

Assessment of livestock feed value chains in Ayedire and Atukmosa East local government areas, Osun state, Nigeria

Anandan Samireddypalle¹, Augustine A. Ayantunde¹, Iheanacho Okike¹, Olaniyi
J. Babayemi², Adedayo O. Sosina² and Alan J. Duncan¹

¹International Livestock Research Institute

²University of Ibadan



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ILRI is a member of the CGIAR Consortium

Box 30709, Nairobi 00100, Kenya
Phone: +254 20 422 3000
Fax: +254 20 422 3001
Email: ILRI-Kenya@cgiar.org

Box 5689, Addis Ababa, Ethiopia
Phone: +251 11 617 2000
Fax: +251 11 617 2001
Email: ILRI-Ethiopia@cgiar.org

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Introduction

Humidtropics, a CGIAR Research Program, aims to help poor farm families boost their income from integrated agricultural system intensification while preserving their land for future generations.

Livestock is an important component of the integrated agricultural systems in almost all production systems. Feed is central to livestock productivity and understanding the ways in which feeds are produced, processed and fed to livestock under different production systems is one of the keys to improve livestock productivity and improve the overall productivity of agricultural systems.

To fulfil this objective, feed value chain studies were carried out in the Ayedire and Atukmosa East Local Government Areas (LGAs) in Osun state.

Approach to the study

The feed value chain has three main set of actors: Producers of feeds as the starting point, traders/processors as facilitators who effectively link producers and consumers and finally feed consumers represented by livestock and the farmers owning livestock as the end point. In addition to these three actor groups, many factors contribute to the effective functioning of the feed value chain including infrastructure, resources, regulations/policy, institutions, demand-supply, knowledge and skill sets. To address the major components of the feed value chain, a quick survey of the field sites was carried out through a combination of focus group discussions with stakeholders, structured questionnaires, personal interviews and observations.

The study was carried out in Osun state involving two LGA – Ayedire and Atukomosa East. At each LGA, two locations, Olunpoan and Oluwosin village in Ayedire LGA and Iwara and Itaapa village in Atukomosa East, were selected for the study.

Survey methodology

At each of the two surveyed villages within the LGA a group of 16-18 farmers from different backgrounds engaged in the livestock rearing were involved in a focus group discussions followed by completion of an individual questionnaire to elicit the information on all issues related to the feeds and feeding of livestock from a small scale consumer's perspective.

In addition to the farmers who represent consumers of feed, traders, millers and processors who produce or trade livestock feeds were interviewed individually to understand their role in the value chain. Feed processors engaged in the feed formulation and marketing were also interviewed to understand the functions they carry out. Information from three sets of actors – consumers (farmers), traders (grain processors, oil industries and traders) and producers (feed manufacturers) were covered through focus group discussions, interviews and personal observations at their respective locations. The value chain on feeds is influenced by a number of factors and those that either directly or indirectly affect the feed value chain were considered in this study.

Feed value chain in Ayedire

Site description- Farming is the predominant economic activity of the people in the area (75%). Cocoa is a major cash crop cultivated in the area solely or in combination with other agricultural crops such as coffee, cassava, palm oil, kola nut, maize, pineapple and yam. For the survey two sites – Oluponna, one of the major towns in Ayedire and Osunwoyin village, which happens to be the site of innovation platform on cocoa plantation under the Humid-tropics project were selected.

Profile of the respondents

General characteristics of respondents such as age, years of experience in livestock, land holding and major crops cultivated by the respondents were gathered through individual interview and are summarized in Table 1.

Table1. Profile of the surveyed respondents at Olunpoan and Osunwoyin

Respondents	Olunpoan	Osunwoyin
Average age (years)	38 (25-46)	39 (25-72)
Experience in livestock (years)	17 (5-34)	16
Land holding (acres)	13 (3-100)	14 (0.5 -70)
Female respondents -percentage	10	60

Figures in parenthesis are ranges

Livestock holdings

Livestock holdings in terms of the species and the number of animals is an important factor that determines the nature and quantity of feed resources required. Of the two centers surveyed Olunpoan had relatively greater diversity of species and some market oriented production systems for poultry and pigs using commercial feeds while at Osunwoyin village the main species of animals were small ruminants, indigenous birds and very few commercial poultry. Livestock holdings at both the sites were small and at Osunwoyin livestock rearing was very traditional with minimum external feed inputs and producers mainly depended on their farm produce to feed their animals. Livestock holding relative to land size was very small at Osunwoyin village indicating the greater importance attached to agriculture and low priority given to livestock farming. Average numbers of animals for the various species at two surveyed villages along with the range are presented in the Table 2.

Table 2. Average livestock holdings of the surveyed farmers

Species	Olunpoan	Osunwoyin
Goats	4.0 (0-17)	2.1 (0-8)
Sheep	3.5 (0-14)	1.3 (0-8)
Indigenous birds	9 (0-42)	10.5 (0-40)
Commercial poultry	140 (0-1200)	3.1 (0-16)
Pigs	1 (8)	0
Ducks	0	1 (0 -16)
Cattle	15.5 (0-60)	1 (16)

Figures in brackets indicate the ranges

The breeds of sheep and goats were mostly West African dwarf and cattle were local white Fulani mainly meant for meat production with very little milk yield. None of the surveyed farmers had improved breeds of sheep /goat and dairy animals implying lack of efforts towards intensification of ruminants. Commercial poultry and pigs were of improved germplasm with higher production potential.

Feeding systems

Feeding systems are influenced by the nature of species and the level of intensification. Improved animals with better genetic potential require better inputs in the form of cultivated fodder and concentrates, while local breeds with low genetic potential can be sustained on low inputs using free ranging or limited supplementation depending on the feed availability from the natural range. The level of intensification observed in both the surveyed villages was very low and most of the animals except for the commercial poultry and pigs, were reared under free ranging practices with little supplementation. Few of the respondents were following stall feeding of small ruminants due to the restriction by the village community not to allow the small ruminants outside to prevent them from damaging the standing crops. Feeding systems were mainly grouped into four categories- free ranging, mainly free ranging with little supplementation, mainly stall feeding with grazing and stall feeding. Various feeding systems for different species at the surveyed villages are presented in Fig.1 and 2.

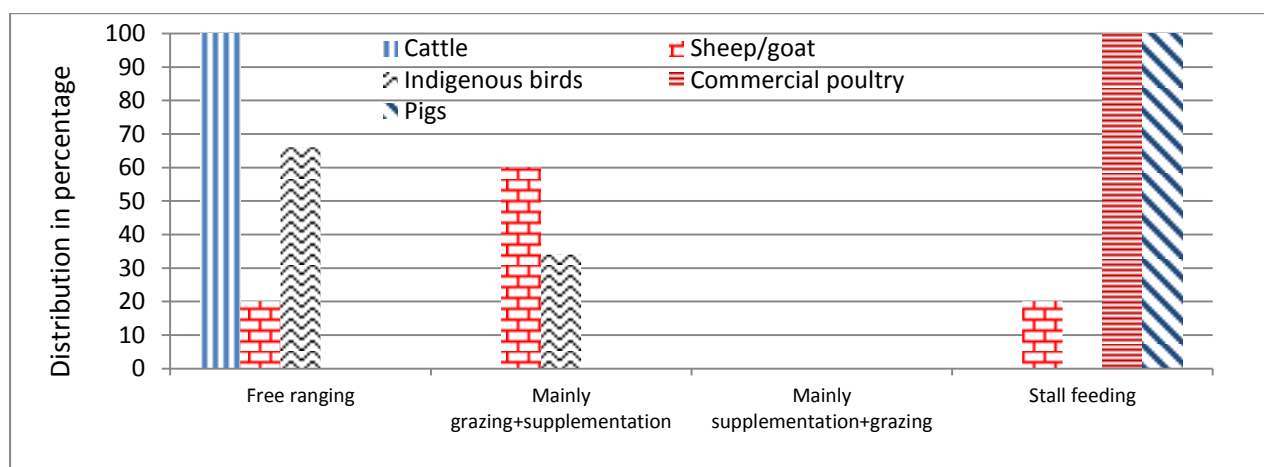


Figure 1. Feeding systems in different species followed at Olunpoan village

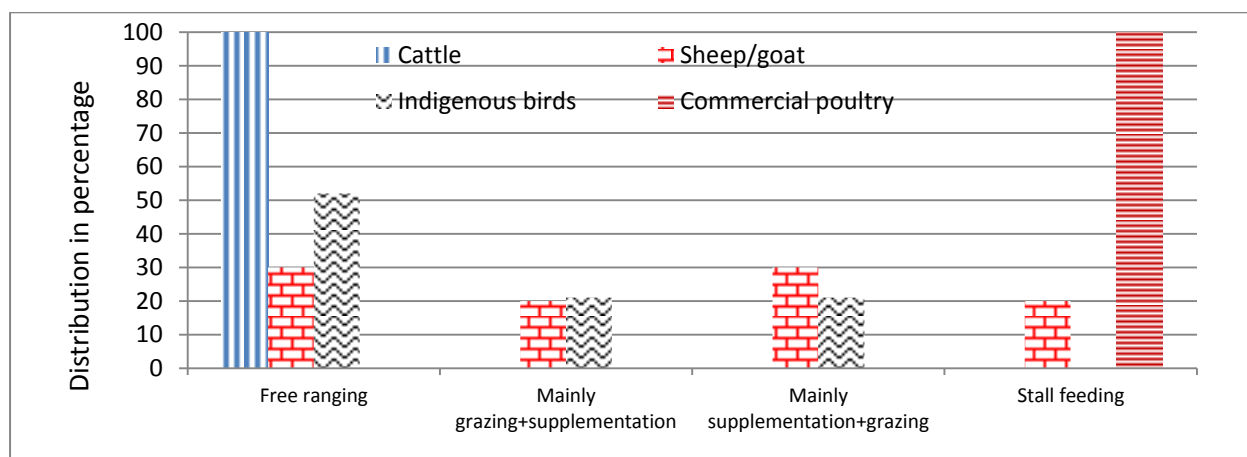


Figure 2. Feeding systems in different species followed at Osunwoyin village

Feed production

None of the surveyed respondents in the village were allocating land for production of fodder or were using the crop residues for feeding their livestock. The major crops in the surveyed areas were cassava, maize, yam, cocoa, cocoa yam and of these only cassava/yam peels, cassava tubers, maize grains and eri (a byproduct of maize obtained during its preparation as food) were used as livestock feeds. Cattle were the only livestock that were using the maize stovers from harvested fields and cassava leaves was not being fed as livestock feed. Only a small portion of the cassava tubers and

maize grains were used for feeding the livestock but the majority of the farm produce was being sold for cash and part of it was being retained for self-consumption. Fodder trees or cut and carry system for grass from cropped areas was also not being followed in the surveyed areas. Lack of feed production from the farming land is mainly due to the notion by the farmers in this region that livestock and crops do not go together and they see crop and livestock as separate entities. Their major emphasis is on food and cash crops and livestock rearing is not given much attention. This is the main reason for the low livestock density observed in the surveyed villages and absence of strong demand for the feeds which could otherwise be produced on farm economically specially for ruminants to augment livestock production leading to better crop-livestock integration.

Purchased feeds and choice of channels

Purchased feeds was seen with only those respondents who had commercial poultry (broilers/layers) and pigs while a very few of the farmers with sheep/goats and a few of them having indigenous birds were buying eri and guinea corn in small quantities. At Olunpoan farmers buying feed ingredients represented 63% of which 38% were buying substantial amounts for poultry and pigs and the remaining 25% represented small time buyers of eri, standing maize stover and salt for ruminants. At Osunwoyin although the farmers buying feeds represented 80% of the surveyed farmers the range of feed resources were limited to a few items (compound feed for commercial poultry, maize/guinea corn for local poultry and salt for ruminants) and the quantity of feed purchased was very little due to low livestock numbers. Details of the purchased feeds by the surveyed respondents in both the locations are presented in Table 3.

Table 3. Feed purchasing trends among the farmers at Olunpoan and Osunwoyin villages.

Parameters	Olunpoan	Osunwoyin
Percent of respondents purchasing	70	80
Percent buyers for commercial poultry & pigs	30	33
Percent of respondents compounding feeds	40	nil
Ingredients*		
Maize	60-230 kg (45N ⁺)	22 -50kg (40-50N)
Guinea corn	-	3-25 kg (80-100N)
Compound feed (Poultry)		6-75 kg (100-140N)
salt	2-25 kg (60 N)	50kg (50N)
Palm kernel cake	50-1000 (42-43N)	--
Soya	45-50 kg (120-140N)	--
Fish clumps	45 kg (50N)	--
Wheat offal	50kg (50 N)	--
Purchase channels		
Feed producers	100 % for commercial poultry and 40% pigs	--
Small retailers	100% for eri	100% from small retailers
Processing industries	60% for pigs (Palm Kernel Cake)	-

* Ingredients quantities are given in kg as range and the rates per kg are provided in parenthesis. ⁺ Nigerian Naira

Compounding of feeds was being followed only at Olunapon and it was being done on farm by a pig farmer while for poultry the compounding was carried out at a feed mill as per the customized formulation. At Osunwoyin there was no compounding of feeds due to low volumes of feeds purchased on account of the small numbers of commercial poultry.

For choice of the purchase channels at Olunpoan there were two large feed millers and one small feed mill operating within the locality selling feed ingredients and compounded feeds (readymade

and as per the customers, specified formulation). Additionally there were two palm kernel processing centers that were selling palm kernel cake to farmers directly. At Osunwoyin there were no traders or feed mills operating in the locality and they had to visit the nearest local market to buy their feed ingredients or compound feed and the nearest local market was quite far and the transport charges for one person to travel to and from to the market was 600 Naira (Approx.- 3.4 USD) . Market access and transport cost was a major problem at Osunwoyin.

The choice of purchase channels for feeds is influenced by a number of factors and the respondents were given the option to choose the three most important factors that they considered from the list of possible options as provided in the questionnaire. Results of the first, second and third options is summarized in the Figure below. To bring out the three most important factors based on the three options chosen by the respondents, all the factors were pooled and the first choice was assigned a weightage of three points, second one two points and the third choice one point and the overall weightage of all the choices were calculated and summarized in Figures 4 and 5. Overall price level followed by transport and trust were the major factors influencing the choice of purchase channels at Olunpoan. Overall at Osunwoyin, three major factors influencing the choice of purchase channels were price level followed by time of year and trust.

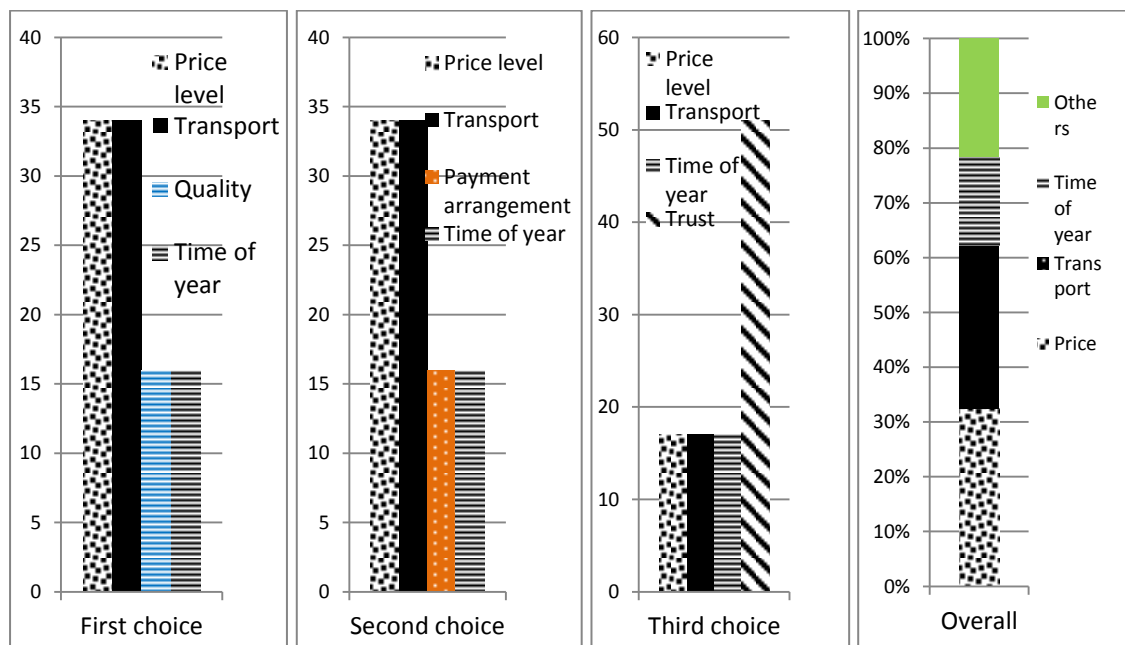


Figure 4. Factors in percentage influencing the choice of feed purchase channels in Olunpoan

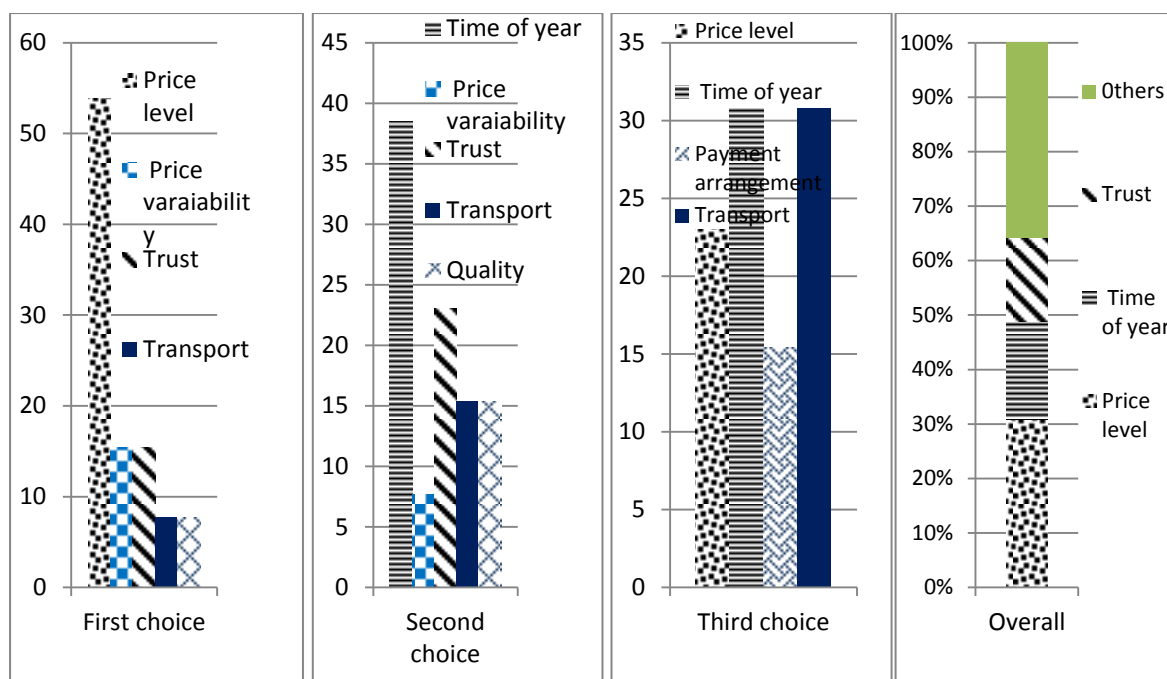


Figure 5. Factors in percentage influencing the choice of feed purchase channels in Osunwoyin

Constraints in concentrate usage

Concentrate consumption in the Osunwoyin village was very insignificant while at Olunpoan the consumption was relatively better mainly due to the commercial poultry and pigs. With regard to opinion of the surveyed farmers on the constraints for using the concentrate feeds the study revealed that the options were quite variable (Tables 4 and 5) at both the sites due to differences in the species distribution, level of intensification and access to markets.

Table 4. Three most important constraints in feeding concentrate at Olunpoan village

Factors	First ranked constraint (%)	Second ranked constraint (%)	Third ranked constraint (%)
High cost	66.7	22.2	12.5
High transport cost	-	33.3	12.5
Capital	22.2	22.2	25.0
Poor access to markets	11.1	-	12.5
Storage	-	11.1	-
Security	-	11.1	-
Poor quality of feeds	-	-	37.5

Table 5. Three most important constraints in feeding concentrate at Osunwoyin village

Factors	First ranked constraint (%)	Second ranked constraint (%)	Third ranked constraint (%)
High cost	56	22	-
High transport cost	11	-	17
Capital	22	45	-
Poor access to markets	11	22	32
High transport costs	-	-	17
Storage	-	-	17
Security	-	-	-
Poor quality of feeds	-	11	17

Osunwoyin village did not have any access to markets in the village and the markets access and transport was one of the major constraints.

Opportunities for enhancing concentrate usage

The results of the survey to find out the future three most important opportunities for enhancing the use of concentrate in livestock feeding are summarized in the Fig. 6 and 7.

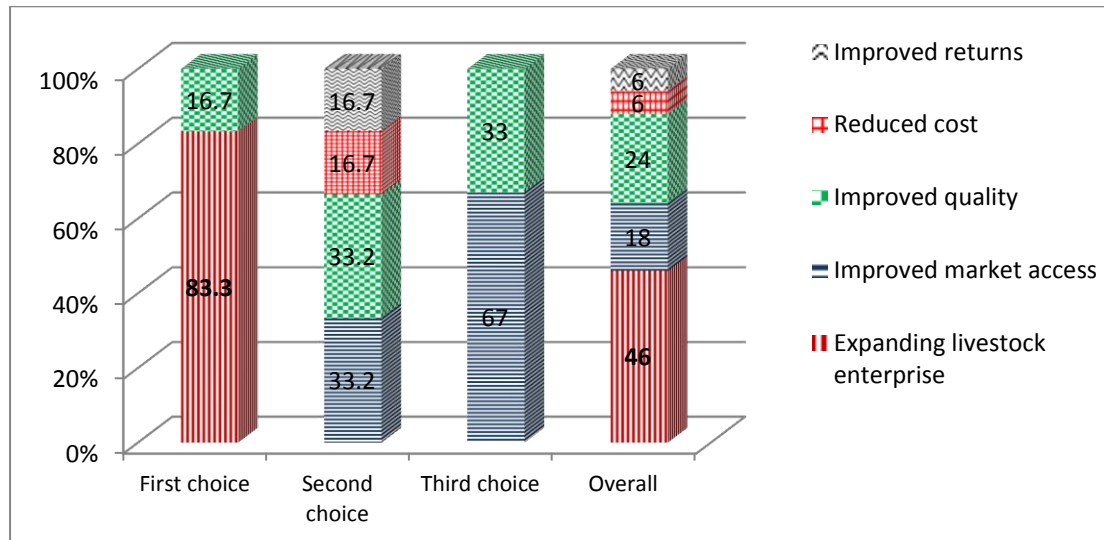


Figure 6. Top three opportunities for enhancing the use of concentrates at Olunpoan

Responses of the Fulani farmers having cattle on the future opportunities for enhancing concentrate revealed that they did not foresee any future for use of concentrate feeding in large ruminants due to high costs and large quantities of concentrates required for feeding the large animals.

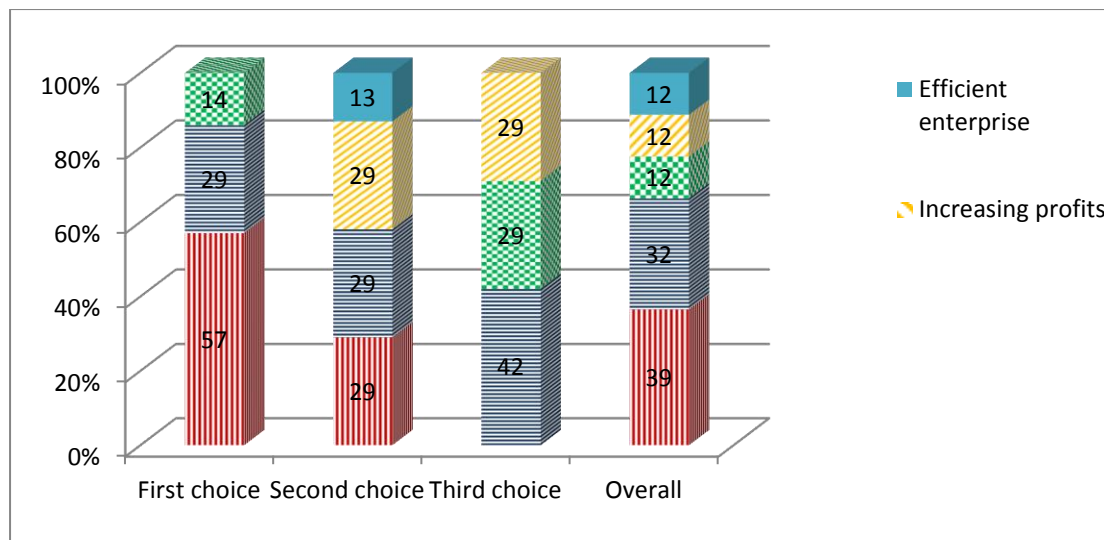


Figure 7. Three major opportunities for enhancing the use of concentrates at Osunwoyin

Concentrate consumption at Osunwoyin village was insignificant and market access was one of the major problems as they did not have any trader or manufacturer located nearby besides the low numbers of commercial poultry, pigs are fishes that rely heavily on purchased concentrates. Respondents at Olunpoan with commercial oriented production ranked expanding livestock

enterprises as the major opportunity for enhancing concentrates while at Osunwoyin market access and quality were also listed in addition to the expanding livestock enterprise as the major opportunity. Overall expanding livestock enterprise followed by improved quality and market access were the major opportunities at Olunpoan while at Osunwoyin the overall major opportunities identified were expanding livestock enterprise, improved market access, improved quality, improved profits and efficient enterprise in the descending order of importance.

Access to advisory services

Information from advisory services regarding feeding and management of livestock is one of the important inputs for strengthening livestock production. Market oriented production is generally characterized by effective information dissemination systems through personnel, literature, meetings and small workshops depending on the extent of intensification. Besides advisory services visits to successful/progressive farmers and model farms and interacting with the farmers is also one of the ways of gathering information on improved livestock production practices. Information on livestock production, frequency of the information gathering and visits to neighboring farms by the respondents was compiled and are presented in Table 6.

Table 6. Percentage of farmers receiving advisory services

Issue	Response	Olunpoan	Osunwoyin
		(% of respondents)	(% of respondents)
Get advice on feed related issues?	Yes	25.0	9.0
	No	75.0	91.0
Visit other farmers' fields?	Yes	80.0	62.0
	No	20.0	38.0
Main sources of information	Visit to neighbouring farmers, extension staff from government and private		

Storage and feed processing practices

The surveyed respondents did not face any major problem regarding the storage of feeds at both the sites. They were aware of the proper storing methods and all dry feeds were properly sun dried and bagged for storage and further due to limited surplus grains or feeds the storage period rarely exceeded 3-4 months. Dried feed materials like grains, grain offal and cakes were dried properly and stored in nylon bags in well-ventilated space for a period of 3-4 months. For wet products like eri and maize gluten the storage time was very short at 2-3 days wherein the wet materials were stored either on raised platforms with proper aeration or well-ventilated spaces with good aeration for short duration as longer storage resulted in spoilage and molds. In none of the villages was green fodder was stored in the form of hay nor was it being harvested and fed. Crop residues were not a major source of feeds and hence they did not store any of the crop residues. Cassava peels were sun dried during the sunny days and stored in bags while during the rainy season the peels were discarded. For concentrate ingredients all the ingredients were ground and used and mash form was the most commonly offered feed in poultry and pigs. Feed mills were using grinders – hammer mill and vertical mixers for producing compounded feed in mash form.

Sourcing of feeds

Among the livestock species at both the surveyed locations ruminants and indigenous birds were mostly reared on grazing, by products from own crops and very little purchased feed inputs. Commercial poultry and pigs relied heavily on the purchased feed inputs - mainly concentrates and were seen only in Olunpoan. Osunwoyin village did not have pigs or commercial poultry in large

numbers. The range of feeds purchased and the features associated with purchase at both the surveyed sites are summarized in Table 8.

Table 8. Feed purchasing trends

Issue	Olunpoan	Osunwoyin
Feed resources	Mainly concentrate ingredients - Maize, soya, wheat offal, PKC, GNC, corn bran, bone meal, salt, compounded poultry feed	Eri, maize, sorghum, compound poultry feed, salt
Quantity and frequency	Reasonably good amounts at regular interval	Very limited range of resources and quantity was being purchased.
Source	Mainly sourced from two feed plants and the palm kernel cake processing unit within the locality	With exception to Eri no access to feed sources in village and had to procure from the neighboring markets
Finance for feed purchase	No access to financial assistance/loan but reasonably large amounts were spent on buying feeds and all the money was self-financed.	No access to financial assistance and very limited amounts was spent for buying feeds from and own source.
Transport	Although the source of feeds purchase was close due to large quantity transport charges were important.	Although the quantity of purchase was limited due to the long distance transport charges for feeds was quite high (600 Naira/trip)
Feed prices and stability	Feed prices were decided by the seller and the farmers did not have much say on the prices. The prices of feeds tended to vary across the year.	
Feed quality and packing	Sensory attributes like- smell, taste, color, consistency, temperature, presence of molds, weevils etc., were commonly used by the farmers and the producers in judging the quality. Awareness on feed analysis, standards for ingredients or finished feeds was not there among the farmers and the feed producers. Ingredients and compound feeds were being sold in nylon bags for all quantities as per the customer's need. No product branding or specification of the quality was being done by the feed mills.	

Feed value chain: Actors and processes

The feed value chain has three main groups of actors and different processes associated with the different actors. Main features of the actors-producers, traders/processors and consumers with the different processes observed in the surveyed villages are summarized as follows.

Producers

The surveyed respondents at Olunpoan were undertaking livestock activities with market orientation for poultry and pigs resulting in purchase and utilization of concentrate feeds. Respondents at Osunwoyin village were mainly crop farmers with livestock as a minor or small component of the agricultural activity and as a result the livestock species and holdings were very small relative to their land holdings and most of the feed resources were sourced within the village and farm byproducts with minimum purchase of feed resources. None of the respondents in either of the surveyed villages were cultivating fodder or growing crops for exclusive use of animals. Cassava and maize were the main food crops and most of these were sold for cash while retaining a proportion for self-consumption. Maize grains and cassava tubers were mainly for food crops and only a small fraction was being used by the farmers for feeding livestock. Cassava peels and eri were the main byproducts of the cultivated crops that were being used for livestock feeding. Harvesting grass or tree leaves from common property resources and their preservation was not being followed to augment feed resources for ruminants. Greater emphasis on crops, weak extension and lack of awareness on the benefits of livestock rearing and their integration with crop cultivation are the likely reasons for low livestock production activity for ruminants. For market oriented production of mono-gastrics such as poultry and pigs, capital availability was the major constraint for expansion. The existing feed resources produced locally were being augmented by the supply of concentrate ingredients and palm kernel cake from the feed processors and palm kernel processing centers.

Traders and processors

These are an important component of the feed value chain as they link the producers and consumers of feeds and strengthen the value chain through augmenting feed resources or adding value to feed through compounding and ensuring timely availability of resources. At Olunpoan there were two large feed mills and one small feed mill with two palm kernel processing units supplying feed ingredients and palm kernel cake. Osunwoyin village did not have any feed mills or processors and they had to travel all the way to Olunpoan to buy feeds. The feed mills, in addition to supplying compound feeds, were also trading in all feed ingredients. Grinding and mixing of concentrate ingredients for different productive functions like layers and broilers using different formulations were being carried out by the feed mills using grinders and vertical mixers. Palm kernel processing units were mainly processing the kernels for oil extraction and palm kernel cake was the main byproduct used for livestock feeding mainly of pigs as a protein supplement. Eri was another minor byproduct produced locally during the processing of the cereal grains, mainly maize, for food production and Eri was being traded for feeding livestock but with limited shelf life due to high moisture content.

Consumers

Consumers in the feed value chain context refers to the livestock producers that utilize feeds and the quantitative demand for feeds from the consumers is directly related to the number of animals held. Qualitatively the demand for feed resources is determined by the species – mono-gastric requiring better quality feeds while ruminants can thrive on medium to low quality feed resources. At Olunapon the demand for concentrate feed resources from mono-gastric such as commercial poultry and pigs was strong relative to Osunwoyin due to absence of pigs and commercial poultry in good numbers at the latter site. The ruminant production system at both the surveyed villages were traditional with greater reliance on free ranging, farm produced crop byproducts and very little reliance on purchased inputs.

Other influencing factors

In addition to the three major components of the feed value chain a number of factors influence the strength of the value chain and of the various factors market is the major factor. Good market demand which is a function of the number of people and purchasing power promotes greater livestock production leading to higher numbers of livestock and better feeding management. In this instance Olunpoan had a greater population with greater demand relative to Osunwoyin village. Infrastructure like road access is another important factor for easy movement of goods and services and in this regard Olunpoan had better road access compared to Osunwoyin village. Besides the above factors a number of factors including government support to livestock through special schemes, soft loans, and institutional support for capacity building of the field staff and farmers, market linkage, export/import regulations can positively impact the livestock production activities and strengthen feed value chains.

Conclusions

Both the surveyed locations were characterized by low livestock holdings. Small ruminants, cattle and indigenous birds were reared on low input systems relying heavily on free ranging with very little supplementation on mostly farm byproducts. Demand for ruminant feeds was not strong as evidenced by lack of fodder cultivation, crop residue storage and utilization, fodder trees or purchase of feed resources for ruminants. Commercial poultry and pig production systems were relatively better using improved breeds and compound feeds. Feed producers were very limited and were present at only one of the surveyed sites – Olunpoan – and they were mainly catering for the broiler/ layers birds and pigs to a limited extent. Feed processors were using simple machinery producing feeds in mash form and selling directly to farmers in all quantities due to limited customer base. High cost of concentrates, lack of capital and transport costs were identified as major constraints to the use of concentrate feeds. Strengthening of on-farm feed production, effective integration of crop livestock systems, capacity building of the farmers, policies to ensure financial assistance/loans, forming of farmers associations, market access to inputs and remunerative prices for farm produce would strengthen the livestock sector to contribute substantially to the overall system productivity. Strengthening of the livestock sector would result in improved efficiency and stronger feed value chains to cater for the growing feed demand.

Feed value chain in Atukmosa East

The survey was carried out at two locations where the innovation platforms on cocoa have been set up and this site is well connected with road and 8 km from the express way leading to Abuja. The second site selected for the study was Itaapa which was around 18 km away from the Iwara with very poor road access to the village. The distance from Iwara to Itaapa was covered in almost one hour due to bad roads and access to Itaapa was one of the major constraints faced by the respondents.

Profile of the respondents

Major characteristics of the surveyed respondents at Iwara and Itaapa sites is summarized in Table 9

Table 9. Profile of the surveyed respondents

Respondents	Iwara	Itaapa
Average age (years)	45 (24-75)	41 (24-62)
Experience in livestock (years)	11 (2-44)	13 (3-30)
Land holding (acres)	14 (0.3-50)*	14 (3.0-30)**
Female respondents (%)	16	67
Major crops	Cocoa, maize, cassava Banana/plantain, yam, citrus fruits	Cocoa, cassava maize, banana/plantain, yam, cocoyam, pepper

Figures in brackets are range: *10% were landless, ** were landless

Of the crops cultivated only cassava, maize and banana/plantain crops were important in terms of feed resources for livestock as the cassava peels, maize grains and plantain leaves were being used for feeding livestock. None of the surveyed farmers were cultivating fodder crops indicating poor demand for feeds or low level of intensification of ruminant livestock production

Livestock holdings

Livestock holdings in terms of species and numbers have an important bearing on the quantity and quality of feed resources requirement. The demand for livestock feeds is proportional to the number of livestock and can be met through common property resources, cultivated fodder/ crops and purchased feeds. At Iwara, pig rearing was the most popular using crossbred pigs followed by commercial poultry with market orientation using purchased concentrate ingredients. At Itaapa small ruminants and indigenous bird rearing was practiced more widely and commercial poultry was on a limited scale. Pigs and fish farming was being practiced by only one each of the total respondents surveyed indicating just 5% of the farmers. Rearing of ruminants and indigenous birds was very traditional with greater reliance on resources within the village and limited purchased feeds. Incidentally none of the surveyed respondents had cattle. The average livestock holdings for different species are presented in Table 10.

Table 10. Livestock holdings of the surveyed farmers

Species	Iwara	Itaapa
Goats	13 (6-29)	8 (3-16)
Sheep	6 (5-6)	19 (8-50)
Indigenous birds	22 (10-40)	11 (4-20)
Commercial poultry	165 (15-800)	83 (10-280)
Pigs	28 (3-90)	27*
Turkey	-	10*
Fish (catfish)	-	2000*

Figures in brackets indicate the ranges for the respondents owning livestock as all the respondents did not have all species

*single respondent

Feeding systems

Feeding systems gives us a fair idea about the level of intensification and feed resources usage pattern. With low levels of intensification and abundance of feeds from common property resources the free range system of rearing is common while with industrial system of production using animals of improved genetic make-up and use of balanced formulated feeds is more common. Fewer animals relative to the land size and local breed with low genetic potential can be sustained on low inputs using free ranging or crop byproducts produced on farm with limited supplementation during the lean season. The level of intensification was higher in Iwara site that had more crossbred pigs and commercial poultry as they mainly depend on concentrate supplementation for their optimum production. At Iwara the number of commercial poultry and pigs/fish was low and the rest of the animals were mostly dependent on free ranging or grazing with little supplementation. Feeding systems were broadly categorized into four categories and distribution of different species under the feeding systems recorded at Iwara and Itaapa is depicted in Figures 8 & 9.

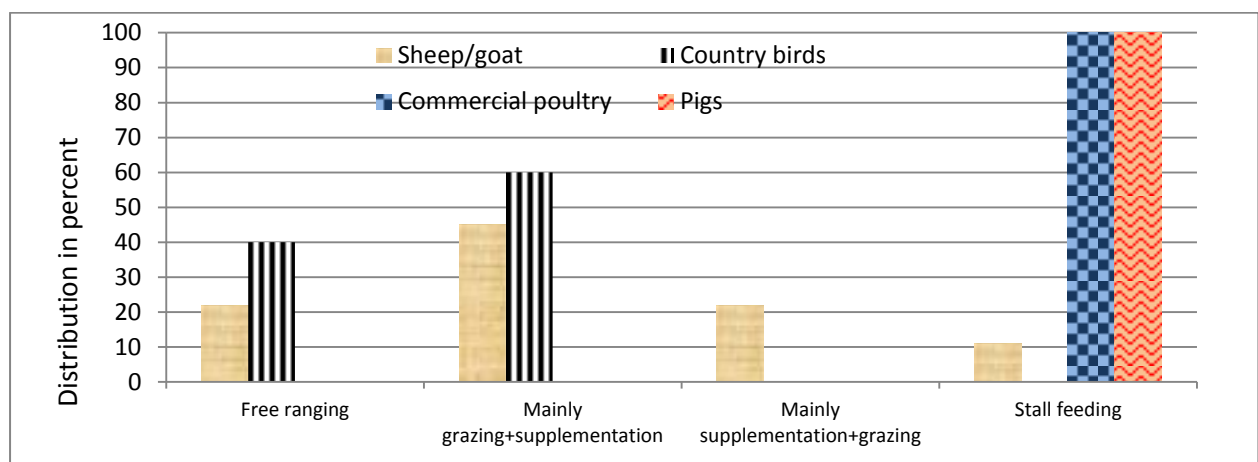


Figure 8. Feeding systems in different species at Iwara village

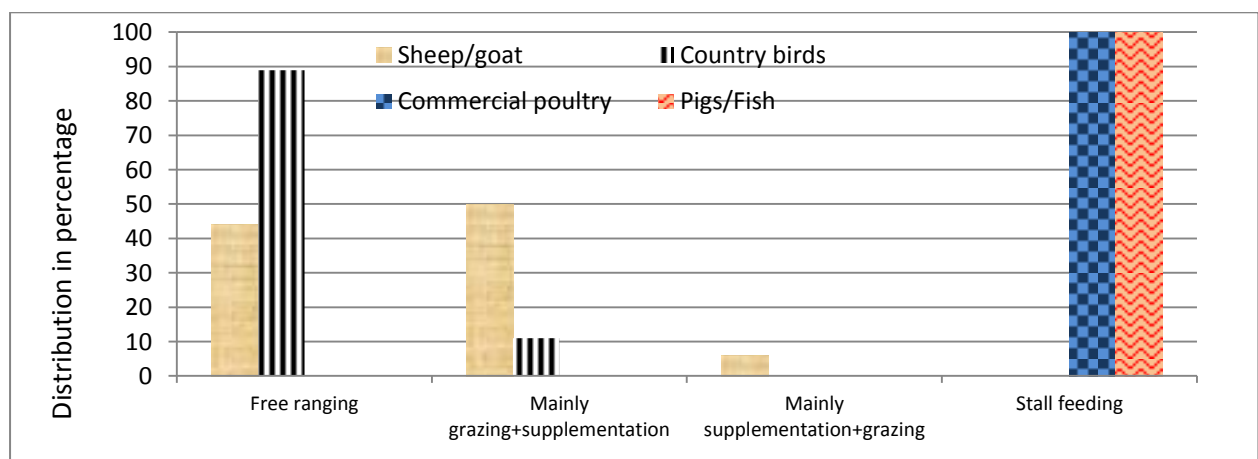


Figure 9. Feeding systems in different species at Itaapa village

Feed production

None of the surveyed farmers were growing fodder or following the cut and carry system for the fodder available from cropped area to feed to livestock showing absence of strong demand either due to large amounts of feeds available or low livestock numbers. Similarly the crop residues were also not being used, especially maize stover and cassava leaves from harvested crops. Majority of the crops like cassava tubers and maize produced was either sold for cash purpose or retained for self-consumption and only very small proportion was being used to feed livestock. The crop byproducts like cassava peels, eri, banana/plantain leaves/peels, pawpaw fruits/leaves and water leaves (*Talinum triangulare*) were being used for feeding livestock. Use of fodder trees to augment feed resources was not observed in the surveyed areas.

Purchased feeds and factors influencing purchase channels.

Purchased feeds included palm kernel cake, brewery waste, maize, wheat/corn offals, groundnut cake, soya, salt and commercial compounded feeds (poultry/fish) mainly for poultry, pigs and fish. Eri and cassava peels were also being purchased in limited quantities as most of it was available on farm or in the village itself. The volume of purchase was higher in Iwara while at Itaapa the volume of purchased feeds was low due to limited pigs and commercial poultry (Table 11).

Table 11. Feed purchase trends among the surveyed respondents

	Iwara	Itaapa
Percent of respondents purchasing feeds	89	78
Percent buyers for commercial poultry & pigs/fish	82	44
Percent of respondents compounding feeds	82	44
Ingredients		
Maize	30-45kg (45-50N*)	24 -120 kg (40-100N)
Guinea corn	10 kg (80N)	15-50 kg(40-100N)
Compound feed (Poultry)	27-50 kg (120N)	150-600 kg (94-112N)
Palm kernel cake	30-6000 kg(30-40N)	750 kg (24N)
Soya	135-150 kg (90-120N)	1500 kg (80N)
Groundnut cake	600 kg (90N)	--
Wheat offal	150-300 kg (40 N)	--
Brewery waste	150-60000 kg (8-10N)	0.25 to 9 truck loads
Purchase channels		
Feed producers	100 % for commercial poultry and 20% pigs	100% for commercial poultry, 10% for pigs
Small retailers	100% for eri, cassava peels	100% from small retailers for small ruminants and 90% for indigenous poultry
Processing industries	80% for pigs (PKC & Brewery waste)	90% for pigs (PKC & Brewery waste)

*Nigerian Naira, PKC- Palm kernel cake

Compounding of feeds was being followed by all the pig farmers and the main ingredients for pig diets were palm kernel cake and brewery waste. Additionally all the commercial poultry farmers were compounding their feeds and few of them were buying readymade compounded feed from the feed producers. The percent of farmers compounding feeds was higher at Iwara due to larger number of farmers rearing pigs and commercial poultry while the percentage was lower at Itaapa due to fewer commercial poultry and pig farmers.

For purchase of feeds, the respondents from both the villages had to visit Ilesha, a nearby town that had all the major sources of feeds like feed ingredients and compounded feeds from the feed processing units, palm kernel cake from two of the palm kernel processing units and breweries waste from International breweries limited (IBL). Only minor resources like eri and cassava peels were available within the villages. Ilesha was quite far (8-10 km) from Iwara and although the road connectivity and access was good, transport cost was a major consideration in purchasing feeds. Farmers in Itaapa which was further away from Iwara (15 km from Iwara) had real problem in accessing Ilesha due to poor road access and very high transport costs.

Factors influencing the choice of purchase channels by the respondents at both the surveyed sites are summarized in Tables 12 and 13.

Table 12. Influencing factors on choice of purchase channels at Iwara village

Factors	First choice (%)	Second choice (%)	Third choice (%)	Three major Overall influences (%)
Expected price level	63.1	21.0	6.3	40.5
Variability of price	5.3	5.3	6.3	-
Payment arrangements	10.5	5.3	6.3	-
Access to markets	5.3	5.3		-
Availability	5.3			-
Trust	10.5	26.3	18.7	17.1
Transport	-	21.0	37.3	12.6
Quality	-	10.5	12.5	-
Time of year	-	5.3		-
Simplicity	-	-	6.3	-
Social influences	-	-	6.3	-

Table 13. Influencing factors on choice of purchase channels at Itaapa village

Factors	First choice (%)	Second choice (%)	Third choice (%)	Three major Overall influences (%)
Expected price level	46.7	13.3	20.0	31.0
Variability of price	6.7	13.3	-	-
Payment arrangements	6.7	6.7	-	-
Trust	20.0	13.3	40.0	21.0
Transport	13.3	40.0	20.0	23.0
Quality	6.7	-	6.7	-
Time of year	-	-	-	-
Simplicity	-	13.3	6.7	-
Social influences	-	-	6.7	-

A survey on the choices influencing purchase channels at Iwara village, which transacted high volumes of feed purchases, revealed that expected price level was the first major factor followed by trust and transport as the second and third most important influencing factors. Calculations using different weightages for first, second and third choices as 3, 2 and 1 revealed that overall price level followed by trust and transport were the major factors influencing the purchase channel at Iwara village. The trend was similar at Itaapa village with a small change in that transport was the second major influencing factor followed by trust as the third.

Constraints in concentrate use

Respondents at each of the surveyed villages were asked to rank the three major constraints in use of concentrates from a list of possible causes with an option to choose others as one of the options to know the constraints that has not be listed but peculiar to a particular farmer or production system. Results of the three major factors were compiled and by allocating weightages to first, second and third options as 3, 2 and 1 overall major constraints were calculated and the findings are summarized in figures 10 and 11.

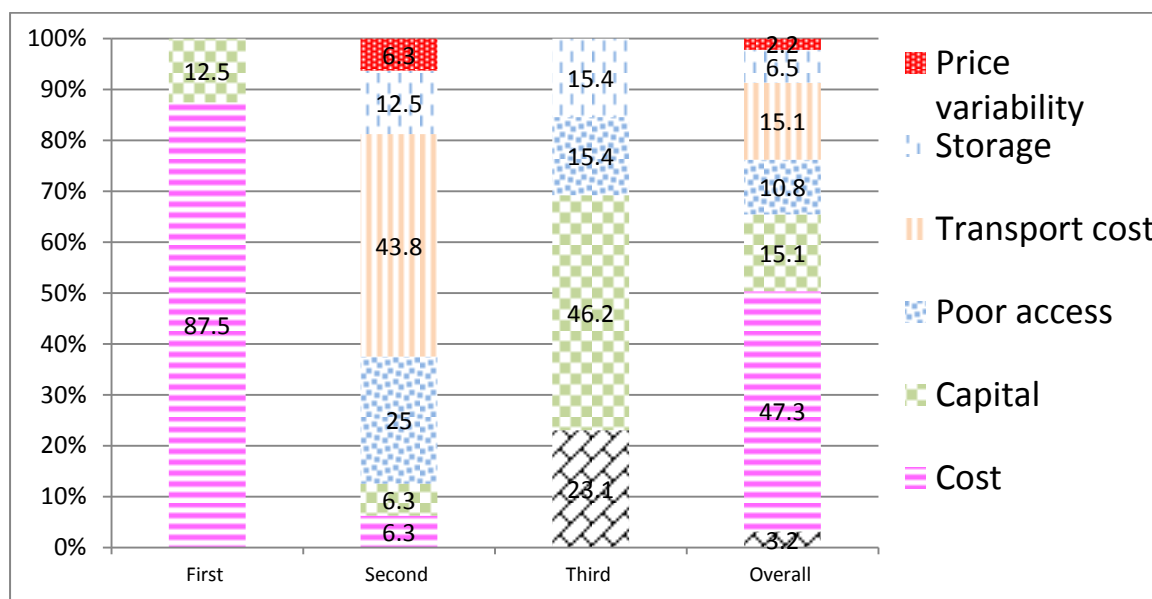


Figure 10. Major constraints as percentages in use of concentrates at Iwara village

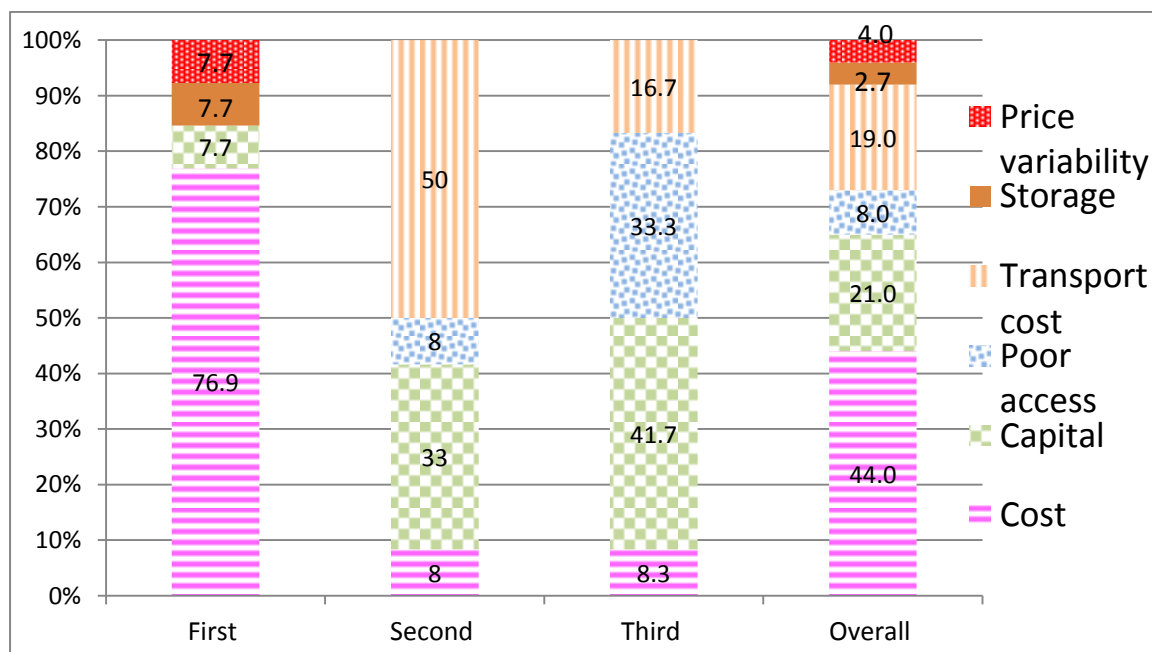


Figure 11. Major constraints as percentages in use of concentrates at Itaapa village

For Iwara site with greater market oriented production the first three major causes identified were cost of the concentrates, transport and capital as the first three constraints. The major factors at

Itaapa were similar and only the sequence changed wherein transport was identified as second major constraint instead of capital as Itaapa was quite remote with poor road access resulting in higher transport costs. However overall factors at both the surveyed villages followed the same trend; cost followed by capital and transport were identified as the three major constraints in use of concentrates.

Access to advisory services on feeding

Access to advisory services on livestock to the respondents in both the villages is summarized in Table 14.

Table 14. Access to advisory services for feeding livestock

Issue	Response	Village	
		Iwara	Itaapa
Get advice on livestock related issues?	Yes	69.0	25.0
	No	31.0	75.0
Visit other farmers' fields?	Yes	87.0	58.0
	No	13.0	42.0
Main sources of information	Extension staff from government, NGO, vets and visit to neighbouring farms		

Advisory services access at Iwara was higher than at Itaapa mainly due to the market oriented production system being followed by the farmers in Iwara where the advisory services were more on health management of pigs and birds and information on feeding was an additional service. Many of the respondents at Iwara were also paying for the advisory services received from the private experts. At Itaapa access to information was poor as the majority of the farmers did not have access and the scale of livestock operations being the probable reasons. Visits to neighboring farmers were more prevalent at Iwara compared to Itaapa where close to 40% of the farmers had never visited neighboring farms to learn from successful farmers. In market oriented production systems respondents generally invest on feeds and try to access all related information from experts even if they have to pay. They also visit successful farmers to learn new things to increase their returns on investment while in traditional system of livestock rearing the drive to invest on feeds and learn new things from experts or successful farmers is lacking.

Storage and feed processing practices

There were no major problems regarding the storage of feeds at either site. Farmers were aware of the proper storage methods and all concentrate feeds except brewery waste were properly sun dried and bagged for storage. Dried feed materials like grains, grain offal and cakes were dried properly and stored in nylon bags in well ventilated spaces for a period of 3-4 months. For brewery waste which was the major feed resource for pigs in Iwara the storage was generally for 2 weeks. The wet material was spread on the floor and allowed to dry and it was used within a period of two weeks as beyond two weeks it was not possible to store due to spoilage on account of high moisture content. During rainy days the brewery waste was always spread thinly and covered with polyethene. One of the farmers at Itaapa was sun drying the brewery waste thoroughly during summer months and was storing for longer durations of 5-6 months. Products like eri and maize were stored for very short periods of 2-3 days and were procured in limited quantities to be consumed within the short duration. In none of the villages was green fodder stored in the form of hay or was being harvested and fed. Crop residues were not a major source of feeds and hence they did not store any of the crop residues. Cassava peels were sun dried during sunny days and stored in bags while during the rainy season the peels were discarded. For concentrate ingredients all the ingredients were ground and used in mash form for poultry and pigs. Feed mills were using grinders

– hammer mill and vertical mixers for producing compounded feed in mash form for pigs and poultry. For fish, feeds were being produced in pellet form using small scale pelletizers as the volume of feed produced was small.

Sourcing of feeds

Both the surveyed villages were sourcing their concentrate ingredients, palm kernel cake and brewery form Ilesa. Differences in the sourcing of feeds observed at both the sites are summarized in Table 15.

Table 15. Feed purchase trends at Iwara and Itaapa

Issue	Iwara	Itaapa
Feed resources	Mainly concentrate ingredients – palm kernel cake, brewery waste, maize soya, wheat offal, corn bran, bone meal, salt, compounded poultry feed, cassava peels	Eri, maize, sorghum, compound poultry feed, fish feeds, palm kernel cake, brewery waste, salt
Quantity and frequency	Reasonably good amounts at regular interval	Limited quantities and less frequent due to low livestock
Source	Mainly sourced from feed plants, palm kernel cake processing unit and IBL breweries located at Ilesa. Eri and cassava peels was being procured locally within the village	
Finance for feed purchase	No access to financial assistance/loan but reasonably large amounts was spent on buying feeds and all the money was self-financed.	No access to financial assistance and very limited amounts was spent for buying feeds from own source.
Transport	Large quantity purchase and distance from Ilesa was major reason for high transport costs. Brewery waste was always being procured as truck loads. Own and hired vehicles were being used for transport.	Although the quantity of purchase was limited due to the long distance transport charges for feeds was quite high. Brewery waste was always being procured as truck loads. For small quantities two wheeler and for large quantities four wheelers were being used.
Feed prices and stability	Feed prices were decided by the feed mills, seller and the farmers did not have much say on the prices. The prices of feeds tended to vary across the year with the harvest and off season.	
Feed quality and packing	Sensory attributes like- smell, taste, color, consistency, presence of molds, weevils etc., were commonly used by the farmers and the producers in judging the quality. Farmers had preference for expeller palm kernel cake <i>vis a vis</i> the solvent extracted cake due to higher oil content. Awareness on feed analysis, standards for ingredients or finished feeds was not there among the farmers and the feed producers. Ingredients and compound feeds were being sold in nylon bags or loose quantities as per the customer's need. No product branding or specification of the finished feed/feed resource was being followed by the feed mills, palm kernel processors and the breweries.	

Key features of the feed value chain

Key features of feed value chain- producers, traders/processors consumers and all other activities associated with the feed value chain at Iwara and Itaapa are summarized in Table 16.

Table 16. Key features of the feed value chain

Key features	Iwara	Itaapa
Consumers- Feed demand is a function of species, number of animals and on farm feed production	Pig and commercial poultry production (market oriented) was quite common and on farm feed production was minimal leading to large demand for feeds.	Pig, fish and commercial poultry production was very limited and mostly ruminants and country birds were more common and were reared on farm produced feeds and hence demand for purchased feeds was low.
Producers	On farm feed production was very limited and the crops cultivated were mainly food and cash crops. Cassava and maize were the only food crops grown in substantial quantity that contributed to the feeds. Even from these crops a large proportion was being sold for cash or retained for self- consumption and very little of the produce was being used as feeds. No fodder crops, cut and carry system for green fodder from cropped areas, conservation of fodder was being followed. A large proportion of concentrate feeds was being sourced in bulk from external sources (outside the survey site) through the feed millers who were buying different concentrate ingredients like, maize, soya, wheat/corn offal, bone meal, fish meal, groundnut cake, rice barn etc., to formulate compound feeds for sale in addition to selling the individual ingredients.	
Traders/processors	The common access point for feed traders and processors for both the sites was Ilesa. Apart from the feed millers who were playing a dual role of trader selling ingredients and processors-producing compound feeds, there were two palm kernel processing plants and one large distillery (IBL) trading in by products –palm kernel cake and distillery waste as livestock feed.	
Infrastructure	Iwara had a better infrastructure in terms of good road connectivity to Ilesa the LGA head-quarters for feed inputs, other services and markets for their produce	Infrastructure in terms of road access was very difficult due to long distance and bad road making it difficult for inputs, services and marketing their produce
Human resources	Respondents at Iwara were better informed and were compounding feeds and were availing advisory services of extension staff, experts on payment basis and visiting neighbouring farmers.	Respondents at Iwara were following traditional ways of feeding and the knowledge level or access to information/extension services was poor
Market orientation	Strong market oriented production as evidenced from the feed purchasing trends.	Very weak market oriented and livestock rearing was not seen as way of making profits as evidenced from the investment made on feed purchase.

Conclusions

Feed value chains at two different locations within the same Local Government Area were characterized by different features. Iwara with better road connectivity had better access to feed inputs and markets resulting in market-oriented production. The Itaapa site was very remote with poor road access making it difficult to access inputs and services and as a result the market-oriented production was lacking.

The presence of a large brewery in the vicinity of Iwara ensuring availability of brewery waste at reasonable price round the year greatly helped the pig production system to develop with many respondents rearing crossbred pigs with better quality feeds.

At Itaapa the production system was very traditional and there was a lack of any effort to intensify the existing livestock production systems as evidenced by lack of fodder cultivation, limited exploitation of crop byproducts and greater reliance on free ranging. Pig production systems was solely driven by regular supply of brewery waste and palm kernel cake from the nearby town of Ilesa and this is one of the examples to show how ready availability of inputs at affordable prices can promote the development of a production system. Distillery waste was sourced from the nearby distillery that operates round the year and the palm kernel cake was locally produced and available at an affordable price.

Feed processing units at Ilesa were mainly producing feeds for catering the poultry species as pig feeding was mostly on homemade feeds using brewery waste and palm kernel cake. Infrastructure is an important issue that affects many activities and road access to Itaapa was the major constraint in development of livestock.

Respondents at Iwara had greater awareness on feeding balanced feeds and at Itaapa the level of awareness was very low. Feed cost, capital and transport costs of feeds were the major identified constraints for concentrate feeding at both the sites. Brewery waste being high moisture feed - needs to be purchased at regular intervals as the shelf life is short and also the cost of transport is high due to high moisture content. Strengthening of feed value chains at both the sites would require different strategies due to differences in the existing production systems.

At Itaapa greater emphasis is required for augmenting the feed resources base through cultivation of fodder, inclusion of fodder trees and better crop livestock integration using the crop byproducts optimally to increase the livestock holdings and ensuring greater reliance on home grown feeds. Iwara with greater pig production systems requires up grading skills on better feed formulation, feeding management according to age and physiological status and formation of producers associations to negotiate with the service providers and marketing agents.