

*Research Journal of Agriculture and Forestry Sciences* \_ Vol. **9(1),** 18-24, January (**2021**)

## *Review Paper* Development opportunities for livestock and dairy cattle production in Uganda: a Review

Denis Waiswa<sup>\*</sup>, Aytekin Günlü and Burak Mat

Department of Livestock Health Economics and Management, Faculty of Veterinary Sciences, Selcuk University, Turkey waiswadenis2@gmail.com

Available online at: www.isca.in, www.isca.me

Received 6<sup>th</sup> August 2020, revised 18<sup>th</sup> November 2020, accepted 26<sup>th</sup> December 2020

## Abstract

On addition to promoting food security and nutrition, creating employment opportunities and alleviating rural poverty, livestock production also contributes to the growth and development of Uganda's economy. The current status of livestock production in Uganda was reviewed, constraints to it's development were identified and possible solutions to these constraints so as to enable increased productivity of the sector were suggested in this article. Factors such as high poverty levels, unequal income distribution, Uganda's demographic structure, limited statistics on the sector's performance and low productivity of animals among others were identified as those hindering Uganda's livestock sector development and performance. Research and development, increased government and NGO's funding in the sector, infrastructural development, creation of cooperatives, adherence to and implementation of policies, implementation of vaccination and veterinary drugs subsidy programs are some of the recommendations for the development of Uganda's livestock sector.

Keywords: Uganda, livestock, dairy cattle, Development opportunities.

## Introduction

Uganda, officially known as the Republic of Uganda, is located in the Sub-Saharan region of East Africa and is about 800 kilometers from the Indian Ocean. It's total area is 241,551 square kilometers; whereby an area of 200,523 square kilometers is covered by land and the rest by water bodies<sup>1</sup>. Annual average temperatures vary between 16°C and 30°C in most regions of Uganda.

Most areas in Uganda receive between 750 mm and 2,100 mm of rainfall annually<sup>1</sup>.Growing at an annual rate of 3.3%, Uganda has a population of over 44 million people according to statistics by the World Bank and it is expected to exceed 100 million by 2050<sup>1-3</sup>.

According to the 2019 report by the Uganda Bureau of Statistics, Uganda's economy was estimated to have grown by 6.5% in the 2018/19 Fiscal Year. Real GDP realized in 2018/19 Fiscal Year (2016/2017 prices) was US \$ 32,701 million and nominal GDP was US \$ 34,248 million. Nominal GDP per capita was US \$ 878 while the Real GDP per capita was US \$ 891<sup>4</sup>.

The structure of Uganda's economy basically has three sectors i.e. the Agriculture, Forestry and Fisheries sector, Industry sector and the Services sector. The services sector made a leading contribution to the national GDP, accounting for 43.3% of the total GDP in the 2018/19 fiscal year. The Agriculture, Forestry and Fisheries sector contributed 21.9% while the

industry sector contributed 27.1% and Taxes on produced goods contributed 7.7% to the national GDP in the fiscal year  $2018/19^4$ .

## **Uganda's Livestock Sector**

Uganda's livestock sector consists of cattle, goats, pigs, sheep, poultry, rabbits, bee keeping and other animals. The sector is characterized by high utilization of family labour, ownership of small pieces of land, high reliance on natural pastures to feed animals and ownership of a large number of local animal breeds<sup>5</sup>. When it comes to the use of labor in livestock rearing activities, 99.1% of livestock keeping households depend on family members for labor in livestock husbandry activities.

The average land size owned by livestock owning households is 2.2 hectares, with exception of the communal grazing areas<sup>6</sup>. Only 2.4% of livestock owning households in Uganda cultivate pastures for feeding animals which shows a high level of reliance on natural pastures<sup>5</sup>. These factors are an indicator of the small herd sizes owned by the greatest percentage of Uganda's livestock farmers and the subsistence nature of Uganda's livestock sector.

According to data provided by Uganda's Ministry of Agriculture, Animal Industry and Fisheries (MAAIF) and the Uganda Bureau of Statistics (UBOS), there is a general annual growth in the number of all livestock species in Uganda as shown in Table-1<sup>4</sup>.

Livestock Species	2014	2015	2016	2017	2018	Percentage change
Cattle	13,623	14,031	14,368	14,189	14,572	2.7
Sheep	3,842	3,842	4,198	4,445	4,584	3.1
Goats	14,011	15,312	15,725	16,034	16,048	2.4
Pigs	3,584	3,916	4,037	4,109	4,245	3.3
Poultry	44,698	46,039	46,291	47,578	48,901	2.8

**Table-1:** Summary of Livestock Numbers (000's) from 2014-2018<sup>4</sup>.

**Cattle Farming:** Cattle are the most valuable among livestock species in Uganda because of their contribution to the national economy compared to other livestock species. Beef, milk and other products from cattle contribute approximately 73% of the gross value of all livestock output<sup>8</sup>. Despite their low production capacity and reproductive performance, local cattle breeds continue to dominate exotic breeds in terms of numbers. This is attributed to the fact that local cattle breeds are versatile and easily adapt to the local climatic and disease conditions. Out of the 14.6 million cattle in Uganda, 93.5% are local while 6.5% are exotic cattle breeds. Among the local cattle breeds, 29.6% are Ankole breeds and 70.4% are East African Zebu and Nganda breeds of cattle<sup>4</sup>. While 0.9% of the total number of cattle are exotic beef breeds, 5.6% are exotic dairy breeds<sup>4</sup>. The Black and White Holstein Friesian is the most reared among exotic dairy breeds in Uganda. Other commonly reared breeds are Jersey, Guernsey and Ayrshire<sup>5</sup>.

Uganda produced 0.217 million tons of beef worth US \$ 0.5 billion in 2018<sup>4,9</sup>. Annual per capita consumption of beef is 6 kg. However, per capita consumption varies across the country with the average annual per capita beef consumption in urban areas estimated to be 9kg and that in rural areas is 6kg<sup>10</sup>. Out of the total households in Uganda, 40% consume beef on a weekly basis<sup>9</sup>.

**Small Ruminants Farming:** Similar to cattle farming, local goats breeds also continue to be dominant over the exotic breeds in terms of numbers. Out of the 16.05 million goats in Uganda, 96.3% are local breeds and 3.7% are exotic breeds. Out of the total number of local goats breeds, 14.5% are Mubende goats, 83.3% are the Small East African goats and 2.2% are Kigezi goats. Of the total number of goats, 0.9% are exotic dairy breeds and 2.8% are exotic meat breeds; 79.1% of the total number of exotic meat breeds are Boer goats, 3.7% are Galla goats and 17.2% are the other exotic meat breeds<sup>4</sup>. As part of the small ruminants, there are 4.6 million sheep in Uganda<sup>4</sup>. In Uganda, 40,910 tons of goats meat and mutton were produced in 2018. Annual per capita goats meat consumption is 0.9 kg and annual per capita mutton consumption is 0.3 kg<sup>10</sup>.

As part of Uganda's livestock industry, pig farming is also carried out in the country. According to the UBOS 2019

statistical report, there are over 4.2 million pigs in Uganda. Farmers rear Landrace, Large White, Duroc, Hampshire, Large Black and Camborough breeds of pigs and more than 24,681 tons of pork are produced every year in Uganda<sup>4</sup>. Annual per capita pork consumption is 3.2 kg<sup>10</sup>.

Poultry Farming: Because of the very low numbers of turkeys, ducks and other domesticated birds in Uganda, poultry is closely associated with chicken. Approximately 40% of all households raise chicken which contributes from 7% to 18% to their household income using largely free range systems<sup>9</sup>. Local poultry breeds continue to dominate the exotic breeds in terms of numbers. Out of the 48.9 million poultry in Uganda, 12.3% are exotic breeds and 87.7% are local breeds<sup>4</sup>. In terms of egg production in Uganda, the number of eggs obtained from local chicken breeds is over four times that obtained from exotic chicken breeds. This is attributed to the fact that over 62.5% of the total number of laying hens are local breeds and only 37.5% of laying hens are exotic breeds<sup>5</sup>. In 2018, 0.9 million eggs worth US \$ 36 million were produced in Uganda<sup>4,9</sup>. Annual per capita egg consumption in Uganda is 22 eggs<sup>10</sup>. As one of the products obtained from poultry, 65,000 tons of chicken meat worth US \$ 87.7 million are annually produced in Uganda<sup>4,9</sup>. The annual consumption of chicken meat per person in Uganda is 1.8 kg<sup>10</sup>.

## **Benefits derived from livestock**

The benefits derived from livestock can be divided into two categories, namely direct use benefits and benefits to Uganda's economy. Direct use benefits are those benefits derived from livestock at household-level in form of goods and services for both commercial and non-commercial or subsistence purposes<sup>8</sup>.

**Direct use benefits: Food Security and Nutrition:** Livestock production has a significant contribution it makes towards sustainable food security and nutrition for many households in Uganda, especially those in the semi-desert habitats of Karamoja and Northern Uganda that are not suitable for crop production<sup>8,11,12</sup>. This contribution is achieved through; the consumption of livestock products, income gained from selling livestock and their products, and increasing crop productivity as a result of the use of fertilizers from animal farming and the use of draught animals for ploughing land<sup>13</sup>.

**Social functions:** Livestock are used for various social functions in Uganda such as payment of dowry. The ownership of livestock increases the social status of the owners and contributes to gender balance when women and children get the opportunity to own animals<sup>8</sup>.

**Contribution to crop production:** Livestock production contributes to increased productivity of crops as a result of the use of fertilizers from livestock and draught animals for ploughing land used for crop production<sup>8,11,14</sup>.

**Generation of income and accumulation of wealth:** Through the sale of livestock and their products, poor farmers generate income which they use to finance both planned and unplanned expenses such as illnesses, payment of school fees. Livestock is also used by farmers as a saving strategy to accumulate wealth. In most communities of Uganda, livestock is used as collateral security to access credit<sup>8,11</sup>.

**Contribution of livestock to Uganda's economy: Employment and livelihoods:** The livestock industry employs and is a source of livelihood for a great percentage of Uganda's population. Many people are employed throughout the livestock production chain, from the production of livestock products at farm level to the processing of these products at industrial level. The livestock industry is a source of livelihood for approximately 58% of households in Uganda<sup>9,15,16</sup>.

Alleviation of rural poverty: Livestock production contributes significantly to reducing rural poverty in Uganda. Available research shows that rural poverty is highly attributed to the lack of livestock<sup>16-18</sup>. Therefore, increasing people's ownership of livestock and increasing the productivity of livestock have a great potential to directly improve rural livelihoods. Reducing rural poverty in Uganda means a reduction in total national poverty levels, since 74% of Uganda's population live in rural areas and only 26% live in urban areas<sup>19,20</sup>.

**Contribution to Uganda's GDP:** The livestock sector not only contributes to employment and rural poverty reduction, but also through its contribution to the national GDP, aids the growth of Uganda's economy. The sector contributed 3.5% to the total national GDP in 2018/2019 fiscal year which amounts to over US \$ 1,188 million<sup>4</sup>.

**Export of Livestock and Livestock Products:** Apart from providing goods and services such as food, fertilizer and draught animals, the livestock industry contributes 1-1.5% to the total export trade value of Uganda<sup>21</sup>. A wide range of livestock products such as eggs, dairy products, meat, horn products, and hides and skins are exported in Uganda. These products are exported to many countries and the major importing countries are Uganda's neighboring countries such as Kenya, Rwanda, Burundi, Democratic Republic of Congo, Tanzania, South Sudan, Somalia and Ethiopia. Uganda also exports products such as hides and skins to Asian countries such as India, China, Turkey and Pakistan. Horn products are exported to European

countries such as England, Italy, Germany and Norway, and milk casein is exported to the United States of America<sup>7,21</sup>.

While dairy products and eggs worth more than US \$ 80 million dominate Uganda's livestock exports, meat and meat products valued at US \$ 6.2 million are the least exported livestock products<sup>9</sup>. According to the report by Uganda's Ministry of Agriculture, 17,079.4 tons of dairy products were exported in 2016 making them the most exported livestock products. These were followed by hides and skins as the second most exported livestock products where by 16,713.4 tons of hides and skins were exported. Other exported livestock products were 2,994.2 tons of eggs, 272.4 tons of horn products, 170.6 tons of animal offals, 32.5 tons of frozen chicken and 20.4 tons of red meat<sup>21</sup>.

# Factors responsible for the current outlook of Uganda's livestock sector

The future of Uganda's livestock sector in terms of production, domestic demand and trade is influenced by various economic, demographic and political factors. These factors have an impact on both the supply and demand of livestock products<sup>11</sup>.

**High poverty levels:** Despite available evidence showing growth in Uganda's economy, poverty levels in the country still remain high. According to data provided by the World Bank, 21.4% of the people in Uganda are poor<sup>22</sup>. As a result of the high poverty levels, most farmers are unable to maintain highly productive exotic breeds of livestock. They cannot meet the health, nutrition, breeding and housing requirements of these animals. This explains why local breeds and traditional systems of production dominate Uganda's livestock sector. High poverty levels also affect the demand for livestock products. The poor population cannot afford most of the livestock products. This is predominant in the demand and consumption of processed livestock products that are more expensive than the unprocessed products.

**Income inequality:** Although there is evidence showing increasing levels of income in Uganda, high levels of unequal distribution of income do exist. This slows down the rise of middle-class consumers, thereby limiting the increase in demand and consumption of livestock products<sup>11</sup>.

**Demographic structure**: Uganda's population is expected to grow to upto 100 million people by  $2050^3$ . With this population growth, a raise in food demand and definitely a raise in the demand for livestock products is expected<sup>8</sup>. However, Uganda's rapid population growth has created a demographic structure where over 68% of the country's population is below 25 years of age<sup>1,23</sup>. Contrary to the aforementioned expectation therefore, the largest percentage of Uganda's population being a non-working population, approximately only 32% of the population can afford livestock products on a daily basis.

Despite available evidence showing growth in Uganda's urban population, its proportion to the total population is still low.

According to available data, only 26% of Uganda's population live in urban areas<sup>19</sup>. However, according to current researches the increase in urban population is often associated with higher average household income and changes in food preferences where more animal products are consumed. This would mean an increase in the demand for livestock products<sup>8</sup>. Therefore, Uganda's low urban population means that even if production of livestock products is increased, domestic market and demand for these products is still low since most of the consumers of livestock products are expected to be those dwelling in urban areas<sup>7</sup>.

Other factors include limited access to production inputs, services and markets, low productivity of animals, limited access to credit, technology and farmer extension services. Drought occurence in some parts of the country is responsible for the low productivity of animals and the very low prices of livestock in the affected areas. Poor transport infrastructure in some parts of the country also poses a major challenge for farmers to access livestock markets. The inability of some farmers to access electricity also makes it difficult to store perishable animal products in many regions of Uganda<sup>11</sup>.

## **Uganda's Dairy Industry**

The dairy sector is an important sub-sector in Uganda because of its enormous potential in reducing rural poverty, development of the economy and promoting household food security. The sector provides a source of income that contributes to poverty reduction and improvement of people's livelihoods<sup>24,25</sup>.Uganda's dairy industry grows at an average rate of 7-10% each year<sup>10,26,27</sup>. This growth is predominant in the processed milk sector where it grows at a rate of about 11% annually<sup>10</sup>. This significant growth rate owes to reforms such as liberalization of the dairy sector by the government and important initiatives and investments by Non-Governmental Organisations<sup>25,27</sup>.

Despite the improvements and investments in the dairy sector by both the government and NGOs, Uganda's milk production is still lower than it's production potential. Uganda currently produces 2.04 million tons of milk annually<sup>4</sup>. However, Uganda has the potential to produce upto over 10 million tons of milk annually from the current annual production<sup>28</sup>. This potential is not met due to factors such as animal diseases, low conception rates and failures in artificial insemination, climatic factors, lack of the necessary farmer extension services<sup>28</sup>.

The amount of milk produced in Uganda increased from 1.5 million tons in 2013 to 2.04 million tons in 2018 at a percentage increase of 35.6% <sup>4</sup>. However, this growth in milk production is as a result of the increase in the number of dairy animals and not the increase in productivity per animal<sup>28</sup>. The annual consumption of dairy products in Uganda is 58 litres per person which is very much lower than the 200 litres/person/year recommended by WHO<sup>10,29-31</sup>. However, there are significant regional differences in the per capita milk consumption levels in

Uganda. This varies from 86 litres/person/year in Uganda's milk surplus western region to 43 litres/person/year in the milk deficit eastern region<sup>10</sup>.

**Consumption of milk and other dairy products:** The largest part of Uganda's population consumes raw (unprocessed) milk from the informal milk marketing channels because it is available at affordable prices. A small percentage of the population can buy packed milk from the formal milk marketing channels<sup>30</sup>. Yoghurt is the most consumed of the processed dairy products. It is then followed by ice cream, butter and ghee. According to a survey conducted by Uganda's Dairy Development Authority in 2011, only 36% of Uganda's population are able to buy milk daily. Butter and cheese are not frequently used by the population. Around 7% of Uganda's population frequently use butter or they take long without tasting it. Only 4% of the population use cheese regularly and more than 75% of the population do not know it's taste<sup>7</sup>.

## Main problems facing Uganda's dairy industry

**High milk production costs:** Producing high quality and large amounts of milk in Uganda requires major investments in several basic practices. These practices include clearing the bushes and removing unpleasant plant species from the land to allow proper development of palatable pastures, digging dams to ensure cows have clean and sufficient water, procurement, maintaining and feeding high productive cows. In addition, cows must be sprayed at least once a week to protect them against ticks and other external parasites thereby preventing diseases such as East Coast Fever and babesiosis. Cows should also be dewormed at least once every three months to prevent internal parasites. When the costs of all these activities are summed up, it costs on average approximately USD \$ 0.13 - 0.16 to produce one litre of milk<sup>32</sup>.

However, despite these heavy investments required, with support from the government and NGO's, the number of dairy cattle farmers has increased in the country over the past thirty years resulting into increased amounts of milk production compared to the previous years<sup>33</sup>.

**Low milk prices:** Amidst the low domestic and unstable foreign markets, transformations and improvements in the dairy sector have led to increase in milk production in the country. Dairy farmers face a challenge of low milk prices as a result of excess production especially during the rainy seasons which are the periods of peak production. During these periods of high production, the price of one litre of milk at the farm gate ranges from US \$ 0.08 - \$ 0.11 in the Western region which is Uganda's highest milk producing region<sup>32</sup>. This price is far below the cost of producing one litre of milk which makes it uneconomical for farmers to continue raising dairy cattle for milk production. As a result, some farmers replace dairy cattle herds with beef cattle herds because beef production is

considered to be more profitable than dairy production. This poses a great challenge to the future of Uganda's dairy industry $^{32}$ .

**Insufficient market for milk:** On addition to the low prices of milk at the farm level, Uganda's dairy industry participants face a challenge of inadequate market for milk. Kenya which has always been a major importer of more than 80% of Uganda's milk and cream banned milk imports from Uganda in December last year. This is because Uganda's milk was being sold cheaply in Kenya thereby dominating Kenya's markets and yet milk production in Kenya had also sharply increased, which meant less demand for Uganda's milk<sup>27,32,33</sup>. Such a ban is a big blow to Uganda's dairy sector because it's growth largely depends on the export market in neighboring countries due to the low domestic market for milk. The domestic market can take up only 12% of the total milk collected in Uganda<sup>32</sup>.

On addition to Kenya's ban on the importation of milk from Uganda, Uganda's milk export market faces several other obstacles. These include; South Sudan's market for Uganda's milk is currently very small, the tax on Uganda's milk in Tanzania is very prohibitive at US \$ 0.87 per litre, and Rwanda is already producing and processing enough milk, which means less demand for Uganda's milk<sup>32</sup>.

Long chain of actors in the marketing of milk: The marketing of milk from the farm gate to the final consumer in Uganda involves several participants and actors. These include farmers, middlemen, traders both retailers and wholesalers, bulking centres and processors. A typical milk marketing chain in most parts of Uganda involves a small-scale trader who buys milk from the farmers to the collection centers, and then large-scale traders who transport the milk from the collection centers to the processing plants<sup>7,34</sup>. At the farm level, farmers are paid less than US \$ 0.16 per litre of milk, because traders and other participants are exposed to transport and cooling costs before milk reaches the processing plants or the final consumers<sup>26,32,33</sup>. Each actor driven by a motive to make profits removes a certain amount of money from the 'real' price of milk to cater for expenses such as transport and cooling. In this case, the end consumers pay a high price for milk, while the farmers get a lower price for their milk. Dairy farmers make more losses than all other actors because they do not decide on the price of milk. Instead it is decided by processors who buy it at lower prices from other actors<sup>32</sup>.

Despite having a similar cost structure for milk processing and selling prices of the processed milk products, the profit margin of dairy processors in Uganda is higher than that of their counterparts in Kenya. This is because of the very much lower purchase price of milk at the farm level in Uganda<sup>31,35</sup>. The cost of processing milk in Uganda is estimated to be US \$ 0.22 per litre. On average, the profit margin for a Ugandan dairy processor is estimated to be 22% of operating costs, while the average margin for a processor in Kenya is only 10%<sup>31</sup>.

Limited statistics on the performance of the dairy sector: It is a great challenge to find statistics about the performance of Uganda's dairy sector and the size of the market for the produced milk. This is because only a small percentage of the milk produced is processed and marketed through the formal marketing channel on which official statistics are based. The largest percentage of the produced milk is marketed through the informal marketing channel. Statistics are also limited because actors in Uganda's dairy sector tend to hide the right information from researchers. This makes it difficult to find the right information about the performance of the sector. In fact, almost all statistics about the performance of Uganda's dairy industry are just estimates<sup>30</sup>.

**Low productivity of animals:** Despite the growth in the total number of cattle in Uganda, the main reason for the low levels of milk production in the country is the low milk yield per cow per lactation. This is attributed to factors such as poor management practices for example unbalanced nutrition, poor housing conditions, animal diseases and climatic factors<sup>30,34,36,37</sup>.

## Solutions to the problems

The development of Uganda's dairy sector can be achieved by increasing policy focus on infrastructural development, research and development<sup>11</sup>. For example, in order to tackle the challenge of low milk prices, there is need for research to determine the unit cost of producing milk in Uganda. Such research will give an idea of how much farmers gain from or lose on milk production. Suitable policies can thereby be implemented to establish farm and consumer prices of milk without affecting any of the actors in the dairy production chain. The government should also establish policies to reduce the number of actors in the informal sector of marketing milk. Reducing the number of actors in the informal sector can be useful in solving both the challenge of low milk prices and that of limited statistics about the dairy sector performance. The government should also empower farmers financially through credit support to enable them add value to their milk. It should also improve roads in the remote areas to enable farmers access markets for their milk<sup>31</sup>.

In order to address the issue of insufficient market for farmers' milk, the following measures should be put in place; Organizing dairy farmers in form of cooperatives and associations, establishing rural milk collection and cooling infrastructure. Training farmers and other dairy sector actors on hygienic milk production, handling and processing to enable the production of quality milk that meets the international standards<sup>7</sup>. Lastly, market integration in Africa to widen the market of Uganda's milk<sup>11,32</sup>.

Another problem facing Uganda's dairy sector and livestock production at large is the inconsistency in the political and policy framework. Implementation of policies and consistency in these policy frameworks is the only solution to this problem<sup>11</sup>.

As a precaution against losses caused by animal diseases, vaccination programs and veterinary drugs subsidy programs should be implemented. As a result of these subsidized veterinary drugs, farmers will be able to get veterinary services at cheaper costs thereby preventing the death of animals from diseases as well as reducing production costs of milk and other livestock products.

The challenge of low productivity of animals can be solved by implementing cross breeding programs and training farmers about the general management practices such as animal nutrition, housing and general animal care. While implementing cross breeding programs however, care should be taken to have cross breeds whose productivity isn't affected by the local climatic conditions. According to studies in the tropics, at temperatures above 27%, 50% crosses between Friesian and Zebu cows produce more milk than the 75% crosses during maximum production despite the higher genetic potential of the latter<sup>34</sup>. Therefore crossing exotic breeds with the local breeds giving crosses that are adaptable to the local climatic conditions is the most appropriate cross breeding strategy for Uganda.

## Conclusion

Livestock production has a significant contribution it makes towards the development of Uganda's economy, improvement of rural livelihoods, reduction of poverty and meeting the country's growing demand for livestock products. This contribution is reflected in the sector's share in Uganda's GDP, employment, eradication of hunger and improving food security. Although the outlook of Uganda's livestock sector as reflected by it's diverse contributions provides many reasons for optimism, major challenges and uncertainties do exist. Growth of the sector is constrained by challenges such as poor policies, low level of infrastructural development that limit market access and increase losses. Income and economic growth levels in most parts of the country are still low. Prevalence of livestock diseases and climatic conditions also challenge the development of the livestock sector.

There is need to find solutions to these constraints because of the fast growing demand for livestock products and the need to reduce the proportion of the population living in absolute poverty, most of whom depend on food and income obtained from livestock. However, increasing livestock production while at the same time maintaining the environment is also one of the challenges facing Uganda today. Unlike in developed countries where growth in the livestock sector is driven largely by intensification accompanied by increased productivity, in Uganda, growth in the sector is driven by an increase in the number of animals rather than efficiency and productivity. This kind of growth is problematic in several ways for example, increasing the number of animals with less production is not economical, has a great negative impact to the environment in terms of methane production, encourages over grazing, deforestation, encroachment on swamps in the search for

grazing areas. With the growing population leading to shortages of large community grazing grounds, growth as a result of increasing the number of animals rather than productivity of the animals is inefficient. Therefore, growth in Uganda's livestock sector will only be efficient if livestock productivity is increased on addition to the growing number of animals.

There are a wide range of ways through which the aforementioned constraints can be solved. However, all these ways require increased funding from the government and Non-Government Organisations. The government needs to develop new and monitor and strengthen existing institutions that provide credit, animal health and breeding services, processing and marketing services for livestock products. The introduction of new technologies and systems of production in the sector should also be accompanied by strengthening of the institutions needed for their implementation. There is also need to support research and development to enable improvement and development in Uganda's livestock sector. The research areas that deserve attention include animal and veterinary public health and disease control, economic analysis on the profitability of the sector and improvements in animal husbandry and management practices. Promoting animal and veterinary public health will not only save farm costs and increase productivity, but will also reduce the risk of losses and improve access to international world markets. Effective farmer extension services are also essential for the successful implementation of new systems of livestock production in the country. Implementing the above recommendations will help Uganda unleash it's potential in livestock production. Improvements in the productivity of the livestock sector comes along with several opportunities and achievements. Increasing production in the livestock sector contributes to growth in national income, reduces dependency on imported livestock products, creates employment opportunities, plays a role in improving livelihoods and poverty alleviation.

## Acknowledgement

The authors acknowledge the efforts of the authors whose journals and publications were used in the writing of this article.

## References

- **1.** UBOS. (2016). The National Population and Housing Census 2014 Main Report.
- 2. World Bank. The World Bank Data. https://data.worldbank.org/country/uganda. Retrieved 25 July, 2020.
- **3.** UN. World Population Prospects 2019, Department of Economic and Social Affairs Population Dynamics. https://population.un.org/wpp/. Retrieved 28 November, 2019.
- 4. UBOS. (2019). Statistical Abstract.

- **5.** MAAIF, and UBOS. (2009). The National Livestock Census Report 2008.
- 6. Tijjani, K.I., and Yetişemiyen, A. (2015). Dairy Cattle and Dairy Industry in Uganda: Trends and Challenges. Research Journal of Agriculture and Forestry Sciences, 3(10), 14-18.
- 7. Balikowa, D. (2011). Dairy development in Uganda. A review of Uganda's dairy industry. Dairy Dev. Authority Uganda. 3202(1).
- **8.** Behnke, R., and Nakirya, M. (2012). The contribution of livestock to the Ugandan economy.
- **9.** FAO. (2019). The future of livestock in Uganda. Opportunities and challenges in the face of uncertainty.
- **10.** Agriterra. (2012). Identification of livestock investment opportunities in Uganda.
- **11.** OECD, and FAO. (2016). Agriculture in sub-Saharan Africa: Prospects and challenges for the next decade. OECD-FAO agricultural outlook 2016-2025.
- **12.** Godber, O.F., and Wall, R. (2014). Livestock and food security: vulnerability to population growth and climate change. Global change biology, 20(10), 3092-3102.
- **13.** Azzarri, C., Cross, E., Haile, B., and Zezza, A. (2014). Does livestock ownership affect animal source foods consumption and child nutritional status? Evidence from rural Uganda. The World Bank. 1813-9450.
- 14. Okello, W.O., Muhanguzi, D., MacLeod, E.T., Welburn, S.C., Waiswa, C., and Shaw, A.P. (2015). Contribution of draft cattle to rural livelihoods in a district of southeastern Uganda endemic for bovine parasitic diseases: an economic evaluation. Parasites & vectors, 8(1), 571.
- **15.** Herrero, M., Grace, D., Njuki, J., Johnson, N., Enahoro, D., Silvestri, S., and Rufino, M.C. (2013). The roles of livestock in developing countries. Animal, 7(1), 3-18.
- **16.** Upton, M. (2004). The role of livestock in economic development and poverty reduction.
- **17.** Ellis, F., and Bahiigwa, G. (2003). Livelihoods and rural poverty reduction in Uganda. World development, 31(6), 997-1013.
- **18.** Ellis, F., and Freeman, H.A. (2004). Rural livelihoods and poverty reduction strategies in four African countries. Journal of development studies, 40(4), 1-30.
- Worldometer. Uganda Demographics. https://www. worldometers.info/demographics/uganda-demographics/ #urb. Retrieved 21 June, 2020.
- **20.** Swanepoel, F., Stroebel, A., and Moyo, S. (2010). The role of livestock in developing communities: Enhancing multifunctionality. University of the Free State/CTA.

- **21.** MAAIF. (2016). Ministry of Agriculture Animal Industry and Fisheries' Performance Review Report Financial Year 2015 to 2016.
- 22. World Bank. The World Bank Data. https:// data.worldbank.org/ zcountry/uganda?view=chart. Retrieved 24 June, 2020.
- **23.** UBOS. Uganda Data Portal, Uganda Population By Age Groups. https://uganda.opendataforafrica.org/ jejnncg/ uganda-population-by-age-groups. Retrieved 21 June, 2020
- 24. Wozemba, D., and Nsanja, R. (2008). Dairy investment opportunities in Uganda-report.
- **25.** Garcia, O., Balikowa, D., Kiconco, D., Ndambi, A., and Hemme, T. (2008). Milk production in Uganda: dairy farming economics and development policy impacts.
- **26.** Mwebaze, T., and Kjaer, A.M. (2013). Growth and performance of the Ugandan dairy sector: elites, conflict, and bargaining. International Journal of Agriculture Innovations and Research, 2(3), 287-298.
- **27.** Ecel, A., and Ecel, R.A. (2013). The structure and competitiveness of Uganda's dairy exports. 3(7).
- **28.** Abdallah, H. (2019, June 19). Uganda dairy sector performing below full potential. The EastAfrican,
- **29.** Mbowa, S., and Shinyekwa, I. (2012). Dairy sector reforms and transformation in Uganda since the 1990s.
- **30.** Herrero, M., Havlik, P., McIntire, J., Palazzo, A., and Valin, H. (2014). African Livestock Futures: Realizing the potential of livestock for food security, poverty reduction and the environment in Sub-Saharan Africa.
- **31.** Nakiganda, A., Mohamed, A., Ojangole, S., and Kaukha, R. (2017). Price incentives to milk producers: a case of Uganda. Livestock Research for Rural Development, 29.
- **32.** Tumushabe, A. (2020, March 17). Dairy farmers struggle to find market for their milk. Daily Monitor,
- **33.** Mwesigwa, A. (2019, November 14). Milk prices test resilience of Uganda's dairy sector. The Observer,
- **34.** Ekou, J. (2014). Dairy production and marketing in Uganda: current status, constraints and way forward. Afr J Agric Res, 9(10), 881-888.
- **35.** Nakiganda, A., and Ahmed, M. (2019). Analysis of price incentives for milk in Uganda for the time period 2005–2013. Gates Open Res, 3.
- **36.** Knight-Jones, T., and Rushton, J. (2013). The economic impacts of foot and mouth disease–What are they, how big are they and where do they occur? Preventive veterinary medicine, 112(3-4), 161-173.
- **37.** Nin, A., Ehui, S., and Benin, S. (2007). Livestock productivity in developing countries: an assessment. Handbook of agricultural economics, 32461-2532.