

Research

Perceptions of veterinary extension staff regarding poultry feed and ingredients in selected districts of Uganda: a qualitative study

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Abstract

Background Feedstuffs and poultry feeds of low quality are major limitations to the growth of the poultry sector.

Methods A qualitative study approach using key informant interviews was used to collect information. The thematic analysis method using a prescribed coding frame was used to analyze the data. Three themes emerged from the data: overview and business environment, consequences and propositions, and quality and enforcement.

Results The study revealed that poultry feed sub sector is constituted by several players operating at varying scale of business dealing in either imported concentrates, feed stuffs or complete feed. The sector was not well regulated and there was no systematic surveillance done to evaluate the quality of products (feeds and feedstuffs) sold to the farmers. Some regions did not have any feed analytical facilities and therefore farmers mainly depended on subjective judgement using their sense of sight, smell, taste and touch to evaluate the quality of feedstuffs. Regulatory services such as certification of animal feed mills were insufficient not surprising that poultry farmers complained about feedstuff adulteration. The only requirement in place to operate feed and feedstuff business was an annual trade license. The actors/players in poultry feed business operated independently of their formal body or association.

Conclusion This study showed that there is legislation gap in the animal feed sector. The players in the sector were at liberty not to follow standards that ensure quality feeds and feedstuffs.

Keywords Poultry feeds · Feed ingredients · Perceptions · Veterinary extension · Uganda

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1 Background

Chicken production in several African countries has significantly contributed as a source of protein, food security, employment, and income in both rural and urban communities [1]. The chicken subsector is constrained by several challenges including diseases and parasites, inadequate housing skills, high feed costs, predation, and limited knowledge of chicken management [2].

Understanding the perceptions of veterinary staff regarding the operations of the animal industry is important for guiding intervention efforts. This is because veterinary staff form a crucial link between livestock farmers (who are the end users of research technologies and innovations), the research system community, and policymakers [3]. Assessing their perception concerning the challenges farmers face is very critical in guiding research efforts and intervention strategies to improve the industry [4].

Commercial poultry farming in urban and peri-urban areas in Uganda has increased over the past years and is likely to grow as a result of the demand for eggs and chicken meat from the growing population [5]. As a result, trade in animal feed ingredients and poultry feed manufacturing is growing, creating a vibrant sector to meet the poultry feed demands [6]. Unfortunately, the manufacturing and trade of poultry feeds are not well regulated. Neither minimum standards nor monitoring mechanisms are followed to ensure stakeholders adhere to acceptable manufacturing and trading practices [7]. The lack of regulation and certification in both the manufacturing and trading sectors has resulted in substandard ingredients and feeds in the markets in Uganda. Poultry farmers are now venturing into formulating homemade feeds despite limited knowledge on feed formulation and animal nutritional requirements [8]. Poultry feeds manufactured from poor quality ingredients lowers the performance of the birds and increases expenditure on feed [9].

Understanding the opinions/perceptions of veterinary extension staff regarding the challenges poultry producers face in accessing quality poultry feeds and poultry feed ingredients is important in guiding research and policy makers in addressing issues related to feed quality [10]. Consequently, evaluating the perception of veterinary extension staff regarding the quality of poultry feeds and ingredients is critical in understanding the gaps in the poultry feed sector and guiding stakeholders on the most pertinent issues that need intervention and policy amendments for the poultry feed sector to be productive and profitable. Although there are several studies on the perception of extension staff on issues of climate change, sustainable agricultural practices and professionalism in extension [10–12], there is scanty information on perception of veterinary extension staff on poultry feed quality and ingredient in low resource settings like Uganda. There is no evidence based information on perception of veterinary staff on poultry feed and ingredient. Therefore, the objective of this study was to assess the perceptions of veterinary extension staff regarding the quality of poultry feeds and feed ingredients in Uganda. The study was conducted in June–November 2021. Information obtained from this study will be crucial in guiding further research and policy aimed at improving poultry productivity and growing the industry.

2 Methods

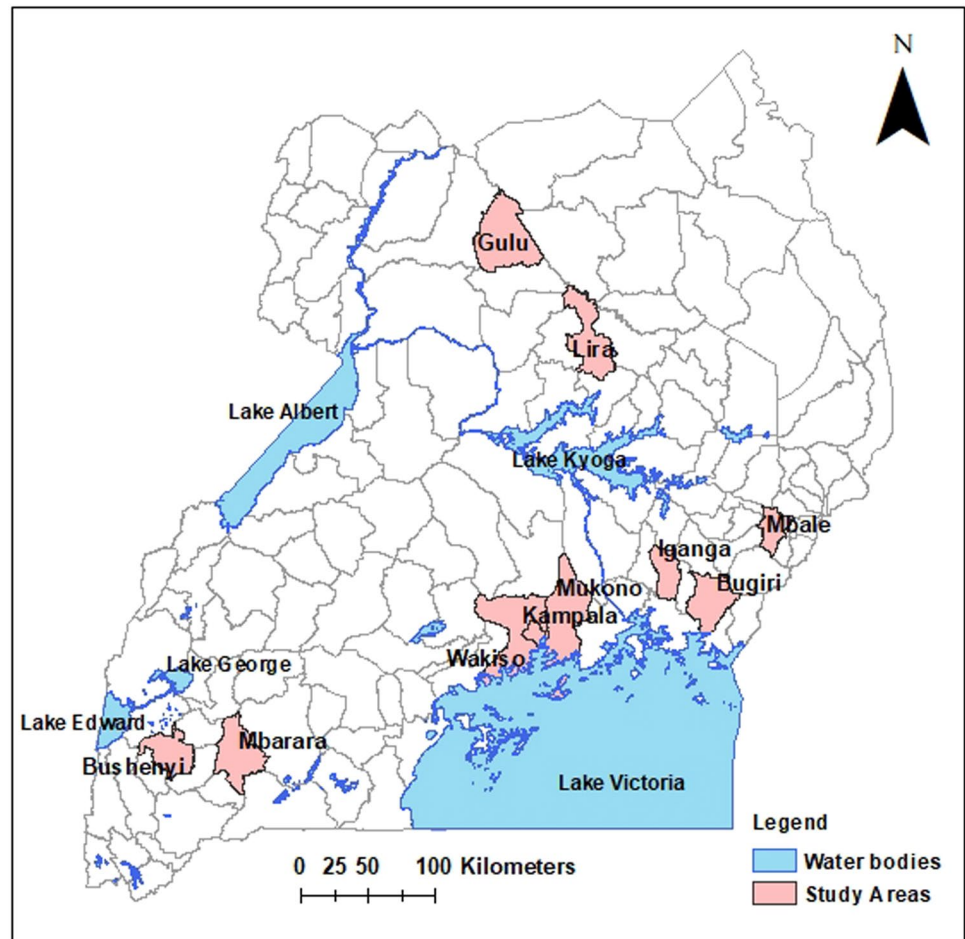
2.1 Participants and recruitment

The study participants for the key informant interviews were recruited using a purposive sampling technique from 4 regions of Uganda: Central, Eastern, Western, and Northern regions. In each of the study regions, districts were purposively selected based on the level of commercial poultry rearing. The districts of Kampala, Mukono, and Wakiso were selected from the Central region (Fig. 1). In the Eastern region, Mbale, Iganga and Bugiri districts were selected. The Western region was represented by Mbarara and Bushenyi districts while Gulu and Lira districts were selected from the Northern region (Fig. 1). The participants' selection was based on being subject matter specialists and their role as frontline veterinary extension staff.

2.2 Procedures

The key informant interviews (KIIs) were conducted by the research team and lasted approximately 60 min. Each member of the research team moderated the interviews in their respective regions (DK-Western region, JI- Eastern region, IN-Central region, and WA- Northern region). The moderators' role and responsibilities was to conduct the interviews

Fig. 1 Map of Uganda showing the study districts from where key informant interview participants were recruited. Source: Author



and to allow free discussion to develop while ensuring that all the questions in the interview guide were addressed. The research team took hand written notes, clarified questions and asked follow up questions (probes) when necessary. Signed informed consent was obtained from the participants before the start of the interviews. The participants were assigned identifying numbers to maintain anonymity.

The question guide (Table 1) was developed in advance prior to the start of interviews by the research team and was based on based on Gibson's theory of direct perception (ecological model) [13]. The theory states that in the real world, sufficient contextual information exists to make perceptual judgements. The questions during the interviews focused

Table 1 Open-ended question guide

Welcome and introduction

Informed consent

In your view please give me an overview of poultry feed and poultry feed ingredients business in this district

I would like to hear from you about your perspective and awareness about the policy and regulation of the animal feeds business in this area. Specifically, I would like to learn about your awareness and perspective about laws, certifications, enforcement, trade license, and permits related to the regulation of animal feed

From your perspective who do you think are the most important and influential individual groups, or organizations in the poultry feed and poultry feed ingredients sector?

I hear you describing (a situation), so in your opinion, why do you think the situation is this way? What is causing this situation?

Thinking about this situation and its contributing factors, what in your view should be done to improve the situation?

What might be the best way forward for addressing this situation?

How is the quality of the poultry feed ensured in this district?

What are some of the challenges faced in enforcing regulations in the poultry feed sector?

Closing remarks and thank you

on the perceptions of veterinary extension staff on practices in poultry feed and ingredient business. Interviews were transcribed by the research team in a word processing software.

2.3 Analysis

We collected qualitative data from 21 interviews: at which time we achieved saturation (Table 2). The sample size was determined by saturation (saturation is a point reached when there is sufficient information to replicate the study, when the ability to obtain additional new information has been attained and when extra coding is no longer feasible [14, 15]) and data were analyzed using a six-phased approach (familiarization with the data, generation of initial codes, search for themes, review of themes, definition, and naming of themes, and report writing) [16, 17]. The research team read all the transcripts from all the interviews to get familiarized with the data. The transcripts were read and reviewed several times to achieve immersion. Content analysis was used to analyze qualitative data which permitted consideration for saturation, a point where no new themes were emerging from additional transcripts [18, 19]. The analysis of data was conducted using a deductive template approach using thematically grounded a priori codes. The codebook described seven deductive codes and included a definition of each code. Example quotes from the data are included in Table 3. The deductive codes were developed based on Gibson's theory of direct perception and on prior literature including academic and media publications concerning poultry feed and feed ingredients [20–23]. The research team held two harmonization meetings regarding the definition and naming of themes. Themes were refined to identify sub-themes and ensure that each theme was meaningful and clear but distinct from each other. Later, the sub-themes were connected by the overall topic or subject area and given a theme title, and then considered as major themes. Three themes emerged from the data: overview and business environment, consequences and propositions, and quality and enforcement (Table 3). The findings were presented in accordance with the consolidated criteria for reporting qualitative studies (COREQ).

3 Results

3.1 Participant demographic characteristics

There were 21 veterinary officers (VO) (n = 15, 71%) and assistant veterinary officers (AVO) (n = 6, 29%) who participated in the study from 10 districts. Both VOs and AVOs were working as front-line extension staff advising livestock farmers with production challenges ranging from health, nutrition, breeding, housing, and daily management practices.

3.1.1 Theme 1: Overview and business environment

Participants reported there was no minimum standard required to set up a poultry feed or ingredient business. Participants reported that the sector was not well regulated.

"No formal training was required to start a business" (VO Mukono).

Table 2 Regions, districts, number of key informant interviews

Region	District	Number of KIIs	Category of staff interviewed
Central	Wakiso	2	Veterinary officer (2)
	Mukono	1	Veterinary officer
	Kampala	1	Veterinary officer
Western	Mbarara	1	Veterinary officer
	Bushenyi	1	Veterinary officer
Eastern	Mbale	3	Veterinary officer (2) Assistant Veterinary officer
	Bugiri	3	Veterinary officer, Assistant Veterinary officer
	Iganga	3	Veterinary officer (2) Assistant Veterinary officer
Northern	Lira	3	Veterinary officer (2) Assistant Veterinary officer
	Gulu	3	Veterinary officer (2) Assistant Veterinary officer

Table 3 Sample codebook and quotes

Themes	Codes	Quotes
Overview and business environment	<p>Overview- Short description of poultry feed and ingredient business in the district providing general information but no details. (Big picture with no minor details)</p> <p>Policy- set of ideas or a plan for action followed by poultry feed and ingredient business</p> <p>Actors- External people that interact with poultry feed and ingredient business</p>	<p>There are several poultry feed and ingredient shops. There are no minimum standards set to start up a business. Both concentrate and individual ingredients dominate the sector. Commercially compounded feeds are used in the starter phase and self-compounded feeds are used in the grower phase</p> <p>There is no plan of action governing the poultry feed and ingredient business</p> <p>Traders. Farmers, feed mills</p>
Consequences and propositions	<p>Causes of status quo- what is giving rise to the current status of the poultry feed and ingredient business</p> <p>Suggestion for improvement- Plan or ideas put forward for consideration</p>	<p>The sector is not well regulated. The poultry feed and the ingredient sub-sectors are not a government priority. A huge investment to start a business according to minimum standards is required</p> <p>Operationalize and comply with the animal feed policy. Extension staff trained in feed quality inspection. Start-up training courses for farmers and traders. Start feed analytical laboratories</p>
Quality and enforcement	<p>Quality assurance framework- means to monitor poultry feed and ingredient quality and actions where poultry feed and ingredient quality are not meeting standards</p> <p>Challenges in enforcing the regulations- Situations that need either physical or mental effort in order to be done successfully</p>	<p>Create raw material commodity markets. Enforce quality mark signs (Q and S) on commercial poultry feeds and ingredients. Set up accredited feed analytical laboratories</p> <p>There are no punitive laws governing the poultry feed and ingredient business. There is no training or certification for ingredient traders</p>

The poultry feed sector is dominated by both concentrate and individual ingredients. Participants reported that self-compounded feeds were commonly used by farmers. Participants described there were no strict laws governing the sale and trading of animal feeds and their ingredients.

"Poultry farmers have been let down by the low quality of feeds and feed ingredients on the market". "There are reports of high mortality in chicken flocks caused by nutritional deficiencies". "Poultry farmers administer so many antibiotics in treating conditions associated with nutritional deficiencies". VO Mbarara,

Participants' described that the district or municipalities only issued trade licenses.

"We hear there is a feed policy but it is not implemented."(VO Mbale)

"Traders, farmers, feed mills, media, and extension staff are the key stakeholder in the poultry value chain"VO Bugiri

3.1.2 Theme 2: Consequences and Propositions

The interviewees were asked to state the causes of the status quo in the poultry feed and ingredients and suggestions for improvement. Participants reported a lack of inspection or supervision of the business operations. Others reported the poultry feed and ingredient business was not a priority for government agencies to streamline the operations. Several participants noted a lack of feed analytical laboratories as a major cause of sub-standard poultry feeds on the market.

"Lack of strong poultry producer association to protect poultry farmers' interests contributes existence of poultry feeds of low quality". VO Iganga.

"The quality of feed raw materials and complete feed is left at the discretion of poultry farmers". "Farmers get information about quality feeds and feed ingredients from fellow farmers based on their testimonies about the performance of their flocks". VO Kampala

Participants noted regular inspections of poultry feed and ingredient sales shops to ensure adherence to good practices will lead to better quality feeds on the market.

"Setting up feed analytic laboratories where farmers and traders can analyze complete feeds and ingredients respectively are key in supporting the poultry feed sector". VO Bushenyi. "Conducting mandatory training and certification courses for traders on the minimum quality standards of poultry feed ingredients and dealing in animal feed and feed raw materials should be categorized as a specialized technical business that should be run by competent persons". VO Kampala, VO Bushenyi VO Bugiri.

"One way to improve the sector is to create a national animal feed regulatory board or a directorate at the Ministry of Agriculture and enforce an annual verification and licensing of registered businesses in animal/poultry feed and ingredient sector". VO Kampala

3.1.3 Theme 3: Quality and enforcement

When asked for plans or ideas on improving the poultry feed and ingredient sector, the interviewee described the possible benefit of issuing heavy penalties for defaulters of poultry feed and ingredient standards.

Interviewees stressed that there are multiple government agencies responsible for enforcing animal feed quality standards (Uganda National Bureau of Standards, Ministry of Agriculture Animal Industry and Fisheries, Local Governments, Ministry of Trade Industry and Cooperatives) which results in a gap in enforcing standards and creates an enabling environment for counterfeits and substandard feeds to thrive on the market.

Interviewees observed the high cost of feed laboratory analytical services as a major hindrance in enforcing quality feed standards in the country.

"Making quality marks mandatory labels on packaging materials of poultry feed and ingredients can help to weed out products that meet the minimum quality standards from the market" VO Gulu.

"Most farmers use organoleptic tests to evaluate the quality of feeds ingredients". VO Wakiso

"Scarcity of certain feed raw materials promotes adulteration of those raw materials by traders". VO Wakiso

"There is need for government to support farmers and farmer organizations to acquire and regularly calibrate real-time testing facilities like the Near Infrared reflectance spectroscopy (NIRS)".VO Mukono

4 Discussion

Veterinary staff both in private and public sectors are at the frontline of the extension and advisory services. Veterinary extension and advisory services are aimed to support farmers improve livestock production, and adopt new technology for increased production and profitability [24]. Extension services when applied successfully can result in outcomes that include noticeable changes in attitude and adoption of good agricultural practice technologies and improve the quality of lives of farm households. The perception of veterinary extension staff of poultry feed and ingredients therefore is critical in guiding research and policy formulation to address the nutritional challenges of faced by poultry producers in Uganda. Effective extension services can promote development in the presence of other important factors like markets, improved technology, availability of supplies, production incentives, quality feeds quality day-old chicks, vaccines, drugs, and transport [25].

The extension staff interviewed were dissatisfied with the current state and further expressed the concern that the sector behaved as a free entry and free exit by the business community with limited guidance from agricultural extension services. These findings are similar to those reported by [26] who found that livestock production was given low priority in agriculture extension intervention in Mali, Benin and Burkina Faso. In Uganda, poultry feeds constitute the majority of commercial livestock feeds. Pig and dairy compound feeds constitute a very small proportion. This is partly because commercial chicken rearing is expanding and these chickens are kept majorly under intensive production system especially in central and Eastern regions [27].

The Ugandan animal feed sub sector is dominated by private operators who are currently working in silos with no strong association to bring them together as actors in the sub sector [7]. In the central region, the use of concentrates was on the increase while there were several small to medium private feed mills that compounded mixed unbranded feeds and sold directly to farmers. The increased importation of protein poultry concentrates could be explained by the fact that individual feed raw materials were of low quality, heavily adulterated by the traders and farmers could not mix poultry feeds of the required energy and protein content. Both feed mills and shops sold feed raw materials to farmers who mix the materials using spades to self-compound complete feeds at their farms.

The poultry feed stuff sector does not have its specific policy, interventions in the sector are guided largely by general agricultural and livestock frame works. Most policies and laws on livestock in Uganda do not make specific reference to poultry feed issues, and poultry farmers' needs are not separated from those of farmers in other subsectors [28].

Although the Animal Feed Policy formulated in 2005 exists, it has since not been supported by any specific legislation (law) for its implementation. The Animal Feed Bill, which was initiated in 2018 and in 2023 presented to parliament has to-date not yet been passed into a law. Without a legislative framework (Act) in place, the animal feed policy cannot be operationalized to regulate the production, manufacture, importation, exportation, storage, transportation, and sale of animal feeds. The violation of the bill as it is not yet a law does not incur legal penalties, fines or imprisonment and can only be implemented after enacted into a law. Similarly, the Uganda National Bureau of standards (UNBS) prepared a draft poultry feed pre mix specification in 2017 to-date this is not yet in use or its specifications are not yet known to many key stakeholders in the poultry sub sector in Uganda.

There are neither surveillance operations nor specific monitoring mechanism regulations to ensure strict adherence to good business practices. Clearly, the sub sector is under regulated and ultimately the quality of feeds, feed additives, raw materials or compound feeds on the market are on several occasions below standards as reported by [8]. Uganda's neighbor, Kenya where raw materials or ingredients are imported from have a Food Animal and Welfare Code of Practice (2018) with specifications for standard of compounded poultry feeds which addresses such concerns. In addition, the regulation of Fertilizers, Farm Feeds, Agro remedies and Stock Remedies Act of 2015 addresses the registration of raw materials, feeds, seeds, grains and all compounded feeds and additives in South Africa. Other countries including Tanzania, Ghana and Rwanda are also still in the process of developing poultry feed policies. The challenges in the landscape of their poultry sector are different. While Rwanda is more concerned with the higher costs of feeds and its farmers have not yet engaged in production of feeds as large poultry farmers depend on imported feeds while other with local poultry find local un compounded feeds for their poultry.

The lack of quality feedstuffs and compound animal feed on the market is a major bottleneck to the expansion and growth of intensive livestock production, the safety of food of animal origin, and increased farmers' household incomes [21]. The quality management of feeds and its raw materials is of major importance as it determines the success and profitability of chicken and other livestock species. The quality of feeds starts with quality of ingredients,

the storage conditions of raw materials, the production process of the feed, the packaging conditions and the storage conditions of the complete feed. The term quality feed or feed raw materials may be defined as the degree to which a set of inherent characteristics fulfills requirements. The requirements could be set by the consumer of the products or the regulatory body, [29]. The poultry farmers purchase either feed ingredients or complete feed but may not have either capacity or facilities to evaluate the quality of feeds or feed ingredients at point of purchase. For farmers to be protected and supported there is a critical need to create an animal feed regulatory body to ensure only quality ingredient and complete feed are marketed. Currently the Uganda National Bureau of Standards (UNBS) is mandated to formulate and promote use of standards and enforcing those standards, the agency has not efficiently and effectively executed its mandate in the animal feed subsector. The quality of feed raw material is an essential component of the successful feed processing operations [30]. Evaluation of the quality of feeds and feed raw materials and securing the evaluation results in real time is still a challenge in Uganda. The cost of analyzing ingredient and feed samples is still too high and the testing facilities are not evenly located in the country. The findings are similar to those stated by animal feed manufacturers [31] who stated that feed analytical laboratory services are very expensive and take a lot of time. The majority of the farmers use their senses of smell, touch, sight, and taste to evaluate feed and ingredient quality or wait to see the performance of the birds and know the quality of feeds the birds consumed. This can be misleading since quality of the feed can vary and the waiting time for farmers to evaluate the flock performance. Though the traditional analytical methods of feeds like proximate analysis do exist, the results from such tests are usually not received in real time to rectify inclusion rate of ingredient in question and alter the production process [32]. The modern fast analytical method that uses near infrared reflectance spectroscopy (NIRS) technology is not affordable by most feed mills, ingredient suppliers and farmers which exacerbates continued presence of substandard feeds and raw materials on the market. The business environment with no stringent legislation of the animal feed subsector is a major impediment for the growth of the commercial chicken production and causes huge financial losses to the farmers. Farmers cannot meet their production targets and can also distort the poultry meat and egg markets.

Due to the prevailing business environment in the animal feed sector which is not systematically monitored it may freely allow contamination and adulteration of feed raw materials not to be detected early which may expose the birds and consumers of poultry products to adverse health effects. Poultry feeds contain significant amounts of cereals and cereal by-products (brans). Cereals when poorly stored or when stored in dump places can be contaminated with aflatoxin producing fungi as reported by [33]. In another study by [34] the findings revealed the effect of aflatoxin on poultry as acute hepatic toxicity, tetragenicity, carcinogenicity, mutagenicity, hematological problems and immune suppression. There are several adulterants that have been reported to be intentionally added to feedstuffs. The common practice of feedstuff adulteration includes addition of sand to fishmeal and lake shells, addition of saw dust, wood shavings and crushed maize cobs to maize bran. Such practices not only lower the quality of feedstuffs but lower the digestibility of feed and cause health effects to the birds.

4.1 Study limitation

This study did not cover all the districts of Uganda and in the study districts not all veterinary extension staff participated in the key informant interviews.

5 Conclusion

This study showed that there is a legislation gap (due to absence of an act) in the animal feed sector and the players in the sector were at liberty not to follow standards that ensure quality feeds and feedstuffs.

The national standard regulator has not paid sufficient attention to enforce feed standards across the sectors. Poultry and other livestock farmers need protection against sub standards and inferior feed and feedstuff. The business community in the poultry and animal feed sub sector need support in form of knowledge, feed analytical facilities and subsidizing the cost of analyzing feedstuff.

Feed stuff contamination and adulteration can cause a public health risk and there is an urgent need to create an independent body to regulate, certify all the practices along the feed value chain and enforce minimum quality standards.

Formation of Animal feed producers' organization can further promote good manufacturing practices (GMP) in the animal feed subsector and create a code of conduct for members to self-regulate themselves.

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Author contributions DK, SO, DN and JI conceived the study. DK, SO, DN, JI, MN, IN WA and VK developed study protocol including data collection tool, data collection strategy. DK, JI, IN, WA. DN were involved in field data collection activities. DK, SO, JI and DN conducted data analysis and interpretation. DK, SO, DN, RA, SN, JI, JT and AO were involved in preparation of the manuscript. All authors contributed to the article and approved the submitted article.

Data availability The dataset(s) supporting the conclusions of this article is (are) available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate All methods were carried out in accordance with relevant guidelines and regulations. The protocol was approved by Makerere University School of Veterinary Medicine Animal Resources (SVAR) higher degrees, SVAR research and ethics committees (SVAR-IACUC /90/2021) and certify that the study was performed in accordance with the ethical standard as laid down in the 1964 Declaration of Helsinki and its later amendments or comparable standards. Study participants signed a voluntary consent to participate in the study

Competing interests The authors report no competing interests.

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