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ORIGINAL PAPER

Communal goat production in Southern Africa: a review

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Abstract Despite the fact that about 64% of goats in sub-Saharan Africa (SSA) are located in rural arid (38%) and semi-arid (26%) agro-ecological zones and that more than 90% of goats in these zones are indigenous, information on indigenous breeds is inadequate. This paper reviews the social and economic importance of goats to the communal farmer and assesses the potential of using goats in rural development in Southern Africa. Farmers in Southern Africa largely use the village goat management system. There are various goat breeds in Southern Africa, of which the Mashona, Matabele, Tswana, Nguni and the Landim are the dominant ones. It is, however, not clear if these breeds are distinct. Major constraints to goat production include high disease and parasite prevalence, low levels of management, limited forage availability and poor marketing management. Potential research areas that are required to ensure that goats are vehicles for rural development include evaluation of constraints to goat production, assessing the contribution of goats to household economies and food securities throughout the year, genetic and phenotypic characterisation of the indigenous breeds to identify appropriate strains and sustainable methods of goat improvement through either selection or crossbreeding.

Keywords Indigenous goats · Goat characterisation · Goat production systems · Goat productivity

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Introduction

The goat world population is estimated at 746 million (FAOSTAT 2003), with 96% of these being kept in developing countries. Of the 223 million goats in Sub Saharan Africa (SSA), about 64% are found in arid (38%) and semi-arid (26%) agro-ecological zones (Lebbie and Ramsay 1999) with the majority (more than 90%) being owned by smallholder farmers (Lebbie 2004). In South Africa, however, 50% of the country's population is kept under small-scale conditions (Shabalala and Mosima 2002). Smallholder farming systems are characterised by minimal resources in terms of land and capital, low income, poor food security, diversified agriculture and informal labour arrangements derived from family members (de Sherbinin et al. 2008), with some non-agricultural activities to supplement household incomes. In the low rainfall communal areas of Southern Africa, goats represent the principal economic output, contributing

a large proportion of income of the resource-poor farmers (Ben Salem and Smith 2008). Regardless of such contributions, village goats are neglected by researchers, veterinarians, extension workers, sources of credit and various other stakeholders (de Vries 2008) leading to lack of improvement in productivity of these invaluable genetic resources.

The goat genetic resources in Southern Africa are reputable for their hardiness (Kouakou *et al.* 2008), prolific breeding (Simela and Merkel 2008), early attainment of maturity and the low requirement for inputs (Olivier *et al*. 2002). Furthermore, goat meat contains less fat and cholesterol than most other types of meat (Saico and Abul 2007) with desirable fatty acids since goats have the ability to deposit higher amounts of polyunsaturated fatty acids (PUFA) than other ruminants (Koyuncu *et al*. 2007). In addition to provision of tangible products, goats contribute towards the livelihoods of the poor through risk mitigation and accumulation of wealth (Peacock 2005). Therefore, goats are an ideal vehicle for generating cash returns to meet food security needs and improve welfare among communal families. This review discusses challenges and opportunities to goat production in communal areas of Southern Africa. It also highlights research aspects required to improve communal goat production.

Importance of indigenous goats

Communal goats fulfil multiple roles that include the provision of meat, milk, manure, skins, cashmere, mohair (Haenlein and Ramirez 2007), draught power (Saico and Abul 2007) and barter trade (Morand-Fehr *et al*. 2004). Goat skins are used to make mats, water/grain containers, tents and drums (Peacock 2005). A survey by Yaron *et al*. (1992) in Namibia revealed that goats, together with cattle, are used as investments and status symbols. Goats, thus, generate income among communal households through sales of goats and their products. Improvement in goat production and commercialization of goats can create employment for people as individuals are hired to process and sell goats and goat products.

Goats play a pivotal role in traditional ceremonies (Simela and Merkel 2008). They are also useful in controlling bush encroachment in the veldts of Southern Africa (Saico and Abul 2007). Goats can also be exchanged or loaned to neighbours to enhance kinship ties (de Vries and Pelant 1987). In other communities, goats are used for guiding sheep during herding of the latter (Peacock *et al*. 2005). However, the actual contribution of goats at household level is not well known because the current valuation systems rely on monetary standards that often ignore the non-monetary contribution of goats to households. Information on the real contribution of goats to human food security and livelihoods is scarce (Saico and Abul 2007).

Goat populations and distribution

In most countries in Southern Africa, goats are the second most important livestock species after cattle (Lebbie and Manzini 1989; Shumba 1993; Panin 2000; Devendra 2006). The goat populations and proportions found in the rural areas in selected countries in Southern Africa are shown in Table 1. A study by Jackson (1989), in South Africa revealed that goat ownership is widespread amongst communal farmers, unlike cattle ownership which is skewed with the top 10% of stockholders owning over 50% of the total herd in communal areas. In a communal area in Botswana, Panin (2000) indicated that 85% of the households reared goats while only 40% kept cattle, indicating that the ownership of goats is also less skewed than cattle ownership. With over 90% of the goats in most countries of Southern Africa in the smallholder sector (Table 1), goat-based development programmes are, thus, likely to benefit more people compared to programmes involving cattle.

Indigenous goat breeds in Southern Africa

Indigenous goats are valuable reservoirs of genes for adaptive and economic traits (National Agricultural Marketing Council 2005; Ben Salem and Smith 2008), in providing diversified genetic pool, which can help in meeting future challenges resulting from possible changes in production systems and consumer requirements (Kosgey and Okeyo 2007). An investigation by Preston and Murgueitio (1992) revealed that indigenous goat breeds are better able to utilise low quality feeds and can walk for longer distances, in search for water and food, than the imported breeds. It

Table 1 Goat populations and the proportion in the communal areas

Country	Population*	Proportion	Sources
Angola	1.5	-	FAOSTAT (2006)
Botswana	2.1	0.97	Seleka and Mmofswa (1996); CSO (1999)
Malawi	1.9	0.90	Behnke (2006); Banda et al. (1993)
Mozambique	5.0	0.95	Maciel (2001)
Namibia	2.1	-	Behnke (2006)
South Africa	4.8	0.50	Shabalala and Mosima (2002)
Swaziland	0.2	0.99	Swaziland Central Statistics Office (2003)
Tanzania	12.5	-	International Trade Centre (2006)
Zambia	1.3	0.97	Sinyangwe and Clinch (2000)
Zimbabwe	2.6	0.90	CSO (2002)

* Populations are in millions

is ideal that such breeds be utilised (Kosgey et al. 2006) in the communal setting. Table 2 summarises characteristics of indigenous breeds found in Southern Africa.

The adaptation of the local breeds to the local production conditions is usually confounded by the low standard of management under which indigenous livestock are normally kept (Mpofu 2002). Studies in Botswana, Zimbabwe and South Africa have shown that when a productivity index, which comprises fertility, survival and yield traits, is used to compare breeds, indigenous breeds raised under rangeland conditions outperform imported breeds (Mpofu 2002; Monkhei and Madibela 2005). Further research is required on validating such a productivity index on other indigenous breeds in other countries in the Southern Africa region.

Although indigenous goat breeds of Southern Africa are hardy, their growth performance is generally poor, partly as a result of high disease and parasite challenge and low nutrition (Peacock 1996). The poor pre-weaning and reproductive performance of indigenous goats in Southern Africa are shown in Tables 3 and 4, respectively. High mortality among kids and slow growth among those that survive are major constraints to goat production (Sebei *et al*. 2004). Weaning percentage, which is a measure of survivability of kids from birth to weaning, is low in the communal areas (Sebei *et al*. 2004). Pre-weaning kid mortality is one of the principal causes of

Table 2 Main characteristics of indigenous goat breeds

Breed	Location	Adult weight, kg		Other phenotypic characteristics	Sources
		Male	Female		
Mashona	Zimbabwe	30	25	Height at withers of about 60 cm; Horned, short ears; variable coat Colour; short and fine hai	Ndlovu and Royer (1988) DAGRIS (2007)
Matabele	Zimbabwe	50–55	39	Bearded; Rarely horned; broad, lopped ears; White and cream coat colours	DAGRIS (2007)
Nguni	Swaziland, Lesotho, South Africa	40	30	Medium-sized ears; horned; variable coat colours.	Epstein (1971)
Tswana goats	Botswana Zimbabwe, South Africa	44	40	Height at withers of 60–75 cm; horned; broad lopped ears; variable coat colours; Lactation length averages 180 days.	DAGRIS (2007) Gray (1987)
Malawi goats	Malawi	29	21	Horned; sharp and pointed ears; variable coat colour.	DAGRIS (2007) Banda et al. (1993)
Landim goats	Mozambique	50	35–40	Horned; Medium-sized ears; bearded; variable coat colours; short and fine hair.	DAGRIS (2007)

Table 3 Pre-weaning performance of selected indigenous goats in Southern Africa under communal conditions

Breed	Kid BW[1]	Kid mortality[2]	Kid WW[3]	GR[4]	Source
Matabele	2.5	30	15.9	98	Sibanda (1988)
Mashona	-	30	11.5	40	Ndlovu and Royer (1988)
Malawi	2.5	-	15.6	-	Nsoso et al. (2004); Ayoade and Butterworth (1982)
Landim	2.35	16	8.5	-	Kamwanja et al. (1985)

[1] Kid birth weight (kg)

[2] Kid mortality (%)

[3] Kid weaning weight (kg)

[4] Growth rate (birth to weaning in g/day)

economic loss to goat farmers (Hailu *et al*. 2006). In Zimbabwe, Shumba (1993) reported a pre-weaning mortality rate as high as 33%, with disease accounting for 55% of this mortality. The most common diseases reported by farmers were heart-water, pneumonia, pulpy kidney, foot rot and worm infestation. The situation is compounded by the unavailability and high cost of veterinary services (de Vries 2008). A survey in Malawi indicated that 89% of farmers raising goats, for example, had never been visited by a veterinary assistant (Mwanza and Mapemba 2000).

Communal goat management systems

Herding of goats is the most common method of goat rearing in Southern Africa. Goats are herded during the day and penned at night. In cases where there is limited grazing land, all the goats from the entire village may be considered as a single interbreeding flock with no attempts of controlling mating. Flocks from different households of the same village, however, may graze separately where there are vast tracts of grazing land. Following crop harvesting, goats are let loose to feed on crop residues until the beginning of the rainy season, when the goats have to be herded. The low intake of poor quality feed often limits production (Peacock 1996). Goats are rarely supplemented. In Mozambique, Loforte (1999), however, reported that farmers supplemented their goats with a variety of fruit trees, maize and cassava crop residues. In most communal areas, school children are responsible for herding goats, implying that grazing is dependent on the school timetable (Loforte 1999), whilst in some cases, for example in Lesotho, men can be employed as shepherds (Wason and Hall 2002).

Tethering of goats is common in Southern African countries such as Zambia (Lovelace et al. 1993), South Africa (Webb and Mamabolo 2004) and Malawi (Banda et al. 1993). Tethered goats are secured with a rope and tied to a peg to prevent them from destroying crops and to enable farmers to conduct other farm activities. Tethering is also practised in areas where goats are herded. For example, in Malawi, in the hot dry season, tethering of goats is the main feeding system (Banda *et al*. 1993). In some cases, goats are tethered in the morning hours and then herded in the afternoon when school children are back from school (Wilson and Azeb 1989). Since feeding is restricted, goats have little choice of feed, resulting in poor body condition

Table 4 Doe fertility of indigenous goats in Southern Africa under communal conditions

Breed	Age at first kidding (months)	Gestation length (d)	Kidding interval (d)	[1]Weaning rate (%)	Source
Matabele	23	-	-	119	Sibanda (1988)
Mashona	18–19	-	370	94	Ndlovu and Royer (1988)
Nguni	16–18	145–148	258	-	Webb and Mamabolo (2004)
Malawi	15.6	-	365	-	Kamwanja et al. (1985)
Landim	-	-	394	-	DAGRIS (2007)

[1] Weaning rate is defined as the proportion of number of kids weaned to the number of does exposed to bucks.

and low weight gains and a higher predisposition of the animals to heavy helminth burdens (Caldeira *et al*. 2007).

Constraints to increased goat production in the communal areas

Goat production and productivity in communal areas is faced with numerous challenges which may differ with areas, countries, regions or geographical locations (Kosgey 2004). These challenges have to be clearly understood and ranked for sustainable goat improvement and production. The main constraints are high prevalence of diseases and parasites (Ben Salem and Smith 2008), low level management, and limited forage availability (Raghuvansi *et al*. 2007) and poor marketing management (Kusina and Kusina 1999).

High prevalence of diseases and parasites

Infectious diseases and parasites are major constraints to communal goat production and are endemic in many regions of Southern Africa (Githiori *et al*. 2006). Loforte (1999) ranked diseases and parasites as the major constraint to goat production in Mozambique. The impact of diseases and parasites may be through high morbidity, mortalities, abortions or subclinical effects manifested as weight loss or reduced gains and the financial implications involved in controlling or overcoming the effects of disease (Mahusoon *et al*. 2004). Goats are also susceptible to *Haemonchus contortus*, a gastro-intestinal helminth causing anaemia and economic losses in goats in the tropics (Van Wyk *et al*. 2006) especially if they graze close to the ground.

Low levels of management

Contributory factors to high kid mortality include failure of kids to consume colostrum, poor nutrition of the doe leading to low milk production, lack of hygiene allowing the build-up of infective agents and contaminated water (Peacock 1996). Poor housing negatively impacts on goat productivity as goats will be exposed to extreme weather conditions. In Zimbabwe, Shumba (1993) observed that goat houses of 15% of the respondents had no protection against extreme heat, cold and rain. Ficarelli (1995), in Malawi, revealed that goat producers lose 30% of their young stock during the rainy season, the main reasons being poor housing and prevalence of diseases. Van Niekerk and Pimentel (2004) attributed the incidence of diseases and high mortality to poor hygiene and precarious housing conditions.

Lack of controlled breeding results in inbreeding and poor growth rates (Saico and Abul 2007) in goats. In most communal areas in Southern Africa, there are no structured breeding systems and appropriate infrastructure such as paddocks and, therefore, does and bucks run together all year round (Tefera *et al*. 2004).

Limited forage availability

Poor management of rangelands, inappropriate grazing management, rangeland fires and droughts limit the availability of fodder (Gutierrez-A 1985) in the communal areas. The productivity of goats, and other ruminants, in the tropical areas is hindered by shortage of good quality feed, especially in the long dry season characteristic of such areas (Raghuvansi *et al*. 2007; Ben Salem and Smith 2008). Veld quality and availability is highly variable in the tropics with crude protein dropping below 8% in dry mature tropical grasses (Bakshi and Wadhwa 2007; Kalundi et al. 2007). In the sourveld, the highest crude protein values are recorded during the wet season. The reduction in protein content of grasses and the increase in lignin content during winter reduce the overall digestibility of the grasses.

Poor marketing management

Marketing, in most communal areas, is characterised by absent or ill-functioning markets (Kusina and Kusina 1999; Moll *et al*. 2007). A study by Seleka (2001) revealed the lack of organised marketing of goats in Botswana. Communal farmers resort to the informal way of marketing their goats where pricing is based on an arbitrary scale, with reference to visual assessment of the animal. Intermediaries in most countries (Kusina and Kusina 1999; Lovelace *et al*. 2000; Simela and Merkel 2008), purchase live animals from farmers for resale in other areas, such as towns and schools. All these transactions are not captured in official statistics leading to underestimation of production and consumption of chevon in Sub-Saharan Africa (Simela and Merkel 2008). Apart from selling goats amongst themselves, farmers do not

have ready markets where they can take their goats to if they need to sell their animals (Sebei et al. 2004).

Possible areas of research for goat development in Southern Africa

Research is required to understand goat production practices and develop strategies that use goats as vehicles for rural development. Aspects that require investigation include generating accurate statistics on the contribution of goats to household economy and food security, characterisation of goats to identify appropriate genetic resources and, more importantly, developing sustainable research programmes and projects that appropriately address the challenges that communal goat producers face.

Baseline surveys and participatory rural appraisals

Much of the work on goats has been carried out under controlled conditions at research stations and the results are usually inapplicable to communal production systems in rural areas (Webb and Mamabolo 2004; Sahlu and Goetsch 2005). It is, therefore, pertinent to determine and evaluate the performance and limitations of these communal goats under the communal goat production conditions. Assessment of existing goat production systems is an important tool to inform researchers about the constraints that farmers face and the opportunities that exist within the systems. As a starting point, it is important to acquire knowledge on traditional practices of goat production through baseline surveys which involve retrieving information from goat-keepers using questionnaires, focus group discussions and direct observations. In any development effort, conducting participatory rural appraisals is crucial to ensure that the farmers, who are the ultimate beneficiaries of the technologies developed, actively participate.

Information on productivity of goats over seasons can be captured through close monitoring of changes in flock sizes and productivity. Flock monitoring involves the participation of willing farmers and takes advantage of indigenous resources and knowledge whilst at the same time introducing new technologies. Monitoring of flocks for at least a year is adequate to cover all seasons and to provide sufficient data for development of appropriate intervention strategies. Aspects that should be monitored include body condition scores, body weights, flock dynamics (i.e. entries and exits into the flock and the reasons involved), growth performance, reproductive capacity (e.g. kidding interval, age at first kidding, prolificacy). Long-term monitoring of goat flock dynamics enhances better perception of goat roles at household level.

Improving production environments

Besides determining the number and quality of goats entering and exiting flocks, it is pertinent to fully understand the nutritional status of the goats. Determination of levels of nutritionally-related metabolites, as is commonly applied in intensively managed animals, should be applied in communal goats to establish when and what classes of goats require dietary supplementation. Examples of metabolites that can be routinely measured include protein status indicators (e.g. total protein, albumin and blood urea), energy level indicators (e.g. non-esterified fatty acids, hydroxybutyric acid, glucose and cholesterol) and minerals (both macro and trace minerals). Concentrations of these metabolites assist in designing dietary supplementation programmes and help understand adaptation traits of different goat strains to their environmental conditions (Caldeira *et al*. 2007).

The epidemiology, burdens and susceptibility to parasites and diseases in different classes and strains of goats require research. Mechanisms of resistance, tolerance or resilience of indigenous goats and the probable development of immunity in imported and crossbred goats should also be investigated. Parasites with huge impacts on growth and mortality, such as *Haemonchus*, should be prioritised in the research efforts. Affordable ways of controlling parasites, such as the use of ethno-veterinary medicines should also be evaluated to complement the conventional control methods.

Causes of kid mortality need to be clearly defined. For farmers to improve their levels of management, concerted efforts to improve their benefits are required. The ideal and affordable housing structures and designs and their impact on kid survival and growth should be identified and evaluated. Other management aspects, such as record keeping on production and economic records should be encouraged, so as to develop models to improve the whole communal production system to benefit the farmer.

Socio-economic research is also required to identifying appropriate marketing channels, developing niche markets for indigenous goats and their products. Development of markets is a sure incentive for the farmers to appreciate the need to improve levels of management, control diseases and parasites and improve nutrition levels. Agricultural economists are, therefore vital in identifying constraints and opportunities to goat production in communal areas.

Characterisation of indigenous breeds

Inadequate description, classification and evaluation of goats have resulted in a poor understanding of the potential of most tropical breeds (Kosgey *et al*. 2006; Simela and Merkel 2008; Tixier-Boichard *et al*. 2008). Breed differences can be established through molecular taxonomic characterisation, which can, in turn, serve as a guide on decisions relating to conservation (Lehloenya *et al*. 2005; Toro *et al*. 2008) and improvement of these breeds. Attributes of each breed will have to be identified and evaluated, to develop appropriate and sustainable breeding programmes. Microsatellites and single nucleotide polymorphisms (SNP) have been the markers of choice in the studying of DNA sequence and variation (Van Marle-Koster and Nel 2003; Toro *et al*. 2008). In South Africa, microsatellites have been used to evaluate the genetic diversity among goats and identify those strains under threat (Visser *et al*. 2004). More similar studies should be conducted, on a large-scale.

Selection of individual goats for breeding

To effectively design sustainable genetic improvement programmes, correct matching of genotypes with the prevailing and projected socio-economic and cultural environments should be considered (Philipsson *et al*. 2006). Breeding objectives should be clearly defined. Traits that should be emphasised, especially under communal production conditions, are the adaptive traits, such as resistance to diseases and parasites and their adaptation to extreme weather conditions (Iniguez 2004; Kosgey *et al*. 2006).

Programmes that encourage farmers to keep records should be developed. Regarding within-breed selection, realistic performance and pedigree recording, with active farmer participation need to be adopted. Baker *et al*. (1998) reported that Small East African (SEA) goats were more resistant to helminth infections and had lower kid and doe mortality under a humid environment than Galla goats. For example, the weaning rate for SEA does (79%) was nearly twice that of Galla does (40%), indicating the importance of selecting goats before using them as breeding animals.

Crossbreeding

There are situations in which the ideal producing animal could be the intermediate between a tropical adapted and an improved temperate breed. One way of achieving this is by crossing the two different breed types. Crossbreeding has been applied in Southern Africa to exploit goat breed complementarity and heterosis (Peacock 1996). Imported breeds have been crossed with indigenous breeds to combine the high productivity of the former with adaptive attributes of the latter. Safari *et al*. (2005) concluded that exotic breeds with higher growth potential can be used to upgrade performance of the indigenous goats. Most crossbreeding programmes, however, have lacked long-term strategies on how to maintain a suitable level of upgrading (Safari *et al*. 2005). This implies that it is important to use a terminal cross system where the progeny are designated for slaughter.

Practical recommendations

Apart from research, several recommendations can be made to enhance goat productivity in communal areas in Southern Africa. The major aspects to be improved relate to feeding management, training of farmers, breeding management of goats and marketing management. Training of farmers requires the cooperation of the agriculture departments, non-governmental organisations, research institutions, universities and other stakeholders. The training of extension officers who will, in turn, train communal goat farmers will go a long way in realising and exploiting the potential of goat production. The training of farmers should target household members who are directly involved in goat production. For example, the Umzimvubu and Lamphum'ilanga goat projects are initiatives where farmers undergo a 10-month training programme on commercialization of goat production (Roets and

Kirsten 2005). The farmers are provided with a manual written in the vernacular.

Farmers should be trained on various aspects of improving goat productivity (nutritional, health and breeding management) in communal areas and developing their entrepreneurial skills. The FAMACHA (Francois Malan Chart) system, for example, developed to identify anaemic animals through inspection of the colour of the conjunctival mucous membrane (Kaplan *et al*. 2004; Burke *et al*. 2007; Burke and Miller 2008), should be mastered by all goat farmers. The technique is much quicker and less labour intensive than routinely collecting faecal samples from goats and screening for egg counts.

To reduce nutritional deficits in the goats, foggage and hay, made from high-quality grass and legumes, and agricultural crop residues such as groundnut tops, should be used. Well known strategies, such as the inclusion of urea in goat diets should also be encouraged. In addition, browse trees, such as *Leucaena* and *Gliricidia* can be lopped for fodder and fed to goats during the dry season to bridge the nutritional gap created by scarcity of feed during the dry season (Akingbade *et al*. 2002). *Leucaena*, *Sesbania* and *Gliricidia* are examples of high-yielding perennials that possess deep-rooted systems. They easily access ground water and retain their leaves in the dry season (Preston and Leng 1987; Peacock 1996). The integration of goat production with tree crops, which is common in West and East Africa (Kusilika and Kambarage 1996), should be promoted in Southern Africa. The browse trees can be grown around gardens or homesteads or on terraces (International Centre for Research in Agroforestry 1994).

Use of cultivated forages should also be considered to increase carrying capacities of the land (Kusilika and Kambarage 1996). Hoffmann and Mouton (1990) indicated the potential of *Cenchrus ciliaris* in enhancing the stability of a production unit and increasing the carrying capacity of goats in Namibia. Different pastures can be established in various areas, in Southern Africa, with consideration of particular climatic and edaphic factors. Napier grass (*Pennisetum purpureum*) and star grass (*Cynodon nlemfluensis*) have been used in the smallholder sector to feed the Malawi local goat (Banda *et al*. 1993). In Zimbabwe, *Pennisetum purpureum* has been grown in small-scale areas where rainfall exceeds 800 mm annually while some accessions perform well in drier environments that receive approximately 600 mm of rainfall per annum (Manyawu *et al*. 1999). The forages can also be processed into silage.

Inbreeding is another challenge for many communal goat flocks. Inbreeding, a manifestation of mating closely related individuals, is exacerbated by the small flock sizes, confinement of goats during the cropping season and the long periods that bucks stay in the flocks before they are culled. Inbreeding can be reduced through exchange of bucks between farmers from different villages or as discussed above, more sophisticated breed improvement techniques may be practised where management allows for it.

Marketing management and policies in most countries in Southern Africa should be improved. Resource-poor farmers need to form co-operatives and pool their animals together prior to marketing. The main challenge with the marketing of goats in communal areas is to disseminate information on prices and market requirements. Provision of premium prices for animals in better condition will motivate farmers to invest in improved animal feed and management technologies. More formal markets, than are available, should be established. Linking the farmers with buyers through workshops also enhances an understanding of the requirements expected of the farmers by the buyers.

An example of government intervention in goat marketing is the Umzimvubu Goat Project in South Africa (Roets and Kirsten 2005). The project facilitates marketing of goats for communal goat farmers. It comprises an abattoir, a meat processing area, a tannery, a curio shop and a leather craft workshop. This project has embarked on various craft products from goat skins which include intact hides for floor and wall covering and footwear. Provision of such appropriate marketing infrastructure enhances and motivates the farmers to improve goat productivity (Roets and Kirsten 2005). Another initiative that could be adopted in Southern Africa is that of the Meru Goat Breeders Association of Kenya. The main objective of the association is to access credits and source for new markets for its members. Members of this association supply goat products such as goat meat and milk to hospitals (Ahuya 1997).

Concluding remarks

In conclusion, although indigenous goats of Southern Africa are hardy, their productivity is hindered by

several constraints that include high prevalence of diseases and parasites, limited feed availability and poor marketing. It is, therefore, imperative to develop concerted, coordinated and comprehensive farmer training, research and development programmes to address these constraints.

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