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POLICY NOTE

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Why have milk yields in Uganda stagnated? An investigation into livestock production practices and milk productivity in Uganda

Executive Summary

This policy note investigates milk-yield performance and the factors constraining milk productivity in Uganda. Based on the household survey panel data, the Food and Agricultural Organization (FAO) statistics and qualitative data from field visits to dairy-producing districts in Uganda, the findings reveal that milk yield per cow has declined over time.
The results show that milk productivity has been severely constrained by increased multi-acaricide tick resistance, low uptake of high-grade improved exotic cattle, inadequate dairy extension services, and limited investment in feed resources to supplement natural pastures. It is therefore important that the government improve enforcement of acaricide quality by increasing the staffing levels and the facilitation budget for both the Uganda National Bureau of Standards (UNBS) and the production departments in districts. The government also needs to boost extension service provisions at the district level to train farmers in better livestock practices.

1. Introduction

The livestock sector contributes approximately 9 % of Gross Domestic Product and 17.3 percent of Agricultural Gross Domestic Product. The sub-sector is also a source of livelihood for approximately 4.5 million people in the country (UBOS 2015). Cattle are the major livestock in Uganda and contribute approximately 74 % of the country's total livestock. According to the 2008 National livestock census, a quarter of Ugandan households (nearly 1.7 million) own cattle, an estimated 14.2 million cattle (UBOS, 2017).

The dairy enterprise is an important sub-sector of Uganda's livestock sector both for food security and employment, and as a source of foreign exchange. The sub-sector contributes up to 50% of the livestock GDP (FAO, 2011) and was predicted to fetch USD 150 million in export earnings in 2018 (SNV, 2018). This would make the dairy sub-sector the second highest agricultural export commodity from Uganda after coffee (*ibid*). Despite the national importance of the livestock sector, the sector's annual growth significantly declined from 2.9 per cent in 2014/15 to 1.6 per cent in 2016/17.[1] Given the importance of milk as a key strategic commodity for the accelerated development of the agricultural sector, this policy note highlights the factors constraining milk yields among dairy households in Uganda.

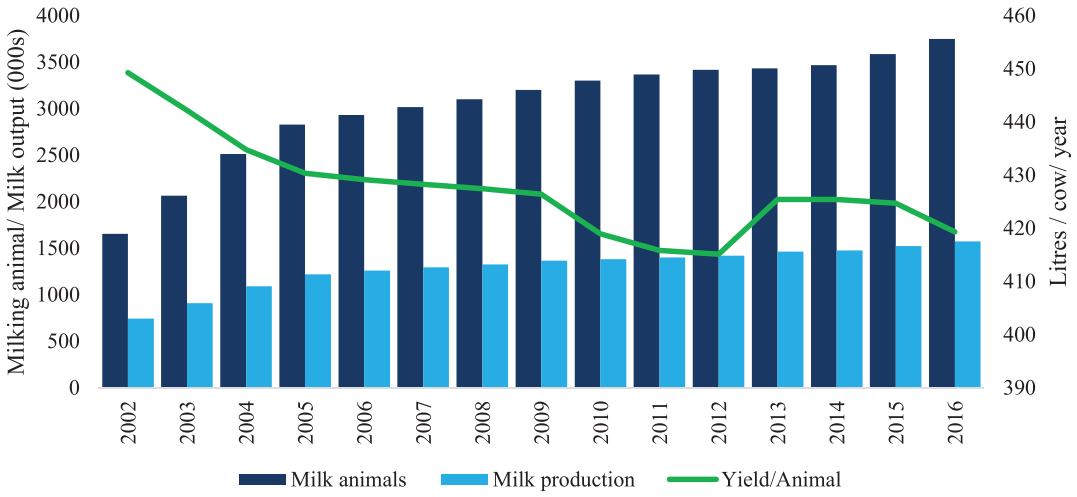
2. Performance of the dairy sector in Uganda

2.1. Milk production and productivity

Over the last decade, Uganda's dairy sector has registered impressive growth in total milk production. Figure 1 shows that between 2002 and 2016, milk output increased more than two-fold, from 0.75 billion litres in 2002 to 1.6 billion litres by 2016 (FAOSTAT, 2018).[2] However, most of the growth in total milk output can be explained by an increase in milk-producing animals rather than yield improvement.

While the number of milking cattle increased more than two-fold from 1,653,333 cows in 2002 to 3,749,038 cows in 2016, general milk yield per cow per year declined by 8%, from 450 litres in 2002 to 415 litres per animal per year in 2016 (T.E, 2016). This decline in milk productivity has been registered amidst a favourable policy and regulatory environment as well as increased budgetary support towards the Dairy Development Authority (DDA) in particular, and the agriculture sector in general.

Figure 1: **Milk producing animals, milk production and yield in Uganda (2002 – 2016)**



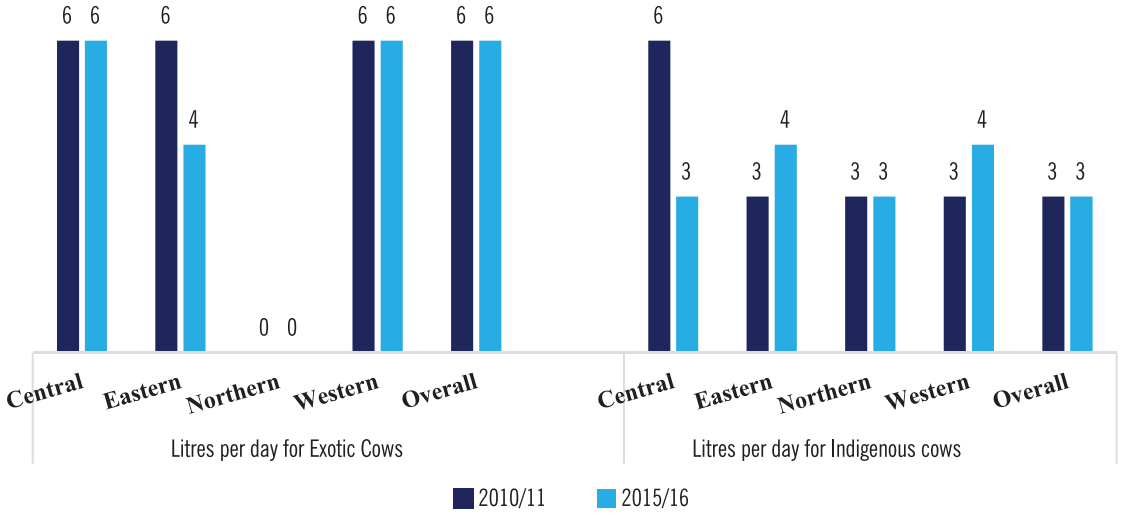
Source: Authors construction based on FAOSTAT database, 2018

2.2. Trends in regional milk productivity

Considering trends in milk yield, Figure 2 reveals that national milk yield per exotic and indigenous cow has stagnated at 6 and 3 litres per day respectively in the last five years. For some regions such as eastern Uganda, milk yield per exotic cattle declined from 6 litres per day in 2010/11 to 4 litres per day in 2015/16. The observed stagnation of milk productivity of exotic cows has occurred without significant improvement in the milk yields of indigenous cattle. A field visit to the Mbarara, Isingiro and Kiruhura districts revealed that dairy farmers were not particularly motivated to improve the genetic potential of their existing indigenous and low-grade cross-breeds to high-yielding superior exotic breeds because of profitability.

Farmers indicated that maintaining a herd with a high proportion of less-yielding but more resistant third cross-breeds was more profitable. Farmers indicated that increased prevalence of disease outbreaks (e.g., East Coast Fever, Brucellosis, Red Water, Lumpy Skin, Foot and Mouth Disease, Anthrax, Black Quarter), increased expenditure on counterfeit acaricides, unstable farm-gate prices for milk, and the high cost of fodder preservation were key deterrents to improving the genetic potential of their herds.

Figure 2: **Milk yield per day by region (litres)**



Source: Authors computation using UNPS 2010/11 and 2015/16 database

3. Factors constraining milk yields among dairy households in Uganda

3.1 Increased multi-acaricide tick resistance on dairy farms

Tick-borne diseases are a major constraint to cattle productivity in Uganda. Ticks have become increasingly resistant to multiple acaricides, causing the death of high-yielding exotic cattle and increasing farmers' expenditure on acaricides. A dairy farmer in Kiruhura district reported that he had lost 9 exotic animals in one year as a result of multi-acaricide tick resistance (EPRC field visit, December 2018). The problem of acaricide failure has forced many dairy farmers to misuse acaricides in search of quick solutions to tick-related illnesses. A key informant interview with a dairy cooperative in western Uganda revealed that dairy farmers have resorted to using Dudu (a plant herbicide) and Lava (a pesticide for bedbugs) to fight ticks.

Animal drugs on display in one of the shops owned by a cooperative in Rushere, Kiruhura district. Multiple acaricide failure is becoming common across Uganda's cattle corridors.

In addition, multiple acaricide failure was amplified by misinformation on tick control from inexperienced private "veterinary" doctors, many of whom were in the business for profit. Dairy farmers reported that the use of herbicides to fight ticks was initially the recommendation of local drug shops and veterinary officers. These practices exacerbate drug resistance and deteriorate both milk and meat quality.

1.2 Inadequate extension services for dairy farmers

Inadequate extension services on the control and management of ticks has also resulted in farmer-created errors on acaricide application and compounded the problem of tick resistance. For instance, farmers in western Uganda were creating their own acaricide application rates. Key informant interviews with the dairy cooperative in Mbarara, Isingiro and Kiruhura districts revealed that farmers had abandoned the recommended acaricide application rates and adopted their own rates. A dairy farmer in Kiruhura district reported that

> *Farmers mix acaricides in 20-litre water jerry cans and use them for spraying. Over time these jerry cans keep expanding due to poor handling. The cans could reach approximately 25 litres. However, farmers do not change application rates and keep using proportions meant for 20-litre jerry cans. As a result, the acaricides applied become ineffective. The limited knowledge is largely a result of limited access to extension- and capacity-building by farmers.*

Source: EPRC Field Interview to Mbarara, Isingiro and Kiruhura districts, 2018

The shortcomings in extension service provisions are further aggravated by inadequate facilitation and staffing of the district production departments. The chairman of a dairy cooperative in Mbarara district observed that

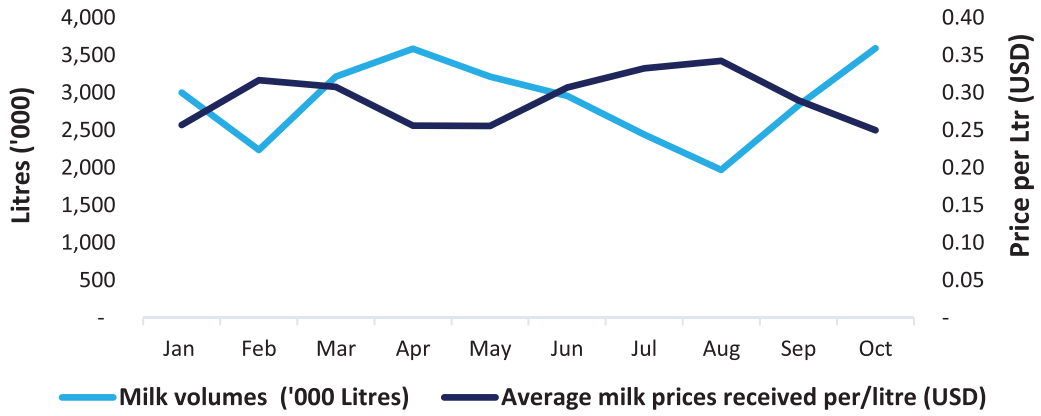
> *As a cooperative, we hire our own private extension officers; a single District Veterinary Officer (DVO) cannot serve 4 sub counties". In addition, no single District Commercial Officer (DCO) has ever collected production information from our cooperative, so how can government effectively plan for this sector?*

3.2 Unpredictable farm gate prices of milk

Market price is a major incentive for exploiting the productivity potential of dairy farmers. This is because a favourable market price helps not only investment in yield-enhancing inputs but also incentivises farmers to maintain milk quality. An analysis of farm-gate prices of 40 diary cooperatives (Figure 3) in Western Uganda reveals that although milk prices have improved over time, farm-gate prices continue to fluctuate between the dry and flush seasons.

Farmers deliver milk to a collection centre in Rushere, Kiruhura district. In most cases private buyers determine milk prices leaving farmers with little profits.

Figure 3: **Trends in milk prices for Western Uganda (2018)**



Source: Authors' computation using data from Uganda Crane Creameries (2018)

Wozemba and Nsanja (2008) reported that liberalisation and the subsequent collapse of strong cooperative unions left most farmers in the vulnerable position of price-takers rather than price-makers. Milk processors and private buyers determine the farm-gate price for milk without considering the farmers' cost of inputs and production. In western Uganda, key informant interviews with dairy cooperatives revealed that the price offered by milk processors was dependent not only on quality but also on the loyalty of the cooperative in supplying a particular milk processor. Therefore, dairy farmers are left at the mercy of processors, which has discouraged the uptake of exotic animals especially in the midst of increasing acaricide costs. In addition to prices being low, they fluctuate at a fast and sometimes unpredictable rate within and across seasons. Figure 3 shows that when the quantities go up, the prices go down, and the reverse is true. Price instability affects planning and hence acts as a disincentive to farmers from adopting high-yielding dairy breeds.

3.3 Limited use of improved management practices

a) Artificial Insemination

It is evident from Table 1 that more dairy households in Uganda prefer to use controlled mating to Artificial Insemination (A.I.) for improving the genetic potential of their herds. Overall, farmers adopting controlled mating increased by 8% between 2011 and 2016. Specifically, dairy farmers keeping exotic cows increased the use of controlled mating by 20 % compared to only 5% for farmers keeping indigenous cattle.

Dairy farmers in the western region reported that insufficient knowledge of A.I., the high cost of A.I., and the inaccessibility of A.I. services within their localities had discouraged the uptake of A.I. services. In addition, difficulties related to heat detection, low conception rates and the high cost of maintaining A.I. offspring from crosses had forced many dairy farmers to prefer bulls for genetic improvement. The persistence of a national preference for controlled mating over A.I. is unlikely to improve herd productivity. This is because effective use of controlled mating requires adequate record keeping, which is highly deficient among dairy farmers in Uganda. Indeed, a key informant interview with a dairy farmer in Mbarara district revealed that farmers obtained "perceived high-quality bulls" from others for mating their animals. The selection of a particular bull was not based on a track record of offspring yield performance or genetic history.

Table 1: **Trends in adoption of yield enhancing technologies (%)**

	Indigenous		Exotic		Overall	
	2010/11	2015/16	2010/11	2015/16	2010/11	2015/16
% Household Practices Zero Grazing	8	15	20	31	10	18
% HH using controlled Mating	11	16	32	52	15	23
% who practiced Artificial Insemination	0	0	1	1	0	0
% watering cows 2 or more times a day	54	64	65	61	56	63
% of HH that didn't vaccinate in the past 1 Year	93	92	87	84	92	90
% of HH that dewormed in the past 1 year	52	50	69	71	55	54

Source: Author's computation based on 2010/11 and 2015/16 UNPS database

Box 1: Reasons cited for low vaccination of dairy animals

- Inadequate extension support to detect, identify and report outbreak of several livestock diseases.
- Regulation of disease quarantines was weak. Farmers reported that district veterinary and police officers mandated to effect regional quarantines were the very ones permitting the movement of sick animals.
- Presence of substandard vaccines on the market had discouraged farmers from vaccinating.
- Due to rising acaricides costs, dairy farmers were vaccinating impulsively during disease outbreaks rather than undertaking routine planned vaccinations.

Source: EPRC field visit (13th -16th December 2018) to Mbarara, Isingiro and Kiruhura districts

b) Vaccination and Deworming

Table 1 reveals that dairy farmers have not adequately adopted disease-control practices to improve the productivity of milking herds. In fact, 90% of dairy households did not vaccinate their animals in the past year. Moreover, the percentage of dairy farmers that dewormed in the past year declined in the last five years. It is also worth noting that as high as 84% of exotic dairy farmers did not vaccinate their animals. Dairy farmers cited the reasons (in Box 1, below) for non-compliance to vaccination guidelines:

c) Low adoption of improved exotic cattle

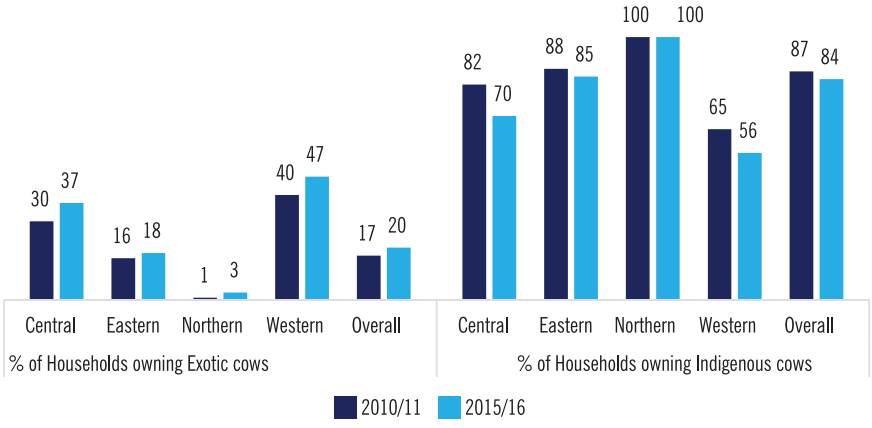
Increasing herd productivity through adoption of improved dairy cattle, i.e., exotic and crossbreeds, is a prerequisite for improving milk yields of a cattle herd. However, an examination of adoption trends of the improved cattle population (Figure 4) reveals that although Uganda has registered an improvement in the adoption of exotic cattle across regions, the national cattle herd largely comprises indigenous breeds.

Figure 4 indicates that only 20 % of dairy farming households in Uganda owned exotic breeds by 2016. At the regional level, the percentage of dairy farmers adopting exotic breeds was lowest in the northern and eastern regions. The absence of a dairy cattle breeding programme in the northern region explains the limited adoption of exotic cattle (Mbowa *et al.,* 2012). Mugisha *et al.* (2014) reported that while Uganda's semen importation for breed improvement had increased since 1959, semen importation has been driven by production and was not linked to a meaningful breeding programme. Consequently, the stock growth of exotic and improved herds has not been great. Moreover, the prevailing land tenure system encourages communal grazing. Therefore, there exists no incentive for dairy individuals to invest in a farm infrastructure that supports the rearing of exotic/cross breeds. The few farmers that have taken up exotic/crosses dairy cattle use zero grazing, which is labour-intensive and limited in terms of stock numbers.

A field visit to Western Uganda revealed that farmers were increasingly replacing exotic with indigenous cattle. The change in herd composition from better-yielding exotic cows to low-yielding indigenous cattle was largely on account of acaricide failure, which had not only resulted in a high death rate of exotic cattle to tick-borne diseases, but had also increased the farmer's total disease-control budget. In addition, the instability of farm-gate prices of milk had forced farmers to resort to the fattening of indigenous bulls for sale to the beef industry at a more lucrative price..

Source: EPRC field visit (13th to 16th December 2018) to Mbarara, Isingiro and Kiruhura districts

Figure 4: Trends in adoption of exotic cattle by region (%)



Source: Authors computation based on 2010/11 and 2015/16 UNPS database

d) Limited investment in supplementary feed resources

High milk-yielding cows require supplementary feeding in the form of silage and hay made from nutritious grasses to avoid nutrient deficiencies and decreased milk productivity, especially during dry seasons. However, most dairy farmers rely on extensive grazing of cattle on rain-fed natural pastures, whose quantity and quality decline rapidly during the dry season.

A farm worker slices elephant grass using a silage cutter for use during the dry season. Due to the unfavorable milk prices, such investments become undesirable among many dairy farmers.

A field visit to western Uganda revealed that farmers were failing to invest in milk-enhancing pastures and that some farms were overstocked. A dairy farmer in Mbarara district stated that, "*Most farmers were not aware that for adequate feeding, each exotic animal requires an average of 2 acres of grass".*

On the other hand, for some districts, uptake of improved pastures had been adopted only recently. A key informant interview with a dairy cooperative in Isingiro district revealed that severe prolonged drought in the district had forced dairy farmers to adopt hay and silage preservation.

In Kiruhura district, farmers stated that investment in improved feeds was not economically viable at the prevailing milk farm-gate prices. A dairy farmer in Kiruhura stated that, "*currently, milk is sold at UGX 600 per litre and yet the labour for land preparation is UGX 9000 per hectare per day."*

4. Conclusions and policy recommendation

This study undertook an investigation of the dairy management practices and the factors constraining milk productivity among dairy households in Uganda. To achieve the objective of the study, the nationally representative Uganda National Panel Survey data for 2010/11 and 2015/16 were used for analysis. In addition, the study used FAOSTAT data from 2018 in the analysis. This secondary data was supplemented by qualitative records obtained through field visits to dairy farmers, cooperatives and non-governmental organisations involved in the dairy value chain in milk-producing districts located in Central and Western Uganda.

The findings reveal that Uganda's cattle herd structure remains largely indigenous, with the national adoption of exotic cattle remaining as low as 20 % of the total cattle owned. Milk productivity for exotic cattle remains below potential and has stagnated at 6 litres per animal per day.

Regarding adoption of better dairy management practices, the findings reveal that dairy farmers have completely ignored Artificial Insemination, while very few routinely vaccinate their dairy animals. It has been revealed that a high percentage of households possessing exotic cattle did not vaccinate nor deworm their animals in the past year.

Milk productivity among dairy households is heavily constrained by increased multi-acaricide tick resistance, low genetic potential of the national cattle herd, inadequate extension services, volatility of farm-gate milk prices that discourage investment in yield-enhancing technology, and limited investment in feed resources to supplement natural pastures.

In light of the above findings, we recommend the following:

- The government needs to increase staffing levels and the facilitation budget for UNBS to improve identification, inspection and enforcement of the quality of acaricides and drugs used in treatment of animals.
- The production departments of dairy-producing districts need to be strengthened to improve extension service delivery.
- Interventions should ensure massive crossbreeding using A.I. through the synchronisation of dairy farmers to improve genetic potential.

References

FAO (2011). A Review of Uganda's Dairy Industry. A report submitted to the Food and Agriculture Organisation access on 11/12/2018 at http://www.fao.org/3/a-aq292e.pdf

Mbowa, S., Shinyekwa, I and Lwanga, M.M (2012). Dairy sector reforms and transformation in Uganda since the 1990s. Economic Policy Research Centre, Report No.4

MoPFED (2017). Background to the budget Fiscal Year 2018/19. Ministry of Finance Planning and Economic Development, Kampala, Uganda

Mugisha, A., Kayiizi,V., Owiny, D., and Mburu, J. (2014) "Breeding Services and the Factors Influencing Their Use on Smallholder Dairy Farms in Central Uganda," Veterinary Medicine International, vol. 2014, Article ID 169380, 6 pages, 2014. https://doi.org/10.1155/2014/169380.

SNV (2018). The Inclusive Dairy Enterprise (TIDE), Annual Report 2017

UBOS (2015). Statistical Abstract report, 2015. Uganda Bureau of Statistics, Kampala, Uganda

UBOS (2017). Statistical Abstract report, 2017. Uganda Bureau of Statistics, Kampala, Uganda

Wozemba, D and Nsanja, R (2008). Dairy Investment Opportunities in Uganda. A report submitted to SNV.

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