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Issues and concerns in pro poor community based cattle breeding program in Bulilimamangwe district of Zimbabwe

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A R T I C L E   I N F O

A B S T R A C T

Cattle rearing plays a crucial role in the semi arid communal areas of Zimbabwe, as a result any developmental strategy that is aimed at improving household livelihood in these areas should target cattle production. The objective of the study was to assess the impact of introducing improved indigenous cattle beef breeds in Bulilima District of Matabeleland South in Zimbabwe. The study was carried out in Masendu ward comprising of six villages of Luvuluma, Mambo, Tjeboroma, Makumbi, Thandawani and Muke. A random sample of 13 livestock farmers were selected from participants of the Kellogg Foundation communal areas indigenous cattle (Tuli, Afrikaner and Nguni) improvement program through a donation of improved indigenous beef cattle bulls. Semi-structured questionnaires were used to collect data on household demographics, socioeconomic factors, herd structure, management practices and constraints in cattle breeding program. Qualitative data were coded and analyzed using the Statistical Package for Social Sciences (SPSS 2008) computer software in order to generate descriptive statistics such as means and frequencies or percentages. The study revealed an interesting scenario on household demographics; the majority of the farmers had formal education, with only 7.7% not having attained any formal

education. As a result of Kellogg Foundation bull donations some farmers (15.4%) increased their herd size to more than 30 cattle which improved their social status in the areas. Farmers interviewed showed that they were motivated to keep improved breeds with least more than half of the farmers reporting that the bulls to a certain extent increased the number of cows serviced within the community herds. Poor animal condition was reported in cattle herds due to the inadequate supply of both water and nutrition, the latter being caused by lack of good grazing. It was noted that government support was necessary in infrastructure development in order to improve community based cattle breeding programs. The need to organise market to encourage smallholder farmers to sell their animals was also cited. There was a belief that better prices were achievable at local markets if the communal herd was genetically improved for important economic traits. Therefore, the key conclusion was that communal farmers had a positive perception on improving the communal cattle herds. This warranted a multi-sectoral approach to address different challenges that militate against high cattle productivity in communal areas.

1. Introduction

Indigenous cattle breeds constitute an important reservoir of genetic material which Zimbabwe has failed to give adequate recognition (Assan, 2012). This is on the background that indigenous cattle genetic resources are critical component of livestock production in small scale farming sector, being mostly utilized for beef production. Livestock industry contributes an estimated 15- 20% of value of total agricultural output occupying an important position in the national economy (Agrisystems, 2000). Between 1970 to 1980, cattle holding in Zimbabwe were that communal farmers owned 70% of beef cattle, with remainder on commercial (CSO, 2000). The off take of beef cattle calculated as the number of cattle sold or slaughtered as a proportion of total holdings, was 1-3% for communal sector and 15- 24% for commercial sector (Mhlanga, 2000). It is estimated that Zimbabwe could carry 6.5 million head of cattle on a sustained basis and given the application of known technology, annual production could reach over 900 00 head (Zimbabwe Herd Breeders Association, 1991). There is a large variation in genetic makeup of the indigenous beef cattle population in the communal areas, which determine their beef production potential and contribution to the country formal meat market. Despite the communal areas being the home of majority of the indigenous cattle population, over the decades there has been a conspicous absence of organized community based cattle breeding programmes in Zimbabwe. The introduction of some exotic breeds in an attempt to upgrade the local cattle population has totally failed due to a variety of reasons. Lack of knowledge on the physical characteristics of indigenous cattle population and the extent of genetic diversity through pressures to increase production have led to underutilization, dilution and replacement of animal genetic resourceses in Sub Saharan Africa (Rowlands et al., 2003). There is an urgent need to improve productivity of local cattle genetic resources through reproductive technologies, conservation or mantaining of local breeds integrity, while at the same time consideringng biological and socioeconomic aspects of the existing production system. In practice, this implies that taking into account appropriate definition of breeding objectives, determining selection criteria, recording performance and carrying out evaluation to design optimal mating systems that take cognisance of the challenges of the target communities. Technological adjustment and greater consideration for community based cattle breeding programmes have brought new opportunities for integration of low and medium input livestock production systems in other regions (Galal et al., 2002). The purpose of this study is to explore the issues and concerns of a pro poor small scale cattle breeding programme in Zimbabwe.

1.1. Statement of the problem

There is general lack of improved and adapted cattle genetic material suited to the needs of the resource poor communal farmers in Zimbabwe. This is on the background that there has been reluctance in improving indigenous cattle breeds for use in communal areas. A demand for an appropriate strategy to address low productivity and off take in the communal areas led to the introduction of unsuitable high-maintenance imported breeds into communal areas, but with little success. Imported breeds, however, lack adaptation traits necessary for survival and production in the rigorous environment of the communal farmer.

1.2. Justification

The indigenous cattle populations are diverse with unique genetic attributes such as adaptation to heat and drought, tolerance to diseases and utilization of low-quality forages, and the majority of cattle population in Zimbabwe are indigenous. However, despite this immense diversity, their contribution to the formal meat market is generally low. It is assumed that the gap created by the repossession of beef commercial farms resulting in decrease in meat sales from the commercial beef sector provides an opportunity for the communal beef herd to participate in mainstream cattle breeding programs through increasing cattle off take to the formal beef market. This is can only be achieved through dissemination of improved indigenous cattle genetic material into the communal areas.

1.3. Research questions

1. What is the socioeconomic impact of introducing improved indigenous cattle bulls in the communal herds ?
2. What are the cattle management challenges faced by the farmers by introducing improved indigenous cattle bulls in the communal herds?
3. Can farmers' breeding objectives be fulfilled by introducing the improved indigenous cattle beef bulls?
4. To what extent has the introduction of improved cattle breeds impacted the livelihoods of the smallholder livestock farmers?
5. Can a newly introduced bull from high management environments compete with locally adapted bulls and successfully mate with local cows?

1.4. Objectives

1. To assess the performance of improved indigenous beef bulls (Tuli, Afrikaner and Nguni) in extensive farming systems of Bulilimamangwe district of Zimbabwe.
2. To determine farmers' breeding objectives and perceptions on introduction of improved breeds in the communal areas of Bulilimamangwe district of Zimbabwe.
3. To identify the constraints to the improvement of communal cattle herds through the introduction of improved bulls.
4. To establish the opportunities available to improving livestock production in the communal areas using improved indigenous cattle breeds.

2. Materials and methods

2.1. Study area

Bulilimamangwe area is situated in the South-West of Zimbabwe along the border with Botswana. Bulilimamangwe was previously one district in 2002 which was split into three districts namely; Mangwe, Plumtree and Bulilima (Mahati et al, 2008). It is found in the agro-ecological zone IV of Zimbabwe which is mainly suitable for livestock extensive farming. The districts receives annual rainfall of between 450mm and 650 mm, while temperatures are high, reaching a maximum of 400C during summer months and an average of 13oC during winter. It is subject to periodic seasonal droughts. The low rainfall makes the district uncertain for any significant cash cropping and traditionally most of the population relies on livestock production and the growing of a few drought resistant crops (Moyo, 2002). The six village studied were in Masendu Ward, namely; Masendu Central, Mambo, Tjeboroma, Luvuluma, Makumbi and Thandawani.

2.2. Data collection and analysis

Semi-structured questionnaires and interviews with key informants were used to collect primary data. The questionnaires were administered in early August, 2014 to randomly selected 13 farmers. The questionnaire was designed to capture information   on house demographics, production parameters, herd dynamics, new infrastructure developments and management practices. The qqualitative data were coded and analyzed using the Statistical Package for Social Sciences (SPSS 2008) computer software in order to generate descriptive statistics.

3. Results and discussion

3.1. Household demographics and education of individual farmers

Household demographics are summarised in table 1. The results showed that the majority of the households (76.9%) were male headed and only 23.1% were female headed households. 23.1% of the respondents had secondary education with only 7.7% not having attained any formal education. The highest level of education group had attained primary education which constituted 69.2%. It is expected that with this education base cattle production may thrive in this area. Education is a paramount to agricultural development as it enables people to acquire knowledge and skill to make informed decisions about their social and economic situations. The experienced cattle production households entails that individual farmers are likely to be more productive and readily accept and initiate, and manage development projects (Mapiye et al 2009; Musemwa et al 2010), which might have had a positive impacts on cattle productivity. It is assumed that literacy level in the studied sample population translates to better understanding of what information is required in general cattle management. On the other hand the fact that the majority of the households were male headed might influence gender disparities in decision making about management of the household cattle herds. The glaring gender disparities in livestock production are largely attributable to a range of multifaceted, though often subtle, communities and societal challenges women routinely face that cut across institutional, social, and cultural dimensions. Taken together, these disparities culminate into a bundle of negative effects that can limit women's participation in livestock production (Assan, 2014). Strategies and planning of cattle breeding developmental models that take account of a gender dimension in livestock development policies should be reference guide for future rural sustainable livestock development programs and projects. In this case, it is imperative to make a distinction among the types of responsibility that women have over cattle: ownership, control over decision-making, use rights and provision of labor in cattle production. According to an extensive study by ILRI of the 600 million poor livestock keepers in the world, around two-thirds are women and most live in rural areas (FAO, 2011a; Thornton et al., 2002). Limited participation of rural women in livestock value chain activities results from a fundamental misunderstanding of gender relationships but also the socio-economic and cultural roles of livestock at the household and community levels (Laven et al. 2009; Coles and Mitchell, 2011). To date, an understanding of women's role in livestock production in developing countries has been limited by cultural biases that underestimate women's contribution. Scientists and development workers have tended to concentrate on male-oriented activities (beef production, large-scale enterprises, etc.), thus neglecting those activities that women are generally engaged in, notably, milk production, the raising of small stock and poultry, meat and hide processing, etc. Therefore, removal of the social and economic barriers which influence the under estimation of women's potential in cattle production will contribute immensely to increase livestock productivity in general.

Table 1

Household demographic information on households.

Characteristic		% of Farmers
Sex	Male	76.9
	Females	23.1
Age ranges	50-60	30.8
	61-70	23.1
	71-80	30.8
	81-90	15.4
Level of education	No formal education	7.7
	Primary education	69.2
	Secondary school	23.1

3.2. Livestock population dynamics

The majority of the farmers in the villages studied were engaged in cattle production although there wasdifferences in the period of practice. The study revealed that the majority (46.4%) of the farmer had cattle production experiences which span for 36 to 45years (Table 2). The second highest category had 46 to 55 years of cattle production experience, with 15.4% noted to have between 5 to 15 years of cattle production experience. The number of herd size differed from household to household before and after the implementation of the cattle breeding project. 56.6% of participating farmers had 1 to 3 cattle before the bull donations, while after bull donation farmers owned up to 30 cattle (Figure 2). The farmers responses pertaining to donated indigenous improved bulls adaptability to the local condition the study revealed that 53.8% of the respondents reported that the donated cattle wel adapted to the environment, while 46.2% declared the inability of the bulls to adapt to the local environment. In Makumbi village the donated bulls died in same year of donation while in the other villages started experiencing animal death after the third year after donations. It was reported that most of the deaths (60%) were associated with drought period. An interesting finding was that the Afrikaner bulls were the only surviving bulls. Lumpy skin disease contributed to 20% of the deaths with 20% of the deaths caused by blackleg. Drought was a key event cited by Khombe et al (2011) that could have impacted negatively on cattle production in the area resulting in losses to donated bulls.. It has been noted that every 5years there is a drought in the area which has affected the grazing lands species composition. The grazing areas constitute more of the unpalatable species which could not sustain appropriate growth in animals. Many of the bulls which died were due to drought. The findings are also supported by Zim VAC (2013) observed that drought caused the highest number of cattle losses in Matabeleland South and other losses were due to lumpy skin and black leg diseases. However, despite the improved indigenous bulls not surviving the harsh ailments (drought and diseases) of the environment they managed to sire offspring in the low management system.

Table 2
Year and cause of death of the donated improved beef bulls.

Village	Year of death	Cause of death
Luvuluma (Afrikaner)	*	*
Makumbi (Nguni)	2007	Blackleg
Mambo (Tuli)	2010	Drought
Masendu Central (Tuli)	2010	Slaughter due to poor condition
Masendu Central (Muke) (Afrikaner)	2010	Drought and eye infection
Thandawani(Afrikaner)	*	*
Tjeboroma (Tuli)	2010	Lumpy Skin Disease

*indicates the villages with no loses in bulls due to death.
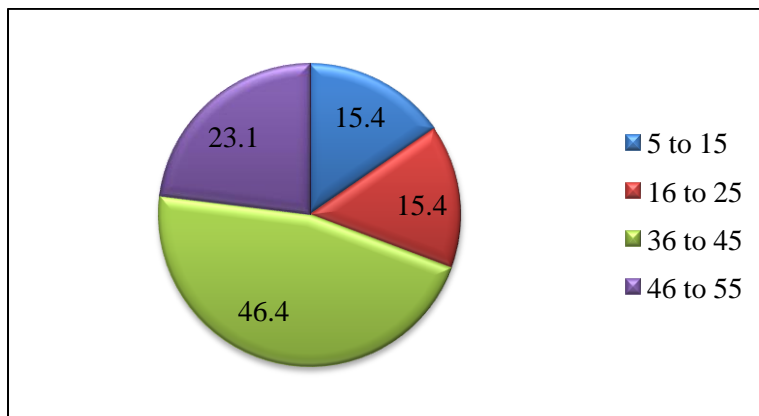

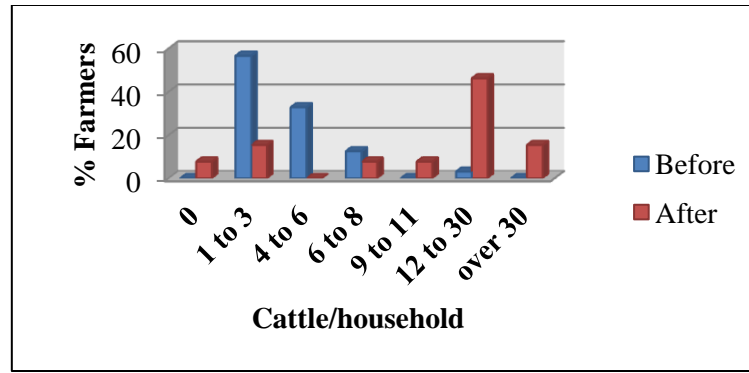**Fig. 1.** Farmers cattle production experience.

Fig. 2. Cattle herd dynamics before and after the project .

3.3. Bull productivity in the program

Figure 3 shows the number of offspring per bull for the farmers interviewed. The highest number of progeny from one of the donated bulls was 15 calves of which 10 were females and 5 were males. The second highest calves from one bull were in descending order 8 and 7, respectively. The other bull did not manage to sire any offspring. Plate 1 and 2 shows the progeny from some of the bulls. Findings show that Masendu ward is afflicted by droughts and this is in agreement with the key events of Masendu ward outlined by Khombe et al (2011) showing that in every 5years there is a drought in the area. The majority of the improved beef bulls died in the same year (2010) due to drought in the previous year. According to USAID (2010) the whole country had received fair rains giving a wet spell in the first dekad of April 2010 thus improving the grazing conditions and availing animal drinking water. Therefore the death of the bulls might be attributed to supposedly severe drought that left the bulls unable to thrive well even if forage was now in abundance after the rains. The findings are also supported by ZimVAC (2013) who found drought to cause the highest number of cattle losses in Matabeleland South. Other deaths were caused by diseases (LSD and Q.E) which the farmers reported were prevalent diseases in the area.
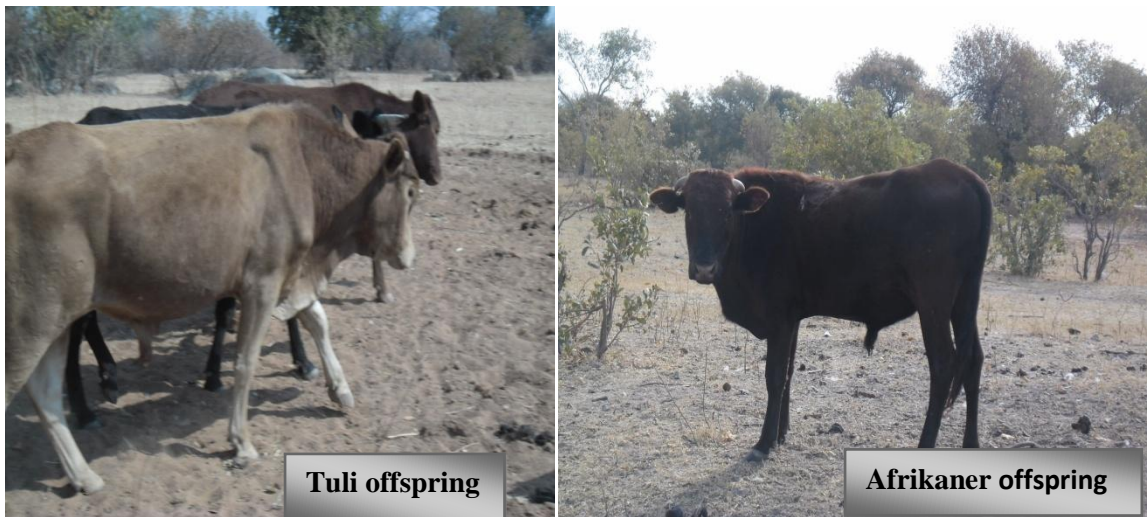

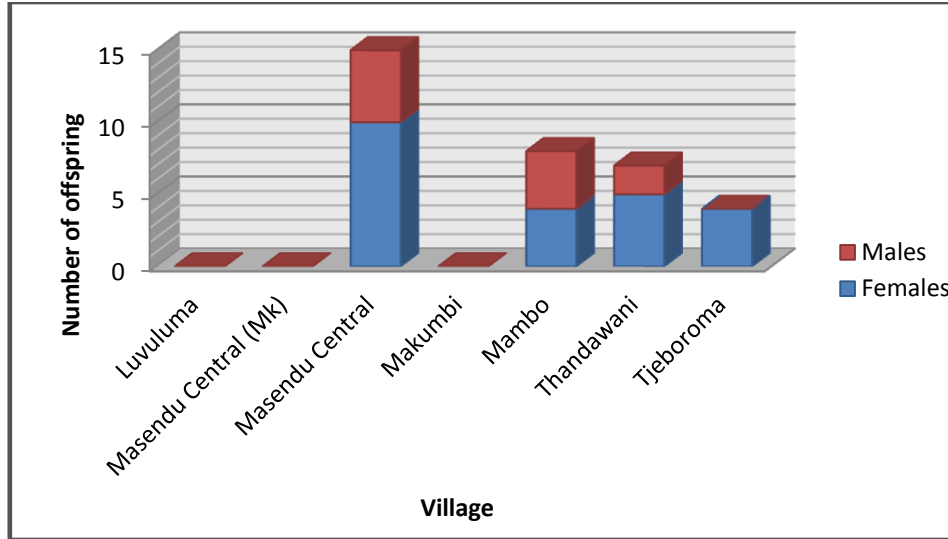**Plate 1 and 2.** Offspring form the improved bulls.

Fig. 3. Progeny sired in different villages.

3.4. Breed composition

Figure 4 shows that before the donation of the improved beef bulls the majority of the farmers (75%) kept non descript breeds with the rest keeping cattle of the Nguni breed. Notably, after the intervention some farmers (33.3%) had a mixture of non descript breeds and Afrikaners while others (33.3%) now had a combination of Tuli, Afrikaner and non descript breed and the remaining 33.3% had a mixture of Nguni and non descript breed types. 66.6% farmers had offspring with the Afrikaner blood within their herds. Prior to the introduction of the Tuli, the majority of the farmers (50%) in some villages had non descript breeds while some farmers (12.5%) had solely Nguni breeds and others (12.5%) had a combination of Tuli and Nguni breed types while the rest (25%) had Brahman and non descript breeds. After the introduction of the Tuli breed various combinations of breeds emerged, namely; Tuli, Brahman and non descript, Tuli, Nguni and non descript, Tuli and Brahman, Tuli and Nguni, Tuli and non descript as well as the combination of 'Tuli, Nguni and Brahman. Notably, after the intervention all the farmers in area 2 had the Tuli breed within their herds. A total of 75% of the farmers interviewed had the Tuli breeds within their herds. The result in the study point to the fact that farmers in the study area practiced uncontrolled breeding. Nqeno (2008) found that 90% of the communal livestock farmers practice uncontrolled breeding which supports the present findings. The bulls were introduced into a system which had already other bulls on non descript nature due to random mating. It can be concluded that the donated bulls increased the herd sizes for some of the beneficiaries. In certain cases it might be assumed that the low number of offspring from the donated bulls was due to more aggressive horned communal bulls driving away the docile donated bulls resulting inability to contribute to the genetic pool.
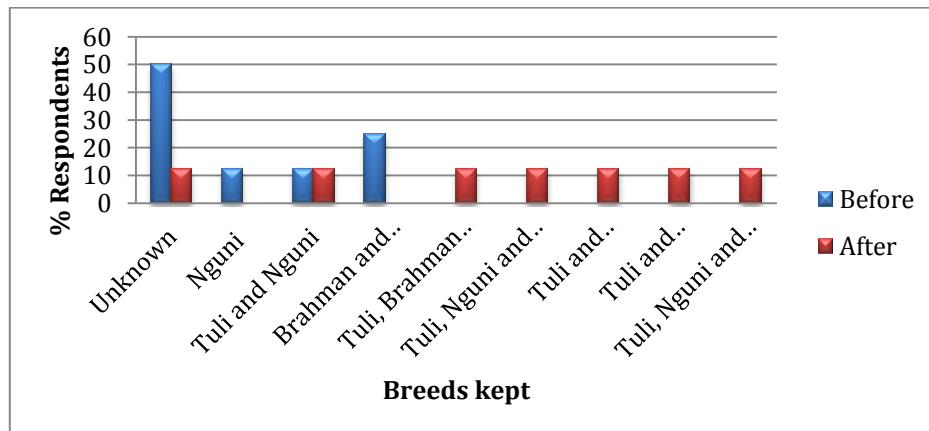

Fig. 4. Breeds composition in different villages before and after implementation of the project.

The preferred bull traits were associated with the farmer's breeding objectives. Docile temperament and disease and tick tolerance were rated highly as desirable traits by majority (61.5%) of the livestock farmers (Figure 4). A few respondents reported prepotency (ability of the bull to stamp out its characteristics into the offspring) as a desirable characteristic in the bulls. However, the characteristics contributed by the bulls to the communal herds showed that conformation and growth rate were the most desired traits by the farmers (53.8%). There was an agreement from most interviewed livestock farmers that the introduction of improved indigenous stock may act as an appropriate livestock intervention strategy that will help increase the genetic merit of the communal herds and provide a cornerstone for future benefit stream. There was a small group of livestock farmers who thought that cattle horns should be part of the objectives of keeping cattle in communal areas due to their importance for traditional or cultural ceremonies; however they did not affect the market value of animal. This confirms the notion that smallholder farmers lack knowledge about traits of economic importance traits that affect the market value of the beef cattle (Bhosale, 2010). Figure 6. shows the purpose of keeping bulls in the herd. The majority of the farmers interviewed were motivated to keep improved breeds with least number reporting that the bulls to a certain extent increased the number of cows serviced within the community herds.
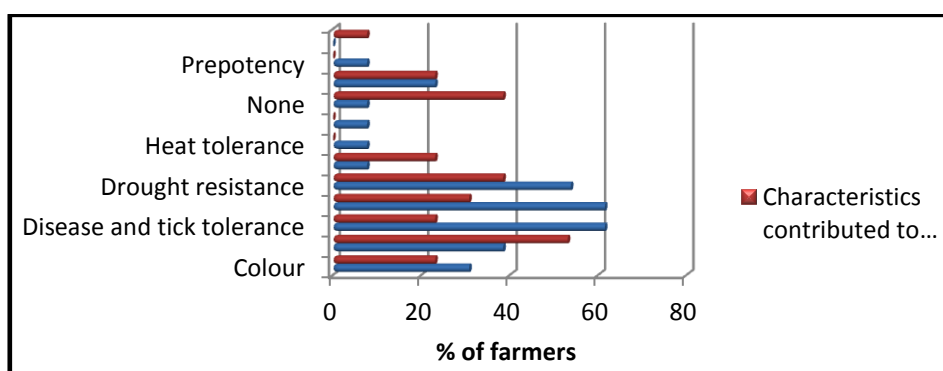

Fig. 5. Breed characteristics attributed to the breeding objectives of the farmers.

3.5. Cattle marketing

Most livestock farmers studied preferred to sell their cattle at auctions. Similar findings were reported by Musemwa (2010) working with smallholder livestock farmers in Zimbabwe. Butcheries and intermediate cattle buyers were offering low prices in order to maximize profit. Cattle auction had an advantage because it did not discriminate on breed lines, only considered traits such as body weight and body condition scores. However, it is generally known that improved breeds attain mature weights faster than the indigenous or non descript breeds due to high growth rate, hence the reason that genetic improvement is sort in smallholder cattle production. A smaller portion of cattle farmers used the farm gate prices due to inaccessibility of the markets or lack of knowledge on marketing channels. However, other farmers did not sell animals due to small herd sizes. Most of the farmers in ward favored the auction marketing system (46.4%) and a few farmers used the farm gate marketing channel. On farm gate marketing cattle were sold to mostly neighbors and nearby butcheries. 15.4%) used both the farm gate and auctions as their marketing channel and 23.1% of farmers did not market their cattle. The communal farmers were however motivated to keep improved breeds even though their perception about the results of the program would take long to be felt. A total of 84.6% report that they were motivated to take part in similar breeding schemes and recommended a similar breeding scheme for other wards in the communal area. Although some (24%) thought that the introduction of the cattle breeding project had brought social conflict amongst farmers.

Cattle production and associated products offer significant opportunities for economic growth and poverty reduction, especially among the smallholder livestock farmers. However, smallholder cattle producers are characterized by low levels of market information and participation. Among many reasons cited in the literature, smallholder farmers do not participate in cattle markets because of remoteness of producers from the main urban market centers, and poor road infrastructure that result in high transport costs. Understanding the determinants and cattle marketing behavior of small holder farmers will contribute to the knowledge gap

regarding why poverty remains high even among households participating in smallholder cattle breeding programs. Small-scale cattle producers in Zimbabwe could climb out of poverty by taking advantage of the explosive growth in demand for livestock products in the formal meat market. The rising populations, incomes and urbanization, has created new market opportunities for livestock products, particularly in formal domestic markets. These high-value markets provide farmers with higher prices, greater diversity of sales destinations, and more opportunities for future growth. However, the lack of access to cattle production technologies required or to information about end-market demands, exacerbated by dilapidated infrastructure makes smallholder cattle farmers unable to penetrate the growing formal meat markets. The public policies in general favor large producers and market agents over smallholder livestock creating barriers to breaking into high-value meat markets. Small-scale cattle producers need pragmatic and cost-effective options that reduce these barriers. Low level of public investment in the cattle production sector is detrimental to the interests of majority of poor cattle producers. There is need for a conducive policy environment to enable poor cattle producers to secure livestock assets, inputs and technology and to improve their access to output markets.

3.6. Cattle production constraints

77% of respondents cited inadequate grazing land and water shortages as major constraints to cattle production in all the villages studied (Figure 7). There were few boreholes and dams for use by the communities for drinking purposes and their livestock. Water shortages resulted in farmers working long distance of watering points affect cattle performance. The shortage of water also reduces the dipping frequencies thereby putting the cattle at risk of tick-borne diseases. Increasing human population reduces grazing land in favor of crop production, unclear and disorganized grazing rights and regimes contribute to poor livestock condition and degradation of land. Periodic droughts have been a constant setback to the sustained development of the beef industry (Revised Livestock Policy, Ministry of Agriculture, August 2007) and had a negative effect on the conception and calving rates in the past 10 years, with national fertility levels estimated at below 50%. This is primarily due to poor condition of animals as a result of continued degradation of the communal grazing lands and poor management practices.
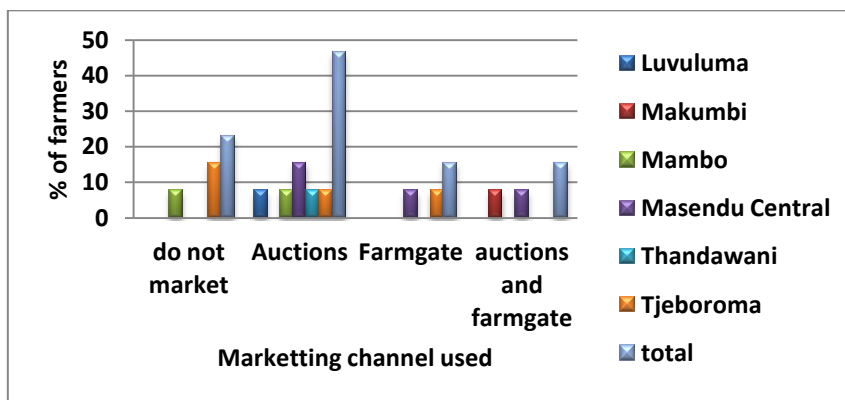

Fig. 7. Cattle marketing channel.

Lack of government extension support on cattle production information was cited by 15.4% of the livestock farmers while diseases incidence was reported by 7.7% as one of the challenges in cattle production. The farmers suggested increased extension services contact hours may result in improved cattle productivity in the area. Provision of extension and veterinary services is the major prerequisite for effective breeding programs through equipping farmers with the necessary knowledge on the best management practices as supported by Kosgey (2004). A total of 53% of the farmers suggested that drilling of boreholes and constructing dams will improve cattle production in the area. Donation of bulls could also take into account the age of bulls where young bulls were suggested for donation. Cattle assessment before they are introduced into a new area and castration were also suggested to help improve the adaptation of the improved breeds in the low management systems. Poor animal conditions are observed in the cattle due to the inadequate supply of both water and nutrition, the latter being caused by lack of good grazing. Shortage of grazing land means that there is limited forage availability

(Ngongoni et al 2007; Tavirimirwa et al 2013).The performance of the improved bulls was affected by inadequate supply of feed resources, both in quality and quantity (poor nutrition) and this in agreement with Lebbie (1996) who states that nutrition represents one of the most serious limitations to livestock production. Bester et al (2001) observed that in addition to shortage of feed resources excessive high stocking rates in the communal area compromise cattle productivity. It is important to note that cattle production sector in Zimbabwe has undergone major changes since the turn of the century, not least as a result of major changes in the way the agricultural sector has been restructured since the advent of the Fast Track Land reform Programme (FTLRP), combined with considerable fluctuations in macro-economic performance. This has resulted in significant shifts in ownership, use and management of livestock, with concomitant effects on animal disease management, marketing and production. The current cattle population is estimated at 5.3 million heads and 92% are owned by smallholder farmers (Sibanda, 2009). It is estimated that about 650 000 heads of cattle are found in A2 farms and former commercial farms, compared to 2.9 million cattle in the commercial farms in 1999. In the country's agricultural planning systems, some specific geographical areas such as Matabeleland North and -South, Midlands and Masvingo Provinces are designated as having comparative advantages for beef production but attaining commercial production and productivity levels among smallholders remains a challenge. Smallholder cattle producers traditionally tend to hold onto their livestock as a hedge against inflation, for draught power and a source of manure and milk.

4. Implications

Zimbabwean resource poor cattle farmers generally lack improved indigenous adapted genetic material suited to their needs. This predicament is particularly heightened in communal areas where indigenous breeds have been replaced by exotic breeds and their crosses which are generally less appropriate and less adapted to the harsh conditions. Basically, problems like low bull/cow ratios, substandard quality of the bulls and very low calving percentages have escalated due to the erosion of the original adapted stock resulting from haphazard replacement or crossing with unsuitable high maintenance exotic breeds in the rural communities. The introduction of this inferior stock into communal farming systems is causing a serious degradation of the genetic resource base. Dissemination of improved stock or crossbred stock to farmers has been carried out with subsequent mating occurring, often uncontrolled and in various directions however, performance data is unavailable for the estimation of the breeding values. Adequate information also has not been gathered on genetic improvement obtained in areas of dissemination and the impacts of such breeding programs have not been assessed. The study established that to a certain extent the bulls' had an impact on the genetic merit of the beneficiaries' herds as seen by the occurrence of the breeds within their herds. The improved indigenous cattle provide the cornerstone for the future livestock productivity in the context of projected climate change and variability. These can provide the missing link to bridge the gap in cattle genetics, adaptation to heat and nutritional stress. Crossbreeding within the improved indigenous cattle may also be visible option. However, there is need to address the myriad of challenges associated with smallholder cattle production which include lack of funding, improved water and grazing land. Drought mitigation strategies need to tackle the issue of perennial drought which is one of the major setback in livestock production in semi arid areas of Zimbabwe. The non availability of infrastructure like properly fenced paddocks have encouraged uncontrolled mating within the community this might arrest realizing any genetic progress in the cattle population. It is believed that cattle breeding impacts can only be significant if extension support services are adequate. The population dynamics in the study reflect the patterns of cattle ownership and a simple cattle breed improvement trends which if supported may result in matching appropriate animal genetic resources to smallholder production system. The study points to the fact that improved cattle management practices in smallholder cattle breeding programs is vital. There is room for engaging smallholder farmers through improved indigenous cattle breeds under low input systems.

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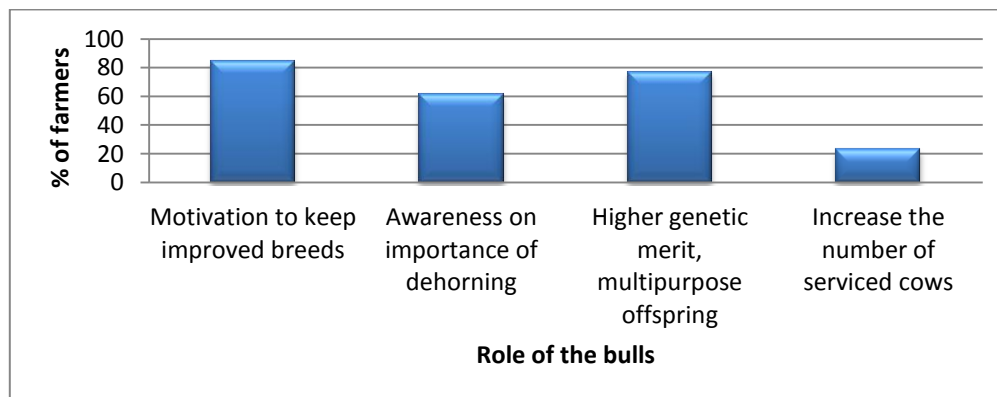**Plate 3.** Male offspring from the prepotent Tuli bull donated to one of the villages.

Fig. 6. Purpose of keeping bulls in the herd.

Table 3
Management practices.

| Management practice		Farmers (%)
Feeding strategy	Natural pasture only	8.3
	natural pasture, crop residues, pods and commercial feed	16.7
	Natural pasture, crop residues and commercial feed	50
	Natural pasture and commercial feed	25
Prevalent diseases	Blackleg (Q.E)	61.5
	Blackleg and Lumpy skin disease	38.5
Diseases vaccinated against	Blackleg	58.3
	Blackleg and Lumpy skin disease	25
	Blackleg, Botulism and Lumpy skin disease	16.7
Cause of Mortality	Blackleg	75
	Drought	16.7
	Blackleg and unknown condition calves	8.3
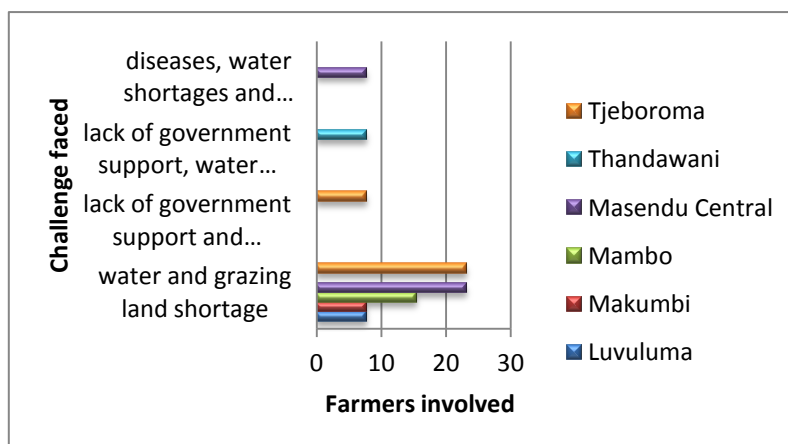
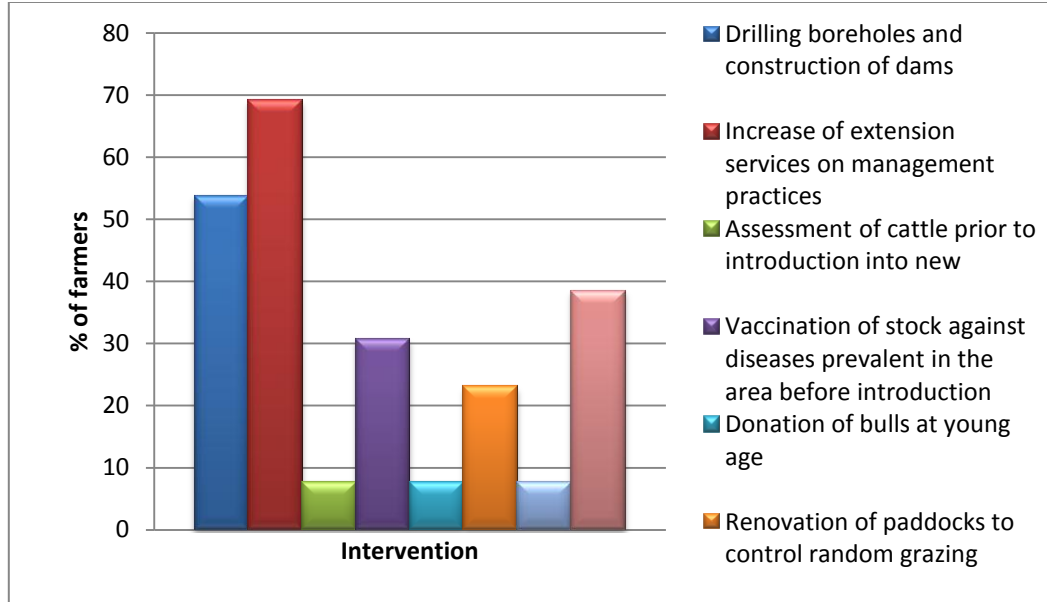**Fig. 8.** Cattle production constraints.

Fig. 9. Suggested intervention strategies in small scale cattle production program.

Plate 7 and 8. Sources of water for livestock and the community.