

## SHEEP AND GOAT PRODUCTION IN BOTSWANA: TRENDS, OPPORTUNITIES AND FUTURE PROSPECTS - A REVIEW.

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### ABSTRACT

This review highlights population trends in sheep and goat (small-stock) in Botswana from 2006 to 2017, opportunities and future prospects of the sub-sector. The 2017 Annual Agriculture Survey Report estimated the national goat and sheep populations to be 1,199,661 and 234,621, respectively. Despite introduction of various government support programmes, small-stock populations have declined over time, while demand for live animals and animal products remains high. The major factors that contributed to the decline in small-stock populations are drought, outbreaks of diseases and parasites, inadequacy and high cost feeds, shortage of grazing land, stock theft, lack of access to markets and inadequate extension service. Opportunities include export of meat and genetic material, and fodder production. Prospects to develop traceability system for small-stock and also develop new small-stock breeds suited to our climate do exist. It is concluded that extension activities be intensified and artificial insemination and embryo transfer technologies used to increase small-stock populations in Botswana.

**Key words:** Botswana, drought, fodder, small-stock, stock theft

### INTRODUCTION

Livestock plays important roles in the livelihoods of Africa's rural populace and also in food and nutritional security and economy through intra-African and global trade. The livestock sector contributes an estimated 30 - 80% of the agricultural Gross Domestic Product (GDP), and has the potential to deliver both the agricultural led growth and the socio-economic transformation as envisioned in the African Union (AU) Malabo Declaration on Accelerated Africa Agriculture Growth and Transformation for shared prosperity and improved livelihoods (AU-IBAR, 2015). About 70% of the rural households in Botswana derive their livelihoods from agriculture, through subsistence farming (Statistics Botswana, 2012). The livestock sector plays important roles in wealth creation and poverty

eradication in the rural areas of Botswana where poverty levels are high (Bahta and Malope, 2014).

Livestock, especially cattle accounts for approximately 80 - 85% of the agricultural output making it the backbone of agriculture in Botswana (AfDB/OECD, 2003; GAIN Report, 2015). About 64% of goats in sub-Saharan Africa (SSA) are located in rural arid (38%) and semi-arid (26%) agro-ecological zones (Rumosa Gwaze et al., 2009). The climate of Botswana is semi-arid with erratic rainfall, thus making it suitable for small-stock production than cattle. According to FAO (2018a), about 300 million smallholders depend on small ruminants for food and income. In addition, small-stock provide nutritious milk and meat, as well as, wool and skins as important by-products (Papas and Papachristodoulou, 1975; World Bank, 1983; FAO, 2018a). Small-stock are hardy and their small size and value compared to cattle makes them less risky and more versatile investment (FAO, 2018a). The 2017 Annual Agriculture Survey Report estimates the national goat and sheep populations in Botswana to be 1,199, 661 and 234, 621, respectively (Statistics Botswana, 2019a).

Animal-source foods (ASFs) currently comprise 39% of protein and 18% of calorie intake world-wide, however, this is not equitably distributed. For instance, poor people in Low and Middle Income Countries (LMICs) often do not consume enough ASFs, whereas their counterparts in High-Income Countries (HICs) and/or increasingly in Middle-Income Countries (MICs) consume in excess of their dietary needs (FAO, 2018a). According to FAO (2017), in the next 30-40 years, the demand for ASFs will grow rapidly in Africa due to increasing human population, increasing consumer purchasing power and urbanization. This increase in demand for ASFs prompts farmers and other value chain players to make significant investments in livestock farming systems and value chains.

The agricultural sector's share of the Botswana's GDP declined from 42.7% at independence in 1966

(Ministry of Finance and Development Planning, 2010) to about 2% in 2017 (Statistics Botswana, 2019b). A decline in the performance of the sector has been observed over the years. In an effort to boost the sector's performance, government has introduced various support programmes such as Livestock Management and Infrastructure Development (LIMID), Integrated Support Programme for Arable Agriculture Development (ISPAAD), Poverty Eradication, Youth Development Fund (YDF) and Woman Empowerment, which are accessible to citizens only. This work endeavours to study trends over 11-year period, and highlights opportunities and future prospects for the livestock sub-sector.

### **Production system**

The main livestock species in Botswana are cattle, sheep and goats. Cattle account for 73% of the total livestock followed by goats and sheep with 22% and 5%, respectively (Economic Commission for Africa, 2012). This implies that small-stock rearing is the second largest livestock activity after cattle. In Botswana, sheep rearing is not a popular enterprise as cattle and goat rearing (Monkhei and Aganga, 2005). Table 1 presents data on cattle, goats and sheep in nine districts of Botswana excluding Chobe district. The country's cattle, goats and sheep populations are estimated to be 2, 072, 683, 1, 259, 411 and 236, 764, respectively (Statistics Botswana, 2016a). Compared to other districts, Central district due to its large size has the highest number of both cattle and small-stock, while South East district has the least number of livestock. It is clear from Table 1 that sheep and goats are reared across the districts.

The production indicators for goats and sheep are given in Tables 2 and 3. The traditional and commercial sectors do not differ much in terms of performance. This is surprising given that management in the commercial sector is expected to be high compared to the traditional sector. However, it must be noted that most of the commercial livestock farms in Botswana are primarily for cattle than small-stock rearing. As shown in Table 2, goats reared in the traditional sector had slightly higher birth rates and death rates but low off-take rates than the commercial sector. For sheep, the traditional sector had slightly higher birth rates but lower death rates and off-take rates than the commercial sector. The fact that the traditional has lower death rates than the commercial sector implies that the commercial sector is poorly managed.

In their evaluation of performance of the poverty alleviation component of LIMID programme in Letlhakeng Sub-district of Botswana, Moreki and Kopano (2014) found that only 37.5% of beneficiaries had received visits from government extension staff, whilst 62.5% were never visited. In

addition, only 35.71% of beneficiaries received training on small-stock management prior to establishment of projects, while 64.29% did not receive any training. These findings point to the inadequacy of extension service. It is therefore necessary to intensify extension support to raise productivity to desired levels.

### **Socio-economic importance of small-stock**

Sheep and goats are important livestock species in developing countries (Gutierrez-A, 1986), and play multiple roles in the lives of rural families including provision of nutritious milk and meat, wool/skins, and manure (Kindness et al., 1999; Aganga and Mosimanyana, 2001; FAO, 2018a). Ugwu (2007) reported that the main reasons why farmers in Southeast Zone of Nigeria engage in small ruminant production include, provision of income, home consumption/entertainment, prestige, provision of animal by-products (i.e., manure and skins) and security against financial risks. However, Hassan et al. (1998) and Legesse et al. (2008) in Zamfara Grazing Reserve in Sokoto State (Nigeria) and Ethiopia respectively, observed that the principal reason for keeping small-stock was to generate cash income. In addition, Monau et al. (2017) reported that over 80% of farmers in the communal areas of Botswana kept goats for cash which was used to pay tuition fees, buy school uniforms and household commodities, as well as, for restocking of animals.

Although skins are used extensively to produce various leather goods and handicraft, they are not fully utilised in Botswana as the market for them is limited. As a result, the majority of the skins are left to rot. While manure is widely used to fertilise farms in other countries, its use is however limited in Botswana as farmers receive free chemical fertilizers through ISPAAD. Devendra (1988) stated that mohair and cashmere are very important fibres in the textile trade and are in high demand. Small ruminants also serve as a walking bank which can be quickly accessed to meet immediate family needs. For Ahmed and Egwu (2014), sheep are also used for religious/traditional rites. They can also be used as gifts to strengthen relationships or slaughtered to welcome a visitor.

### **Ownership**

The study by Kindness et al. (1999) in Matobo and Bubi districts in Zimbabwe reported that ownership of goats belonged to the male head of the family and management to women and children, whereas marketing rests with men. Similar observations were made by Nipane et al. (2016) and Tungu et al. (2016) in India and Tanzania, respectively. Byaruhanga et al. (2014) observed that although women and children were responsible for various goat production related activities they participate less in decision making. In another study, Dhara et al. (2019) found

that the majority of farmers involved in goat rearing in Sundarban of West Bengal, India were women (69.77%). Kumar et al. (2010) also reported that goat rearing was a major source of income for women resulting in them being economically empowered.

In Botswana, Nsoso et al. (2004) found that 48% of small-stock farmers in Kweneng district were females, while Aganga and Mosimanyana (2001) found no significant difference between the male and female headed households in the ownership of stock. Moreki et al. (2010a) evaluated utilisation of LIMID programme from 2007 to 2010 and reported that 73.5% (4,089 beneficiaries) were females compared to 26.5% (1,474) males, indicating that the most of the small-stock package was utilised by females. The authors concluded that small-stock rearing plays an important role in food security, in addressing issues of gender imbalances and poverty eradication in furtherance of the Sustainable Development Goals, especially Goals 1 (no poverty) and 2 (zero hunger). In another LIMID evaluation exercise that covered 10 districts of Botswana, Moreki et al. (2010b) found that 87.38% (360) of the beneficiaries (farmers) utilised small-stock package, making it the most popular LIMID package. The authors found that 89.38% of women benefitted from the small-stock package compared to 10.62% for men. These findings point to the fact that more women are involved in small-stock rearing than cattle rearing which is the domain of males. Dossa et al. (2008) found that women represented 71% of the keepers of goats in Benin. According to FAO (2018b), women in Botswana are responsible for small-stock and indigenous chickens, and men for large livestock such as cattle.

#### **Small-stock population trends (2006 to 2017)**

As illustrated in Figure 1, the country's goat population generally declined over time. However, an increase in goat population was observed from 2006 to 2010 which was thereafter followed by a decline. From 2006 to 2017, the national goat population decreased by an average of 43, 033.9 goats per annum, representing a decrease of 2.5%. The observed increase in goat population from 2008 to 2010 could be attributable to the increased uptake of government programmes (i.e., LIMID, Special ISPAAD, Poverty Eradication Programme, YDF and Woman Empowerment) and intensified technical support offered by the government extension services. It is mandatory for beneficiaries of government support programmes to undergo training in small-stock production before they could access funding.

AfDB/OECD (2003) identified major challenges in the agriculture sector in Botswana to include recurrent droughts; poor soils; lack of skills in labour force; relatively low levels of investment, especially

in irrigation, infrastructure and marketing; and traditional farmers' resistance to adoption of new and improved technologies. Similarly, Statistics Botswana (2019a) attributed the failure of the agriculture sector to perform optimally to recurring droughts.

According to Manthe-Tsuaneng (2014), Botswana experienced the worst drought from 1981 to 1987 followed by 1990 to 1995. Drought also occurred from 1998- 1999, 2002 to 2006 and from 2011 to 2013. Furthermore, Statistics Botswana (2018) reported that between 2001 and 2017 the country did not experience drought for only two periods (i.e., 2008- 2009 and 2013 -2014, indicating that Botswana is drought prone. The Botswana Environment Statistics Natural Disasters Digest 2017, reported that during 2015-2016 period, cattle experienced the highest mortality followed by goats. In 2015, Kweneng district experienced the highest cattle mortality (4,686) followed by Kgalagadi (1,966), North West (1,485), and Southern districts (1,007). On the contrary, the highest goat mortality (535) occurred in Chobe district, followed by Southern district (418). Compared to other districts, Kweneng district experienced the highest livestock mortality (Statistics Botswana, 2018). This clearly shows that drought contributes significantly to the decrease in livestock populations in Botswana.

The official mortality figures are however underestimated given that most small-holder livestock farmers are lacking are poor record keepers. Recently, Tselaesele et al. (2018) observed that small-holder livestock farmers lack knowledge and skill in farm records and accounts. The extension agents do not have adequate resources to enable them to visit farmers regularly to collect data on livestock enterprise performance. Furthermore, the high ratio of extension agent to farmers and the extension agents' involvement in the assessment and implementation of support programmes leave little time for the extension agents to visit farmers to offer technical assistance or guidance on livestock production.

The sheep population also declined over time (Figure 2). However, an increase in sheep population was observed from 2006 to 2008, which was followed by a decrease up to the year 2017. Again, the increased utilisation of support programmes, as well as, intensified technical support offered to farmers by the government extension service would have contributed to the increase in small-stock population though briefly. Therefore, farmer training activities through Rural Training Centres (RTCs) spread across the country might have contributed to improvements in husbandry management practices. Low levels of management and/or inadequate management practices were found to be challenges in livestock

production (Anteneh, 1989; Rumosa Gwaze et al., 2009). Recurrent drought and inadequate feed supply were also reported to be some of the major constraints in sheep production in Enderta woreda, Ethiopia (Hayelom, 2013). Other factors that hampered the productivity of sheep keeping were unavailability and high cost of feeds, as well as, seasonality of feeds (Ahmed and Egwu, 2014; Debele and Habta, 2015). Anteneh (1989) identified animal feed and nutrition, genetic factors and inadequate management practices to be main challenges in livestock production.

The decline in small-stock populations could be attributable to inadequacy of extension service due to a high number of farmers per extension agent following the introduction of government support programmes without increasing the number of extension agents and/or availing additional resources such as transport and funding to enable regular monitoring and evaluation of projects. Tselaesele et al. (2018) reported that small-holder livestock farmers lack knowledge and skill in artificial insemination; feeds and feeding, nutritional diseases, and range management. Ahmed and Egwu (2014) in Nigeria also found that inadequate extension services is a major challenge that hampered productivity of sheep keeping in Sokoto State.

Livestock diseases have been identified as one of the major constraints to improved livestock farmers' productivity in Botswana (Nsoso and Madimabe, 2003; Bahta et al., 2013). Similarly, Anteneh (1989) found animal health and disease problems to be one of the main constraints to livestock production in Africa. Endemic animal diseases such as Foot and Mouth Disease (FMD) contribute to the agriculture sector not performing optimally (Statistics Botswana, 2019a). The outbreaks of diseases and parasites result in serious economic losses. The outbreaks of FMD that occurred in North West district in 2015, 2017 and 2019 gave rise to restrictions of live animal, and meat products movement within and outside the district. This affected the operations of slaughter facilities resulting in the reduction of slaughter animals and halting of beef exports from North West district. In addition, the outbreak of FMD in the Limpopo Province of South Africa in January 2019 resulted in farmers in Botswana failing to import breeding stock to improve their stock, and resulting in breeding challenges. Additionally, Ahmed and Egwu (2014) identified disease and vaccination problems as some of the major challenges affecting the productivity of sheep farming in Sokoto State of Nigeria, whereas disease prevalence was mentioned by Hayelom (2013).

Genetic factors and uncontrolled breeding have been cited as major challenges in livestock production in Africa (Anteneh, 1989; Monau et al., 2017). Previous

study by Mosalagae and Mogotsi (2013) reported that the five most important constraints in livestock production in Gantsi and Kgalagadi districts of Botswana were drought, predation, inadequate drinking water for livestock, limited grazing land, loss of livestock due to road accidents and theft. Ben et al. (2018) also conducted a survey study on livestock theft in Mogocono village of Kweneng district (Botswana) and reported that 50% of the respondents lost 5 to 15 herds of cattle and goats each in the past five years. Some challenges to improved livestock productivity identified by farmers during the livestock value chain survey in the Central district of Botswana included water shortage, livestock theft, shortage of grazing land, lack of good breeds, poor access to drugs, livestock transport problems and high feed costs and inputs such as medicine and seeds (Bahta et al., 2013). According to Hayelom (2013), predators such as fox and hyena also pose a challenge in sheep production, especially in Enderta woreda of Ethiopia. Predation is worsened by lack of herding.

Previous study by Nsoso and Madimabe (2003) identified lack of market for pelts and meat, lack of skilled manpower and lack of capital to be major challenges to efficient Karakul sheep production in southern Kgalagadi of Botswana. Skilled manpower has a bearing on the efficient delivery of technical support to small-holder farmers. Currently, lack of access to market is one of the major challenges to producers as there is no abattoir that slaughters small-stock. The Lobatse based Botswana Meat Commission abattoir that used to slaughter goats alongside cattle no longer slaughter small-stock. However, a new abattoir that will have a line to slaughter goats is being constructed at Tsabong in the Kgalagadi district (western part of the country).

### Opportunities

1. The market for mutton and chevon exists locally, in the Southern Africa Development Community (SADC) region, Middle East and the rest of the world.
2. Application of assisted reproductive technologies such as artificial insemination (AI) and embryo transfer (ET) should be considered in an endeavour to increase the national small-stock population. The AI technology has never been applied in small-stock in Botswana; hence the need to consider intensifying its usage especially on farm AI. There is also need to consider developing the AI value chain.
3. Opportunities exist in fodder production as a large proportion of fodder used to feed livestock is imported mainly from South Africa. The promotion of fodder production needs to be intensified given frequent occurrence of drought. Drought results in

forage availability being limited in both quantity and quality. As a consequence, it is necessary that a comprehensive fodder strategy is developed which will be supported with funding from government.

4. The skins that presently have little value could be processed into various products for export to the international markets. The processing of skins locally should lead to job creation and transfer of knowledge and skills to the locals.
5. There is growing interest and willingness by the banking sector to finance small-stock business ventures. This should lead to more people going into commercial small-stock production.

#### Future prospects

1. Export of breeding materials (breeding stock, semen, and embryos) and meat such as lamb, mutton and chevon.
2. Development of own breeds (climate smart) as more farmers join breeder societies and become more knowledgeable in breeding aspect through short courses.
3. Improving market access by utilizing abattoirs that are currently underutilised or not in use. These include inter alia Francistown BMC plant, Jwaneng municipal abattoir, and Meat Inspection Training Institute abattoir in Lobatse.
4. Development of traceability system for smallstock and this may call for review of BAITS regulations.

#### CONCLUSIONS

The population of sheep and goats in Botswana has declined over time though the demand for mutton/lamb and chevon is high locally and internationally. The major contributory factors to the decline of sheep and goats population include drought, outbreaks of diseases and parasites, inadequacy and high feed costs, shortage of grazing land, stock theft, as well as, lack of access to markets. The high ratio of extension agent to farmers coupled with lack of regular training for small-stock extension agents hamper extension service delivery resulting in farmers not adopting appropriate and relevant technologies. The use of assisted reproductive technologies such as Artificial Insemination and Embryo Transfer must be urgently employed to increase sheep and goats populations to enable the country to export both live animals and meat products. ISPAAD should be reviewed to allow more land to be cultivated with fodder. A small-stock development strategy that will guide the development of small-stock sub-sector is long overdue.

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**Table 1:** Cattle, goats and sheep populations in nine districts of Botswana

District	Cattle	%	Goats	%	Sheep	%
Southern	184 410	8.90	172 371	13.67	57 011	24.48
South East	5525	0.39	15 367	1.22	2060	0.87
Kweneng	219 555	10.59	163 296	12.27	36 516	15.42
Kgatleng	90 923	4.39	55 226	4.39	10 043	4.24
Central	744 159	35.90	521 520	41.41	73 958	31.24
North East	28 382	1.37	61 194	4.86	5413	2.29
Ngamiland	238 132	11.49	111 604	8.86	14 700	6.21
Gantsi	69 724	3.36	26 970	2.14	5863	2.48
Kgalagadi	108 174	5.22	69 876	5.55	31 200	13.18
<b>Total</b>	<b>2 072 263</b>		<b>1 259 441</b>		<b>236 764</b>	

Source: Statistics Botswana (2016a).

**Table 2:** Production indicator trends of goats in traditional vs. commercial production systems

Year	Birth rates		Death rates		Off-take rates	
	Traditional	Commercial	Traditional	Commercial	Traditional	Commercial
2006	42.5	42.6	22.1	22.3	7.5	12.1
2007	42.3	36.6	16.3	16.4	6.6	6.8
2008	44.9	39.9	23.5	23.1	8.5	10.4
2009	43.5	37.6	19.8	13.2	6.9	9.5
2010	41.7	36.7	18.7	15.0	5.6	9.8
2011	41.5	39.5	24.1	21.1	10.9	5.8
2012	41.4	39.9	21.8	23.5	6.0	8.7
2013	42.3	40.0	22.8	25.0	7.0	10.0
2014	41.9	-	18.3	-	6.8	-
2015	44.0	39.0	17.0	16.0	7.0	10.0
2017	39.1	-	23.3	-	7.3	-

\*Values not available

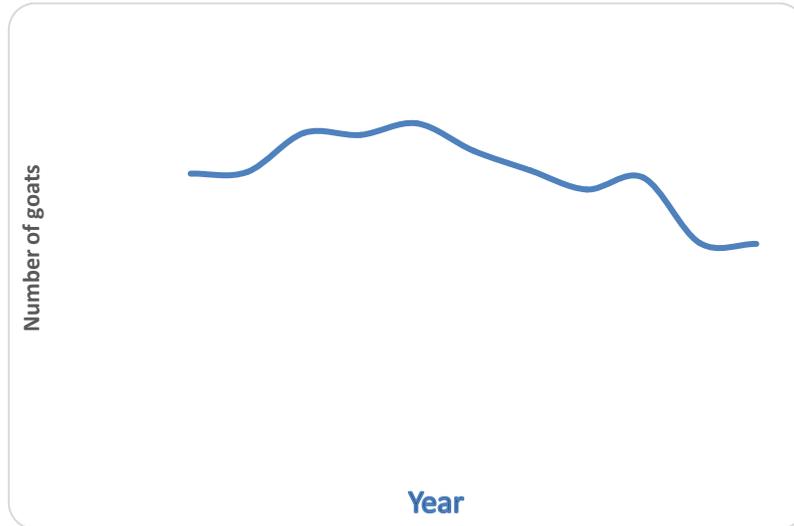
Source: Statistics Botswana (2016b, 2019a)

**Table 3:** Production indicator trends of goats in traditional vs. commercial production systems

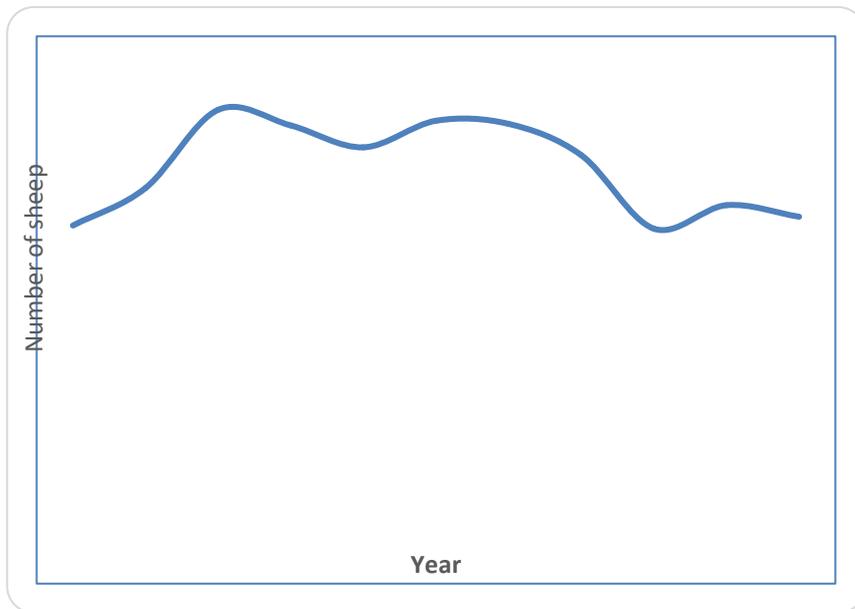
Year	Birth rates		Death rates		Off-take rates	
	Traditional	Commercial	Traditional	Commercial	Traditional	Commercial
2006	32.9	35.1	17.6	15.2	5.9	12.8
2007	34.2	32.0	11.6	36.2	6.6	6.8
2008	35.2	30.6	13.4	14.6	5.5	7.5
2009	35.4	31.9	15.8	12.5	7.3	5.8
2010	32.7	31.8	13.6	6.5	4.7	8.6
2011	32.8	33.4	16.3	17.9	5.7	10.0
2012	33.0	35.0	14.5	16.2	4.6	10.7
2013	36.0	35.0	15.0	14.0	4.4	9.0
2014	35.1	*	15.1	*	2.7	*
2015	37.0	34.0	12.0	12.0	6.0	9.0
2017	33.0	*	16.1	*	3.9	*

\*Values for years not available

Source: Statistics Botswana (2016b, 2019a)



**Figure 1:** Goat population from 2006 to 2017  
Source: Statistics Botswana (2012, 2016b, 2019a)



**Figure 2:** Sheep population from 2006 to 2017  
Source: Statistics Botswana (2012, 2016b, 2019a)