

The Concentrate Feeds Supply chain in Uganda: emerging trends and implications on quality and access to smallholder farmers and chain efficiency



A project report

Lukuyu B¹, Baker D¹, Baltenweck I¹, Poole J¹, Kabi F², Katongole C², Nadiope G⁵, Byarugaba A⁵, Kugonza J⁴, and Wabwire R⁴,
¹ International Livestock Research Institute (ILRI), Nairobi, ² Makerere University, Kampala, Uganda, ³ World Agroforestry Centre (ICRAF), Uganda
⁴ East African Dairy Development (EADD) project, Uganda, ⁵ Volunteer Efforts for Development Concerns (VEDCO), Kamuli, Uganda

Key points

- The concentrate feed value chain study revealed lack of feed quality regulation policy in Uganda and no single actor in the chain currently requires certification to participate in the chain.
- Lack of quality regulation and certification has resulted in supply of poor quality feeds to livestock farmers hence low productivity reported. Due to lack of feed quality regulation and certification, livestock farmers resorted to formulating homemade feeds despite glaring lack of knowledge about feed formulation and animal requirements.
- Feed quality along the chain is affected due to use of unsuitable modes of transport; poor feed handling during transportation from one actor to another, poor storage across the chain and feed adulteration in transit as well as during repackaging by traders.
- The value chain is characterised by high fixed transaction costs with no framework for market intelligence and clear information flow. This limits the ability of actors to negotiate for competitive prices in the chain.
- Most manufacturers do not have the necessary technical skills to formulate and produce compounded feeds. Producers, therefore, rely on trial and error means of formulating the feeds with a risk of producing substandard feeds.
- As a coping mechanism to the escalating prices of the ingredients, small scale entrepreneurs diversify use of locally available raw materials depending on their cost with preference for cheaply available materials regardless of its quality in order to reduce on prices of formulated feeds. This has resulted into stiff competition with large scale producers who have opted out of the feed production business and opted to specialise in the supply of raw materials or concentrates in an attempt to segment customers to address different market expectations.
- Although supporting services such as extension, credit, feed testing and technical information was regarded valuable by all the actors, it was reported to be effectively inaccessible to most actors in the chain.
- The study also revealed that there are neither feed associations nor farmers' organisations in Uganda to address animal feed issues amongst the actors in the entire concentrate feeds supply chain. This has resulted into uncoordinated efforts to deal with quality of feeds and policy issues affecting availability of quality livestock feeds, limited animal productivity and absence of specialised actors such as big commercial feed millers in the chain.

Introduction

The increasing effective demand for livestock products such as milk, meat and eggs in Uganda drives farmers to supplement their livestock with concentrates to improve on their productivity. In Uganda about 33% of the dairy farmers use compounded dairy concentrate feed while a sizeable percentage of households nearly 56% use feed ingredients such as maize bran and rice bran as straights (EADD, 2010). The annual production of compounded feeds by the commercial feed millers is estimated at about 75,000 tons with small scale mixers producing 40,000 ton (Graffham et al. 2003). In some areas farmers often supplement with compounded feeds aimed at maintaining the animals' condition and sustaining production during the dry season (Lukuyu et al. 2009). However, Uganda is faced with serious problems related to availability of well formulated and balanced rations for adequate dairy cattle feeding. Despite an abundance of cereal grains and their by products such as maize and maize bran, sorghum, millet, rice bran and root crops (e.g. cassava) as energy concentrates as well as protein concentrates such as soybean, sunflower cakes, cottonseed cakes, peas and groundnuts, farmers have continued to lament about the high prices of commercial feeds and poor quality feeds (Nakiganda et al. 2005).

Over the past few years large and medium scale livestock feed producers have been reducing but with an increasing number of small scale 'backyard' feed mixers (Graffham et al., 2003). The apparent 'liberalization' of the feed market has allowed many small processors to penetrate the market supplying the concentrate cattle feeds to farmers. The emergence and growth of small scale feed producers in the chain have induced changes in feed value chains providing small producers with opportunities but on the other hand introducing new challenges into the concentrate feeds value chain. These changes and emerging challenges need to be thoroughly understood if appropriate action in improving concentrate feed production, delivery and use by smallholder consumers in Uganda is to be taken.

Dairy production in Uganda

Livestock production including poultry, pigs, sheep and goats constitutes an important subsector of agricultural production in Uganda currently contributing 1.7% to the total GDP (UBOS, 2011). The 2008 national livestock census estimated the number of cattle at 11.4 million whereas the sheep, goats, pigs and poultry were estimated at 3.4 million, 8.5 million, 3.2 million and about 27.5 million, respectively (NLC, 2008). Ugandan milk production is largely dominated by small-scale farmers who own over 90 percent of the national cattle population (NLC, 2008). Up to 94% of the Ugandan cattle herds are indigenous comprising 30% Ankole, and 70% Zebu/Nganda (UBOS, 2010). About 60% of the households in Uganda keep indigenous cattle while 40% keep exotic/cross breeds (NLC, 2008, EADD 2010).

The climate in high potential agricultural zones such as in the south western, central and eastern Uganda are characterized by two rainy seasons lasting 3-4 months during which there is abundant growth of pasture and two dry seasons when pasture is scarce. The south western areas of Masaka, Bushenyi and Mbarara are dominated by a semi-intensive cattle production system while the central Uganda milk shed is dominated by zero-grazing farmers. The eastern Uganda milk shed is dominated by intensive dairy cattle production under zero-grazing with some pasture grazing (LSRP, 2000; Atokple, 1995).

By far, the majority of milk production systems in Uganda are characterized by a low input–low output approach and livestock is not considered a major source of income but rather a source of food, store of wealth and status symbol. Moreover, as incomes of the the urbanite middle class increases milk demand is also increasing and driving more and more of the dairy farmers to intensify so as to increase household returns. However, lack of planted fodders and poor quality feeds which is aggravated by both the prolonged and unpredictable dry season due to changing weather patterns and lack of consistent quality feeds on the market, farmers are experiencing limited livestock productivity in many of these areas (Bareeba and Mugerwa, 1988). The majority of ruminant animals depend mainly on grazing pastures and crop residues during the dry season which are often of low quality due to persistent scarcity and high costs of commercial feed. This scenario is exacerbated by paucity of information and lack of understanding of the operations of the actors across the feeds value chain especially the small-scale mixers in terms of the activities, operation, costs, and demand/market opportunities of the concentrate feed industry in Uganda. This study was therefore conducted with the objectives of i) Obtaining a detailed understanding of the actors along the chain, their activities, costs, and demand/market opportunities related to commercial and on-farm concentrate feeds starting with input stockists/suppliers and ending with the customer farmers / consumers ii) Calculating the value-added captured by the various value chain actors along the chain (following *Value Links manual (GTZ, 2008) Methodology*) and (iii) Examining the quality of compounded feeds and feed ingredients along the production value-chain in Uganda.

Data sources and methods

Study sites

The study was conducted in the central Uganda milk shed that comprises mainly of Kampala, Mukono, Wakiso and Lugazi and their peri-urban areas. The study also stretched to the eastern Uganda milk shed of Jinja, Kamuli, Iganga and Mbale as well as the south western milk shed areas that are mainly comprised of Masaka, Bushenyi and Mbarara. These are milk shed regions form a belt around the northern shore of lake Victoria.

Sampling

Actors were sampled across the whole value chain including input stockists, processors (breweries, grain millers and animal feed manufacturers), producers (large, medium and small scale/-backyard), middlemen (traders, transporters, brokers and/or agents), exporters and consumers. A list of potential actors operating in selected milk sheds in Uganda was generated and compiled by the research team¹ in consultation of Makerere University team with local Non-Government Organizations. The initial sample of input stockists/suppliers and processors were randomly selected per milk shed. From each of the initial value-chain actors the next stages (producers) were randomly selected and similarly from the producers, a number of middlemen and exporters (and consumers if dealing directly with producers) were selected. Finally, a random selection of consumers was taken from each of the middlemen.

A stakeholder consultation workshop was organized in each of the milk sheds with participation of various market actors, namely, raw material suppliers (importers and local dealers), agro industrial processors, feed producers (small and large scale), feed traders (wholesalers, retailers, dairy farmers cooperative societies), service providers (transporters and nutritional laboratories) and consumers (small and large scale farmers). Workshops were held in three representative milk sheds in three regions of Uganda: the central Uganda milk shed, mainly Kampala and its peri-urban areas, the eastern Uganda milk shed including Jinja and its environs areas and the south western milk shed areas of Masaka and its surrounding areas. Focus group discussions (FGDs) were conducted with all the stakeholders to obtain an overview of concentrate feeds supply chains in Uganda.

These workshops were organized into two sections namely FGDs and a session where individual respondents completed of a short quantitative questionnaire. The FGDs were aimed at obtaining consensus and mapping the concentrate feeds value chains, identifying flows of raw material and product, developing supply and demand calendars for various products and actors, discussing transportation and storage issues, feed quality issues, risks encountered, service provision within the chains and assessing the importance and relative power of each actor in the chains.

¹ The research team comprised of Fred Kabi, Constantine Katongole, Gideon Nadioppe, Audrey Byarugaba, Jane Kintu, Jane Kugonza, Ronald Wabwire and Ben Lukuyu who were responsible for the data collection. The authors wish to thank the team for their contribution to this study.

Structured interviews with 77 different types of market actors from these three milk sheds were carried out. These included 2 processors, 16 producers (4 large and 12 small-scale), 12 traders and 47 consumers including those who mix feeds part of which is consumed at home. There were no specialized transporters but the processors, producers, traders and consumers sometimes also double as transporters. The interviews were aimed to collect more detailed information about input and output volumes, sources, price and margin information, products information, feed purchases and sales, quality issues inputs and outputs, technical service provision, payments, capital and costs, opportunities and constraints faced, by all the actors and how this influences quality of the feeds and productivity of livestock. Appropriate models were used to analyse quantitative data obtained from the questionnaire. These were used to incorporate the potential correlations between actors within a specific value-chain but also allow comparisons between actors and sites (e.g. value-chain ID as a random effect in model).

Results

Mapping the pork value chain in Uganda

There are two predominant types of concentrate feed (CF) value chains in Uganda. One is the large scale value chains generally supplying rural and urban/ peri-urban areas (Figure 1). The other is the small scale concentrate feeds value chains generally operating in urban/ peri-urban or rural areas across the country (Figure 2). Large scale CF supply chains to rural counties and urban and peri-urban are generally longer and more complex, and include a range of actors although larger ones (wholesalers, distributors and large scale farmers) are more dominant. In these chains, trade of CF occurs within counties and also across counties or regions to supply large and small scale consumers. Compounded feeds coming from large scale feed producers linked in this chain all go through urban, peri-urban and rural distributors, wholesalers and outlets to supply to CF traders. For instance, 80-90% of the total volume of concentrate feeds produced produced by large scale feed entrepreneurs go through general shops and agro vets while 10-20% go to dairy cooperative societies including institutions and few large scale farmers. Large scale feed producers source raw materials from large scale grain millers that process cereal grains such as maize, wheat, sorghum and rice into flour for human consumptions and avail cereal by products for livestock feed. The cereals by products produced and used in sizeable quantities for producing livestock feeds are maize, wheat and rice brans and wheat pollard. The large scale feed producers also source raw materials from agro-industrial processors who extract oil from oil rich grains for human consumption and provide the oil cake by products from conversion into livestock feed. The common oil cake by products includes cotton seed cake, sunflower seed cake and soybean cake. Other raw material sources include a range of products from traders and importers of premixes and mineral supplements

as well as additives such as aflatoxin binders. Feed premixes and supplements are mainly imported into Uganda by international manufacturing companies or local appointed agents. These are supplied into this chain by wholesalers, general and agrovet shops.

In contrast, the small scale feeds supply chains in urban-peri urban areas are generally shorter, simpler, and include more small scale actors 'often referred to locally as 'backyard feed mixers'. Feed trade is usually localized, where feed is hand mixed and packed in various non conventional types and quantities of packages depending on customer needs. A distinct characteristic of this chain is that feed is sold where it is produced in quantities as demanded by the consumer with little regard to quality control. However, due to stiff competition, there is an emerging trend where few small-scale traders are opening outlets for selling their products to neighboring towns of their businesses. Farmers make personal visits to 'back yard' feed producers and specify types of feed composition and the amount they require. They also sell feed ingredients that are used as 'straights' (without being mixed with other products) by farmers. Small feed producers sell all (100%) of their products to small holder farmers in rural as well as peri-urban and urban areas. They sell 60% of the total feed they produce to poultry farmers, 20% to dairy farmers and some 10% to pig farmers mostly within parishes where they operate and 10% to their own livestock since they are also farmers in most cases. No large scale feed producers are linked to this chain. Unlike large scale feed producers who have electrical operated large feed mixers, small scale feed producers only use shovels or horizontal drum mixers with limited mechanical advantage where all feed mixing is often done by hand at rented premises at the back shops within trading centres hence the name 'backyard feed mixers'. Small scale feed mixers performs multiple functions. For example, they buy feed ingredients from raw material suppliers, stockists, and other cheaper sources. For instance, "back yard" feed mixers can directly buy grain from farms to produce maize meal for human consumption but use the bran for feed mixing. The silver cyprinids, *Rastrineobola argentea* also known as Mukene (Uganda), Omena (Kenya) or Dagaa (Tanzania) as well as the lake or oyster shells can be directly bough from Lake Victoria landing sites by the small scale feed mixers. These feed ingredients can either be traded as concentrates or 'straights' or used to make compounded products. This action diversifies the product range of small scale feed producers and it helps them to meet the needs of a large number of farmers and also reduces on the transaction cost.

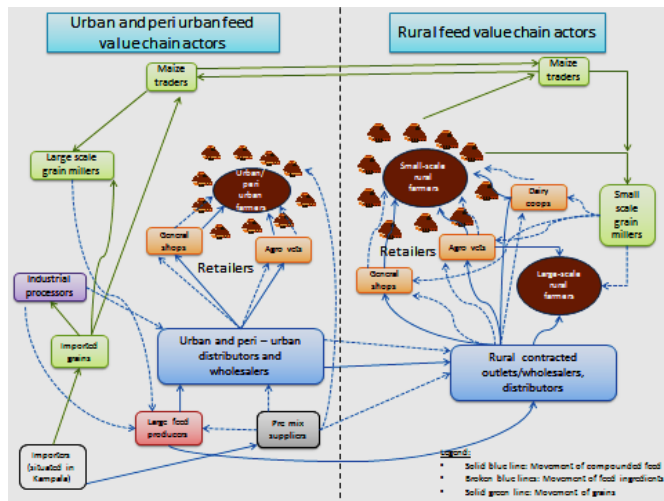


Figure 1: The large scale concentrate feeds value chains in Uganda

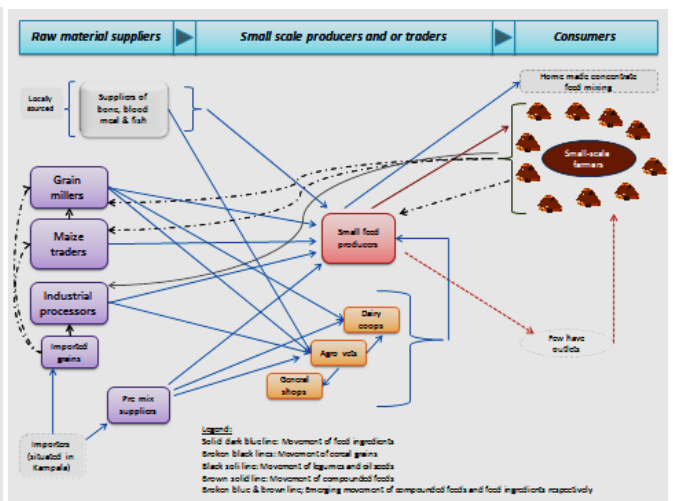


Figure 2: The small scale concentrates feed value chains in Uganda

Feed quality and policy issues in the chain

Feed production facilities operated by both small and large scale entrepreneurs have varying feed rations hence produce feed of variable quality. Whereas large scale feed producers have a relatively constant feed ration with slight variations depending on available feed ingredients, small scale feed rations vary drastically because they are not only influenced by available and cost of locally available feed ingredients but also by farmer demands. Quite often farmers not only buy the ingredients but may also present their own formulae and request the small feed mixers to compound the ingredients bought according to their instructions. This action therefore makes the quality of compounded feed coming from the back yard smallholder feed manufacturers quite variable in prices and quality to meet the livestock requirements.

The requirements for feed safety and quality of livestock products meant for human consumption demands that livestock feeds are produced according to the national set standards. However, there is currently no government set feed standards to guide feed production in Uganda although the responsibility of routine inspection of compounded feeds on the market lies with the Uganda Bureau of Standards (UBOS). There was no evidence, during the study to show that routine inspection of feeds to compel manufacturers to adhere to the known feeding standards is conducted by UBOS. A representative from the Ministry of Agriculture, Livestock and Fisheries reported that a feed policy drafted is awaiting scrutiny and approval by policy makers. Meanwhile, lack of policy on feed manufacture has left the task of feed quality monitoring and regulation to actors cross the chain. Due to the lack of feed quality regulation and certification, value for money of a large fraction of feeds on the market is difficult to get in terms of quality that foster better animal productivity. Therefore livestock farmers are resorting to formulating their own homemade feeds despite lack of knowledge about feed formulation and animal requirements. This action combined with the more diversified, flexible and more resilient small back yard feed manufacturers has in effect knocked out many of the large scale manufacturers out of business at the expense of quality. Even the few large scale manufacturers who are still struggling in the market they do not have

their feeds labeled with nutrient composition suggesting that they are not legally answerable to the consumers on the nutrient composition of their own products. Therefore, the important and delicate task of supplementing livestock aimed at improving animal productivity is done on trial and error basis with total disregard of value for money to the final consumers.

Feed quality assessment by the farmers and the small scale manufacturers is mainly based on smell, colour, texture and assumed density of products that are associated with high protein and energy content. The other consideration is the reputation of the producers or product brands largely based on recommendation from previous users of the products. Buyers also look out for the physical appearance of feed for physical contaminations such as with foreign particles. Actors across the chain are aware and concerned about the dangers of aflatoxin poisoning in animal feeds. Actors across the chain use various simple organoleptic strategies to avoid aflatoxin poisoning to their livestock including testing feeds for moisture content, looking out for mouldy feeds and storing feeds on a raised platforms called pallets and ensuring cool and dry conditions with adequate ventilation. Consumers buy stock that last not more than two weeks to avoid prolonged storage of feeds. Some actors are aware about the importance of storing compounded feeds and ingredients separately from livestock drugs. It was reported that aflatoxin was more likely in mashed feeds that are poorly stored and high moisture brewers' waste than in dry feeds that are stored under cool and dry environment.

Actors across the chain identified two main sections of the chain where feed quality is affected most. Firstly, feed quality is affected during transportation of feeds or their ingredients from one actor to the next. The main causes are exposure of feed on bicycles, motorcycles, or in open trucks to the vagaries of weather due to lack of tarpaulins, an action that predispose feeds to damage due to high temperatures and moisture. Spillages and contamination of feed with muddy conditions and disease causing agents in old and used gunny bags during transportation was also cited as one of the ways in which quality is compromised. Other causes are poor feed handling during loading and off loading and feed adulteration in an attempt to increase bulk by truck personnel during transit. Adulteration is usually deliberately done by adding water to the grain or maize bran, sand, saw dust or any other materials of inferior quality but cheaply obtained on the market. Adulteration of the feed ingredients is exacerbated by the fact that along the value chain quantity is only easily determined gravimetrically by the weighing machines that are readily available to every actor in the chain. Secondly feed quality is affected through poor handling and storage, re-packaging and re-mixing by feed traders. Most consumers prefer buying repackaged feeds and feed ingredients in small quantities preferably in weights ranging between 1 - 20kg due to limitations in cash flow. This is against the conventional feed packages mostly in quantities of 70 kg but some times in 35, 50 and 100kg.

Licensing and permits in the chain

The Ugandan government policy on manufacturing of goods requires that all feed manufacturers get a feed production certificate and the relevant trading license but none of the small scale feed producers interviewed had complied. On the other hand, traders require a trading licence that is issued on annual basis by respective urban authorities. Traders are only required to submit the relevant documentation and fees to get the licence. Most traders that were interviewed indicated that they had licenses but on further probe it was apparent they had no other compelling certification to ensure that quality of the livestock feeds and feed ingredient is kept. The retail trading license cost Ush. 50,000 – 65,000 (US\$ 20-26) while a wholesalers licence costs Ush. 100,000 - 120,000 (US\$ 40-48) depending on the distance of the urban district from Kampala.

Feed prices and pricing

All consumers viewed feed quality as important criteria that should be used in pricing feed. On the other hand, 78% of the producers viewed the cost of raw materials and overhead cost such as labour, energy rent and transportation costs as the most important factor influencing pricing of products. Other important factors that were identified were quality (72%) and availability (61%). The perception on quality seems to be based on the type of livestock ration formulated and the amount of feed ingredients used rather than the chemical composition of the finished product. Hence, feed products that are perceived by buyers to be of higher quality are priced highly on the market.

Small scale producers, traders and consumers in the chain mainly rely on feedback from previous consumers to determine quality of their feeds and maintain customers and price. Lowering of the feed prices, however, can still attract the unsuspecting customers to the poor quality livestock feeds which the farmers themselves can enrich with concentrates to meet the demand of the intended livestock. The other attributes that influence pricing of compounded feeds also include branding, type of packaging, and labeling feed with nutritional composition and date of manufacture. These attributes were reported to increase the cost of production. However, buyers usually associate raw materials or products that comply with such attributes to be of higher quality.

The pricing determinants for raw materials are quality mainly limited to physical purity; the prevailing market prices, availability (demand and supply), quantities required and seasonality especially for crop based feed ingredients. Large and medium scale producers are willing to pay higher prices for premium raw material provided quality is guaranteed. On the other hand, small scale feed producers diversify on the types of raw materials that cost differently and cheaply regardless of quality to reduce on prices of their products. Their perpetuity in business is supported by the fact that the majority of other actors especially the small holder consumers

who buy the bulk of these manufactured feeds base their decision of whether to buy from one source or the other majorly on price and quality is only secondary and determined by the response of the animal productivity.

Actors reported a steady rise in animal feed prices in recent years in Uganda due to the ever increasing fuel and food prices as well as the effects of climate change in the region. Actors also attributed this rise to the weakening of the local currency against international currencies. The market was also reported to be experiencing seasonal price fluctuations of raw materials with lower prices during the harvesting season and high prices during the dry seasons. The price fluctuations were observed to be a threat with the risk of causing financial losses as well as changes in customer loyalty (Figure 3 and 4). Actors in the feed value chain have to make tradeoffs between maintaining higher profits commensurate to rising feed prices and risk losing customers and maintaining lower prices but with subsequent lower profit margins (<15%) to maintain customers (Figure 5). Some producers and traders resorted to maintaining breakeven levels in order to remain in business and some were contemplating temporary closure of business to do with livestock feeds while consumers were exploring use of locally available alternative feed resources to reduce on production costs. While some respondents considered lack of price information for various products on the market as the major limitation to the ability of several actors to set or negotiate for competitive prices in the chain, others attributed the sky rocketing prices of the feeds and feed ingredients to lack of policy on the export of maize grain to neighbouring countries especially to Kenya and southern Sudan. All the actors in the feeds value chain seemed to agree that while export to the neighboring countries should be encouraged, there is need to process especially the cereal grains locally such that flour is exported but leaving the bran for the livestock industry. Meanwhile traders have resorted of bulk stocking in anticipation of higher prices as a mitigation strategy but this is likely to come with the challenges of moulding, aflatoxicosis and the need for big storage facilities.

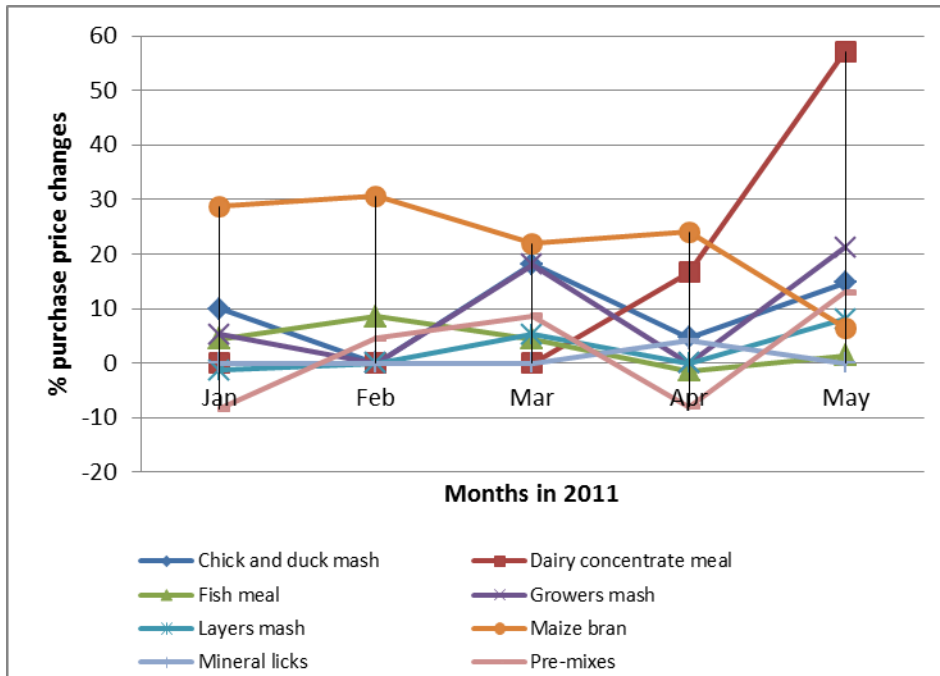


Figure 3: The mean percentage purchase price changes for different products amongst traders in the value chain

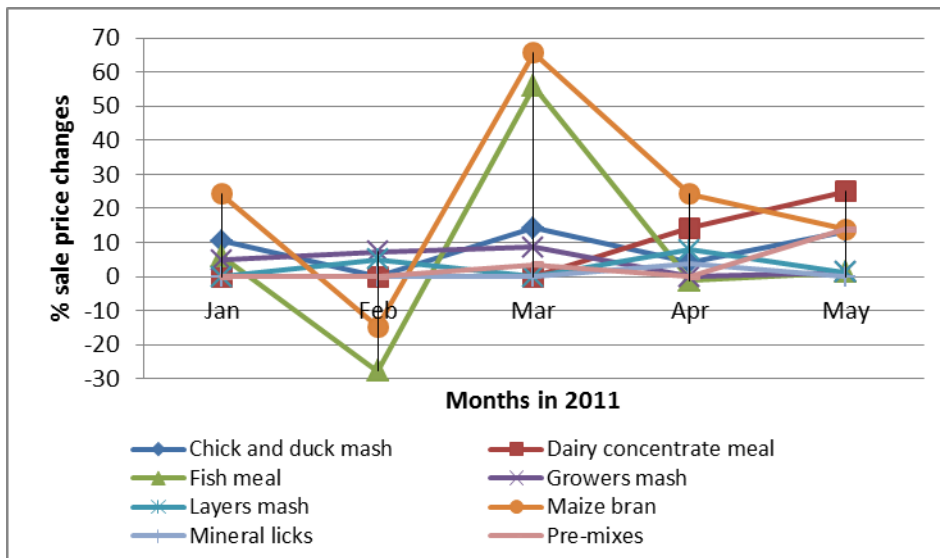


Figure 3: The mean percentage sale price changes for different products amongst traders in the value chain

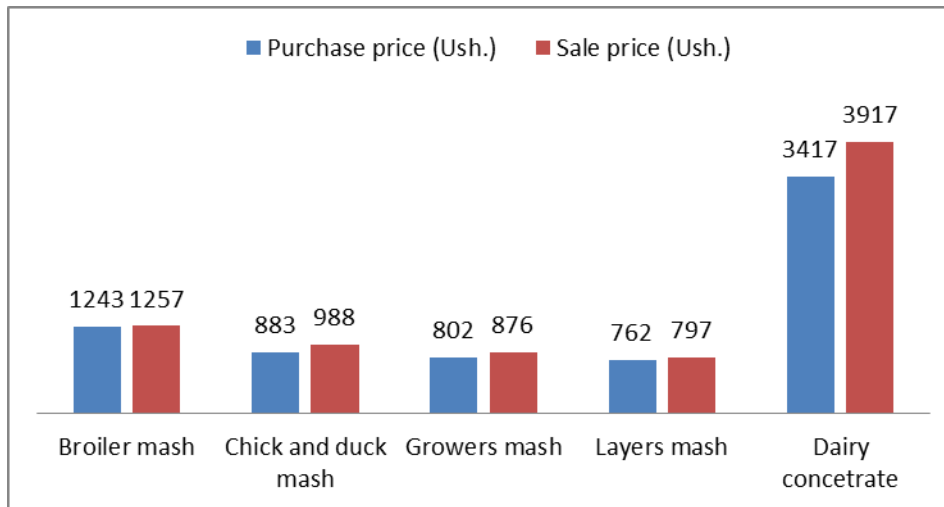


Figure 5: Mean margins for traders on various products in the chain

Demand patterns for various product in the value chain

The demand for different types of compounded feeds and raw materials varies throughout the year for various reasons. The increase in the use of dairy meal is mainly noted during the dry seasons between the months of June –August and November to February. There is also an increase in the sales of poultry products in the months of October – January which usually coincides with the Christmas festive season (Figure 6). Demand for pig products is perceived to be the lowest but follows the same trends as for poultry products throughout the year.

Brewers’ waste which is now very popular with intensive peri-urban dairy farmers was report to have the highest demand during the dry seasons. Animal supplemented with brewers’ waste were reported to have impressive performance in milk productivity although farmers reported experiencing problems with storage of the feed resource due to its high moisture content that tends to make it mould easily. There is need for deliberate intervention by animal nutritionists to develop appropriate technologies to enable the farmers store this agro-industrial by product without developing mould.

While recent trends in the regional market dynamics driven by scarcity of food and feed in Southern Sudan and Kenya was said to be good news for the crop farmers, this development has not been welcomed by livestock farmers since it has forced Ugandan farmers to sell whole grain maize for export to the regional market. This has created deficit in maize supply for both human food and livestock feed especially limiting the availability of maize bran which is the major source of energy for the poultry, dairy cattle and pig livestock species as well as fish throughout the year. These are new challenges in the livestock sector that call for rethinking the policy on export of unprocessed grain as well as national storage silos during the bumper seasons. Actors therefore called for policies that will compel all the cereal traders to process maize before export to generate the maize bran that will benefit the local livestock sector.

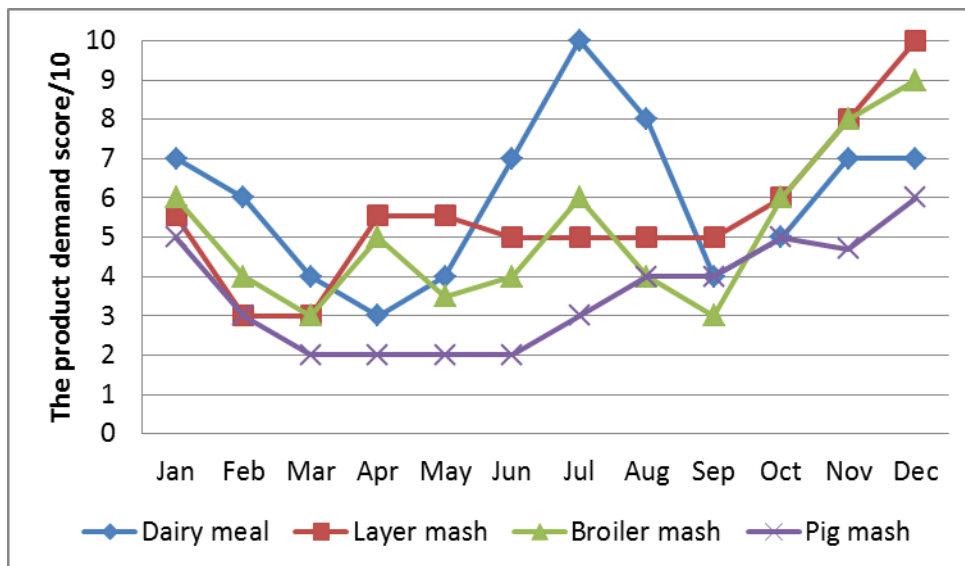


Figure 6: The actors demand score (out of 10) for various compounded feed types in the value chain

Market risks

The National Agricultural Advisory Services (NAADS), a government program designed to promote efficient access to and use of concentrate is providing funds to appointed feed producers to source and sell concentrates to farmers at subsidized rates in rural areas. However, the few appointed small scale producers have monopolized concentrate feed supply in areas of their operation introducing lengthy bureaucracy and mismanagement that has increased transaction costs and compromised feed quality and efficient delivery. It is also discouraging farmers from investing resources in purchasing concentrate feeds.

Actors view the ever rising transport costs as an important market risks that reduces their profit margins. Large scale producers and wholesalers contract transporters who supply feeds to retailers. The cost of transport is included in the cost of the products. Few retailers also provide free transport to lure customers but in fact it is factored in the price of the product. Actors also reported receiving concentrates feed that weigh less than the required and labeled weights. Actors cannot easily control this because they do not have appropriate weighing scales to counter check during the transaction. Since the duty of regulating weights and measure lies with UBOS, it is important that enforcement of proper weight and measures is enforced.

Technical efficiency in feed manufacture

Feed manufacture

The main factors that affect technical efficiency in the manufacture of animal feeds are storage problems, limitation in feed production skills, unreliable and high cost of energy. The common causes of storage losses during feed manufacture include increase in moisture content of raw material over storage time, storage conditions or intentional addition of water by suppliers to increase weight. Most manufacturers do not have the necessary technical skills of formulating and producing compounded feeds. Producers rely on the job training with a risk of producing sub standard feeds. Producers reported experiencing high electricity tariffs and frequent interruptions leading to use of generators that are less efficient and costly to run. Sub-optimal operations of feed mills were attributed to idle time due to power outage.

Production capacities and risks

There is a huge variation in the production capacities of various compounded feeds and raw material producers in Uganda. The Uganda brewers limited (UBL) and Nile breweries have the monopoly of producing yeast and brewers waste. The UBL produces 15 tons of yeast per month which comprises 70% of the total yeast production in Uganda. Nile breweries produce the remaining 30%. The UBL also produces 50 tons of brewers' waste per day that all goes into the animal feed chain. Large scale feed producers compound more than 10 tons of feed per day medium scale feed producers compound an average of 2-5 tons of feeds per day. Millers produce 1-2 tons of wheat bran, maize bran or cotton seed cake per day. Small scale 'back yard' feed producers manufacture an average of 0.2 - 1 ton/day of compounded feeds. Producers attribute the highest risk in the manufacture of animal feed to inefficient processing equipment. This could account for about 10-15% losses depending on the capacity of the machine. Other risks include shortage of water supply for cooling the processing equipment and the conventional occupational hazards. On average manufacturing actors produce 60%, 30% and 10% of poultry, cattle and pig feeds, respectively.

Access to and use of services

Credit

Actors view credit facilities as necessary due to cash flow constraints amongst many consumers. They are constrained to give credit mainly when there is low turnover of feed sales to reduce stock so as to avoid overstaying stocks. Actors in the chain reported a risk of defaulting by customers on their credits. Hence, they assess their clients worthiness and give credit facilities selectively to regular customers whom they view as credit trust worthy. Some of the mitigation strategies actors take against defaulting are making formal credit agreements such as supplying goods against postdated cheques, check off system (supplying feeds against livestock products supplied e.g. eggs and milk) and supply on contract with distributors where there is a specified

credit period. These arrangements are common with wholesalers, dairy cooperatives and small scale producers. A few consumers (about 10%) access credit facilities but they rely on interpersonal trust and integrity they have developed with traders over time. Large scale feed producers do not give credit facilities to their customers.

Loans

Producer, traders and large scale consumers in the chain access loans from microfinance institutions or commercial banks. About 20% of them borrow money mainly as operating funds or capital investment for their businesses. All these actors take loans from microfinance institutions. Microfinance institutions offer loans of up to Ugsh. 15 million (US\$ 6000) depending on the type of security. The actors indicated that they preferred loans from Microfinance deposit taking institutions (MDI) to the conventional commercial banks because MDI have lower interest rates (7-13%) with room for bargaining, have a grace period of 1-2 months, and are more flexible in case of delayed repayment. On the other hand, conventional commercial banks have high interest rates (14-18%) with no room to bargain, have demanding conditions including trading records and are strict on their payment and recovery schedules. Small scale consumers mainly access loans from the savings and credit cooperative organisations (SACCO's) in which members can benefit from lower interest rates (4-6%) with soft recovery rates. Most actors prefer short duration loans. Actors who do not prefer to take loans avoid risks and uncertainties associated with loan repayment due to low farm productivity, unstable feed markets and financial environment e.g. inflation and weakening of the local currency against international currencies. Most actors also pointed out that the majority of them also lack collateral to offer for the loans. A few actors claimed lack of information about credit providers and sources.

Feed testing

A total of 39% of feed producers reported sending samples for feed analysis to laboratories especially at Makerere University faculty of Agriculture, Animal Science Department. Most actors, however, indicated that they do not test feed for quality attributes not only due to high cost of feed analysis but also to the long interval to get results as well as lack of laboratory facilities in close proximity. In Uganda, feed quality testing is mainly done at the national research stations such as Uganda bureau of standards in conjunction with the Government Chemist Department, Makerere University (MAK) and a few private companies such as Kemipher in Kampala. This leaves the feed assessment issues in the hands of actors across the chain. Actors from the eastern, central and south western milk sheds felt a greater need for an intervention geared towards fostering linkages between the government regulatory agency, national research stations, MAK and actors in the value chain aimed at having regional centres for feed quality analysis.

Information and services

The majority of consumers (89%) rely on specialized advice on how to use feed concentrates and supplements. A total of 83% of producers offer specialized advice on feeds and feeding requirements. All traders reported offering simple advice on aspects related to when and how to use various feed products. Only one trader reported charging for this service. The major types of information sought by all actors in the chain includes feed requirements for various types of livestock, information on quality of feeds, how best to use the products and market information such as potential suppliers. The main sources of information for all actors in the chain are learning institutions and research organizations.

Consumers did not access adequate information on how to use alternative feed resources for livestock i.e. molasses, sugar cane tops and bagasse, brewers' waste, brewers' yeast, banana peels, industrial fish wastes, pineapple peels and crown and leaf meals from leguminous trees. Farmers suggested that there is potential for these agro-industrial by-products to be exploited as animal feed to keep production cost low. There is therefore need for government to deliberately rethink and invest in knowledge creation through research, development and dissemination targeting especially the sugar factories and breweries to turn all the molasses reported to be 115,000 metric tones per year ($10.3 \text{ MJ kg}^{-1} \text{ DM ME}$; $39 \text{ g kg}^{-1} \text{ DM CP}$), sugar cane tops, brewers waste/spent grain ($350 \text{ g kg}^{-1} \text{ DM CP}$), brewers' yeast, palm kernel cake and palm oil fronds that otherwise pose environmental problem on disposal into feed for livestock.

Institutional constraints

Actors along the chain cited a number of institutional constraints affecting production, delivery, access to and use of concentrate feeds and feed ingredients. All actors were unanimous about the lack of a national livestock feeds policy to regulate importation, manufacture, distribution and use of compounded livestock feeds, feed ingredients as well as supplements, cereals and legume grains. Feed policy interventions could enhance feed quality regulation, availability of raw materials and overall participation of small as well as big scale actors in the concentrate feed value chain. The actors suggested interventions such as developing feed standards, reduction of taxes on imported animal feed raw materials and trade regulation on animal feed raw materials to protect the local industry. They cited 18% value added tax (VAT) imposed on livestock feed premixes from mid 2011 as an example of tax that will increase the cost of compounded feeds that will further compromise quality and livestock productivity where actors opt to forego its use as a means of cutting down on the cost.

Actors in the chain also identified poor access to and delay in feed analysis as well as the high cost of analysis as some of the constraints to improving feed quality in the chain. They recommended involvement of the private sector as partners with government in the regulation of feed quality. Intervention to achieve this could include decentralizing feed analysis

laboratories to district level and allowing private sector to participate in feed analysis to reduce the cost. However, the actors in the chain emphasized that government should engage in feed quality regulation by investing into the regional laboratory infrastructure in a public private partnership. Direct Government intervention targeting major infrastructural development is crucial to the livestock sector development and promotion of the concentrate feed value chain. Such major infrastructure cannot be afforded by small scale feed manufacturers yet it is crucial to the vibrant livestock development driven by high quality feeds.

Other constraints

Producers cited high price variability, lack of feed quality control and working capital as the most important constraints. Others constraints included high cost of transportation and seasonal feed availability. While traders viewed seasonal feed production, illiteracy amongst farmers and high cost of transport as the major constraints (Figure 3) in the feeds value chain, consumers viewed high cost of feeds, price variability and high transport cost as the main constraints (Figure 4)

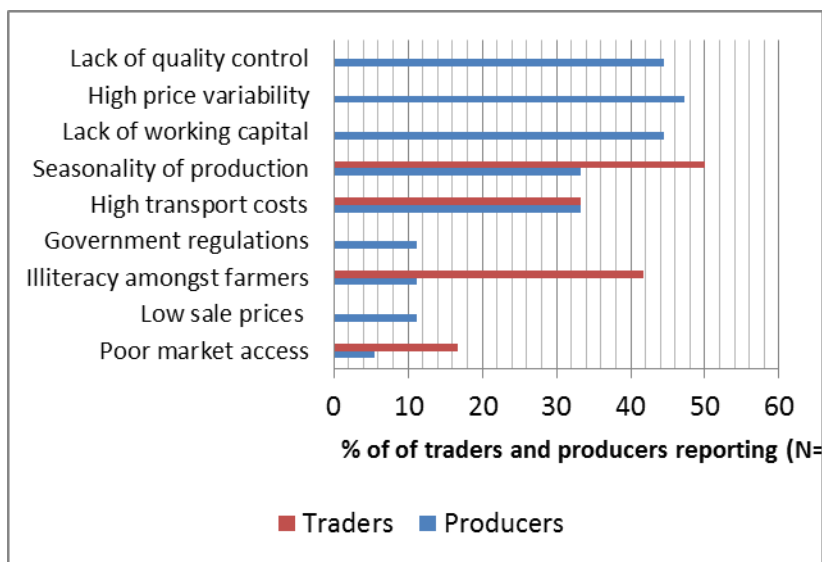


Figure 3: Constraints cited by traders and producers in the chain

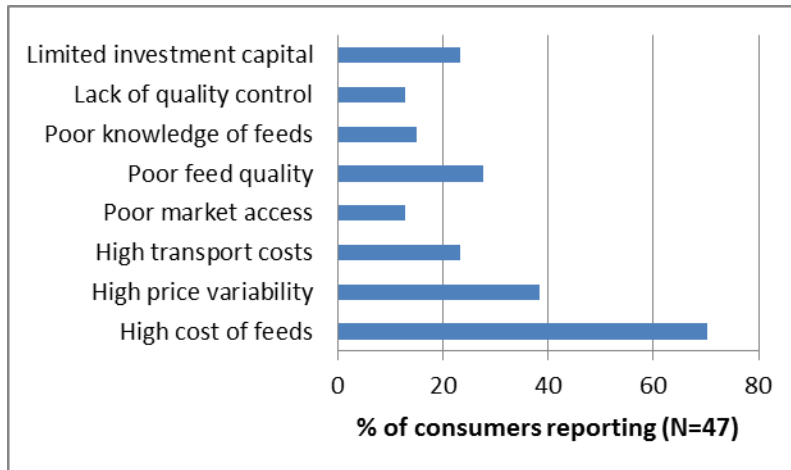


Figure 3: Constraints cited by consumers in the chain

Innovation

There are no feed associations or organisations to address animal feed issues in the chain. This has resulted into uncoordinated efforts to deal with quality and policy issues affecting actors in the chain. There was evidence of actors in the chain seeking to supply new markets and responding to changes in market requirements. This includes practices such as small-scale producers beginning to open market outlets for their products in other villages to try and overcome stiff competition as well producing products for new markets such as fish products for the aquaculture industry. A total of 94% of the producers reported seeking to supply new markets. Some large scale producers are reacting to stiff competition from small scale producers by specialising in the supply of raw materials and segmenting customers to address different expectations. For example currently, it is only the large scale producers who have developed technologies to produce floating fish feeds. The large scale producers also have diversified the types of raw materials based on the state of the art imported scientific innovations such as use of aflatoxin binders and micronutrient to fortify compounded feeds for better productivity. However, all these innovations by the large scale producers apparent result in increased prices of feeds. The small scale feed producers on the other hand innovatively address price issues by diversifying on the types of raw materials with emphasis on use of locally available and cheap materials in compounded feed. The small scale feed producers are also more flexible towards the consumers demand and package in small quantities of say 5 kg or less enabling the consumers to have the feeds piece meal which may be in line with their constrained cash flow. The small scale feed producers also have the ability to compound feeds of varying composition in accordance with consumer demand regardless of the quality. However, the small scale producers cannot afford to use the state of the art innovations which can be important in revolutionising the livestock sector. These examples of innovation underline the dynamism of the value chain.

Conclusions

- Small scale feed producers control a significant share of the feed market in the value chain; highlighting the important role they play in these chains to improve feed access to smallholder livestock producers. This contribution is also significant in the context of feed quality concerns in particular and broader feed production issues in general.
- In addition, small scale feed producers are dominant players in the concentrate feed value chain in terms of their strong influence on prices of raw materials and their ability to compound feeds of varying composition in accordance with consumer demand regardless of the quality.

References:

- Atokple I, Byenkya GS, Mahabile W, Sebotja I and Verschoor A. 1995. *Towards Revitalising Livestock Industry in Mukono District, Uganda*. ICRAF Working Document Series 45.
- Bareeba FB and Mugerwa JS. 1988. Use of research results to formulate a feeding strategy for livestock during the dry seasons in Uganda. Utilization of research results on forage and agricultural by-product materials as animal feed resources in Africa. Proceedings of the first joint workshop held in Lilongwe, Malawi 5-9, December 1988, pp. 249.
- EADD, 2010. A baseline surveys report, The East Africa Dairy Development Project report. Feeds and feeding practices. Report 3, ILRI, Nairobi, Kenya.
- Government of Uganda (GOU), (2009). Livestock sector brief. Uganda Investment Authority, Kampala Uganda.
- Graffham A, Kelin U, Jagwe J, Nabawanuka J, Wanda K, Kalunda P, Ntibarikure G and Ferris S. 2003. *A market opportunities survey for value-added utilization of cassava-based products in Uganda*. Part 1: Demand analysis for industrial; utilization, ASARECA/IITA Monograph 1 IITA, Ibadan, Nigeria. pp. 52
- LSRP, 2000. The Livestock Systems Research Programme Report. The District Diagnostic Survey Report series. Livestock Systems Research Programme, NARO/DANIDA/LSRP, Entebbe, Uganda.
- Lukuyu B, Kitalyi A, Franzel S, Duncan A, and Baltenweck I. 2009. *Constraints and Options to enhancing production of high quality feeds in dairy production in Kenya, Uganda and Rwanda*. ICRAF Working Paper No. 95. Nairobi, Kenya. World Agro Forestry Centre.
- MAAIF 2008. The National Livestock Census report. Ministry of Agriculture Animal Industry and Fisheries, Entebbe, Uganda.

Nakiganda A, Upton M, Phipps R, Mcleod A, Taylor N and Bua A. 2005. Economics of feeding strategies in smallholder dairy cattle farming systems in central Uganda. African crop science conference proceedings, Vol. 7. pp. 767-769

National Livestock Census (NLC 2008) Version 1.1 of the public use dataset (May 2010), provided by the Uganda National Data Archive. www.ubos.org/nada, Uganda Bureau of Statistics.