

ISSN 1996-3351

Asian Journal of  
**Biological**  
Sciences

## Quality Assurance in Goat Meat Production for Food Safety in Botswana

<sup>1</sup>A.O. Aganga and <sup>2</sup>A.A. Aganga

<sup>1</sup>Botswana College of Agriculture, Private Bag 45, Labatse, Botswana

<sup>2</sup>Federal University of Agriculture, Oye-Ekiti, Ekiti State, Nigeria

*Corresponding Author: A.O. Aganga, Botswana College of Agriculture, Private Bag 45, Labatse, Botswana*

### ABSTRACT

Production constraints of traditionally managed Tswana goats are diseases, lack of available feed, parasite infestation problems and high mortality. Traditionally managed goats are highly productive animals but routine management practices such as vaccinations and supplementary feeding should be practiced to reduce mortality which is currently 20.8% of the national goat herd. The average goat take-off rate is 6.9% while, 4.4% are slaughtered for home consumption and only 3.4% are sold. Rearing of goats by majority of Batswana for food has contributed to the nutritional well-being of the citizenry. A considerable number of goats slaughtered for food in Botswana take place in well established slaughterhouses, where appropriate good processing practices are enforced and adhered to while some homesteads carry out their private slaughter for family consumption.

**Key words:** Tswana goats, production system, processing system, Botswana

### INTRODUCTION

Goats play an important role in the economy of Botswana, especially among the smallholder farmers. They fall in the age group of over 50 years and own over 70% of the goat population (Table 1). Goats provide ready income (through the sales of live animals) (MoA., 2007). The goat is reared by most Batswana for multiple reasons: meat, security, milk, hides and are used during festive seasons and for paying social dues. Aganga and Fasanya (1985) stated that goats are particularly useful to man because of their short generation interval which makes it possible to increase their production over a shorter time as compared to cattle. Goats thrive well in arid regions because of their adaptability to a wide range of feeds which includes high preference for browsing. Thus, they thrive well on sparse vegetation, unsuitable for the satisfactory feeding of other domestic animals (Aganga *et al.*, 1996). Botswana's goat population was estimated to be 1.88 million in 2010 (Statistics Botswana, 2011).

Goats are opportunistic foragers and can maintain a high quality diet under diverse conditions. Consequently, goats have acquired a reputation for survivability on harsh, degraded rangelands (Devendra, 1981). Most rangelands in Botswana offer potential for raising goats. This is evident from the presence and availability of leaves, twigs and pods from shrubs and tree fodders along with native grasses which are green in the rainy season. Some farmers offer supplementary feeding to their goats while majority rely solely on natural ranges. The quality and quantity of forage intake by browsing goats is important to identify the constraints in efficient production of goats on rangelands. Voluntary forage intake depends on numerous intrinsic factors both of plants and animals. Secondary metabolites in browsers may influence palatability and forage intake

Table 1: Goats holdings and population by gender and age group of holder

Age group of holder	Goats holdings		Goats holdings		Total holdings		Goats population		Goats population		Total goats population	Average No. of goats per holding
	Male owned	Percentage	Female owned	Percentage	Male owned	Percentage	Male owned	Percentage	Female owned	Percentage		
12-14	2	0.0	-	-	2	-	64	0.0	-	0.0	64	32
15-19	13	0.1	9	0.1	22	0.1	184	0.0	299	0.2	483	22
20-24	117	0.5	86	0.8	203	0.8	1,167	0.2	1,026	0.5	2,193	11
25-29	399	1.7	216	1.9	615	1.9	6,588	1.1	2,569	1.3	9,157	15
30-34	815	3.5	216	2.9	1,140	2.9	15,422	2.6	5,488	2.8	20,910	18
35-39	1,284	5.5	325	5.5	1,903	5.5	29,055	5.0	8,507	4.3	37,562	20
40-44	1,850	7.9	619	8.3	2,777	8.3	45,777	7.8	16,508	8.3	62,285	22
45-49	2,482	10.9	927	10.3	3,632	10.3	62,393	10.6	20,335	10.2	82,728	23
50-54	3,035	12.9	1,150	11.0	4,269	11.0	87,033	14.8	22,097	11.1	109,130	26
55-59	2,847	12.1	1,234	12.1	4,201	12.1	77,461	13.2	23,980	12.1	101,441	24
60-64	2,917	12.4	1,354	11.7	4,224	11.7	73,250	12.5	23,689	11.9	96,939	23
65+	7,753	33.0	3,950	35.3	11,703	35.3	188,306	32.1	74,100	37.3	262,406	22
Total traditional	23,514	100.0	11,177	100.0	34,691	100.0	586,700	100.0	198,598	100.0	785,298	23

(Aganga and Mosase, 2001). Study by Aganga *et al.* (2000) showed that Tswana goats are able to select a relatively high quality diet from a variety of available feeds on the ranges. During the dry season most grasses are dried and browsing is the most important source of forage to the extensively managed Tswana goats. Crude protein of browse is relatively constant during the year and much higher than in grasses. Aganga *et al.* (2000) reported that browse leaves contained high crude protein (10.34-29.89%) and high calcium (0.5-0.16%). Tswana goats use leaves when available in the rainy season but consume more twigs, pods, fruits and branches when leaves are scarce in the dry season (June-August).

Does are preferentially retained in the system for breeding purposes. Castrates are either sold to the butcheries for immediate cash or slaughtered for home meat consumption (Hussein *et al.*, 1996). Tswana goats in the communal system have a specific role they play, that is not necessarily related to generation of cash income such as payment of social dues and exchange of goods. This is in contrast to the commercial sector where emphasis is on generation of income. Goats are used for multiple reasons in Botswana by small holder farmers. The main reason being for keeping goats were protection against crop failure, thus goats can help farmers to overcome unforeseen crisis which demands immediate finance.

## **CONSTRAINTS AND DEMOGRAPHIC PARAMETERS**

Mortality rate of goats ranged from 10.9% in goat herds with over 100 animals to 44.9% on farms with 1-10 animals, herd size (Table 2). Most of the deaths resulted from diseases and poor management on extensively managed farms. Diseases are major constraints to goat production which is possibly due to the absence of disease prevention measures which should be put in place for goats. Mia *et al.* (1996) reported 49.21% disease related deaths in Black Bengal kids and adult goats in Bangladesh. Diseases have also been reported to be a limiting factor in goat production in the humid Tropics (Ogebe *et al.*, 1995).

Feed unavailability is a limiting factor in Tswana goat production. In extensive systems of goat production, the supply of feed largely depends on forage availability on the range. The absence of quality and right quantity of feed is a predisposing factor to diseases in goats (Wilson and Murayi, 1988). Goats feeding on low quality and quantity feed are unable to resist diseases and hence they are prone to diseases. This leads to reduced growth rate, reproductive capacity and low survival rate of kids (Mia *et al.*, 1996).

Most goat farmers do not have good housing structures for their animals. Consequently, predators, especially jackals snatch kids wondering outside the kraal. In some cases, farmers reported predators attacking their animals while they were in the kraal. Most farmers are unable to herd their goats to the grazing areas where most of the attacks occur. This was also the case with Mgalwana farmers, who could not follow up their flock to the grazing areas due to old age (Mahanjana and Cronje, 2000). Most farmers in Botswana do not have any land tenure problem. Mahanjana and Cronje (2000) found that farmers in Mgalwana attributed failure to practice controlled breeding to the communal land tenure system, for instance non existence of camps and fencing. Haas and Horst (1979) associated the degree of sophistication of husbandry with systems of land tenure. Tswana goat production in the communal system may be improved by introducing preventive health care programme, as it is mandatory with cattle in Botswana. This will reduce disease incidence in goats and hence reduce kid mortality. Goats will also be able to express their growth potentials. Also, as part of the quest to improve production, farmers should be encouraged to provide supplementary feeds for their animals.

In recent times, the accurate and timely identification of products and activities in the supply chain has become a new factor in food and agribusiness. In order to meet consumer demands for

Table 2: Goats holdings and population by gender and goats herd size

Age group of holder	Goats holdings			Goats holdings			Goats population			Goats population			Total goats population	Average No. of goats per holding
	Male owned	Female owned	Percentage	Male owned	Female owned	Percentage	Male owned	Female owned	Percentage	Male owned	Female owned	Percentage		
01-10	7,226	5,002	30.7	12,228	44.8	7.5	29,441	14.8	73,389	6			73,389	6
11-20	6,674	3,119	28.4	9,793	27.9	17.2	46,975	23.7	148,034	15			148,034	15
21-30	3,661	1,454	15.6	5,115	13.0	15.7	36,458	18.4	128,312	25			128,312	25
31-40	2,158	668	9.2	2,826	6.0	13.0	23,420	11.8	99,592	35			99,592	35
41-50	1,285	334	5.5	1,619	3.0	9.9	15,033	7.6	73,183	45			73,183	45
51-60	741	200	3.2	941	1.8	7.0	11,002	5.5	52,078	55			52,078	55
61-70	508	121	2.2	629	1.1	5.6	7,896	4.0	40,738	65			40,738	65
71-80	292	86	1.2	378	0.8	3.7	6,540	3.3	28,408	75			28,408	75
81-90	218	48	0.9	266	0.4	3.2	4,159	2.1	22,758	86			22,758	86
91-100	152	38	0.6	190	0.3	2.4	3,600	1.8	17,918	94			17,918	94
101+	599	107	2.5	706	1.0	14.8	14,074	7.1	100,888	143			100,888	143
Totl	23,514	11,177	100.0	34,691	100.0	100.0	198,598	100.0	785,298	23			785,298	23

consistent supply of top quality, safe and nutritious foods, as well as rebuild public confidence in the food chain, the design and implementation of full backward and forward traceable supply chains from 'farm to plate' has become an important part of the overall food quality assurance system (Opara, 2003). In Botswana, meat and meat products, live animals, hides and skins are major export commodities (BoB., 1997). This has been possible because of the effective disease control measures and advice to farmers through extension services offered by the Department of Veterinary Services. This is coupled with the well organized slaughterhouses serving both the export market and the local community.

At the village level in Botswana, slaughter slabs, made of concrete floors, sloping sufficiently towards a drain allowing for cleaning with water are routinely used. The slaughter slabs are functional and compact in design and space. They are mostly equipped with facilities for hygienic and humane slaughter, proper bleeding, dressing, meat inspection, adequate cleaning of the intestines, high standard of sanitation, facilities for sterilization of slaughter tools, hand washing facilities, hygienic disposal of effluents and safe treatment of condemned carcasses (Aganga, 1991).

In the past two decades, the significance of microbial contamination of meat has been increasingly recognized throughout the world. Consumers are now better educated and are more demanding and conscious of what they consume. *Salmonella*, *E. coli*, certain viruses and chemical residues are becoming of increasing concern (WHO., 1989). In order to address these concerns, training of personnel involved in the entire process of meat hygiene cannot be overemphasized. These officers from Botswana and other African countries are trained at Meat Inspection Training Center, Lobatse on meat hygiene and quality assurance.

## CONCLUSION

A disease prevention programme should be introduced to vaccinate the goats so as to improve their health status and increase productivity. Farmers should drench and dip their animals to reduce internal and external parasite infestations, respectively. Small holder farmers should not rely on nature only to provide feed for their animals. They should provide supplementary feeding to increase growth rate, reproductive performance and survival ability of the goats. Botswana has a considerable number of trained meat hygienists but more should be trained for the improvement of the meat hygiene responsibilities. Provision and use of appropriate slaughter facilities in strategic locations so as to cater for the entire nation has to be vigorously pursued. Assuring food quality to the public with a well co-ordinated meat hygiene service will contribute tremendously to achieving one of the essential elements of primary health care, in a healthy nation.

## REFERENCES

- Aganga, A.O., 1991. Meat hygiene and public health: The importance and significance of meat inspection. An Invited Paper Presented at an F.A.O. Funded Workshop organised by the Ministry of Health held at the Presidents Hotel, Gaborone.
- Aganga, A.A. and O.O.A. Fasanya, 1985. Goat raising for meat production in Nigeria. Niger. Livestock Farmer, 5: 28-30.
- Aganga, A.A., D. Seabo and C.M. Tsopito, 1996. Goat raising in South Eastern Botswana: Available genetic resources, ecology and production potential. Thai J. Agric. Sci., 29: 43-54.
- Aganga, A.A., T. Adogla-Bessa, U.J. Omphile and K. Tshireletso, 2000. Significance of browses in the nutrition of Tswana goats. Arch. Zootec., 49: 469-480.

- Aganga, A.A. and K.W. Mosase, 2001. Tannin content, nutritive value and dry matter digestibility of *Lonchocarpus capassa*, *Zizyphus mucronata*, *Sclerocarya birrea*, *Kirkia acuminata* and *Rhus lancea* seeds. *Anim. Feed Sci. Technol.*, 91: 107-113.
- BoB., 1997. Bank of Botswana annual report. Annual Report, Government Printers, Gaborone, Botswana, South Africa.
- Devendra, C., 1981. The potential of sheep and goats in the less developed countries. *J. Anim. Sci.*, 51: 461-473.
- Haas, H.J. and P. Horst, 1979. The significance of goat production for covering protein requirements. *Anim. Res. Dev.*, 9: 41-73.
- Hussein, S.S., P. Horst and A.B.M.M. Islam, 1996. Study on the growth performance of Black Bengal goats in different periods. *Small Rumin. Res.*, 21: 165-171.
- Mahanjana, A.M. and P.B. Cronje, 2000. Factors affecting goat production in a communal farming system in the Eastern Cape region of South Africa. *South Afr. J. Anim. Sci.*, 30: 149-155.
- Mia, M.M., A. Ali and A.K.F.H. Bhuiyan, 1996. The reproductive performance of Black Bengal, Barbari, Barban x Black Bengal and Anglo-Nubian goats. *Indian Vet. J.*, 73: 1048-1052.
- MoA., 2007. Botswana agricultural survey report. Ministry of Agriculture, Government Printers, Gaborone, Botswana, South Africa.
- Ogebe, P.O., B.K. Ogunmodede and L.R. McDowell, 1995. Growth and reproductive characteristics of Nigerian southern goats raised by varying management systems. *Livest. Res. Rural Dev.*, 7: 183-190.
- Opara, L.U., 2003. Traceability in agriculture and food supply chain: A review of basic concepts, technological implications and future prospects. *J. Food Agric. Environ.*, 1: 101-106.
- Statistics Botswana, 2011. Livestock population. Botswana Statistical Year Book 2011, Government Printers Gaborone Botswana, pp: 146
- WHO., 1989. Health Surveillance and Management Procedures for Food Handling Personnel. WHO, Geneva, pp: 52.
- Wilson, R.T. and T. Murayi, 1988. Productivity of the small East African goat and its crosses with the Anglo-Nubian and the Alpine in Rwanda. *Trop. Anim. Health Prod.*, 20: 219-228.