

Research Application Summary

Grazing strategies for sustainable beef cattle production; case study of Uganda's cattle corridor

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Abstract

Uganda is one of the African countries with pronounced livestock population where production of beef plays fundamental roles in the national economy. Beef production makes a significant contribution to income and revenue generation at homestead, community and national levels. A study was conducted in the central cattle corridor, located between 0 35' 21N and longitude 31 21' 36E. The purpose of this study was to ascertain the grazing practices and vulnerability challenges in the beef production industry and suggest possible strategies for improved productivity. Data was collected using focused group discussions (FGD) and key informant questionnaires. The highlighted challenges included: inappropriate quantity and quality feeds and water; poor livestock health management; poor breeding practices; under developed marketing infrastructures; unstable input prices; inadequate extension services and faint farmers' associations and cooperative societies. The study suggested integrated tailored grazing systems; modern methods of pasture establishment and management; adaptation of appropriate livestock welfare handling facilities and marketing infrastructures. The developed beef industry will enhance meat consumption (food), social status, investments and government revenue. Therefore, integrated tailored grazing strategies should be adapted in order to overcome highlighted vulnerability challenges. Collectively, these practices motivate and support beef development, enhance productivity and innovations in beef industry. A well developed beef industry creates jobs, improve farmers' income, food security and decision-making processes on local and national policy to support social economic transformation.

Key words: Beef, Cattle corridor, grazing strategies, pasture resources, rangelands, Uganda

Résumé

L'Ouganda est l'un des pays Africains à fort élevage où la production de viande bovine joue un rôle fondamental dans l'économie nationale. La production bovine apporte une contribution significative aux revenus et à la génération de revenus au niveau de la ferme, de la communauté et au niveau national. Une étude a été menée dans le corridor bovin central, situé entre 0 35' 21N et 31 21' 36E de longitude. Le but de cette étude était de déterminer les pratiques de pâturage et les défis de vulnérabilité dans l'industrie de la production bovine et de suggérer des stratégies possibles pour améliorer la productivité. Les données ont été recueillies à l'aide de discussions de groupe ciblées (DGC) et de questionnaires d'informateurs clés. Les défis mis en évidence comprenaient: la quantité et la qualité inappropriées des aliments et de l'eau ; mauvaise gestion de la santé du bétail; mauvaises pratiques d'élevage; des infrastructures de commercialisation sous-développées ; prix des intrants instables; services de vulgarisation inadéquats et faibles

associations d'agriculteurs et sociétés coopératives. L'étude a suggéré des systèmes de pâturage intégrés sur mesure ; méthodes modernes d'établissement et de gestion des pâturages; adaptation d'installations de manutention et d'infrastructures de commercialisation adaptées au bien-être du bétail. L'industrie bovine développée améliorera la consommation de viande (nourriture), le statut social, les investissements et les recettes publiques. Par conséquent, des stratégies de pâturage intégrées et adaptées doivent être adaptées afin de surmonter les défis de vulnérabilité mis en évidence. Collectivement, ces pratiques motivent et soutiennent le développement du bœuf, améliorent la productivité et les innovations dans l'industrie du bœuf. Une industrie bovine bien développée crée des emplois, améliore les revenus des agriculteurs, la sécurité alimentaire et les processus décisionnels sur les politiques locales et nationales pour soutenir la transformation socio-économique.

Mots-clés: Bœuf, Corridor bovin, stratégies de pâturage, ressources de pâturage, Parcours, Ouganda

Introduction

Beef production supports the livelihoods of more than 65% of the world's rural poor, and about 25% of the global trade of Agricultural commodities (Ali, 2007). In Uganda, the beef industry is a key contributor to the national food system, and meat alone is estimated to provide about 15% of the protein in the Ugandan population. Growing demand of meat due to increased human population, expanding markets from tourism and expatriates as well increasing income and purchasing power of the community provides great opportunities for socio-economic transformation (McDermott *et al.*, 2010). Despite the expanding demand of beef, grazing has remained the cheapest feeding approach contributing significantly to efficient beef production systems. Therefore, it is fundamental to identify and understand the feasibility and sustainability strategies in beef grazing management systems with aim of contributing to long-term food security. Suitable beef grazing systems provide an entry point to realistic utilization of rangeland resources.

Beef grazing systems follow a year-round strategy that incorporate coordinated set of inputs and activities that meet required levels of genetic competences that are coherent with beef and beef products. The system often involves competition for space, labour and genetics. Identification and understanding grazing system dynamics is the first step towards fulfillment of opportunities for enhanced beef productivity. Given the enormous range of beef grazing models that require high technical inputs into complex beef grazing management systems (Phanthavong *et al.*, 2016). Beef feed-year strategies involve harmonizing production cycles in beef production system. Production cycles are characterized with fluctuating availability of feed sources over time. Therefore, government policies, perception of the community, producers' attitudes and asset limitations must be harmonized to allow innovations in grazing systems that unlock opportunities in the beef production sector. It is not in the scope of this case study to address all the challenges, but nevertheless we provide a basis for identifying and understanding innovations from producers that are incorporated in designing grazing strategies. The strategies consider human population growth rate, finite land holding, urbanization and rising income that stimulate fast growth of the beef sub-sector in Uganda, described as the beef revolution (Van der Zijp *et al.*, 2010).

The multiple purposes for keeping livestock suggest that it is misleading to consider raising beef cattle as a conventional, isolated production activity (Fig. 1). Instead, beef rearing activities and processes are integrated within household production decisions. Therefore, contribution of beef cattle production ought to be minimized at household level. Randolph *et al.*, 2007 used sustainable

livestock framework to conceptualize the model that explain the complexity and provide insights about the role of various players and activities at household level and to identify the assets and liabilities, with focus on vulnerability of beef producers. The objective of this study was to explore, assess and understand various beef grazing strategies for overcoming feed shortages and embracing the opportunities of the fast-growing beef subsector.

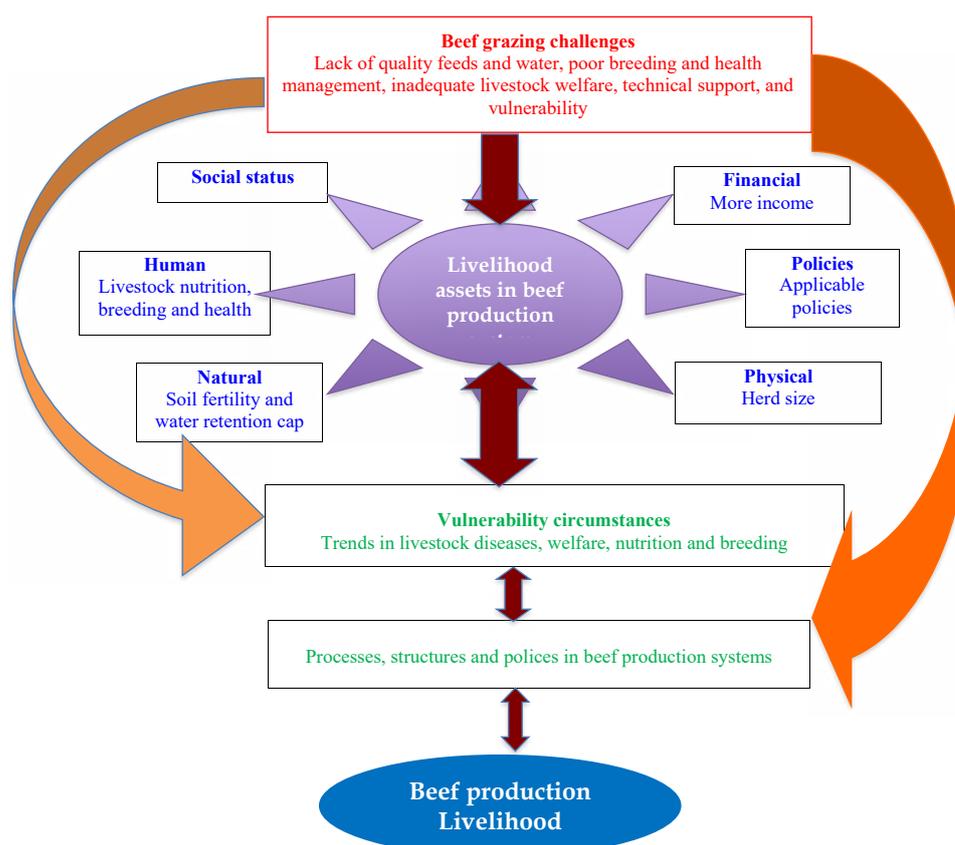


Figure 1. Adopted from Randolph *et al.*, 2007

Materials and Methods

This case study was conducted in the central cattle corridor of Uganda, located between 0° 35' 21" N and longitude 31° 21' 36" E. A nonprobability sampling method was used to purposively select 158 beef producers' households for structured questionnaires and focused group discussions. Structured questionnaires were used to gather detailed information about different grazing practices, processes and procedures. Focused group discussion collected data regarding herd dynamics and other proficiency parameters. The qualitative data obtained from structured questionnaires and focused group discussions were utilized to explore attitudes, perceptions and values of beef producers in the study area. Furthermore, the obtained data was used to construct a model of roles and benefits of beef production and linked them to grazing management practices. In addition, the qualitative data contextualized the discussion on challenges and strategies and put the discussion into perspective on different grazing systems. The proposition of multiple objectives in grazing systems and consideration of cattle as an isolated production activity proved to be misleading

in the context of livelihood framework strategies. Data analysis was performed using Statistical Package for Social Sciences (SPSS) (SPSS, 2000).

Results

Benefits and products derived from beef production in cattle corridor of Uganda are summarized in Table 1. It is evident that cattle are placed as a strategic asset of needy populations to contribute to national social economic transformation.

The herd composition and number of cattle are presented in Tables 2. It was reported that breeding females constituted the largest number of the herd (62.1%). The relatively low proportion of bulls and steers (13.8%) in relation to female animals suggest that male animals are either sold for income or slaughtered for home consumption.

Table 1. Benefits and products derived from beef cattle grazing system

Benefit	Products
Food	Milk, meat and processed products
Monetary	Capital wealth; investment and savings; income from sales of products and animals
Social	Bride price, ceremonial and companionship

Table 2. Herd composition (N=1645)

Herd class	Total	%
Cows and heifers	1021	62.1
Bulls	41	2.5
Steers	188	11.3
Calves	395	24.1
Total	1645	100

The herd size category and number of households are illustrated in Table 3. According to the results, 24.7% of the respondents owned ten or less tropical livestock units (TLU) and only 33.9% of the households owned more than 40 TLU.

Table 3. Herd size summaries (N=227)

Herd size category (TLU)	Number of households	%
1-10	56	24.7
11-20	43	18.9
21-30	13	5.8
31-40	38	16.7
>40	77	33.9
Total	227	100

The cattle production efficiency parameters are presented in Table 4. It was evident that the average age at first calving was 30.6 months, calving interval was 30 months, calving percentage was 38.3% and mortality was 12.1% higher than off take percentage of 10.8%.

Table 4. Cattle production efficiency parameters

Factor	Time (months)	%
First calving age	30.6	
Calving interval	30	
Calving rate		38.3
Weaning rate		33.2
Herd mortality		12.1
Off take		10.8

Reasons for rearing beef cattle in the cattle corridor of Uganda based on respondents ranking are illustrated in Table 5.

Continuous cattle grazing practice in open free-range was the predominant form of beef production in the study area.

Table 5. Ranking of reasons for beef cattle rearing

Reason	Rank
Selling and meat consumption	4
Wealth	3
Status and savings	2
Social activities	1

Table 6. Ranking of grazing systems

Grazing system	Rank
Continuous cattle grazing system	4
Rotational grazing system	2
Differed grazing system	2
Paddocking	1
Feedlot system	1

Applicable highlights relating to focused group discussions as translations from local language to English are presented in Table 6. The qualitative information obtained from FGDs were used to construct a model of roles and benefits, desired characteristics of cattle that were linked to grazing objective after analysis.

The qualitative information contextualized the discussion of the results. The proposition that the multiple objectives for grazing cattle considered beef cattle grazing as a conventional unique production activity in the context of producer's vulnerability and sustainable livelihood.

Table 7. An assembled model of roles and benefits acquired from cattle, linked to desired characteristics and grazing objective

Roles/Benefit	Desired characteristics of cattle	Grazing objective
Selling and meat consumption A calf per cow per year Frame size (Stature)	Cattle should be well adapted and easy to care for fertility and good mothering ability	Adaptability
Wealth status and saving Calve annually	Well adapted to simple management system	Adaptability
Social activities	Conform to certain expectations (Colour)	Specific colour, shape of the horns

Discussion

It was widely reported and accepted that herd size and composition were regarded as major attributes to increasing beef production in the central cattle corridor, Uganda. “Production” was relative, especially when comparing two or more grazing systems. According to the results of this study, breeding female animals constituted the largest group of the herd (62.1%), which was in agreement with results of other studies in the cattle corridor of Uganda (Mbabazi and Ahmed 2012; Ruhangawebare, 2010). The study revealed that two-thirds of cows give birth during the rainy season. The peak calving period was associated with the bi-modal rains that are highly rigorous during November–January and March to May. The reproduction rate in this study (35.6%) was lower than findings of Nthakheni, 2006, who reported that beef production systems had reproduction rates of between 40% and 50%. As cows rarely conceive within a year of calving, calving intervals of two to three years are common. The long calving intervals could be attributed to management style where calves are allowed to run with their dams until natural separation occurs. Extended drought periods, which are frequent in the study area, contribute towards the low reproduction rates. The common grazing management method in beef production was a low input, low out put system where animals graze naturally (Undi *et al.*, 2008). It was evident that mortality rate in cattle corridor was high, which obviously represents a considerable loss to farmers. In extended dry periods, the probability of lactating cows dying was higher than for non-lactating cows. Cows, which calve regularly, remain in a relatively poor body condition and rarely have the opportunity to improve during severe droughts. Therefore, highly fertile cows are at “high-risk” of dying during drought periods. Majority of the respondents did not want to sell cattle, as they believed in maximizing the number of cattle owned. Others felt that owning many cattle was a safety net against mortalities and other risk factors. Beef activities are integrated within household livelihood decisions, playing a major role in food security (Vandamme *et al.*, 2010). Randolph *et al.*, 2007 used a conceptual model (Fig 1) to explain this complexity and to provide insights about the role of various types of livelihood assets at household, with a focus on livestock. Results from this review clearly support the model as explained by Randolph *et al.* (2007). Thus, understanding

the utilization of the rangeland resources in consistent feed-year system will contribute towards ensuring appropriate supply of quality nutrition to beef animals. Beef production efficiency depends on the quality and quantity of rangeland resources (Nkrumah *et al.*, 2006). The options for achieving desirable change include: adopting different grazing methods, feed management, preservation and storage approaches; beef production system that include health, welfare and breeding; enhanced digestive and physiological performance; and understanding other livestock welfare technologies. Grazing system, beef cattle behavior, rumen function and physiology are key in determining the realization of desired modifications in beef grazing system.

Beef producers in the cattle corridor rangelands depend mostly on natural pastures (Ruhangawebare, 2010), a few of them have established pastures. Therefore, mobilizing, sensitizing, encouraging and promoting establishment of improved pasture species will ensure sustainable beef production in the rangelands. Conservation and preservation of pastures should be emphasized, though the cost required for these practices is unaffordable to local beef producers. Developing rations that are grass-based impact positively on meat quality compared to grain-based feed (Priolo *et al.*, 2001). Ugandan consumers often prefer beef derived from cattle reared on natural pasture. The natural pasture beef has higher Omega 3 PUFA percentages (Fisher *et al.*, 2000), as well as essential amino acids, vitamins A, B6, B12, D, E and minerals such as iron, zinc and selenium (Williamson, 2005) and low-fat content with better flavor compared to concentrate-fed cattle. Identifying and understanding various grazing strategies that promote use of pastures and fodder is critical in promoting quality beef production. It is important to train local beef producers to manage better grazing, encourage lopping practice on local browse trees and shrubs during the dry season and utilizing pastures that are adaptable to diverse climatic conditions. Promoting pasture seed production enables beef producers to settle in their respective rangeland areas, as they benefit from selling quality beef animals as well as pasture seed, baled hay, and other conserved feed. However, the relationship between beef cattle production, livelihood strategies and social development still stand out (Kitalyi *et al.*, 2005). This analogy was logical because the production and consumption of beef products are not necessary for survival but also for quality of life. Improvements in grazing management have often been represented as one of the best avenues for raising the livelihood of beef producers from the level of subsistence to commercial entrepreneurs. The improved livelihood component of beef producers in rangelands may thus be viewed as a crucial biophysical and economic link of organic and mineral nutrient cycling for the maintenance of resilience productivity of the natural resource-base in beef grazing systems. Therefore, embracing different strategies, innovations and technologies in beef cattle grazing system enhances feed availability throughout the year and improved beef productivity.

Conclusions and recommendations

It was clearly evident that beef-grazing strategies are an important facet of beef production, which can be developed to protect vulnerable beef producers. To achieve this, a thoughtful support of conventional multiple grazing strategies must be used to address existing challenges. This suggests considering beef cattle grazing systems as an integral household production segment. Therefore, there is need to invest in grazing systems so as to enhance beef cattle productivity. Forage pasture and cattle breeders should emphasize on sustainable breeding practices and procedures that have long-term biological, ecological, and sociological influences in national beef production goals. In addition, the returns obtained from innovate grazing systems should form the basis for decision-making process of the grazing system with regard to desired food security

and employment objectives. The challenges of pasture preservation; conservation and storage are pertinent in overcoming the major challenges. The agencies and private sector practitioners must train beef cattle farmers in modern management practices of rangeland resources. Enhanced beef productivity in Uganda will create employment, motivate and support income generation at household and community levels. Furthermore, it will encourage production of high quality food, improve the standards of living of vulnerable beef cattle producers, processors and marketers along the production value chain.

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