sure of what the government is doing to lessen the impacts of climate change on livestock. Mr Mano the district livestock specialist for Guruve admitted that as a department they have done very little on climate change. There is no official position on climate changes as of now because it is still a subject of great debate internationally; very little research has been done on climate.

LGDA is implementing a chicken project in partnership with FAO and the department of livestock production and development which provides technical support to farmers. The communities has no decision making power in such projects this confirms Ukpong (1990:73)'s assertion that the upper class may stereotype the poor as a

passive, ignorant group whose improvement awaits external engineering and deliverance. FAO is implementing the projects in most parts of the country. This is meant to improve the capacity of the rural farmers. LGDA and FAO are promoting chicken production because of the quick turn over as compared to other large stock. The layers are supposed to boost the income of the beneficiaries who sell the eggs to cope with other cash requirements. The household cash flow is set to improve however; the project has very few beneficiaries. There are fifty beneficiaries per ward only. Ward twenty two for example has about nineteen villages with an average of thirty households. The project does not make much difference to the community as there are few beneficiaries. Therefore, it is difficult for donor given projects to make meaningful contribution to the society because of lack of proper funding. The projects officer of LGDA admitted that they do not have proper control over the project but FAO has. He could not justify why they chose chicken production among other small stock species. He claimed that FAO knows better, LGDA is just an implementing partner with very little control over the project. Foreign funding is also a problem of top down, thus the farmers have little control over the project they feel subordinated because of too much supervision. The project was not brought by consensus with the farmers of what they felt as the best project but LGDA and FAO tabled to the farmers what they had already decided. The farmers were desperate and had to agree to the project but in actual fact they were not given choices. The project does not take into account the local knowledge and practices. The farmers are provided with medical and stock feeds for the lifespan of the chicken. LGDA and FAO ignored the indigenous knowledge system of the people of Guruve; these farmers had their own ways of doctoring livestock like using soot and the aloe plant. Most farmers are poor they do not afford veterinary medicines. Promoting chicken production should be accompanied by promotion of ethno veterinary medicines for it to be sustainable. After the withdrawal of the donor farmers will struggle to buy expensive medical kits if they are to continue with the chicken project. NGOs should take into consideration the local knowledge and practices in order to make meaningful contribution to the society. Most of the farmers preferred natural methods of animal health care because of their cost effectiveness and their availability. Moreki (2003) noted that the use of traditional remedies in poultry predominated in the villages especially in remote areas where drugs and vaccines are not accessible. However, this study demonstrates that even when these modern medicines are in stock, farmers opted for ethno veterinary

medicines which they get at no monetary cost. Climate change adaptation calls for a permanent solution, one which is in line with the culture and practices of the people. Harnessing natural ways of caring for chicken could help the LGDA or FAO project to be more appealing to the farmers of Guruve. FAO will not continue to supply farmers with medical kits and these farmers are poor to afford the medical kits what they have is aloe and soot which they fetch locally at no monetary cost. Climate change is a permanent process so LGDA and FAO are not doing enough to curb the effects of climate change on livestock in Guruve. All the farmers who responded to the questionnaire said the NGOs are doing nothing to alleviate the impact of climate change on livestock in their area.

Distribution of indigenous knowledge on livestock production and knowledge stocks available to women farmers

Indigenous knowledge of livestock production is not evenly distributed. As noted by Grandin and Young (1994), indigenous knowledge is not uniformly distributed, it may be held by all in society or by specialists, and different areas of indigenous knowledge can be held by men and women. Though it is local knowledge some people do not know much about natural medicine of animal health care. Elderly men and women had more knowledge of indigenous livestock health care than young men and women. The reason for this trend is the negation of indigenous knowledge as backward and hence some aspects of natural veterinary care are still found in the elders who recall how they used to treat diseases. Habermas (1968) noted that knowledge is a historical product embedded in experience and action. Modernization has contributed to the negation and sidelining of indigenous knowledge. Mr Mbira who is sixty four years old had better knowledge of the trees and herbs used to cure diseases in cattle, goats and chicken. Mr Utete who is sixty also had deeper knowledge on various methods of curing diseases. The two narrated on how they had used indigenous knowledge to treat diseases from their boyhood. At some point this knowledge was lost due to overdependence on modern veterinary systems. Now the modern veterinary medicines are very expensive this is pushing farmers to resort to their old ways. These methods are an asset in the hands of a few elderly men and women who control the distribution of indigenous knowledge. There are other

common plants like the aloe vera which most people use for many diseases in chicken, goats, pigs, donkeys, sheep and cattle.

Some diseases in cattle require knowledge of some trees like *melia azearach*, wild custard apple, pine apple and monkey bread or Carmel foot *bautinia tiinia thonnigii* which are used for a number of diseases such as red water and lump skin. According to LPP (2006) indigenous knowledge is not uniformly distributed. This uneven distribution of indigenous knowledge was witnessed in Guruve where herbalists like Mr Utete had specialist knowledge but the majority of the farmers only had general knowledge. Warren and Mechan (1980) also noted that indigenous knowledge is very much age and gender based. Opinions vary according to locality, age, sex, specialisation, education, attitudes and economic class. Ones level of formal education was also an important determinant of the amount of knowledge that one had on ethno veterinary medicine, Mr Moyo who is educated and works as a dip attendant did not use indigenous medicines. He questioned the testability of such medicine instead he uses modern veterinary medicine hence farmers like Mr Mbira blame modernity for shunning traditional veterinary practices. Religion is another limiting factor for the full utilization of indigenous knowledge in livestock production. Christianity associates digging herbs with witchcraft hence some Christians who responded to the questionnaire lacked knowledge on some of the herbs that are used in traditional veterinary. There is a strong link between ethno veterinary medicine and traditional healing since both practices depend on natural herbs and trees for medicine. LPP (2006) noted that indigenous knowledge of veterinary care is not isolated from beliefs. This is one of the reasons why knowledge of traditional veterinary is controlled by a few specialists who jealously guard against the spread of this knowledge. Mr Utete explains how witchcraft is used in the control of traditional veterinary knowledge. Some of the people who are familiar with traditional medicines keep this knowledge to themselves as it is a source of earning money through the consultations that are made. The fact that some herbalists never disclose the herbs shows that knowledge is a contested asset which is jealously guarded. Mr Utete noted that those with witchcraft keep on earning money from consultations, even if one accompanies them to the bush to dig the medicine they use witchcraft to make one forget about the medicine they would have told him or her. This is a serious way of controlling the distribution of ethno veterinary medicine, it is controlled by

individuals hence there is little continuity as a person may die without disclosing the herbs to friends and relatives. This compares with the intellectual property rights in modern medicine. African medicine is also controlled and regulated in natural ways.
Men had more knowledge on a variety of herbs that can be used to treat diseases in livestock than women. This is attributed to the gender ideologies that confines women in the private sphere of the home and liberates men to the public sphere. Public gatherings like beer parties are important platforms for sharing ideas and wisdom, when people are drunk they share even the most treasured secrets hence men benefit from such discussions than women because the majority of women do not drink beer thus they do not usually go to these beer parties. Cornell (1987), 'men benefit from the patriarchal dividend that is the advantage that men get from the subordination of women'. Mr Utete noted that men had more knowledge on many aspects of veterinary care because of their access to the public sphere. This is a disadvantage to women who do not enjoy public life due to some cultural expectations of a good wife or mother.

In Guruve there is a gendered division of livestock responsibility, generally large stock like cattle and donkeys are regarded as stock for men. Dyson Hudson and Dyson Hudson (1982) noted that women and men have the same knowledge on the general principles of animal husbandry. This study contrasts with Dyson Hudson and Dyson Hudson as it shows the role of livestock specialisation in the distribution of ethnoveterinary knowledge. Cattle are very important religiously and culturally among the Korekore and the Shona people in general. Traditional ceremonies like *kurova guva* (bringing back the spirit of the dead) involve the slaughter of cattle. A sacred bull is also kept for religious purposes, this bull is said to possess the spirit of ancestors which protect the family. The value of livestock is also confirmed by IFAD's Strategic Framework (2007-2010) which argued that livestock are key assets for the poor people providing multiple economic, social and risk management functions. Cattle also provide milk and draught power during the planting season. In farming communities like the research area cattle are more valuable. The value of cattle is also witnessed in marriage transactions where bride wealth is mostly calculated in cattle than cash. The possession of cattle is seen as a mark of manhood hence more knowledge on disease management in cattle than women because cattle is men's stock. Farmers like Mr Moyo, Mr Utete and Mr Mbira were familiar with most

diseases in cattle than women. This contrast with IFAD's (1994) analysis which suggested that women are in most societies are responsible for the daily care of animals, their reproduction and doctoring as a result, women in general have more in-depth knowledge of traditional pharmaceutical practices than do men. Due to livestock specialisation in the study area it, IFAD's generalisations were found to be a bit misplaced. Men's knowledge about herbs used in curing cattle was deeper because herding of cattle is mostly regarded as men and boy's job, women herd cattle when men are busy or are not there. This gives men an advantage on the knowledge of a number of trees found in the bush. They know the areas were some of the trees for ethno veterinary medicine grow. It becomes easy for men to get the suitable herbs when the animal gets sick. Women struggle to locate the areas where the herbs and trees are found because most of them are not familiar with the bush. However, single women and widows are familiar with many aspects of cattle doctoring than their married counterparts who leave the care of cattle to men. Women whose husbands work in town also had knowledge on many aspects of indigenous veterinary care for large stock because they do not always have the men to look after cattle and they had to assume the responsibility. It could be concluded that although men have more knowledge on doctoring and caring for cattle, single women and widows are familiar with many aspects of cattle production and health care since they assume men's duties like herding cattle. These women are also familiar with the trees and herbs that are used for ethno veterinary medicines. Grace Mhepo who is a single mother all the duties that are usually considered as men's duties including repairing the cattle pen and preparing the traditional mixtures for sick cattle. On the other hand married women like Jessica Vambe concentrate on small stock leaving the care of cattle to her husband. Cattle production, reproduction and doctoring are a men's area.

Small stock is considered as stock for women therefore men generally had more knowledge on large stock and women knew more about small stock. Fuller (1994) argues that knowledge held by indigenous men and women may differ according to their customary livestock responsibilities. The livestock specialist from LPD noted that the major obstacle that they face as a department in the promotion of small stock production is the feminization of small stock production. Men resist small stock production because it is traditionally regarded as women's stock. Women had more knowledge on the various aspects of chicken and goats' production and disease

management. Mr Utete concurs with the livestock specialist that goats and chicken belongs to women. Simple methods like mixing soot with water and aloe juice are used by women to treat diarrhea in goats and chicken. Soot is readily available, it gathers on the wooden poles above the fire place in the kitchen. Every woman has access to this type of medicine. It may be argued that women use simple medicine that they extract from their surrounding like soot. This is in sharp contrast with the control of knowledge that is practiced by men who are not at liberty to disclose the trees and herbs to one another. Women also use aloe vera which is very common and grow in many places. Mwale et al. (2005) noted that small holder farmers use aloe vera and aloe spicata to treat coccidiosis, fowl typhoid and NCD. Women had knowledge on controlling the fleas that bite chicken by burning grass inside the fowl run. Mwale (2005) and Moreki (1997) reported the effectiveness of using natural methods to control parasites like smoking or burning inside the chicken shelters and placing leaves of thamnisma rholesia in the chicken shelter. This is considered as more effective than the modern methods of spraying chemicals which may kill the chickens. It may be concluded that women use locally available resources like grass, soot and aloe. These methods of disease control are more effective. They do not need some sophisticated mixtures that are made from herbs extracted from a secret bush. They utilize what is ordinary to produce ethno veterinary medicine. There are very few none diseases in goats Mrs Vambe concurred with the district livestock specialist that goats have a strong immune system which is boosted by their browsing tendencies. Goats eat a variety of trees some of these trees has special healing properties. It may be argued that free grazing of goats helps to boost their immune system as they eat some herbs which help them to resist diseases. Mrs Vambe noted that goats take a lot of herbs in the process of browsing and grazing. Women have unique knowledge of herding goats in areas covered with a variety of tree species in order to harness the natural healing that is found in some of the trees. This becomes another way of controlling diseases in goats that is unique to women.

Free range chicken production improves their immunity. Chicken feeds on some grains, insects and plants. Mrs Vambe argued that free range chicken has better immunity as compared to broiler chicken because they also pick some soil particles and this helps them to fight diseases. It is a way of self healing and they will be at a lower risk of contracting diseases. It may be concluded that women utilizes the natural

healing advantage that is found in methods of livestock care such as free range chicken production. It is the wisdom of women to utilize this natural advantage and it adds to their existing knowledge base on ethno veterinary medicine.

Women are more innovative, whilst men are still following the methods of disease control that they inherited from their fathers; women had modern ways of treating diseases in livestock. According to Gueye (1999) all ethno veterinary knowledge is in the custody of elders. However this analysis contrasts with Gueye because there are some farmers like Grace Mhepo who are more innovative, Grace Mhepo is thirty two, and she uses coke and soot mixture to treat diarrhoea in goats. One may argue that though the elders have more knowledge, young people are more innovative and for ethno veterinary medicine to remain relevant, innovation is required. This fusion of the traditional and modern is a way of adapting ethno veterinary medicine to new challenges and in a way it helps to keep ethno veterinary medicine in line with new innovations and changes in time. IFAD (1994) also noted the same trend among Yemeni women who use Pepsi cola as a substitute for oil to treat bloat in their sheep. Therefore, it may be concluded that women are very innovative and this helps to keep indigenous knowledge relevant to the changing times. Over dependants in the bush for ethno veterinary medicine is risky due to veld fires that consumes vegetation in the dry season other methods like mixing soot and coke becomes important as substitute for medicines that are extracted from the bush whose availability is not always guaranteed. Women are leading an adapting indigenous knowledge of ethno veterinary medicine to new conditions.

It may be argued that women and men specializes in different livestock species, therefore it is not possible to judge whether women or men has better knowledge about ethno veterinary medicines. Most men had more knowledge on cattle production and health care but lacked knowledge on some aspects of disease management in small stock like chicken and goats which is regarded as stock for women. Women demonstrated deeper knowledge on the production, reproduction and health care of chicken and goats. However, most women with the exception for widows and single women lacked knowledge about caring and doctoring cattle a responsibility that is often given to men.

Conclusion and Recommendations

Though indigenous knowledge systems form a strong base of knowledge for the society, they are still shunned and negated due to lack of institutional support. As a result, they are not properly utilized though evidence has proven that they are very effective. Ethnoveterinary medicines have several advantages over modern veterinary care. They are cheap and locally available compared to modern pharmaceutical drugs which are expensive and sometimes out of stock. With climate change, livestock production has been affected due to lack of enough water and forage. This affects the health of the animals. There has been a marked increase in the number and frequency disease outbreaks, a factor that is related to climate change. Vector borne diseases are on the increase due to changes in weather and rainfall patterns. Duff and Gaylean (2007) and Baylis and Githeko (2006) also noted that climate change will affect parasites and pathogens, diseases and vectors for domestic livestock. Prolonged winters causes diseases outbreaks and the late onset of rains results in disease. Excessive heat also affects the reproduction of animals. Small holder farmers faced with these challenges are forced to utilize ethno veterinary medicines despite calls by the veterinary services to stop using these medicines because they are unapproved.

The emphasis should be on developing indigenous knowledge systems and documenting this unique knowledge into the mainstream knowledge. In Zimbabwe, there is little documentation of this knowledge yet it is a viable alternative knowledge base. There is a high risk of extinction of indigenous knowledge if it is not documented. To avoid this loss, research should be done on the various methods of ethnoveterinary medicine and document the effective ones for use by the future generations. Cultural systems of knowledge control argued in this study present a problem for the harnessing of ethno veterinary knowledge. Culturally, ethnoveterinary herbalists are not at liberty to tell the herbs that they use are animals but they just give a prepared mixture. This control over knowledge is business to the ethnoveterinary herbalists who earn some money for their profession. There is need for change of attitude towards sharing of knowledge to allow research and documentation of ethnoveterinary knowledge.

The smallholder farmers are more vulnerable from climate shocks from the commercial farmers. It is predicted that small stock production like goats and chicken will be more viable as it is more tolerant to climate change. However, the cultural value that is attached on cattle among the Shona makes it difficult to see this transition. There is need to develop the adaptive capacity of poor farmers to cope with climate change. Drinking water for animals is becoming scarce, there is need to construct dams to make water available for animals. There is a symbiotic relationship between crop yield and livestock production. Livestock production depends on good crop yields, cattle feed from maize stover and chicken are fed from grains. Constructing dams will harness irrigation potential thereby positively affecting livestock production. There is need to localize climate change discourse so that that villagers may know what it is. There is very little literature on climate change in Zimbabwe; as a result, studies are dominated by examples from Western countries which are not relevant to the situation in Zimbabwe

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