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Breeding of goats: An indigenous approach to enhancing opportunities for smallholder farmers in Inyathi, Zimbabwe

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In Zimbabwe, at least 97% of the national goat herd is owned by smallholder indigenous farmers. The farmers rarely breed the goats for commercial purposes despite the fact that the country has potential to export goat products. Common breeds in Zimbabwe include the Matabele goats, Mashona goats, Boer goats and the Kalahari goats. With this diversity of the goats' population, there is need to move from subsistence to commercial production. The drought prone Inyati community is likely to benefit in terms of nutrition and economic security from the goat business. Goats are a rich source of meat (chevon), milk and skins products. While there is a market for goat meat locally, communities can exploit better opportunities in the Southern Africa region such as South Africa as well as beyond the continent, to the Middle East. Goat farming is a viable enterprise and farmers in Inyati district can prosper relying on their indigenous environment. The focus of the study is Inyati community, particularly the smallholder indigenous goat farmers in the area. A purposive sample of 19 goat keeping households was selected on the basis of their flock size from 8 villages under the Inyati community. Data were collected using semi-structured group interviews coupled with personal interviews involving three to four households per village as well as observations. Extension workers, as representatives on the ground were used in the collection of information from communities. Findings of the study revealed that there were management challenges in the rearing and marketing of goats by indigenous farmers. Among other challenges were factors such as high kid mortality and lack of good management practices among farmers, lack of information on the emerging commercial goat production system, economic viability, prospects and constraints of commercial goat farming in the country. Recommended for the study was information on marketing system for goats and their products, and the mechanisms stretch from village level to markets, both locally and abroad. The study came up with a model which promotes the sharing of information between commercial goat farmers in the country. The information shared includes quality of animal's breeds (germplasm) which are critical for the strengthening of indigenous farmer goat enterprise in Zimbabwe.

Key words: Goat flock, goat breed, goat breeding, indigenous, small holder farmers.

INTRODUCTION

Smallholder variegated livestock farming has become popular in most developing countries (Kusina, 2000). In Zimbabwe, smallholder farmers' contribution of marketed livestock and livestock products increased from 6% in

1983 to about 22% in 1998 (Masunda 2011) and an estimated 45% in 2002 (Garwe 2007). Smallholder dedicated livestock farming developmental programmes were initiated in a more rapid way from 1987 to encourage both communal and newly resettled small scale famers to adopt rearing of small livestock.

Livestock production in the smallholder areas is practiced for feeding the family and for sale, to produce manure to support crop production and to provide animals for insurance and financing emergency cash needs and for social status (Kusina 2000). Smallholder animal farming also assists farmers to diversify, spread farming risks and creates opportunity to make some idling resources like crop residues enter the human food chain utilizing marginal form resources (Masunda 2011). The differences in perspectives to smallholder livestock production hamper the formulation of effective livestock policies aimed at improving the livelihoods of smallholder farmers.

Small-scale farmers in many parts of the world have continued to maintain a livelihood through livestock production in the face of unfavorable conditions. A good number of rural households in Southern Africa, mainly in countries like Botswana, Zimbabwe and South Africa also engage in livestock production on a significantly small to medium scale. Small livestock like goats are constantly traded or bartered in the informal sector, contributing significantly to household incomes and constituting the backbone of rural populace's livelihoods (Ben and Smith, 2008). Promoting livestock production contributes to drought risk mitigation, particularly in drought-prone areas, and facilitates empowerment of vulnerable and deprived groups of people in communities such as women, people living with HIV/AIDS, orphans, the elderly and the poor in general. Livestock production is therefore viewed as an integral part of the smallholder farming operations.

Most of the goats that are owned by communal area farmers are the indigenous Mashona and Matebele breeds. These breeds have been reported to be hardy and prolific, with an average litter size of over 1.5 (Kusina and Kusina, 2001). However, despite their high prolificacy as demonstrated on research stations, high reproductive wastage under traditional systems of management is a limitation to increased productivity (Obwolo, 2011). This loss in production has been attributed to a number of constraints namely poor nutrition, poor health care and low management input (Kahiya, 2009). Such poor management practices and inappropriate shelter result in high kid mortality, increase the incidence of diseases and reduce the reproductive performance and overall flock productivity. It is against this background that the study expounds on challenges being faced by smallholder farmers in goat production as well as coming up with probable recommendations to improve this lucrative indigenous enterprise.

Goat farming in Zimbabwe

Goats (Capra hircus) are found across all agro-ecological environments and in nearly all livestock production systems and are suitable for very extensive to highly mechanized production systems (Wilson, 2012). Goats play a vital role in the livelihoods of small-scale farmers in developing countries (Chikura, 2009). They contribute to food security and can alleviate seasonal food variability and availability directly through milk and meat production and indirectly through cash earned from the sale of their products (Agrisystems, 2000). In semi-arid areas, goats have comparative advantages over cattle. Since they are more resistant to droughts, they utilize a wider diversity of plants and their higher reproductive rate allows populations to recover quickly (Shumba, 2003). As browsers, they use different vegetation than cattle and thus allow farmers to make more efficient use of the available natural resources (Mhere et al., 2002). In addition, goats play an important socio-cultural role.

Mhere et al. (2002) revealed that, the skins contribute substantially to foreign exchange earnings as well as permitting import substitution for use in the local tannery and leather craft industry of Zimbabwe. It also provides raw materials to traditional technology like in the making of mats, covering handles of tools (knives, dancing costumes, ropes, drums and shields) and covering ornamental articles, footwear, strings and musical instruments (Beffa et al., 2004). The importance of goats in Zimbabwe is based on meat and skins (Singh and Kumar, 2007). Makuza et al. (2013) claimed that some of the major reasons for promoting goat production in Zimbabwe include the growing human population which has created a significant demand for goat meat in Zimbabwe and in the Arab world. Goat rearing requires a low capital investment. Local breeds are of poor quality and can be improved by selection and cross-breeding (Obwolo, 2003). In addition, where ranching is widespread, goats are useful in bush clearing as they enjoy browsing more than grazing.

Campbell et al. (2005) averred that promoting goat production contributes to risk mitigation, particularly in drought-prone areas, and empowerment of vulnerable groups (women, HIV/ AIDS, poor). Goats play an important role in the food and nutritional security of the rural poor especially in the rain fed regions where crop production is uncertain, and rearing large ruminants is restricted by acute scarcity of feed and fodder. Sibanda,

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(2005) pointed out that goat rearing has distinct economic and managerial advantages over other livestock because of its less initial investment, low input requirement, higher prolificacy, early sexual maturity, and ease in marketing. Goats can efficiently survive on available shrubs and trees in unfavorable environments (Agrisystems, 2000).

Zimbabwe has regions with different agro-ecological potentials and different suitabilities for goat production. In Natural Regions I to III crops do well because of the favorable climatic conditions whereas most livestock is found in the drier regions, IV (parts of Manicaland, Mashonaland Central and East, Masvingo and Matabeleland North and South) and V (parts of Manicaland, Masvingo and Matabeleland North and South). In these drought-prone areas, goats are considered to be highly valuable assets for income generation and source of investment. Almost all goats are found in communal areas, thus the goat sector has the potential to ensure food security and alleviate poverty for a significant proportion of the rural population.

Goat production in Zimbabwe forms an integral and important component of the smallholder farming system (Chinuwo et al*.,* 2001). According to Chikura (2009), over 97% of the 4.7 million goats in Zimbabwe are found in the smallholder farming sector. Most of the smallholder farmers live in agro-ecological regions IV and V, which are characterized by poor rainfall, and only permits low cropping activities. Livestock rearing, especially goat production, predominate in such arid and semi-arid regions (Chikura, 2009; Masunda, 2011). Kusina (2000) identified five breeds of goats in Zimbabwe and these are the Mashona, Matebele, Boer, Saanen and Angora goats. Among these breeds, the most common breeds as highlighted by Sibanda (2005) include the Small East African (SEA) and the Matabele goat.

According to Kusina and Kusina (2001), it is common practice among the farmers to tether or herd the goats during the rainy season so as to control their access to cultivated crops, thus preventing crop damage. Such management practices lead to limited grazing time, which reduces feed intake and, consequently, lower the productivity of the animals (Mhere et al*.,* 2002). Tethering is the restriction of goat movement by attaching them with ropes or chains to either pegs or trees (Ben and Smith, 2008). The restraining is done on road-sides, in crop alleys or on communal rangelands (Nyamangara, 2001). Heffernan et al*.* (2004) said the advantage of tethering is that labor that is normally used for herding the flocks can be used on other farming activities (Chikura, 2009). Overnight tethering of goats in pens is done to restrain aggressive animals and prevent them from charging and inflicting injury on other goats (Ben and Smith, 2008). There are several methods of tethering and these include the use of a wobbling rope, a running lead or a center peg (Chikura, 2009). However, the majority of farmers prefer to use ropes attached to a center peg or a tree.

According to Beffa et al*.* (2004), in a herding management system, a goat attendant controls the movements of the grazing goats by guiding the animals to preferred grazing areas. The attendant also prevents goats from entering into crop fields, vegetable gardens or places where harvested crops or thatch grass are being preserved. However, herded goats are able to select a variety of plants and pods compared to goats that are tethered (Agrisystems, 2000). Shumba (2003) observed that foraging goats moved very fast and in situations where fences existed, they easily jumped over the fences and strayed into crop fields. Because of this, goats were usually confined in pens until late in the afternoon during the rainy season before they were released for herding when labor had been freed from cropping activities or school (Kusina and Kusina, 2001). This prolonged penning reduced the time goats were allowed to feed and consequently, had a negative effect on the productivity of the animals (Chikura, 2009).

In the free ranging management system, goats are released in the morning to feed on veld forages and crop residues without any restriction on their movements (Agrisystems, 2000). This system is mostly practiced during the dry season after crops have been harvested and stored in secure places. Although there is more access to feeding by the goats, the forages during this time of the year are of poor quality (Hamudikuwanda et al*.,* 1999). In addition to the poor nutrition, goats are more vulnerable to predators when they are free ranging.

Campbell et al*.* (2005) explained that, goats under confinement are housed in pens all the time. They are offered concentrates and forages, which are harvested and brought to the pens (Gambiza and Nyama, 2000). According to Beffa, et al*.* (2004), confinement of goats is normally practiced on intensive goat production farms. This production system requires high inputs in terms of labor, feed, veterinary drugs and management and it results in high milk production and carcasses of good quality (Masunda, 2011).

Opportunities for small-holder goat production

There are several opportunities for small-scale farmers to supplement their incomes by integrating small ruminants into their farm enterprises. Such opportunities are created by several factors such as the rising demand for goat meat, the low start-up cost, the minimal labor requirements, the ability to use the animals for brush control and multi-species grazing, in addition to the prolific nature of goats. Commercial goat production has become an attractive opportunity in the semi-arid areas of Zimbabwe (Mhere et al*.,* 2002). The reduction of the commercial cattle herd (–75% from 1996 to 2004) led to higher beef prices and stimulated consumers to substitute it with goat meat (Sibanda, 2005). In the process, the retail prices of goat meat in urban areas have increased to a level comparable to that of beef

(Agrisystems, 2000). Goats offer small scale farmers possibilities to create value-added products, such as graded meat, milk, skins and manure. Furthermore, small-scale farmers venturing into commercial goat production could benefit from established cattle market infrastructure and large abattoirs that currently function far below capacity (Gambiza and Nyama, 2000).

Campbell et al. (2005) averred that although goats are seasonal breeders, and a doe (mature female goat) can be bred and successfully give birth (or kid) three times every two years. Moreover, goats have more reproductive cycles than cattle within the same period of time (Gambiza and Nyama, 2000). In a period of two years, it is possible for a doe to give birth to six kids because of its high twinning rate, whereas a cow is most likely to produce two calves for the same period (Obwolo, 2003). This quick turn over rate is an advantage to the producer in terms of cash flow and the building up of his or her herd size.

Campbell et al. (2005) carried out a study to determine goat production practices, constraints, flock dynamics, body condition and weight variation in two ecologically different resource-poor communal farming systems of the Eastern Cape Province of South Africa. He concluded that shortage of feed, disease and parasite were reported as the most important constraints across the two areas. In both areas, goats housing were poorly constructed using acacia brushwood's. Kid mortalities constituted the greater part of outflows. High kid mortalities occurred in hot wet (December), hot dry (September) and post rainy (April) seasons. His study found out that there was a significant interaction between season and age of goat on body weight of goat. Highest ($p < 0.05$) body weights were recorded in the post-rainy and autumn season in both kids and does. He recommended that, it is therefore very important to come up with affordable interventions which take into play ecological differences of the areas for improved nutritional status of goat in communal areas that will lead to improved goat productivity and the poor-resourced farmer human nutritional and livelihood.

Nyamangara (2001) used a cross sectional study design where 150 randomly selected farmers were interviewed to examine factors affecting goat production in Ethiopia. Descriptive analysis and Tobit model were employed to answer the objectives of the study. The study findings indicated that poor extension service deliveries, distance to market, access to credit, goat farming experience, diseases, parasites, housing and land size owned had a significant relationship impact on goat production.

Makuza et al. (2013) carried out a study using surveys in six districts in the provinces of Matabeleland North and South in the semi-arid tropics of Zimbabwe to investigate factors affecting goat productivity. Three of the districts fall in natural region IV (Matabeleland North) and three are in natural region V (Matabeleland South), both characterized by low rainfall and with crop and livestock production system. The study concluded that, goat mortality has been found to be the most important constraint. Farmers with few goats are unable to sustain their flocks, whereas those with larger flocks do not realize the potential benefits from goats due to high mortality rates. It was also discovered that poor access to animal health support, dry season feed shortages and inadequate housing were the most important immediate factors contributing to high kid mortalities. They can generally be ascribed to a lack of information and poor service structures, both resulting from limited support given to the small stock sector by government and NGO support services.

Objectives of the study

i) To ascertain the strategies used by the indigenous goat farmers in Inyathi.
ii) To identify the challenges faced by the goat farmers in the area.
iii) To propose a goat farming model for productivity and sustainability.

MATERIALS AND METHODS

This qualitative research approach and case study design was conducted in Inyati, targeting the smallholder indigenous goat farmers in the area. A purposive sample of 5 goat keeping households was selected on the basis of their flock size from 8 villages under Inyathi community. Data were collected using personal interviews involving the 5 goat farmers on a range of activities on their goat management strategies. Extension workers, as representatives on the ground were used in the collection of information from communities. As a way of authenticating interview responses, the researchers did some observations on the strategies of goat farming, the physical environment and the structures used by goat farmers in the area of study. Responses from farmers (pseudo names were used as an ethical requirement) were analysed using patterns and themes.

RESULTS AND DISCUSSION

Goat management plays a crucial role in goat farming. The success of goat farming largely depends on the management strategies adopted. The following are responses from interviews with goat farmers on the reasons for engaging in goat farming.

The indigenous farmers keep goats for a varying reasons ranging from the social expectations to commercial uses as to earn a living. It is a cultural expectation in the African home to keep some few goats for social rituals and subsistence uses. There are some farmers like Mr. Mabuza and Mrs. Zondo who keep goats as a source of living and as a business venture. The type of breeds that are kept for business are different from those that are kept for social uses; exotic breeds like bore goats are kept by those in business while indigenous

Table 1. Reasons for engaging in goat farming.

Farmer	Reasons	Breeds kept	Number kept
Mr. Makhaza	Family consumption. Selling for family needs like school fees.	Indigenous Matebele	34
Mrs. Zondo	Selling for livelihood. Family needs.	Cross Boer -goats	48
Mr. Mabuza	For business and livelihood. Family needs.	Indigenous Matebele and Cross Boer goat	74
Mr. Khabo	Social expectations. Family consumptions. Social functions.	Indigenous Matebele	22
Mrs. Ngwenya	Family consumption. Milk for the family. Just for having them.	Indigenous Matebele	16

Table 2. Strategies of controlling in-breeding.

Farmer	Prevention of in-breeding
Mr. Makhaza	I do not do anything about this, I only change my bucks when they are old. I use from the stock.
Mrs. Zondo	I change my bucks, after 2 years, I buy new bucks I do not use any from the stock.
Mr. Mabuza	I buy service cross Boer goats for my bucks and I change them every 2 years. I don't allow my goat to be followed by other bucks in the community
Mrs. Khabo	I do not mind about bucks. I just want my goats
Mr. Ngwenya	I do not buy backs I nature from my stock, I also rely on other bucks from the community.

breeds are kept by the farmers who are keeping goats for social uses. Table 1 summarizes the various reasons for the farmers to engage in goat farming.

Prevention of inbreeding of goats

From Table 2, it can be seen that those who are keeping goats as a business venture have strategies of preventing inbreeding of their herds while those who are not in goat selling business are not concerned about the issue of inbreeding. The buck change is recommended so that the breed is kept strong; however, this understanding has not yet been grasped by the communal goat farmers who continue keeping their bucks for a long time.

Treatments administered to goats

Pests and diseases are also among the challenges affecting goat production in Inyathi. Diseases alter the value of the animal by changing its conformation or rendering the products unfit for human consumption. Furthermore, substantial revenue is lost annually because of the failure of many potential producers to meet the sanitary requirements of lucrative markets. This seems to be in agreement with Chikura (2009) who reveal that animal diseases constitute a major constraint to livestock production and the safe utilization of animal products worldwide. For small scale farmers, the impact of livestock disease on lives and livelihoods is particularly severe. An outbreak of disease can mean the difference between sufficient food stocks and food insecurity, and between having a secure income to the loss of key household assets. The presence of livestock disease also makes it difficult for the poor to participate in local and even the national livestock economy. The quality of goat meat produced by the small scale farmers is mainly targeting local markets due to its poor quality as a result of disease. In Inyathi, few farmers have embraced the use of animal treatments from the veterinary stores; many still rely on traditional ways of treating animals, as seen from Table 3.

Nutrition

Farmers were asked if they do give additional feeding to their stools. The following are the responses of the farmers. Beffa et al. (2004) postulates that nutrition plays an essential role in goat farming systems. In developing countries, these systems are characterised by low input of poor quality pastures that contribute to inadequate

Table 3. Treatments administered by the farmers on their goats.

Farmer	Treatments administered by the farmers
Mr. Makhaza	I only rely on traditional concoctions for treatments.
Mrs. Zondo	I do follow advice from Agritex on goat dosing
Mr. Mabuza	I use antibiotics for my goats and same traditional treatments
Mr. Khabo	I rarely treat my goats, use paraffin for tacks.
Mrs. Ngwenya	I don't treat the goats, they are always well.

Table 4. Additional feeds administered by the farmers.

Farmer	Additional feeds administered by the farmers
Mr. Makhaza	The pastures in this area are very good, we have plenty acacias no additional feeding necessary.
Mrs. Zondo	The goats have enough from the pastures, but I give them same crumbs for strength.
Mr. Mabuza	I give additional feeding to add to their nutrient levels and salt for additional strength.
Mr. Khabo	This place has a variety of pasture for the goats, therefore I don't give any feeds.
Mrs. Ngwenya	My goats have enough feed from the pasture, during winter I give them maize stalks from the harvest.

feeding and nutrition (Ben and Smith, 2008), alongside low productivity (Thomas and Rangnekar, 2004). This is in turn aggravated by the rearing practice that is mainly characterized by tethering of indigenous breeds in natural pastures (Nyamangara 2001). Improving feeding and nutrition, and maximising the use of the available feed resources should be the main target considered when enhancing goat productivity (Agrisystems, 2000). Table 4 shows the value the indigenous goat farmers place on the use of additional feeds to their goats.

The mobile upper lip and prehensile tongue of goats enable them to graze short grass swards and browse even those shrubs and trees that have mechanical deterrents such as thorns (Nyamangara, 2001). Goats are also capable of assuming a bipedal stance that allows them to utilize overhead branches of trees and shrubs (Devendra and Burns, 2003). However, despite having these advantages, goats still face a nutritional challenge that limits their productivity. The feed resource base for goat production in Zimbabwe is natural grazing and crop residues (Gambiza and Nyama, 2000). The quality and supply of these resources is seasonally variable. Grazing resources in many areas are diminishing due to increases in cropping land. Bush encroachment and overgrazing have reduced grazing resources in the pastoral areas (Masunda, 2011). One of the most serious of these is the indiscriminate burning of veld, resulting in critical shortages of grass during winter and early spring (Ben and Smith, 2008).

Challenges affecting goat farming

Despite the hardiness of Zimbabwean indigenous goats, their mortalities are very high in communal areas (Chikura, 2009). Flock mortalities have been reported to be in excess of 50% with kids being the most vulnerable group (Pandey et al., 2004). According to Kusina et al. (2009), lack of proper health care was the major cause of such high mortalities. Obwolo (2011) reported that 39% of all deaths were due to diseases. He identified infections and nutritional inadequacies as the major causes of goat diseases. He reported that infectious diseases, particularly those caused by gastro-intestinal parasitism, were the dominant cause of losses in the goats in smallholder farmers. Prevalence of diseases and parasites is very high in the region of Southern Africa (Githiori et al*.,* 2006). Its impact is experienced through high mortalities, abortions or sub-clinical effects manifested as loss of weight in animal. The diseases and parasites can impact negatively through financial implications involved in controlling the effects of disease and mortality (Wilson, 2012). The indigenous goat farmers as seen from Table 5 alluded to some of these threats to their farming adventure.

Beffa et al. (2004) asserts that goats have limited resistance to nematodes due to limited exposure to these parasites. These animals normally browse well above the ground, whereas parasites are deposited on the ground (Ndlovu, 1992). Veld characteristics, such as overgrazed forages, which compel the goats to graze close to the ground, resulted in parasitic infestations (Singh, 2006). Financial losses from gastro-enteritis were mainly incurred through mortality and reduced live weight gain (Shumba, 2003). According to Campbell et al. (2005), the dominant internal parasites affecting goats were *Haemonchus contortus* (large stomach worm or wire worm), *Oesophagostomum colombianum*, *Trichostrongylus* spp and *Bunostomum* spp (Masunda, 2011). In Zimbabwe, high levels of infestations by parasites were observed during the rainy season (Kusina

Table 5. Major threats facing the goat farming industry.

Farmer	Threats to goat farming
Mr. Makhaza	Predictors, like jackals, thefts, and diseases.
Mrs. Zondo	Jackals, high kid mortality theft.
Mr. Mabaza	High kid mortality, law prices by the buyers, predictors like jackals.
Mr.Khabo	Theft , jackals
Mrs. Ngwenya	Jackals

et al*.,* 2009). The increase in the infestations was attributed to the rainy conditions that enabled the eggs of the parasites that were passed in faeces to develop into infective larvae (Kusina et al*.,* 2009). The gastrointestinal parasites have been observed to reduce growth rate and body condition of the infested animals (Agrisystems, 2000). In addition, heavy worm burden caused diarrhoea, anaemia and in acute cases death occurred, particularly in kids (Obwolo, 2003).

Singh (2006) noted that poor nutrition aggravated the parasitic damage in small ruminants as a result of lowered resistance. Makuza et al*.* (2013) affirmed that, malnourished kids infested with parasites suffer from severe weight loss and bottle jaw. Infestation of does by *Ostertagia Circumcinta* or *H. contortus* reduced milk production and severely reduced live weight gains of the kids (Masunda, 2011). Shumba (2003) reported that dam infestation did not usually affect the birth weight of the kids but it affected the growth rates of the kids when they were three weeks old and above. Maphosa (2001) established mixed nematode infestation in goat faeces and suggested the use of anthelmintics to control strongyle worms. Similarly, Wilson, (2012) recommended dosing the breeding females towards parturition in order to reduce pasture contamination and prevent the newly born kids from being exposed to heavily contaminated pastures. Waghorn and Shelton (2005) suggested the feeding of tannin-rich plants to goats in order to control gastro-intestinal parasitism. On the other hand, provision of improved goat housing aimed at reducing contact of goats with worm eggs was recommended by Kusina et al. (2009).

Markets

Although goats fulfil an important cash function, many farmers often do not realize these benefits. No formal markets for goats exist in Zimbabwe. Infrastructure and access to market information are poorly developed. Farmers often have no other option than to sell their goats at the farm gate at very low prices (Maasdorp et al*.,* 2002). Therefore, they have very little incentive to invest in goat management and remain with low goat production (Ndlovu,1992). Improved market access can promote this golden opportunity for small-scale farmers to be incorporated into mainstream agriculture. The challenges and opportunities that small-scale farmers face in goat production and marketing are poorly understood (Agrisystems, 2000). Makuza et al*.* (2013) argued that existing goat markets, market flows and the role of the market players are not documented, and it is therefore difficult to develop effective marketing strategies. Little is known about farmers' goat management strategies and access to information and services (Masunda, 2011). Campbell et al*.* (2005) posits that major shortcomings along the market chain of goats include lack of information on consumer preferences and markets, shortage of slaughtering and processing facilities in urban and rural areas, high transaction costs and difficulties in accessing markets, all of which ultimately contribute to low prices for the farmer.

Singh and Kumar (2007) asserts that the viability of goat production depends not only on technical and biological efficiency, but also on market factors. The goat market is a neglected area and limits goat development in communal areas. Makuza et al*.* (2013) suggest that an effective marketing system for goats would likely increase communal area meat production and peasant incomes, and improve veld (range) conditions more than would a substantial rise in the price of beef. The marketing policy should therefore be to improve prices, improve transport facilities for live goats from communal areas and design goat meat promotion and advertising techniques (Wilson, 2012). Small scale farmers in Inyathi expressed concern over shortage of organised markets. Lack of value chain addition was also noted to be a challenge to goat production.

Extension services

Extension services are also considered as a challenge to goat production by farmers. The frequency of visits by Extension Service Officers from Ministry of Agriculture is quite poor. During the wet season, goats are affected by a number of diseases and it is at that juncture that they require extension services; most however, they will not be able to get them as the roads will be inaccessible. According to Anderson and Feder (2003), productivity improvements are only possible when there is a gap between actual and potential productivity. They suggest

that two types of 'gaps 'contribute to the productivity differential – the technology gap and the management gap. Extension services can contribute to the reduction of the productivity differential by increasing the speed of technology transfer, by increasing farmers' knowledge and assisting them in improving farm management practices. Additionally, extension services also play an important role in improving the information flow from farmers to scientists (Birkhaeuser et al*.,* 1991).

When the Veterinary Services Department fail to adapt to farmers' perceived training needs, they can end up seeking information from unofficial sources. Moradnezhai et al. (2007) discovered that most of the small scale farmers in communal areas depend on friends, neighbours and other native sources like local leaders and educated people for their information needs. Besides, other studies by Kibwika et al. (2009) confirm that information exchange within rural communities is indicated as one of the most common responses to farmers' cognitive needs. Although the importance of local indigenous knowledge should not be underestimated, these channels of information are unable to supply farmers with new knowledge, and focused on specific production's issues.

Information gathered from interviews held with Agricultural Extension Officers indicated that the tropical challenges being encountered by farmers who are into goat production include lack of information on goat production systems, prophylactic health program for small ruminants as well as market linkages. Financial support for expansion of business was also noted as a constraint as the banks which are giving agro-loans such as Agricultural Bank of Zimbabwe require collateral security in form of immovable property.

The Agricultural Extension Officers noted that most farmers in Inyathi are yet to appreciate the value of having training in various aspects of goat production. Most of them are not even keen to expand the goat farming as they regard it as a source of meat for the family and for undertaking several family rituals. It is therefore a challenge for the farmers to be embraced with several goat management practices that can be put in place in a way of improving productivity.

The main challenges that have created the largest obstacles to the development of a viable small ruminant production in Zimbabwe are lack of an effective means to control internal parasites, lack of effective marketing strategies for products derived from goat meat, inadequate expertise information, and limited access for limited-resource farmers to financial support (Masunda, 2011). Goat mortality has been found to be the most important constraint in Zimbabwe (Mhere et al*.,* 2002). Beffa et al. (2004) claimed that poor access to animal health support, dry season feed shortages and inadequate housing are the most important immediate factors contributing to high mortalities and can generally be ascribed to a lack of information and poor service structures, both resulting from limited support given to the small stock sector by government and non-governmental organisations (NGO) support services.

In addition to the type of management practices adopted, there are several other factors that limit goat production in the communal areas of Zimbabwe and these include nutrition (Ndlovu, 1992), health (Obwolo, 2011; Pandey et al*.,* 2004; Kusina et al*.,* 2009) and type of housing (Chikura, 2009), whereas Chikura, (2009) revealed technical challenges such as unavailability of high genetic potential breed, absence of high productive exotic breed for cross breeding, lack of scientific feeding practices and scarcity of reliable and good quality germplasm (goat breed) center and goat breeding services.

Mitigation strategies

This is as shown in Table 6.

Data from observations

The researches made same visits to the different farmers in the Inyati area and made the following observation to the goat farming.

Pastures

The district is very rich in acacia vegetation that makes it very appropriate for goat farming. His thick acacia vegetation however makes the area a favorable hub for jackals and other predictors that prey in the goats.

Breeds kept

It was observed that the indigenous Matebele goats are on the majority as well as the cross-Boer goats. The Boer, Saanen and Angora goats are kept for meat, milk and mohair production, respectively. Mature weights of Boer does and bucks are 80 and 130 kg respectively, whereas those of the Saanen doe and bucks are 65 and 75 kg, respectively. However, the dominant breeds are the indigenous Mashona and Matebele goats. The Matebele goat is a large meat breed. The females and males have mature live weights ranging from 30 to 40 kg and from 50 to 55 kg, respectively (Chikura, 2009). This breed is similar in size to the Boer and Nguni breeds of South Africa and the Tswana breed of Botswana (Bryant et al*.,* 1997a). The breed is found on smallholder farms in Matabeleland North and South Provinces of Zimbabwe. Smallholder farmers in other parts of the country keep the Mashona goat which has a low mature body weight ranging from 25 to 30 kg (Shumba, 2003).

Table 6. Strategies used by the farmers to in mitigating the challenges in goat farming.

Farmers	Strategies used by goat farmers
Mr.Makhaza	Have reported the theft cases to the police, look after the goats. Use 1kg treatments,
Mrs. Zondo	Tried dosing the kids , help the police apprehend the thieves , house the goats
Mr. Mabuza	Dosing the kids, keep them in warm places look for alternative markets , house the goats
Mr. Khabo	Look after the goats, house then especially at night.
Mrs. Ngwenya	Look after the goats and house them.

Grazing patterns practiced in the area

The farmers in this district practice communal grazing method where all goats in the community graze together. Thus, it was observed that it discouraged the individual farmers to have their own bucks as they achieved on the communal bucks. Most of the farmers resorted to free ranging, herding and confinement as goat production systems. The free ranging system consists of no mating control; therefore, community goats interbreed as a single flock (Manyema et al., 2008). This system is common in rural and communal areas during the dry season when the crops have been harvested and the rangeland feed quality is of low nutritive value (Maphosa, 2001). The goats are released early in the morning to forage freely without any restrictions. Kusina (2000) reveals that goats are more prone to predators in this system since they would travel on their own for long distances in search of feed.

Some farmers use tethering. In this feeding system, goats have their movement controlled. The farmers said that this is mainly meant to prevent them from wandering and damaging the neighbouring crops. Goats are therefore tied or pegged to a 3 m rope along roadsides, in crop alleys or on communal rangelands. Water is only provided when the goats are shifted which is usually at night when they are returned to their shelter. Although the farmers had received some training in goat production which exposes them to various production systems as well as their merits and demerits, they still opted for tethering as it allows them to do other farm activities without being bothered on looking after goats. Aggressive animals can be tethered overnight in order to restrain those (Gizaw et al., 2010). In mixed crop and livestock farming systems, tethering allows sparing of labour for other farm activities, especially cropping.

However, some studies have cited that tethering in goats resulted to loss of body condition. Additionally, there is less exposure for mating in breeding animals hence there is a reduction in reproductive performance of the does. Chikura (1999) contributes that high incidences of vegetation degradation have been noted in areas where tethering is practiced mainly due to overgrazing as a result of over utilization of tethering spots. This would create bare patches on the ground eventually leading to soil erosion at the onset of the rains. It can therefore be recommended that the tethering spots be frequently changed so as to allow vegetation regrowth as well as nematode control (Obwolo, 2011).

Herding is mainly conducted by women and school children or employed shepherds. Herded goats have access to freely select a variety of plants and pods unlike the tethered goats (Maphosa, 2001). Goat movement is however controlled by the herder through guiding them into preferred grazing areas. This system is generally popular throughout the year preventing goats from straying into cropping fields or vegetable gardens of other farmers. As a result of commitment of labour to other activities such as school and cropping, goats are often penned for longer periods awaiting availability of labour. Kusina (2000) says that this situation leads to reduced foraging time that translates into poor body condition.

Relatively few farmers use paddocking (confinement) in goat production and they are very satisfied with the economic results and improvement to the ecosystem, as well as the change in management lifestyle and social environment of their businesses. Farmers narrated that use of paddocks/confinement has a lot of advantages which include making it easy to separate pregnant expecting does and nursing does from the entire group thereby reducing mortality rate of kids. This is supported by Kusina and Kusina (2011) who discovered that if lactating does and kids had to travel long distances to find feed with the mature herd this situation usually leads to deaths of kids. Although farmers are aware of several merits of paddocking or confinement, most of them do not use it due to initial costs involved in fencing and construction of feeding and water troughs. As a result, herding is the most used system in the community.

The highest number of live births were recorded on confinement production system as compared to herding and tethering. Miscarriages in confinement were very few as in herding and tethering. Injury or a doe getting rammed, stress and infections such as pink eye and salmonella are some of the causes for miscarriages in goats (Obwolo, 2003). When confinement is used as goat production system, the goats will not be much stressed as in tethering and herding. The least live births are characteristic of the tethering production system. With this production system, the does will get stressed hence greater chances of abortion. The doe which would have aborted might not get back on heat so easily, hence,

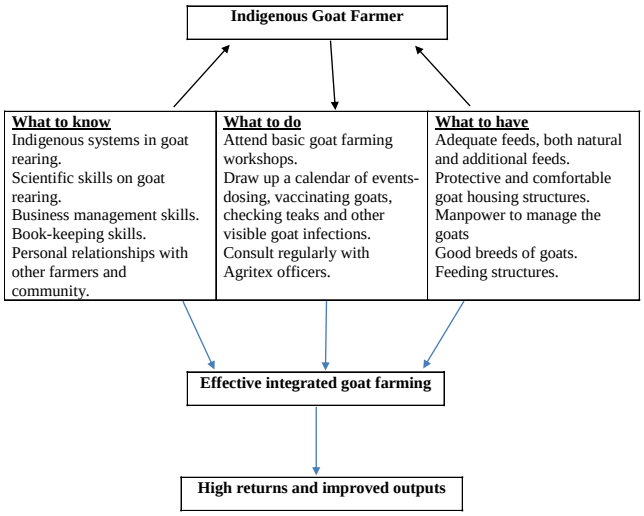

Figure 1. The proposed goat farming model.

productivity reduced. This assertion is in line with that of Wilson (2012) who reveals that if a doe miscarries, she may or may not go back into heat that season until the regular breeding season the following fall.

Goat housing systems

It was noted that the goats were housed on unroofed housing system that exposed the animals to the weather hazards thereby increasing their chances of being attacked by a variety of dieses. Beffa et al. (2004) asserted that, poor housing and habitat is primary constraint in failure of goat farms production. Traditional high floor housing system restricts farmers to keep large flocks of goats. The shed are usually congested without any provision for separate enclosure for kids (Masunda, 2011). Such poor housing conditions many times appeared to have resulted in higher disease incidence and kids' mortality (Maphosa, 2001). In Zimbabwe, over 50% of all kid deaths were reported to be a result of the lack of appropriate housing (Chikura, 2009). The poor housing offered little or no protection against wind, cold, rain and muddy conditions. Shumba (2003) cited lack of knowledge on the adverse effects of inappropriate goat housing, as the main reason behind construction of poor goat housing structures.

Lack of appropriate shelter resulted in the prevalence of diseases such as pneumonia, foot rot and internal parasites. According to Obwolo (2003), foot rot causes lameness. These conditions are associated with painful swollen legs (Linklater, 2003) and reduced the foraging ability of the affected animals. Consequently, the animals lose body condition and become more susceptible to other diseases. Improvement of goat housing in addition to prophylactic treatment and better nutrition were observed to reduce pre-weaning kid mortality (Matika and Sibanda, 1997; Mtenga et al., 2004). Proper scientific housing for goats are necessary to run profitable goat farms and use of latest management equipment to control environment in kennel type tropical housing for goats become essential.

Conclusions

In the light of the information gathered in this research, the researchers conclude that management related issues such as inadequate husbandry, inadequate and ready supply of most appropriate type of breeding stock and how they can be improved, lack or poor supply of inputs including drugs, feed, water, unavailability of appropriate markets, poor market organization, poor infrastructure and lack of efficient information networks are major constraints in goat production.

The problems being encountered by small scale farmers are not permanent as possible solutions to challenges were raised as seen in Table 6. The raised points have great potential to mitigate impact of the constraints identified.

RECOMMENDATIONS

Basing on the findings of this study, the researchers recommend that:

i) Small scale farmers in goat production should be trained in management related issues that include animal husbandry, health and nutrition of goats.
ii) Extension support services need to be improved if goat production is to be improved
iii) Small scale farmers should take farming as a business.
iv) Financial institutions should relax conditions such as the one on collateral security when giving loans to goat farmers in order to promote and enhance goat production by small scale farmers.
v) The points captured in Figure 1 could be used to transform the communal goat farming activity so that the farmers would reap adequate and sustainable returns from their farming.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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