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Goat production in the smallholder section in the matobo district in semi arid areas of Zimbabwe

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ABSTRACT

Goats contribute significantly to the subsistence, economic and social livelihood of the majority of the smallholder resource poor rural population in Zimbabwe. However, no comprehensive studies on the impact of goat production on the socio-economic livelihoods have been carried out in semi arid areas of Zimbabwe, hence very little information has been documented on smallholder goat production system and its productivity. This study aims at assessing the importance of goat production on smallholder farmers' social and economic livelihood, and to identify constraints to increased productivity. Although goats do not contribute to the official cash economy, they contribute to the food and cash needs of the rural household's populations. This is evident from the large number of goats and their popularity in rural semi arid areas, where cropping is limited. A survey was carried out by a questionnaire using a total of 100 randomly selected smallholder farmers households in Matobo district of Zimbabwe. The major reason for keeping goats by smallholder farmers was providing food for the families, and other reasons given were that income earned from goats went towards paying school fees, medication, acquisition of household assets, and cultural purposes. Inadequate livestock health support services from government and lack of organised marketing facilities were identified

as some of the major constraints. The unavailability of formal goat market system affected the viability of goats production, as a result of low returns. The results showed that households acquired goats mostly through purchases and least acquisition was from inheritance. The study concluded that from the proportion of goat earnings used for household food consumption showed that goats are important to the poor resource farmers and thus can be a suitable target for development assistance. Hence, goat rearing can be a sustainable livelihood strategy in improving the quality of life of the small holder farmers in Matobo district. It is also hoped that this study will contribute to the improvement and the understanding of the socio-economic impact of goat production on smallholder farmers in Matobo district of Zimbabwe, and to a greater extent in the arid and semi-arid areas.

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1. Introduction

In Zimbabwe the value of goats as domestic livestock in smallholder livestock farming sector is presently widespread, as it has been stimulated by a wide recognition of their role in food production, their economic value and importance in traditional beliefs. Goat production is an important avenue for poverty alleviation in small-scale farming sector through its contribution to household nutrition and income generation (Assan, 2012). Income from goats often accrues to vulnerable women, who use the money to provide better nutrition and education to their children (World Bank 2001). The advantages of goats over other livestock species in traditional farming systems is associated with small size, low initial costs, rapid turnover and efficient conversion of feed resources not directly eaten by man (Braker et al 2002). This is on the background that goat population in the communal areas in Zimbabwe have generally increased over the last four decades. Communal farmers own in a descending order, 98% of goats, 84 % of sheep, 68 % of cattle and 60 % of pigs (Agrisystems, 2000). Someone may assume that the resultant trend indicates that goat production forms an important and integral part of the smallholder livestock farming system in Zimbabwe. This means the potential of goat production to contribute to the alleviation of poverty in the smallholder farming sector is considerable. The goat population stands at 3.3 million, of which the 97 % of this population are indigenous breeds and found in the smallholder farming sector (Assan, et al, 2011). The Matebele goat is the most popular indigenous goat breed in the semi arid areas in the agro-ecological region IV and V, which are characterized by poor rainfall, which only permits low cropping activities. The indigenous goat have managed to survive, reproduce and produce in harsh environmental conditions, which has been attributed to their adaptation, as they deliver multiple products and services, and make valuable contribution especially to the poor in the rural areas (Assan 2013). Goats have withstood heat stress and endure prolonged water deprivation, making them more adaptable to adverse climatic and geographical conditions, where cattle and sheep can not survive (Azizi, 2012). It is assumed that livestock intervention strategies to improve goat production can translate into overall protein nutrition and improve the larger segment of households socio-economic welfare in communal areas of Zimbabwe. Goat enterprise may be a viable form of sustainable livestock production particularly for individuals with limited financial resources, limited land and vulnerable groups, and contributing largely to the livelihoods of low and medium income farmers. The expansion of smallholder farming sector through goat production can lead to a faster rate of poverty alleviation, by raising the incomes of rural population and reducing food expenditure, and thus reduces income inequality (Magingxa and Kamara 2003; Diao and Hazell 2004; Resnick 2004; World Bank, 2008). Increasing productivity of goats will contribute significantly to the improvement of the living standard of the rural people. The basic objective of this study was to assess the socio-economic impact of goat production on smallholder farmers in the semi arid areas of Zimbabwe and to identify constraints so that improvement strategies might be formulated hence improving the quality of life of the small holder farmers in Matobo district.

2. Materials and methods

The study area is located in the Matobo district in the Matebeland South province, Zimbabwe, between the latitude 20° 23' south and the longitude 31° 30' east, situated 30 km South West of Bulawayo. The district falls in the agro-ecological region V, characterized by low erratic rainfall ranging between (450mm-600mm) annually, interspersed with long dry spell (Meteorological Services Department, 2014). The wet season lasts on average from Mid-November to Mid-March. Little or no rain falls during the rest of the year. Sits on an altitude of 1 350 m and minimum mean temperatures of the hottest month are 21.60C and 11.40C, respectively. The soils are predominantly granite-driven sands and loamy sands. The dominant vegetation type is savanna with various Acacia species and grass species. Detailed description of the climate and vegetation type were given by Day et al (2003) and Gambiza and Nyama (2000), respectively.

A survey was carried out in Matobo District of the semi arid areas of Zimbabwe. The survey was done using a questionnaire consisting of both open and close-ended questions designed to solicit both factual information and the attitudes of farmers with regard to the socio-economic impact of goat production on smallholder farmers in Matobo district of Zimbabwe. A random sample of 100 households were interviewed in districts and also farmers group discussions were carried out. Agricultural extension officers in the district were interviewed in order to determine the involvement of government in this sub-sector. As expected, not all information sought from farmers was received, especially that related to income. Being a descriptive study, comparisons were made purely on a percentage or absolute number basis. Data obtained from the questionnaire were coded and summarized prior to analysis, and the analysis was performed with SPSS 17 (Statistical Package for Social Science) software.

3. Results and discussion

There were three types of goat management systems employed in the district namely free grazing, herding or supervised and tethering. The most popular system among the farmers was the free range where goats were allowed to roam and forage freely during the day and penned during the night. The existing goat husbandry management systems in Zimbabwe are normally the result of hundreds of years of tradition where goats are kept primarily for meat. The greater percentage of goats in the district studied is owned by subsistence farmers based mainly in an extensive system, which is characterized by poor management and low productivity. The goat's adaptability, prolificacy and modest nutrient requirements make it ideal for exploitation under extensive conditions of semi arid areas. This system did not follow any seasonal pattern and was the major factor in uncontrolled breeding. One may assume that due to uncontrolled breeding inbreeding was prominent in the district. The average flock size in the study area was 12 goats (Figure 1), which was higher than the average flock size of 7.5 goats per flock in Nigeria (Francis, 1988), 5 goats in Cameroon (Ndamukong et al., 1989) and 8 goats in Ghana (Turkson, 1992). The flock size observed in our study is lower than the average flock size of 19.2 reported by FAO (2009) in Zaria and 15.5 reported by Akpa et al., (2010) in smallholder goat herds in Kano, Nigeria. A variation in flock size was attributed to quality of grazing and human population density. The smaller average flock size in general provides limited scope for a commercially oriented approach to goat production. A market oriented approach will require substantial cash input to purchase more animals, for better housing, improved pastures and the necessary infrastructure development. The small flock may translate to low household cash income to meet improved goat management costs. The limited number of goat owners vaccinating and drenching their goats may be largely a result of financial constraints. This has serious repercussions as untreated animals continue to contaminate the environment for treated ones. It was noted that segments of the district with predominantly acacia species type of vegetation, low human densities and elderly headed households had higher flock sizes than those headed by young adults and highly populated areas. In the high populated areas the smaller flock size was a result of overgrazing of grazing lands which could not now sustain larger flock sizes. The general pattern of ownership and flock size across Matobo district are presented in Figure 1. The goat houses were made using pole and mud, and some with thatched roof for protection against heat and rainfall. The houses were open sided for adequate ventilation. There was no organized health care provision in terms of vaccination and deworming. However, some goat farmers claimed that veterinary officers were called to treat the animals when cases of ill-health occur. Not much supplementary feeding of the animals was done before turning them out for grazing and in the evening before they were kraaled. A few farmers supplemented their goats with groundnut hulks, beans pods,

maize, millets and sorghum offals. No mineral supplements and water were provided. The kids were allowed to run with their dams throughout the year, and weaning was by natural means.

Of the population studied, 56.3, 43.3 and 3.0 per cent were does, bucks and wethers, respectively, and all goats were of the indigenous Matebele goat type. The high preponderance of the females in the herd implied that farmers were conscious of keeping only those animals which are productive for the sake of increasing their herds. The low percentage of wethers is indicative of minimum castration practices among goat owners. This may be responsible for the high buck to doe ratio of 1:3, this ratio portray existence of a proportionately larger number of breeding bucks in the flocks of rural goat keepers. Our observation is in agreement with the observation of Sellers et al (1974) and Matthewman (1977) in Nigeria who observed buck to doe ratios of 1:4.3 and 1:2.7 respectively. The buck to doe ratio was 1:3 and 1:2 for Small East African goat keepers in semi-arid and sub-humid areas, respectively, in Tanzania (Chenyambuga and Lekule, 2014). The high buck to doe ratios are characteristic of traditional goat husbandry systems. In rural southern Botswana, Matlho (1983) noted a buck to doe ratio of 1:3.5 and Akapa et al., (2010) reported a buck to doe ratio of 1:5 in smallholder goat herds in Kano, Nigeria. Male goats took longer to reach market size, hence the greater numbers. Similar observations have been made in other studies in Africa (Wilson, 1988; Reynolds and Adediran, 1994). In another study Akpa et al., (2010) observed that although buck to doe ratio increased with increase in herd size, it was noted that the bucks were under utilized particularly in the traditional smallholder management system where bucks are indiscriminately allowed to run with the does. But in a control mating system more appropriate mating ratio is used. In this study the buck to doe ratio ranged from 2 to 13. This is far below the buck to doe ratio of 1:40 used by Das and Sendalo (1990). However, the gap in sex differences of males and females is a major cause of concern in terms of animal breeding. The high buck to does ratios on the other hand have a negative implication for breeding especially under the uncontrolled breeding system. Does not only lead to some females being bred too early, resulting in low conception rates, low birth weight and poor kid survival but also allows for the perpetuation of inferior genotypes. The fact that goat farmers do not castrate their goats, this translates to every male in the population studied being a potential breeder. The bucks are most of the cases of the same blood, hence inbreeding is imminent in such populations which may result in inbreeding depression. One may assume that one of major cause of low productivity among the smallholder goat population is due to inbreeding depression. This is also worsened by the fact that only owners of larger flock sizes keep breeding bucks. On the background that there is less or no buck selection based on performance, which result in most of the bucks being mediocre type. On the other hand may argue that uncontrolled breeding which may facilitate random mating is advantageous for the smallholder farmers as it minimizes the problem of inbreeding, particularly for small herds, and it removes the cost of keeping males, especially to resource poor farmers. However, random mating may have disadvantage because of the high risk of inbreeding and spread of diseases (Chenyambuga et al (2008). Genetic improvement programmes are difficult to establish where there is random mating and the practice may lead to genetic erosion of distinct populations through interbreeding with other populations. Thus, if genetic improvement programmes are to be established for smallholder goat flocks random mating should be avoided in order to enable the selection of individuals with better performance to be parents of the next generation.

Goats were acquired in different manner where the majority of farmers purchased (78%) their goats from neighbours and the least of acquisition was through inheritance (8%) (Figure 2). However, only 14% of the respondents said that they acquired goats through NGOs or government schemes. Goat ownership is inherently a loyalty to most households, which is justified by the highest percentage of acquisition coming through purchases. Most youth in this areas are immigrant workers in South Africa or Botswana and usually invest in buying goats or cattle as a measure against the risk of being deported. This information was gathered during the focus group discussions. The reasons for keeping goats varied amongst households (Table 3) and in a descending order of importance families kept goats for meat (27%), income generation (25%), symbol of wealth and /or investment (19%) and milk production from goats (12%) was not popular with farmers. This is in disagreement with Gurmessa et al (2011) who reported that provision of milk for home consumption is the major reason for keeping goats in Ethiopia. Also a study by Ogola et al (2010) in Kenya and Teufel et al (1998) in Punjab reported that provision of milk for home consumption is the major reason for keeping goats. The differences in the observation emanated from the fact that the breed under study was a dairy breed, while our study dwelled on a indigenous goat meat breed. Our observation agrees with Kosgey et al (2006) who ranked income as the second important purpose for keeping dairy goats. However, goat milk consumption may have a cultural connotation. This study result reveals that a combined 64 % on reason for keeping goats is devoted to income generation and food security for the

smallholder rural livestock farmers. Devendra (2013) concluded that goats occupy a very important biological and socio-economic niche in farming systems making significant multifunctional contributions especially to food, nutrition and financial security, stability of farm households, and survival of the poor in the rural areas. The other point to note is that farmers preferred cattle milk than goat milk because of the unpleasant odor associated with goat milk hence milk consumption was not popular. However, goat milk consumption is an issue which needs to be revisited to possibly encourage farmers to use goat milk for home consumption. Goat's milk is one of those cult products among alternative health and beauty devotees who claim so many benefits that it rather strains credibility. But some may be valid - for example, people who suffer from low levels of lactose intolerance may be able to digest goat's milk which has a slightly different composition of milk proteins than cow milk. Some of the health benefits of goat milk lies in the high presence of iron, calcium, phosphorus and magnesium. Apparently goat's milk has less fat, builds your immune system, and reduces anti-inflammation of the bowel. It is reasonable to suggest that women prone to iron deficiency due to giving birth, the answer could lie in goat's milk. Goat's milk helps prevent softening of bone and anemia and also aids digestion and metabolic utilization of minerals such as iron, calcium, phosphorus and magnesium. However, there is high variation in nutritional, chemical, and rheological compositions between and within goat milk and products, due to the multiplicity of manufacturing procedures, localities, animals, and management factors (Park, 2011). For other reasons for keeping goats, cultural functions featured highest (9%) than manure for crops (7%) and hides was negligible (1%). In other studies in Africa the same reasons for keeping goats under smallholder production system is production of milk, generation of income, provision of manure and insurance against future uncertainties were cited (Chenyambuga et al., 2014).

The spent income earned from selling goats on household food accounted for 49%, while that on school fees, medication and household assets accounted for 40%, 7% and 4%, respectively (Figure 5). It is evident that the highest proportion of the goat earnings went towards household food consumption, which was followed by school fees, medication and acquisition of household assets. These findings are in agreement with Sarupinda and Tavesure (2009) for studies conducted in the same area, which revealed that goats earnings are critical source of household cash for small scale farmers. Goats earnings are among the few cash income options which exist in this area. This is particularly important to mention due to the fact that the district is in the semi arid areas of Zimbabwe which is prone to persistent droughts. This makes goat earnings a mitigation strategy against crop failure, making it an important component of food security. The values observed on expenditure on school fees in this study are higher compared to those observed by Ogola et al (2010) who reported 16.7% of income being spent on school fees. However, the observation in this study is closer to Shirima (2005) who reported that more children are sent to school due to extra income from dairy goat enterprise. Furthermore, the findings by Nordhagen (2003) indicated that introduction of dairy goats in Tanzania has contributed significantly to the education of children.

Farmers constraints were classified into two groups namely those that were experienced under general goat production and marketing of goats. A variety of constraints were cited in goat production by farmers which include lack of and/or inadequate formal markets, high transaction costs involved with formal marketing which result in low returns, lack of marketing information and lack of community cohesion in goat marketing. In goat production main constraints were animal disease control (23%), lack of water (23%), insufficient grazing (17%), poor quality grazing (9%), lack of cash to buy feed (3%), lack of knowledge or extension services (3%) and theft was not a problem (2%). Surprisingly 14% of the respondents felt that there were no constraints in goat production and another 6% attributed challenges to other factors other than mentioned here. Animal disease control was just as important to goat production as drought. The inability of government departments to engage in animal disease control targeted on goats has made farmers unable to keep their animals disease free. Veterinary drugs are becoming too expensive taking into account the earnings from goats. The prominent disease which has raked havoc in the area is heartwater which is spread by ticks. Recently, government ceased subsidizing on acaricides as in previous years for control of tick borne diseases such as heartwater. An efficient, well-planned animal health service is a pre-requisite for increasing goat production in smallholder production sector in Zimbabwe. There has been much emphasis on animal health services for cattle as compared with other animal species. It is now common knowledge that the number of goats in the country has increased significantly and that of cattle has dwindled drastically. It must be stressed, however, that any improvement in animal health services must go hand in hand with an adequate improvement in the provision of feed or improving grazing areas. If this is not done, expected improvements in goat productivity may not be realized and could lead to further destruction of rangelands in the district as a result of large increase in goat numbers. An improvement in the performance of goats in small scale goat sector where there are numerous, would directly improve the diet and standard of living

of the large number of rural smallholders farmers. The low productivity and common non-specific disease problems encountered could largely be due to inadequate nutrient intake by the goats which survive by scavenging and feeding on the natural range. These unimproved grasses are of low nutritional quality, this situation becoming worse in winter and during droughts.

The key long-standing challenge of the smallholder goat farmers is low productivity stemming from the lack of access to markets and improved livestock husbandry technology. Figure 4 shows the characterization of goat marketing systems and their products in Matobo district. There has been no particular incentive for farmers in goat marketing. Poor marketing system due to underdeveloped infrastructure, inadequacy of market space and unavailability of market information have been seen as the major constraints in improvement of small holder goat production. An appropriate marketing system will open up and act as a critical link between the small holder goat producer and the consumer. Most of the cases goats are sold to neighbours for cash and are traded at the farmers homestead. The goats are sold per head price not per kg on live weight because there are no scales. Farmers can sell their goats at any time of the year, however higher numbers are sold especially during festive seasons (ie christmas or new year). The prices are based on physical appearance, size, age and sex, and the prices are high during festive seasons. The findings further indicate that lack of access to goat markets reduces the market value of animals, and this hampers the ability of the farmers to convert livestock assets to cash and other physical assets. Farmers have no option but to sell their goats at the low farm gate prices. Therefore, there is need for a well established goat marketing system, this may incentivize the smallholder goat producers to commercialize their production and get maximum benefits. Community cohesion is key in community projects or initiatives. Lack of knowledge is reflected by the high proportion of respondents suggesting that they did not face any challenges with regards to either marketing or goat production, while observations were contrary to their statements. Sarupinda and Tavesure (2009) argued that the approach of intergrating goat market development with improved management technologies can build on previous experience such that of Cold Storage Company. The support from the company in goat production resulted in organised goat marketing and farmers benefiting from good prices. Assan (2011) suggested that given the right market incentives subsistence goat producers in Zimbabwe may move to a more commercial orientation with better management of their goats resulting in higher production and off take rates. There is great opportunity of commercializing smallholder goat production through market development initiative which encompasses the improvement of the overall goat production practices and an increase in the number of smallholder goat producers with a deliberate commercial orientation would be the priority of the whole program. Goat farmers do not seem to have any problem selling their goats as most are consumed at home. Individual buyers bought goats to meet urgent traditional needs or household obligations. Farmers preferred to sell to neighbours as they paid more than the middlemen. However, a market oriented approach will need organised marketing channels, services and facilities. Improved access to markets is a key precondition for the transformation of the goat sector from subsistence to commercial production. Smallholder goat farmers must be able to benefit more from efficient markets and local-level value-addition, and be more exposed to competition. The situation is that goat farmers are still grappling with marketing of goats, with markets being unavailable to serve the needs of the resource poor goat farmers.

Table 1
Results of variance analysis of characteristic analyzed in Rape varieties

Change resources	degree of freedom	height	Mean squares		weight of 1000seeds	seed's functioning	oil%	oil function
			no. of seeds in the shea	No. of seeds in the shrub				
Block	3	29/48ns	2/15ns	47/7**	0/007ns	1576/01*	0/04ns	234/32ns
Variety	5	1272/17**	101/57**	10286/34**	0/71**	287587/74**	6/85**	53109/08**
Error	15	41/88	2/61	8/34	0/003	376/9	0/17	174/16
Change's coefficient(%)		4/47	7/15	16/5	15/3	7/2	9/3	11/1

ns and ** are meaningful and non meaningful respectively at the level of possible percentage.

The extent of smallholders goat farmers' market access and benefits should be a major concern because smallholders still produce the majority of livestock. However, smallholders farmers themselves are partly to blame

because they are less organized, thus their ability to influence public policy is less; as well as their ability to organize for greater access to markets or services most of the time have been compromised. Improving marketing services and decreasing market barriers can increase the income of the rural poor through incentivizing smallholder goat farmers to increase productivity. There are many opportunities to increase support to goat production sector in Zimbabwe, to increase the income of the rural poor and sustainability of goat sector growth. Goat production is regarded as a feasible means to improve the income and nutrition of rural communities and to bring these communities into commercial marketing systems (Braker et al., 2002).

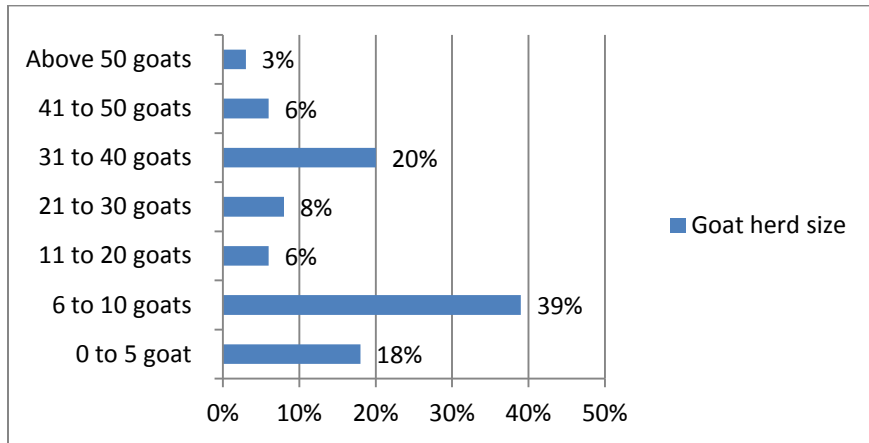


Fig. 1. Goat ownership and flock size.

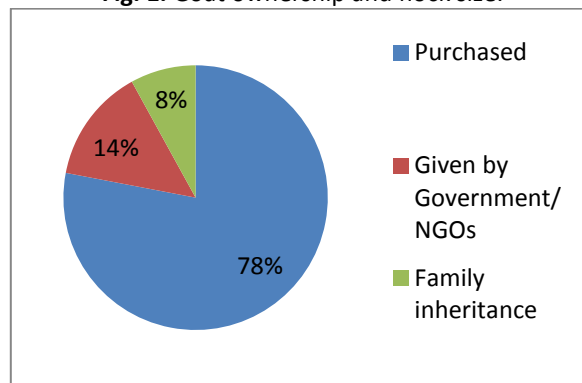


Fig. 2. Goat acquisition method.

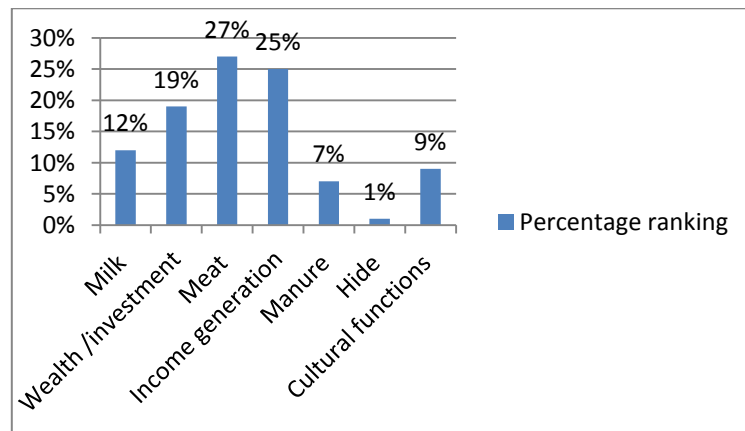


Fig. 3. Reason for keeping goats.

4. Implications

Smallholder goat production landscape is characterized by low factor productivity, and often also by practices that aggravate environmental problems. Support from government on goat production remained insufficient to adequately address poverty, attain food security, and lead to sustained growth in the sector. This is on the background that goats are widely distributed and contribute immensely as a major source of livelihood of the small farmer in rural communities in Zimbabwe. The high average flock size is an indication that goat population is increasing warranting greater attention to directly improve the diet and standard of living of the large number of rural smallholder farmers. The major concern is that goat productivity in the smallholder sector is still low. However, there are greater opportunities to improve goat productivity in the small scale livestock farming sector through establishment of appropriate marketing system. Results from this study shed light on flock characteristics and production limitations of the goat population in Matobo district guiding livestock policy makers in sustainable livestock production intervention. The intervention in goat production in communal areas continues to remain in a state of crisis, primarily due to the communal tenure system of grazing, severe overstocking and poor husbandry. This in general have resulted in overall livestock production indices being very low and mortality excessively high, While the government having invested considerably in cattle related infrastructure such as dip tanks nothing of that nature has been devoted to increasing goat production. The arms of the government provide livestock advice on cattle, but similar structures for sheep and goats are weak, despite the increasing in the population and importance of goats in the communal areas of goats. This anomaly has perpetuated the low livestock production indices due to the disregarding the contribution of goats in smallholder farming sector. The reliance on cattle which is a long term process, creates additional difficulties in the smallholder livestock production environment. In cases of disasters such as droughts which have continually hit the country cattle numbers take many years to recover than small stock. Since the herd size is small, one way of increasing it is by means of improved methods of production, that is, increasing output in a way that is economically worthwhile to the farmer and sustainable to the environment. The strategies to intensification and increase in output of goat production is the application of improved husbandry and marketing technologies which has been a thorny issue in goat disposal. Goat marketing has been mainly informal and farmers being abused by middlemen hence not realising sufficient income from sales. These measures of improving goat production are difficult to come by because of low income levels, inadequate resources and managerial skills as well as general socio-economic characteristics which, together, constitute production and marketing constraints in goat production. Appropriate strategies and testing of innovations of goats in smallholder goat farming sector requires an understanding of existing constraints relating to available resources, management practices, ownership patterns as well as marketing conditions. Given the several production and marketing constraints identified in that survey, it was observed that most goat farmers were reducing the number of animals they keep and were shifting towards crop production which seemed to offer a better alternative to subsistence life. The study can conclude that the ability of smallholder goat farmer to adopt a particular technology with which to increase productivity depends on the resources availability, socio-economic status as well as those factors outside the farmers' own control such as research and extension. Improved goat production is widely advocated to meet the increasing demands for livestock products and to contribute to improving the livelihoods of rural households. Whether or not individual households respond to these drivers depends on the availability of household resources, the family situation, and livelihood alternatives. As livestock systems intensify, the relative importance of the various functions of livestock changes. Goats are an appreciated activity, or an essential source of security and small income for the very poor and vulnerable groups. The potential of improving goat production systems to substantially increase incomes of rural households appears to be untapped. Innovations in goat production and marketing will only be adopted by smallholders if they fit farming household priorities and resources. The results of this study provide strong justification for using goat production to alleviate poverty and food insecurity in rural poor households in the semi arid areas of Zimbabwe.

5. Specific recommendations

- There is need for dialogue between the government and other stakeholders in the livestock production sector to have joint planning and implementation of goat oriented programmes as a viable livelihood strategy for smallholder farmers under semi-arid regions of Zimbabwe

- Infrastructure development and development of organized markets, where smallholder goat farmers can sell their goats and goat products should be identified. In this case accessibility and market information is crucial. This will increase farmers market participation which on the other hand strength the farmers capacity at the expense of the exploitative middlemen. Providing an opportunity to the farmers to generate more income, and hence improve their livelihoods is imperative.
- For effective health management, farmers should be able to diagnose, prevent and treat the most common animal diseases. However, it was observed that farmers were often unable to identify diseases and causes as well as to determine appropriate treatment. This shows a critical knowledge gap and need for improved access to basic information on the most common diseases and their seasonal prevalence.
- The Government/NGO's should also adopt a participatory approach in introducing new technologies in goat production. The group approach plays a key role in problem solving and fund generation for such initiatives.
- The need for establishment of goat abattoirs or processing plants close to production areas and in various towns to broaden the market as well as providing improved goat meat market access to farmers is overdue. Abattoirs, livestock markets and roads, are required so that the animals can be bought and sold. Abattoirs provide an opportunity for producers to directly supply animals for export.

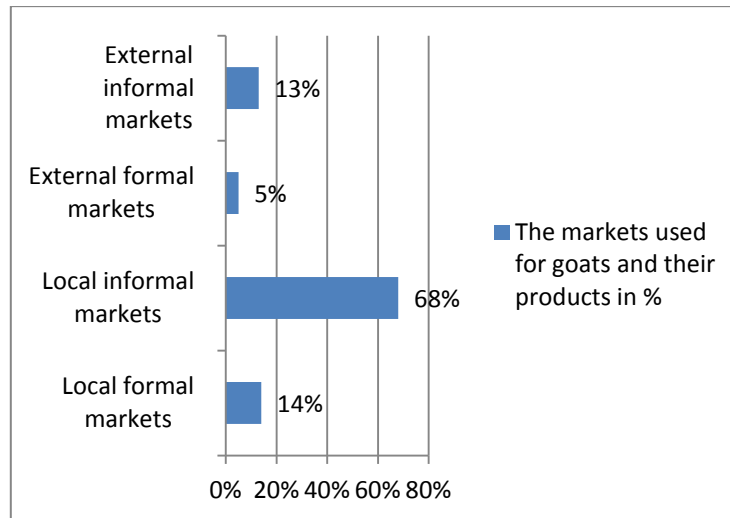


Fig. 4. Markets characterization and product output.

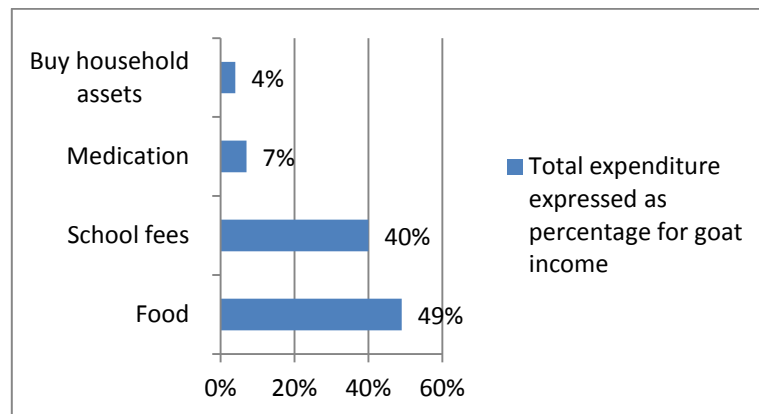


Fig. 5. Total expenditure expressed as percentage for goat income.

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