

# Assessment of livestock feed value chain in Ido and Ogo Oluwa local government areas, Oyo state, Nigeria

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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 fulfill this objective, feed value chain studies were carried out in the Ido Local Government Area (LGAs) in Oyo 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 conducted at two sites in Arutu village and Akufo camp within the Ido LGA in Oyo state.

## 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 Ido

At Arutu village under the Ido LGA a total of 22 farmers were interviewed and they represented two separate sets of farmers. The first set of fourteen farmers was engaged in farming and animal rearing and in this group women representation was 21%. The second set of Fulani farmers were eight in number and all were men since men are mainly involved in herding of the cattle across different locations in search of the fodder. The second village under the Ido LGA was Akufo camp and a total of eight farmers were interviewed to gather information on livestock and feeding resources. One out of eight farmers was a woman.

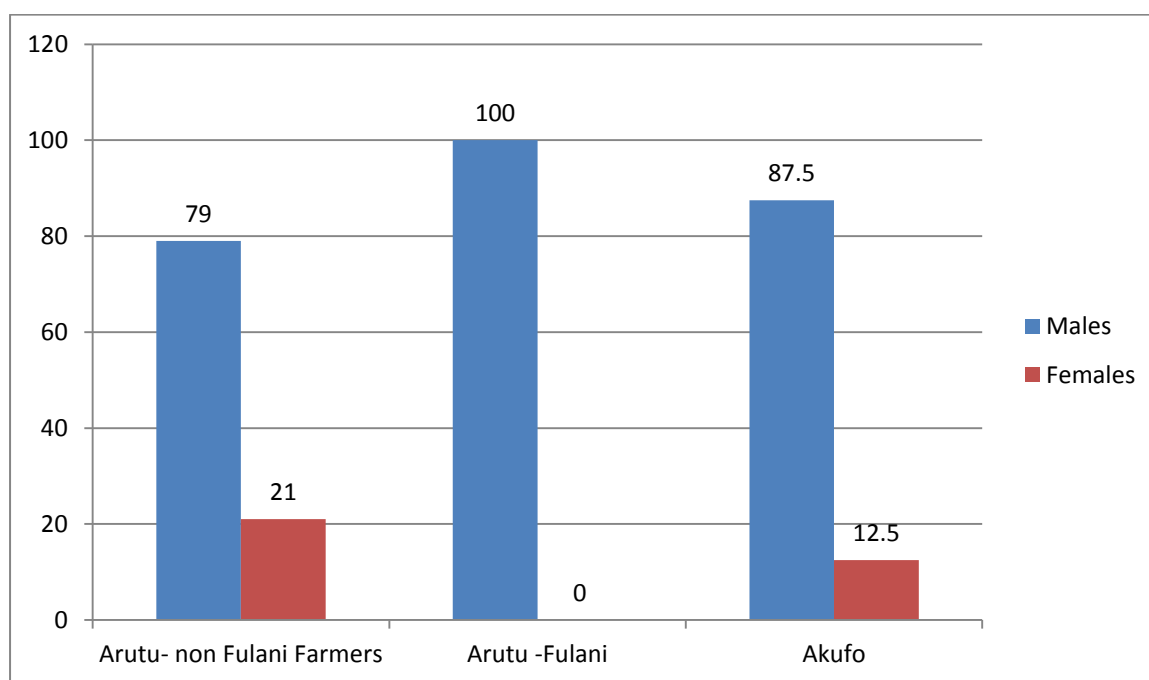


Figure 1. Percentage of male and females respondents in the study

### Landholding and land use for feed production

While the majority of the farmers in the Arutu village owned land few of them had lands under lease or were landless. Among the surveyed respondents in the Akufo camp all the respondents had land and few of them had large land holdings of up to 25 acres. The average land holdings among the Yoruba non-Fulani and Fulani (cattle rearers) at Arutu village and the Akufo camp are presented in Table 1. Among the 14 non Fulani Yoruba farmers three of them were landless while the rest had access to land. Among the eight Fulani farmers, two of them were landless and the remaining six had access to small areas of land. None of the surveyed farmers were cultivating fodder for feeding livestock. Although generally Fulani – cattle rearers – are nomads who move constantly in search of fodder, there has been a gradual shift and some of the Fulani are trying to settle down by either purchasing or leasing land and cultivating mainly food crops for self-consumption.

Table1. Land ownership in Arutu and Akufo camp

Category	Average* land holding (acres)	Range (acres)
Arutu - Yoruba	4.6	1-10
Arutu-Fulani	1.9	2-5
Akufo camp	9.4	1-25

Average\*- excludes landless owners

### Livestock holdings

Among the indigenous population of Arutu village, small ruminants and indigenous birds were the only livestock owned by the surveyed respondents. Among the small ruminant, goats were more popular than the sheep due to the greater liking and demand for goat meat in the local community/markets. None of the surveyed farmers had pigs or commercial poultry. Among the Fulani, cattle numbers were the highest followed by a few sheep, goats and indigenous poultry. Sheep were more popular with the Fulani than goats and the reason given for this trend is that sheep are more easy to manage and they get along very well with cattle and they follow cattle herds during the migration unlike goats which are very choosy and do not move with the cattle herd, besides use of sheep for all ceremonial functions. At Akufo camp the livestock holding was more diversified including the cattle, small ruminants, poultry and pigs under commercial system of production

The average and range of livestock holdings for the two different groups – the indigenes and Fulani's of Arutu village and the Akufo camp is presented in Table 2.

**Table 2. Livestock holdings among the non-Fulani and Fulani's of Arutu village and Akufo camp**

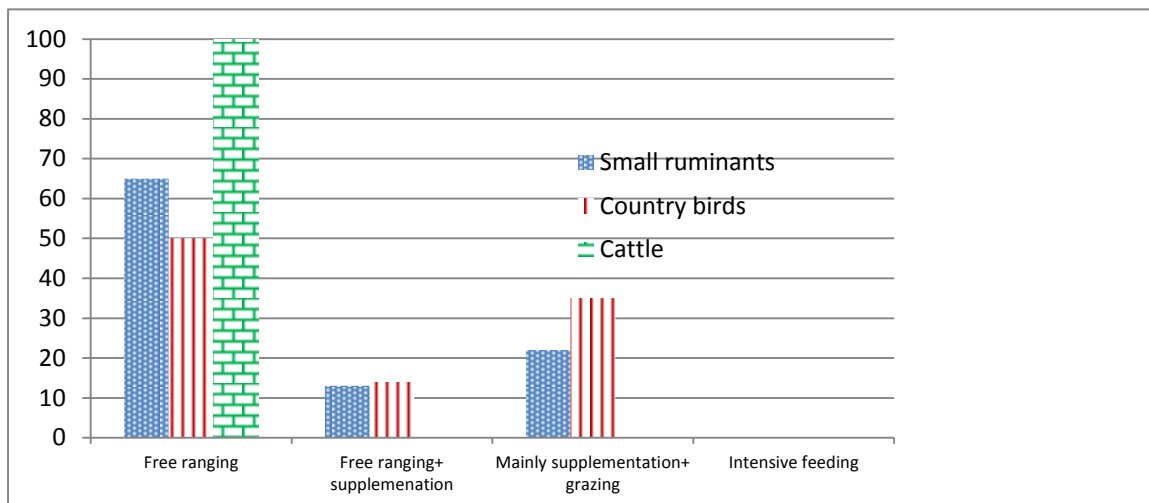
Category	Species	Average* numbers	Range
Arutu -Yoruba	Goat	6.5	4-12
	Sheep	5.2	1-8
	Country birds	10.2	3-25
Arutu-Fulani's	Cattle	225.6	24-753
	Goat	4.0	1-20
	Sheep	8.9	4-30
	Country birds	4.5	2-30
Akufo camp	Cattle	40	--
	Goat	8.5	4-15
	Sheep	8.3	5-12
	Commercial poultry	947	75-4000
	Pigs	100	--
	Rabbits	40	--

\*Average – Includes only farmers having particular species

The breeds of sheep and goats were mostly West African dwarf while a few of the Fulani had northern goat breeds. All the cattle were local white Fulani mainly meant for meat production with very little milk yield. Good milkers in the herd were reported to yield 3-4 liters and poor milkers 2-3 liters during initial peak lactation and the lactation length extended over 6-7 months. At Akufo camp the commercial poultry and pigs were of improved germplasm with higher production potential.

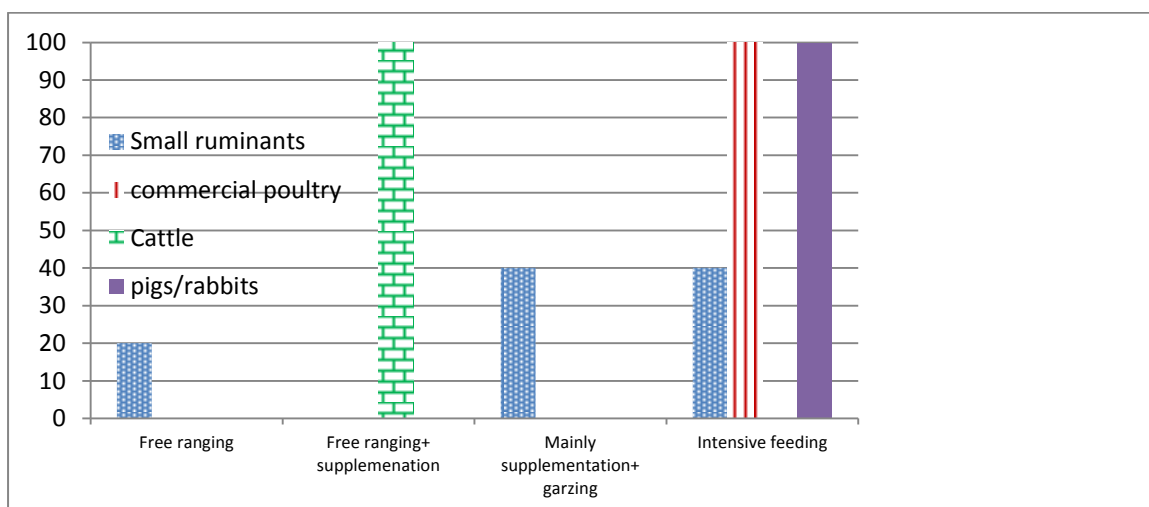
### Feeding systems and feed resources

At Arutu village for sheep and goat feeding three different systems of feeding were observed and none of them followed the intensive stall feeding. A free ranging system was the most common followed by mainly stall feeding with grazing and third system was mainly grazing with supplementation. The respondents who described the feeding system as mainly stall feeding followed by grazing practiced, day-time confinement of the small ruminants feeding them on cassava peels and eri ( a wet maize byproduct) and letting them loose in the evenings allowing them to free range over night and were confining them back in the morning. All the local chickens were reared through free ranging or free ranging with a little supplementation. For cattle it was free ranging throughout the year and occasionally they were using the post harvested maize stovers left over in the field. None of the cattle were supplemented with any sort of supplement. The percentage breakdown of different feeding systems in the non-Fulani and the Fulani groups observed at the Arutu village is given in the graph below.



**Figure 2. Graph showing the percentage of respondents using different feeding systems for different livestock species in Arutu village**

At Akufo camp cattle were reared under mainly grazing with supplementation system while sheep and goats were raised under three different systems- free range, stall feeding and mainly stall feeding with grazing. Commercial poultry- layers and broilers, pigs and rabbits were kept under stall feeding. The breakdown of the different feeding systems for different species is presented in the graph below.



**Figure 3. Graph showing the percentage of respondents using different feeding systems for different livestock species in Akufo camp**

The predominant feed resource in the surveyed areas at Arutu village mainly consisted of greens from the grazing areas and the areas around the village consisting of local grass with wild Guinea grass occurring naturally. The crop based resources consisted of cassava peels, standing maize stover from the harvested fields and maize grains. We did not come across any maize stover stored for subsequent use in the dry season. Maize grains, guinea corn to a very limited extent and “eri” were the only concentrates used in the Arutu village. Eri is a local name for the residue obtained from fermented ground maize used for the preparation of the pap - food consumed locally. Feeding of oilcakes and bran was not being followed as most of the animals were on the low input free range systems. Most of the Fulanis were purchasing the post harvested standing maize stover from the maize growers and they paid an amount of 4000-6000 Naira/acre depending on the quantity and

quality of left over stover. Cassava and maize are the major crops grown and the fields are not fenced and are freely accessible and confining of ruminants is not practiced hence the chances of crop destruction by small ruminants is always there. Small ruminants were not fed with cassava leaves or cassava crop residue and maize stover and the thinking was that if these animals are fed on crop residues they will get used to the taste and it is likely that they will start feeding on the standing maize and cassava crops.

At Akufo camp the range of feed resources was much more diverse and they were using lot of purchased concentrate ingredients in commercial poultry and pigs. For cattle and small ruminants in addition to grazing they were using supplements like cassava peels and brewery waste to supplement the diets.

### **On farm produced and purchased feeds**

On farm feed production at Arutu village was restricted to the products derived from the food crops- maize and cassava. There was no cultivated fodder or cut and carry fodder from the farms in the surveyed farmers of Arutu village. The percentage of Yoruba farmers producing feed from farms was 36% and the average area was 1.7 acre while among the Fulani farmers 50% produced feed from the farm on an average area of 1.8 acres consisting of cassava and maize crops. The non-Fulani farmers purchased cowpea haulms, cassava peels, eri (corn waste) maize and sorghum or guinea corn on a very limited scale to feed mainly the small ruminants and country birds. The percentage of the farmers buying different commodities and the prices of various purchased products is presented in Table 3. Fulani farmers purchased the standing maize Stover in the harvested field from the farmers cultivating maize as the farmers were not using the maize stover for feeding small ruminants. Additionally they were using their own residues of maize and cassava crop residues post-harvest for feeding their animals. In addition to maize stover the only other commodity that Fulani farmers were buying was common salt. Harvesting of stover and storing was not being practiced even by the Fulani farmer's in spite of the fact that cattle consume maize stover and feeding during the dry season is a challenge.

At Arutu village commercial feeds were not being used by the farmers and the only traded commodities were maize and sorghum grains, eri, and maize stover and cowpea haulms. The volume of the commodities traded or purchased was very nominal as the production system was mainly an extensive system of rearing with little dependence on purchased concentrates. The major channel of purchase was small retailers within the village. The Fulani farmers were buying the maize stover standing in the field from the maize growing farmers in the village in addition to using their own land under the maize crop. Out of the total respondents, only 65% of farmers were buying feeds in small quantities. Most of the farmers (85%) were buying the feed resources from a single source – small retailers (including people within the village producing eri) and producers and only 15% of the farmers were buying from multiple sources ( small retailers, grain processors and producers). A summary of the purchased feed resources at the Arutu village is presented in Table 3.

At Akufo camp unlike Arutu village the range of feed resources and the volumes of feed resources used was quite high due to commercial orientation of livestock production consisting of poultry and pigs. Almost 88% of the surveyed respondents were buying feeds and the purchase channels used by the respondents are summarized in Table 4. Cattle still relied on grazing and were supplemented with purchased supplements like brewery waste and farm produced cassava peels. Small ruminants were also fed on cassava peels and grain/grain by products in addition to grazing. Compared to ruminants- pigs and poultry were fed intensively on concentrate ingredients the majority of which were purchased and in a few instances farm grown maize grains were used for compounding concentrate mixture using either the concentrate supplement or a variety of other purchased concentrate ingredients. Some major farms produced feed sources included maize grains and cassava peels. Other minor sources included cut fodder and soya residues. Only 25% of the surveyed



respondents were harvesting nominal amounts of greens from the cropped area (500 kg/over a period of 3 months).

**Table 3. Feed purchasing pattern and purchase channels observed at Arutu village and Akufo camp**

	Arutu village	Akufo camp
Percent of respondents	65%	88%
Buying feeds		
Purchase channel options		-
Feed producer %	15	75
Grain millers %	23	13
Industries %	-	13
Wholesalers %	-	26
Small retailers %	62	50
Others & %	-	-

The quantity of concentrate ingredients purchased by the farmers at Arkufo camp over the last three months (prior to the survey conducted in November) with the average rates for various resources is detailed in the Table 4.

**Table 4. Concentrate feed ingredients purchased by the surveyed households over a period of three months at Akufo camp**

Ingredients	Percent of respondents purchasing	Total quantity (kg)	Price range (Naira/kg)	Transport (Naira)
Brewery waste	13%	6000	14-15	Range – 2300 to 2500 /ton feed or 100-125 per bag.
Palm Kernel Cake	25%	3035	35-40	
Maize grains	63%	7600	40-50	
Cassava chips/floor	25%	5800	10-20	
Soya	26%	1020	100-150	
Soya	39%	5500	48-50	
Wheat offal	26%	10	25	
Bone meal	26%	3000	100	
Ground nut cake	13%	2500	40-42	
Compound poultry feed	39%	5600	130-135	
Poultry concentrate				

1USD is equal to 168 Naira approx.

### Compounding of feed

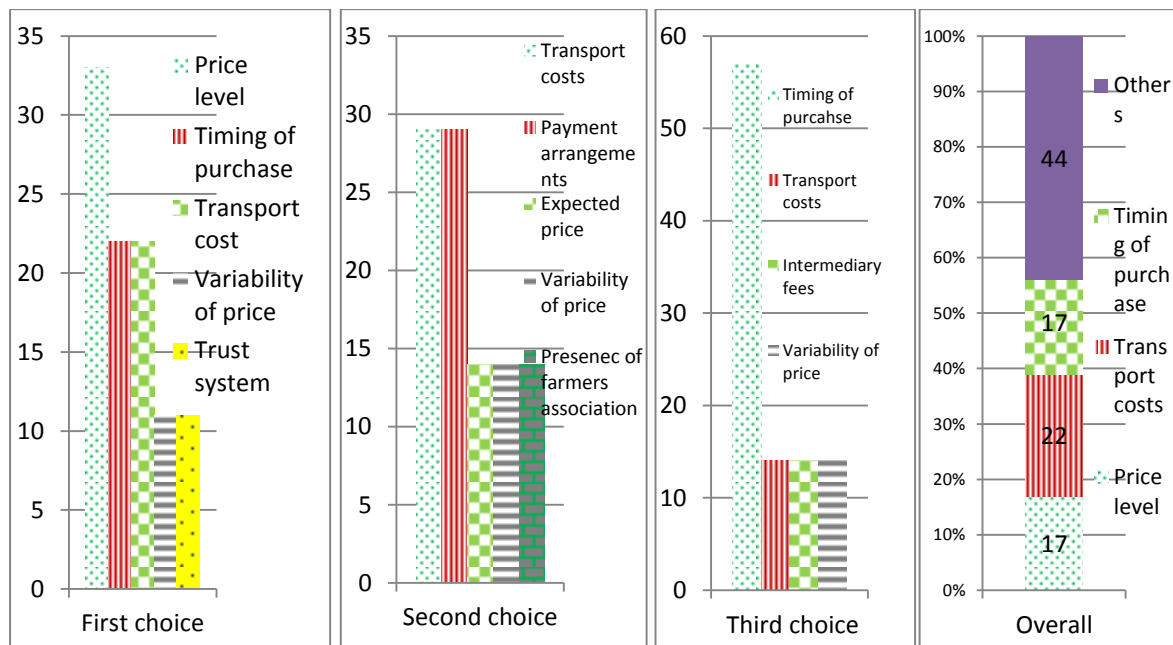
Farmers in the Arutu village were mainly dependent on free range grazing and a few of them were supplementing feeds – cassava peels, eri, grains and haulms. The practice of compounding the feeds was not practiced widely except 15% of the farmers who reported compounding of feeds for small ruminants. Fulani farmers were not using any of the concentrate ingredients and the local chickens were allowed to free range with supplementation of maize or sorghum grains. At Akufo camp compounding of feeds was practiced by the surveyed respondents either using the purchased poultry concentrate with maize and wheat offal or purchasing it compounded from the poultry feed mills as per their formulation. For pigs the feeds was compounded at farm. Some of the respondents were also using the readymade concentrate mixture procured from the feed mills to feed the poultry.

**Table 5. Commonly used formulations for compounding concentrate feeds at Akufo camp**

1. Poultry concentrate + Maize + wheat offal
2. Maize+ Soy meal+ Wheat offal+ GNC+ bone meal+ salt & minerals
3. Maize+soya+wheat offals+Bone meal+oyster shell+salt
4. PKC+Maize+Soy+GNC+Cassava floor+Blood meal+Bone meal+Spent grains+premix

### Purchase channel influences

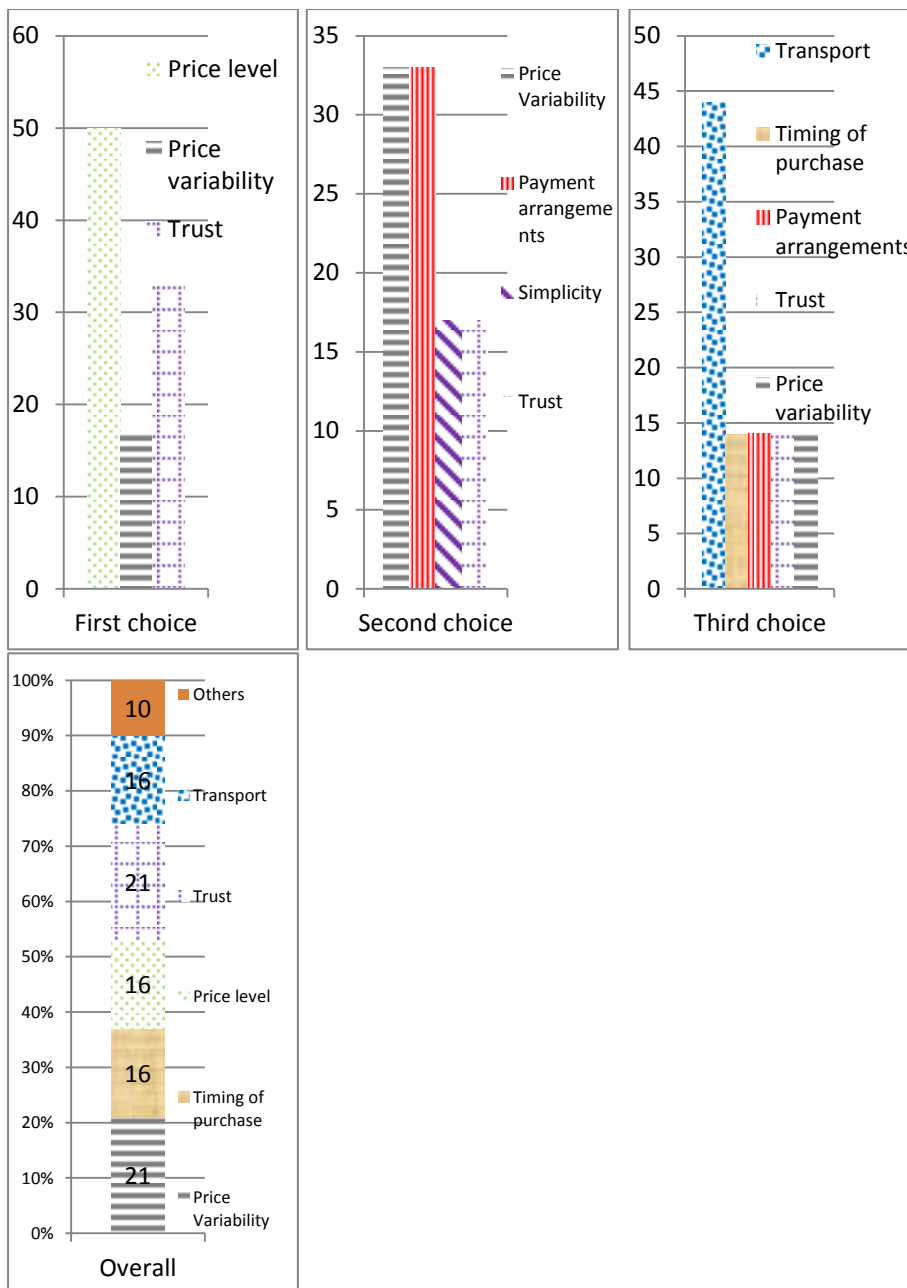
Although the amount of purchased feeds was not substantial at Arutu village the survey on the major three factors influencing the purchase is depicted in Figure 4.



**Figure 4. Factors in percentage influencing the choice of feed purchase channels in Yoruba farmers at Arutu**

The results of the survey at Arutu village need to be viewed in the context of the wide prevalence of the extensive to semi extensive system where the factors influencing the purchase channels are not as pronounced as they would be in any typical intensive system of production with heavy reliance on the purchased inputs. Overall transport costs was found to be the major factor influencing purchase channel choice to an extent of 22% followed by price level and timing of purchase influencing 17% each. For Fulani farmers at Arutu village only 25% of farmers were purchasing feeds (maize stover in field) and the major factors were purchase price and the timing of purchase as during dry season the demand for feeds is highest

For Akufo camp the survey results for factors influencing the purchase channels is depicted in Fig 5.



**Fig 5. Factors influencing the choice of feed purchase channels in non-fulani farmers at Akufo camp**

In contrast to Arutu, at Akufo camp there was large scale purchase of concentrate ingredients and price level and price variability were important influencing factors as the seasonality of crops and the variation during crop harvest and off season has an important bearing on the price and the availability besides the seasonal fluctuation in the demand for the feeds (festival and non-festival periods). Overall price variability and trust were the major factors influencing the purchase channel to an extent of 21% each followed by transport, price level and timing of purchase influencing 16% each

### Constraints for concentrates use

With regard to the opinions of the surveyed farmers on the constraints for using the concentrate feeds the study revealed that the options were quite variable and this could be due to the low intensity and volumes of purchased feeds at Arutu village. Overall high cost was identified as major constraint followed by high price variability in feeding concentrates.

**Table 6. Three most important constraints in feeding concentrate in Arutu village**

Factors	First ranked constraint (%)	Second ranked constraint (%)	Third ranked constraint (%)	Overall (%)
High cost	41	27	10	28
High price variability	17	19	10	15
High transport cost	8	27	-	12
Poor knowledge of market prices	17	9	10	12
Capital	17	9	10	12
Poor knowledge of feeds	-	9	10	6
Poor access to markets	-	-	10	3
Poor quality of feeds	-	-	40	12

Among the Fulani of Arutu village the most important constraint regarding feeding was listed as the shortage of feed and water resources during the dry season. The Fulanis expressed that due to the expanding fish cultivation, many water bodies that were freely accessible a few years ago have been utilized for fish farming and access to water has been a major problem.

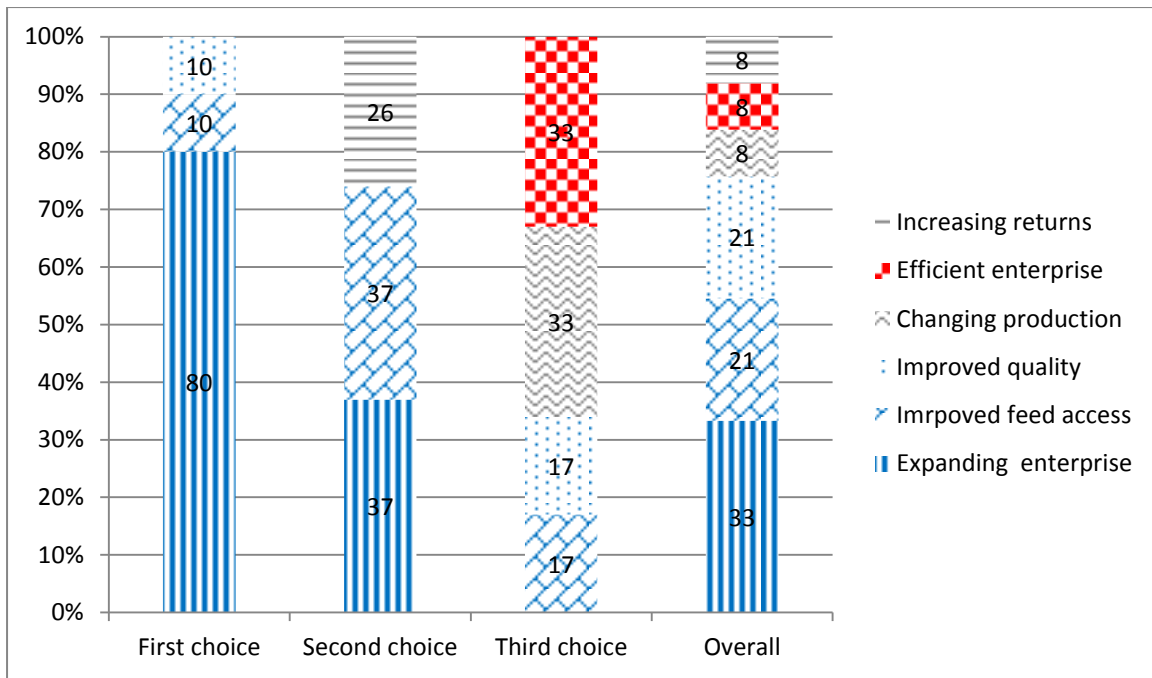
Three major constraints in feeding concentrate as per the survey carried out at Akufo camp revealed that cost of the ingredients was a major constraint followed by other factors like transport cost, capital, price variability etc.. Overall high cost followed by capital and high price variability was the major constraints (Table 7).

**Table 7. Three most important constraints to feeding concentrate in Akufo camp**

Factors	First ranked constraint (%)	Second ranked constraint (%)	Third ranked constraint (%)	Overall (%)
High cost	50	25	-	27
High price variability	-	37.5	17	18
High transport cost	25	-	-	9
Capital	25	-	49	23
Poor access to markets	-	-	17	5
Poor quality of feeds	-	12.5	17	9
Lack of storage	-	25	-	9

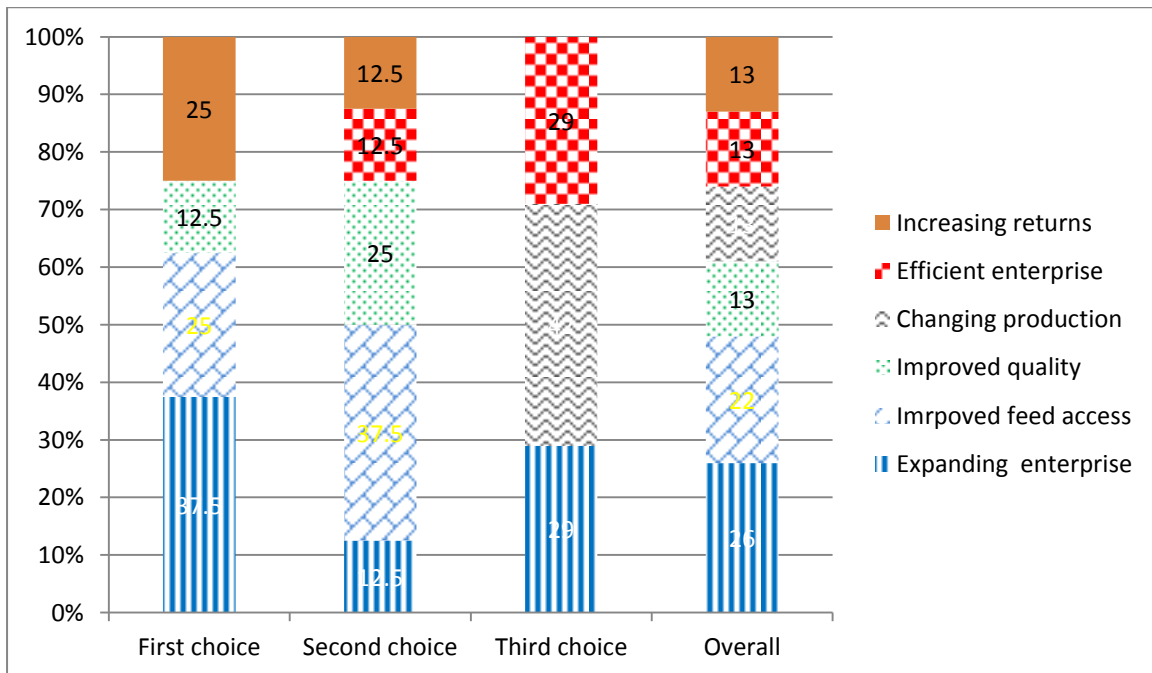
### Opportunities for enhancing concentrate use

Survey results on the three most important opportunities for enhancing the use of concentrate feeds in livestock at Arutu village revealed that most respondents (80%) suggested expanding livestock as the first choice for improving the amount of concentrate feeding. The second choice was split between the improving the market access for feeds and the improving quality of feeds. The third choice was split equally between changing production practices and the own enterprise becoming more efficient. Overall expanding livestock enterprise followed by improved feed access and improved quality of feeds was the major opportunity for enhanced usage of concentrates.



**Figure 6. Farmer's perception expressed in percentage on the opportunities for enhancing use of concentrate feeds in Arutu village**

A survey among the respondents at Akufo camp on the three major opportunities for enhancing the use of concentrates revealed that expanding livestock enterprise was ranked as the major opportunity along with increased returns and the improved feed access as second and third choices as they are inter-related. The second and third major opportunity was identified as improved feed access to markets and changing production practices respectively as the most important ones. Overall expanding livestock enterprise and improved feed access was identified as the major opportunity for enhanced use of concentrates at Akufo camp.



**Figure 7. Farmer's perception expressed as percentage on the opportunities for enhancing use of concentrate feeds in Akufo camp**

## Access to advisory services

Information pertaining to advisory services on feeding and other aspects is summarized in Table 8.

**Table 8. Summary of access to advisory services**

	Arutu	Akufo camp
Get advice related to feeds (% of respondents)	80	86
Frequency of advice obtained per month	2.5 ( 1-4 range)	2.4 (1-4range)
Visit other farmers` fields (% of respondents)	85	100
Number of visits made per HH in the last 12 months	8-12	Avg. 18
Nature of advice obtained from service providers	General aspects of feeding and management	General aspects of feeding and management, use of products,
Major sources of information	Government extension staff	Government extension staff, Learning institutions, Private extension staff, Neighbouring farmers

Fulani's who are always on the move with their cattle in search of feed did not receive any sort of advisory information or services. Farmers at the Akufo camp were more progressive due to market orientation as their source of information on feeding and management of livestock was more diversified compared to the Arutu village. The majority of the respondents at both locations had access to the advisory services from the government extension staff on general feeding and management of livestock.

## Storage and feed processing practices

Farmers at both locations were storing feeds for short durations and did not complain of major problems. Dried feed materials like grains, grain offal and cakes were dried properly and stored in nylon bags in well ventilated space for periods of 3-4 months. For wet products like eri and maize gluten the storage time was very short at 2-3 days and here the wet materials were stored on raised platforms with proper aeration. In none of the villages was green fodder stored in the form of hay. Crop residues mainly from maize, which happens to be major cultivated crop, was not harvested and stored for dry season feeding. Most of the farmers were drying the cassava peels thoroughly during the dry season and storing for later use while a few of them were sun drying the brewery waste and storing it in dry form for long term use. For poultry and pig feeding concentrate was used only in mash form and use of pellets or crumbles was not being practiced.

## Sourcing of feeds

The range of feed resources and the amount of feed purchased is directly related to the intensification of livestock production systems and the situations at Arutu village and Akufo camp were quite contrasting as far as feed purchase was concerned. All transactions at both locations were done by cash payments. Major differences in feed purchase trends are summarized in Table 9.

**Table 9. Feed purchasing trends in the surveyed villages**

Issue	Arutu village	Akufo camp
Feed resources	Grains- maize and guinea corn, eri, cowpea haulms	A wide range of feed resources mainly concentrate – ingredients and compounded feeds were purchased
Quantity and frequency	Limited amounts were purchased and the frequency was more in dry season	Substantial quantity was purchased on a regular basis round the year
Source	Mainly sourced within the village - farmers and at the local market	Sourced from multiple sources - like distilleries, palm kernel processing unit, feed traders at nearby towns-mainly Ibadan and feed manufacturers (3-4) located close within 2-4 km along the main road
Finance for feed purchase	No access to financial assistance and very limited amounts was spent for buying feeds from and own source. Financially the farmers were weak with no capital to invest.	No access to financial assistance/loan and reasonably good amount was spent on buying feeds and all the money was self-financed. Financially the farmers were well off.
Transport	As the source of purchase and amount of purchase was low, transport was not a major issue.	Due to multiple sources and amount of feeds transport charges was important and the farmers used either own or hired vehicles – mostly four wheeler or two wheelers
Feed prices and stability	Feed prices were decided by the seller and the farmers did not a major say or negotiating power. The prices of feeds tended to vary across the year and were mostly linked to the seasonality and production of crop (demand-supply).	
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 most of the farmers and only very few feed producers had some idea on this issues. Ingredients and compound feeds were being sold in bags of 25-50 kg packs but small quantities in loose was also being sold to cater all class of clients.	

# Functions, activities and actors in the feed value chain

Based on the survey a series of actors and processors were identified and the role of various actors and the process associated with the feed value chain at Arutu and Akufo camp under the Ido LGA is summarized below.

## Input supply

Input supply includes the feed resources grown on farm or purchased within the village or resources that are external to village. Feeds derived from crops include food crops and their byproducts, cultivated fodder and fodder from grazing resources. Cultivation of fodder was not being practiced in both places and the feed resources within the village was the major source at Arutu village while purchased feeds in addition to the farm produce was the major resource at Akufo camp.

## Feed production

Cultivation of fodder was not being practiced at either location. Cassava and maize were the major food crops cultivated in both villages and the grains and byproducts like cassava peels and maize stover were the feed resources derived from food crops. Eri (byproduct of cereal grains) was produce locally to a limited extent and there was one palm oil processing plant near Akufo camp but the palm kernel seeds was being sold to another processing unit located far away and thus palm kernel cake was not being produced locally. Concentrate ingredients like- maize grains, soya, groundnut cake, wheat offal, maize gluten, brewery waste, palm kernel cake and compounded feeds was being procured from outside the village mainly through the feed processing mills. Feed processing units were small scale enterprises with limited basic equipment- grinder, mixer and weighing balance to carry out the feed business.

## Feed marketing

Most of the feeds in Arutu village were produced on farm and very little marketing was being done among the farmers within the village. In Akufo camp feed marketing was well established and for a few commodities it was being sourced directly from the producers like palm kernel cake and brewery waste. To a great extent it was being routed through the feed processing mills that were trading in both ingredients and the compounded feeds. Prices were dictated by the sellers and buyers had hardly any say. The feed processing mills were doing good business and the markets has been increasing steadily and greater emphasis was to ensure the timely supply of required quantities and quality considerations was not a major issue. Feed standards or specifications was not being followed or enforced by the producers or consumers

## Feed retailing and transport

Farmers had to either buy directly from the producer (insignificant) or the feed mills (significant) that in turn procured the material from multiple sources -directly from the producers, wholesalers or retailer depending on the quantity and nature of the commodity. Feed mills were single source for most of the farmers due to a number of reasons - the convenience of getting a range of resources instead of getting it from multiple sources, facility to buy in smaller quantities and the proximity to suit the farmer's needs. From the feed mills the commodities are directly traded with the farmers and the transport cost is being borne by the farmer using either his own pick up or hired vehicle. Farmers/consumers travel to the feed mills for procuring the feeds or feed ingredients and feed mills do not engage in delivering the material to the customers and probably the volume of transaction is small and buying is at regular intervals due to limited capital and storage size. Feed mills also have limited capital and storage space and they were procuring materials at regular intervals and thus were subjected to the price fluctuations of the commodities across the year.



## **Storage and processing**

Due to limited capital and storage space the feed ingredients were not stored for longer duration by both the farmers and the feed processing mills. The maximum storage period hardly exceeded two months and the farmers and the feed mills were in the habit of buying at regular intervals. Storing of crop residues or green fodder was not being practiced due to low levels of intensification in cattle and small ruminants and abundant land mass available for grazing. Only poultry feeds were being processed and was always used as mash after compounding with multiple ingredients including the premix containing the minerals, vitamins and amino acids for optimum performance. Pig feeds were processed to a limited extent after grinding the ingredients and compounding. For ruminants feed processing like chaffing or compounding was not being practiced.

## **Conclusions**

The survey on feed value chains at two sites within the Ido LGA revealed two different scenarios. The value chain at Arutu village was very basic with few actors and processes along the chain while at Akufo the value chain was relatively better established with many actors and processes along the chain. In general the ruminant production systems in both locations were less evolved than non-ruminants. The major difference at two locations is due to the orientation of the livestock production systems where in the Akufo camp producers were following market oriented production using the animals with better genetic potential that require quality feeds to express their genetic potential while the animals in Arutu village were indigenous animals that were raised on low input and low output system with greater reliance on the natural resources available within the village. Other major factors like capacity of the farmers in terms of the capital, resources, know-how and market access also differed between the two locations. Interventions to strengthen the feed value chains would involve improving the access to finance to further expand their activities, capacity building of the producers and improving the efficiency of the existing production system through better feed resources management (fodder grasses and trees, harvesting and storage), formulations, quality control and feeding management. Organizing the farmers and facilitators like feed processing units, traders, processing industries that supply the feed resources into associations would help to safe guard their interests and allow them collectively contribute to the value chain. Strengthening market links with ready access to inputs and remunerative prices for the livestock produce will further strengthen the feed value chains.

# Feed value chain in Ogo Oluwa

## Site description

A feed value chain survey was carried out at two locations within the Ogo Oluwa local government area (LGA) i) Lagbedu-the site of Humid-tropics innovation platform on Cocoa crop and ii) Ajawaa which happens to be the headquarters of the Ogo Oluwa Local Government Area. Both the places are well connected with road and are connected to the main road between Oyo and Ogbomosho. The nearest biggest market is Ogbomosho that is approximately almost 30 minutes' drive from the surveyed sites.

## Profile of the respondents

The profile of respondents in terms of the gender ratio, age, experience in livestock farming, land holding and crops cultivated was gathered through the survey and the results are summarized in Table 10.

**Table 10. Profile of the surveyed respondents**

Respondents	Ajawaa	Lagbedu
Average age (years)	52 (30-81)	40 (19-65)
Experience in livestock (years)	22 (4-60)	20 (7-40)
Land holding (acres)	7.9 (3-19.5)	13.2 (3-40)
Female respondents (%)	38	65
Major crops	Cocoa, cassava maize, yam, pepper, tomato, cowpea, oil palm, cashew	Cocoa, cassava maize, tomato, yam, pepper, cowpea

Figures in parenthesis are ranges

From a livestock feed point of view only cassava, maize, yam and cowpea were important as the byproducts of these crops had feed value and other crops did not contribute to feeds. None of the surveyed farmers were cultivating fodder crops indicating poor demand for feeds or low level of intensification of ruminant livestock.

## Livestock holdings

Livestock holdings in terms of the species distribution and the number of animals were recorded for all the surveyed respondents. The results are summarized in the Table 11.

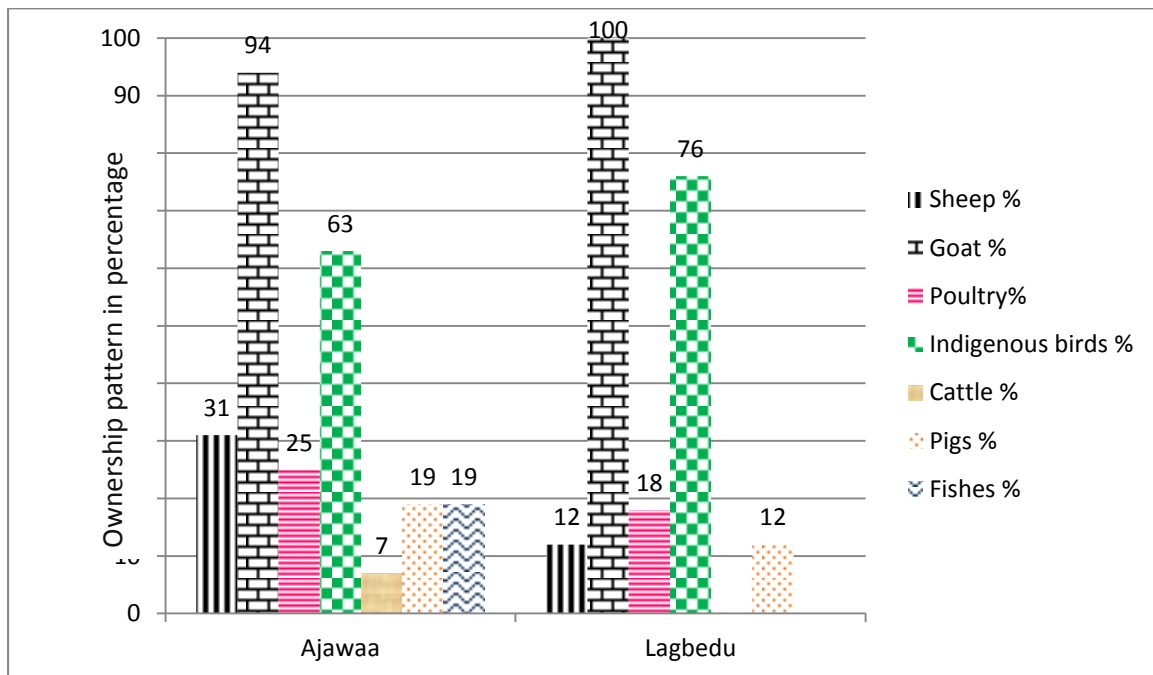
**Table 11. Average livestock holdings per household at Ajawaa and Lagbedu**

Species	Ajawaa		Lagbedu	
	Average	Range	Average	Range
Sheep	2	1-15	3	2-50
Goat	10	3-20	22	2-200
Commercial poultry	4	4-40	182	20-2000
Indigenous birds	9	10-20	44	4-50
Cattle	1	18*	0	-
Pigs	6	20-50	1	18*
Fishes	169	300-1200	0	-

Range is only for the respondents possessing particular animal species. \* Single respondent

From the average numbers it is clear that Ajawaa had greater numbers of pigs and fishes while Lagbedu had higher numbers of other species. One of the surveyed farmers in Lagbedu had exceptionally high number of goats (200), sheep (50) and indigenous poultry (500) resulting in higher household averages of goats, sheep and indigenous birds. Apart from the average number of animals per household the distribution of different species among the surveyed respondents is an

important indicator of the distribution of a particular species. Ownership of different species among the surveyed respondent's is presented in Figure 8.

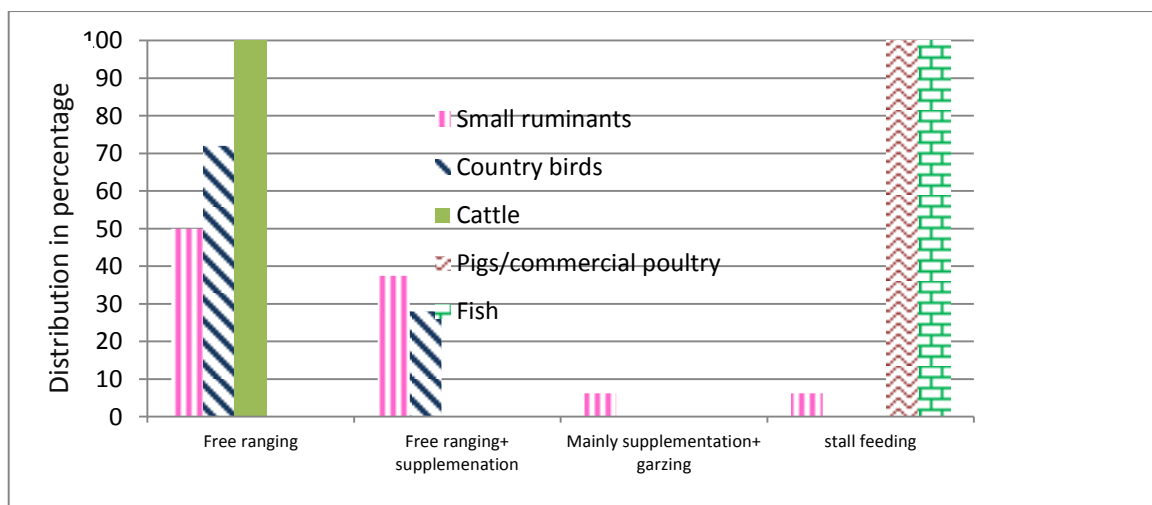


**Figure 8. Ownership pattern (percentage) of different species among the surveyed respondents**

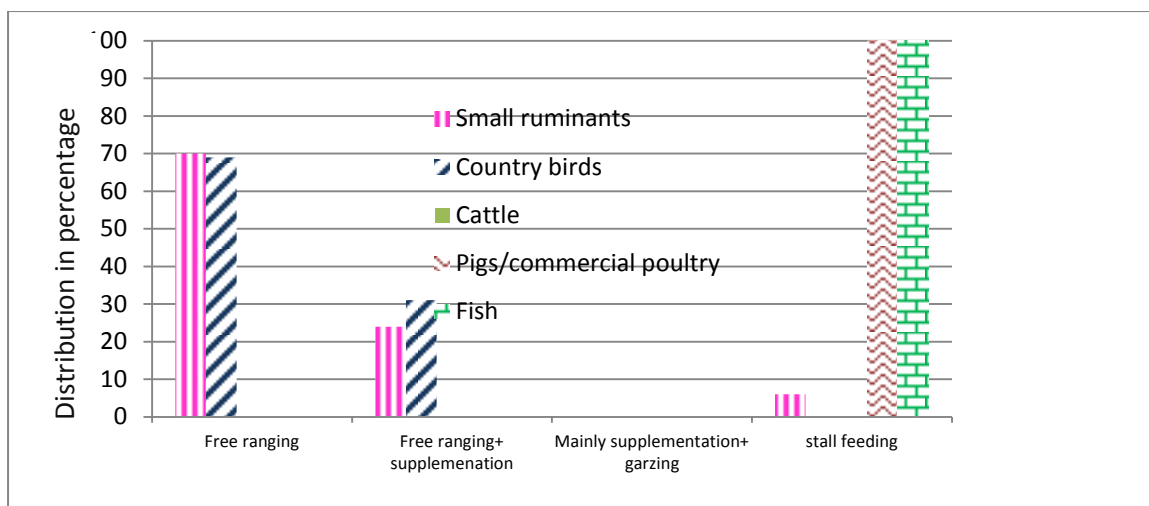
Almost all the respondents in both the sites had goats, indigenous birds were the next most popular species. Ownership of commercial poultry, pigs and fishes which rely mainly on concentrate ingredients was higher in Ajawaa than the Lagbedu, while goats and indigenous birds that mainly rely on free ranging was higher in Lagbedu. Cattle species were not very popular in either sites and among the small ruminants goats were more popular than sheep in both the locations.

### Feeding systems

Feeding systems were mainly categorized into four categories: free ranging, mainly free ranging with little supplementation, mainly stall feeding with grazing, and stall feeding. The production system followed at Ajawaa and Lagbedu for different species of livestock is depicted in figures 9 and 10.



**Figure 9. Feeding systems followed in different species at Ajawaa**



**Figure 10. Feeding systems followed in different species at Lagedu**

Feeding systems for small ruminants at both the sites were mainly extensive system and a small fraction of small ruminants were being fed in confined systems. Similarly the indigenous birds were reared on free ranging or free ranging with little supplementation while the commercial poultry, pigs and fishes were mainly stall fed. Cattle was seen only in Ajawaa and was reared under the free ranging system. Breeds of sheep and goats were all West African dwarf breeds and cattle were also local Fulani breeds. There were no improved breeds except for commercial poultry, pigs and fishes which were all improved animals with better genetic make up bred for higher growth rates.

The predominant feed resource in the surveyed areas at Lagbedu village mainly consisted of greens from the grazing areas, areas around the village consisting of local grass with wild Guinea grass occurring naturally and tree leaves occasionally during dry season. The crop-based resources consisted of cassava peels and tubers, yam peels, cowpea haulms/shaft, corn grains, corn gluten and eri, a byproduct obtained from fermentation of maize grains used for preparation of food, vegetable/fruit waste. A few of the farmers cultivating groundnut and soya were also feeding the soya and groundnut haulms to the livestock. The range of feed resources used at Ajawaa was almost similar to Lagbedu as the crops cultivated were similar. Cultivating of green fodder or storing of crop residues from maize which is one of the major crops or utilizing the cassava leaves which is another important food crop was not being practiced in the surveyed areas.

At Ajawaa there were a greater proportion of farmers having commercial poultry, pigs and fishes resulting in more diverse purchased concentrate ingredients and compounded feeds for poultry and fish. For small ruminants and indigenous birds in addition to grazing/free ranging farmers were using supplements such as cassava peels, cowpea haulms, maize/sorghum grains, kitchen waste and tree leaves.

### **Purchased feeds**

Purchased feeds were mainly concentrate feeds for pigs, fishes and poultry and the quantity of purchase was higher at Ajawaa than Lagbedu due to greater number of fishes and pigs. Additionally small quantities of eri or maize gluten a local byproduct obtained during the processing of maize for food preparation is also used for feeding small ruminants. Maize and guinea corn (sorghum) to a very limited extent was being for feeding indigenous birds. Percentage of surveyed respondents buying feeds and the purchase channels at Ajawaa and Lagbedu are presented in Table 12.

**Table 12. Feed purchase trends at Ajawaa and Lagbedu**

	Ajawaa village	Lagbedu
Percent of respondents buying feeds	94%	76%
Purchase channel options		
Feed producer %	47	24
Grain millers %	-	-
Industries %	7	18
Wholesalers %	-	-
Small retailers %	47	53
Others & %	-	-

The quantity of concentrate ingredients purchased by the farmers at the surveyed LGA's over the last three months (prior to the survey conducted in November) with the average rates for various resources is detailed in Tables 13 and 14.

**Table 13. – Feed ingredients purchased by the surveyed households (average per household) over a period of three months at Ajawaa**

Ingredients	Percent of respondents purchasing	Quantity (kg)	Price range (Naira <sup>^</sup> /kg)
Eri (maize gluten)	38%	Local units	5-10N/susi+
Palm Kernel Cake	19%	2	35-40N
Maize grains	38%	7	50-120N
Guinea corn (sorghum)	19%	2	120-160
Soya	19%	*	120-150N
Wheat/maize/rice offal	19%	*	40-60N
Bone meal	19%	5	30N
Compound poultry feed	13%	90	120-160N
Fish pelleted feed	19%	543	280-300N
Pig compound feed			56-60N

\* Quantities are part of the compounded feeds

+ Susi is a local unit – Eri is sold in small lots of round balls known as Susi

<sup>^</sup> Nigerian Naira

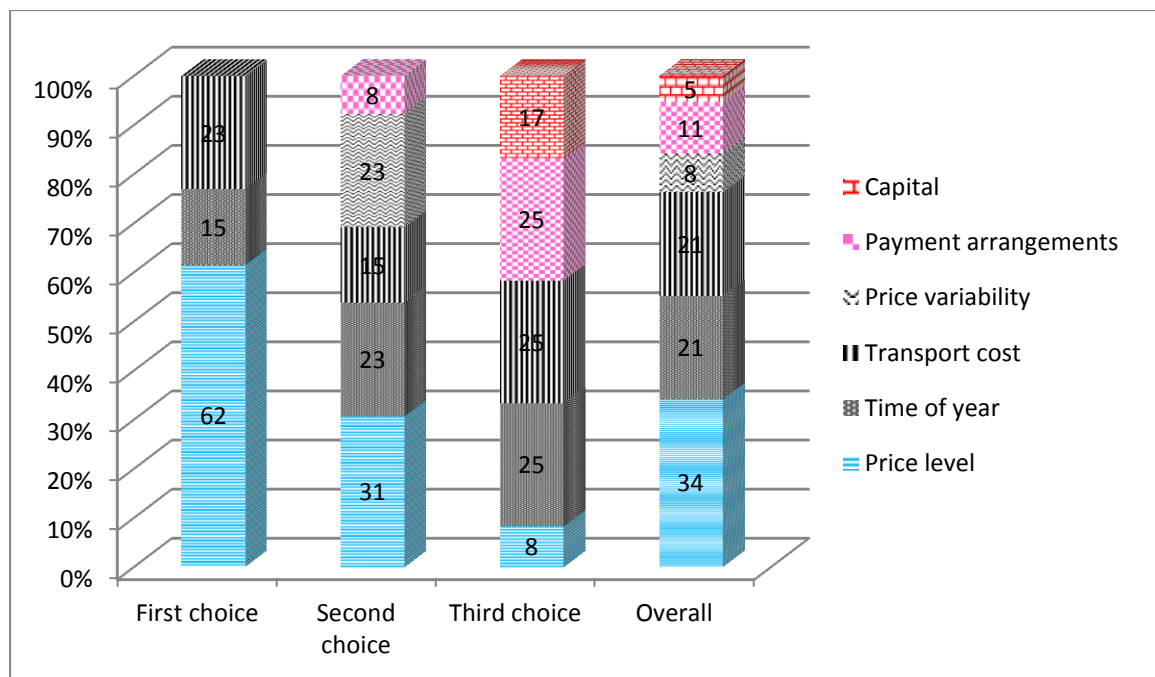
**Table 14. Feed ingredients purchased by surveyed households (average per household) over a period of three months at Lagbedu**

Feeds	Percent of respondents buying feeds	Average quantity	Price range (Naira /kg)
Poultry feed	18%	24	100-150N
Pig feed	6%	3	50 N
Palm kernel cake	12%	18	30-35N
Eri	41%	Local units	5-10 N/Sisu
Guinea corn (sorghum)	12%	4	80-120N
Cow pea haulms	6%	97	32N
Rice offal	6%	106	16N

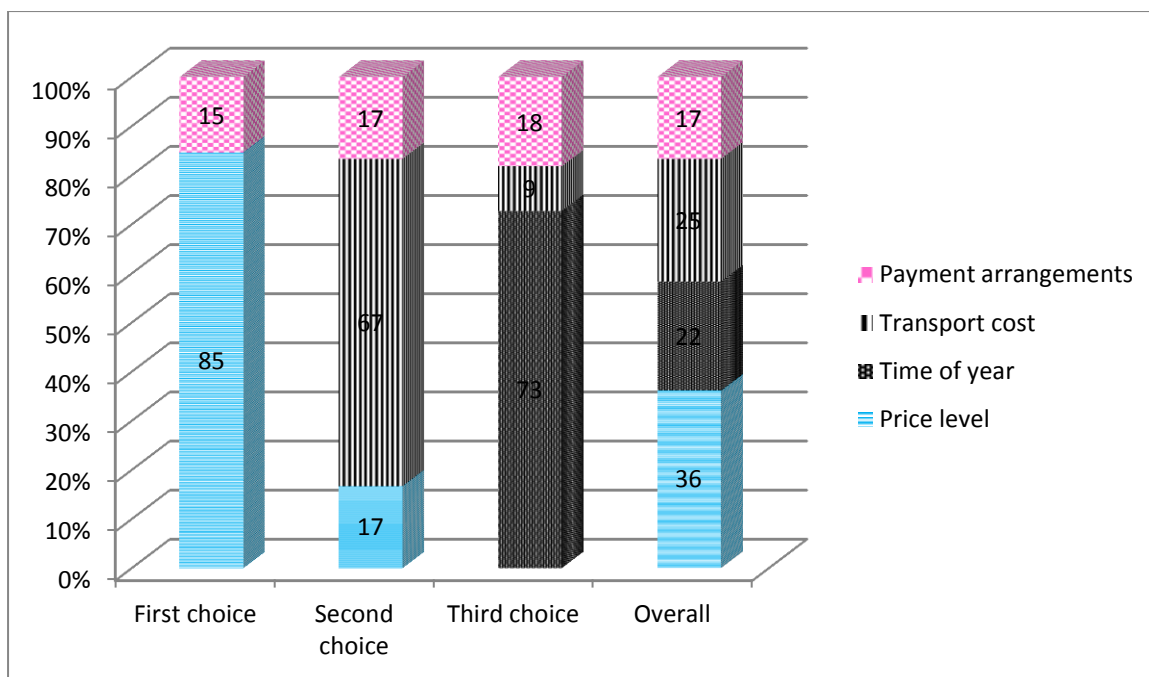
Concentrate ingredients were purchased in higher amounts in Ajawaa due to greater number of pigs and fish.

### Factors influencing the choice of purchase channels

The choice of purchase channels is influenced by a number of factors and the respondents were given the option to choose three factors that they consider and the results of the first, second and third options are summarized in the Figure 11. Based on the options all the factors were pooled irrespective of the order of importance and the overall factors were calculated and depicted in the Figures 11 and 12.



**Figure 11. Factors influencing choice of purchase channel at Ajawaa**



**Figure 12. Factors influencing choice of purchase channel at Lagbedu**

Overall it was seen that expected price level was the first major factor influencing the choice of the purchase channel at both the sites while transport cost and time of year were the second and third factors at Lagbedu. At Ajawaa transport and time of year was equally important having overall same importance of 21% each.

Compounding of feeds was followed for pigs and commercial poultry and compounding was carried out by feed producers at the feed mill as per the customer's requirement. For fish feeds the feeds were readymade and the company formulated as per the requirements. Compounding formulations at Ajawaa were more common (19%) than Lagbedu (6%). The formulations for pigs and poultry followed by the surveyed respondents are presented in Table 15.

**Table 15. Ingredients with proportions of households using compounding of feeds for pigs and poultry**

Species	Ajawaa	Lagbedu
Poultry	I. Maize-50% Soy meal-10% Fish meal-10% Groundnut cake -29% Salt-1%	I. Maize offal-33% Rice bran-17% Maize-17% Palm kernel cake-17% Soya meal-16%
Pigs	I. Wheat offals15 % Palm kernel cake40% Soya meal10% Brewers distillers garins20% Bone meal5 % Blood meal10 %  II. Palm kernel meal 26% corn/wheat off 20% Soya meal 3% blood meal 11% Brewers distillers grain 40%	I. Maize offal-33% Rice bran-33% Palm kernel cake-17% Soya meal-17%

## Constraints to concentrate use

With regard to the opinion of the surveyed farmers on the constraints for using the concentrate feeds the study revealed that the options were quite variable (Tables 18 and 19) at both the sites due to differences in the species distribution and also level of intensification.

**Table 16. Three most important constraints in feeding concentrate in Ajawaa village**

Factors	First ranked constraint (%)	Second ranked constraint (%)	Third ranked constraint (%)	Overall summary
High cost	80	22	-	37
High price variability	-	-	-	-
High transport cost	-	22	37.5	19
Equipment	-	-	12.5	-
Capital	20	56	12.5	30
Poor access to markets	-	-	25	-
Poor quality of feeds	-	-	12.5	-

**Table 17. Three most important constraints in feeding concentrate in Lagbedu village**

Factors	First ranked constraint (%)	Second ranked constraint (%)	Third ranked constraint (%)	Overall summary
High cost	56	34	-	33
High price variability	-	-	-	-
High transport cost	11	22	17	17
Equipment	-	-	-	-
Capital	33	22	-	20
Poor quality	-	22	-	-
Poor access to markets	-	-	66	-
Poor quality of feeds	-	-	17	-

However in spite of the differences in the ranking of the constraints, overall high costs was found to be the major constraint in use of concentrates and this was followed by capital and transport costs in descending order of importance at both the sites.

Options for enhancing the use of concentrate feeds by the respondents at both the sites were compiled. From first three options the single largest factor was listed and for arriving at the overall factors responsible for enhancing the concentrate usage, all the factors were pooled and irrespective of their ranking the overall frequency of each was considered (Table 7). Overall opportunities for enhancing use of concentrates at both the locations include expanding livestock enterprise, improved feed access for livestock farmers, improving quality and own enterprise becoming more efficient in the order of importance.



**Table 18. Options for enhancing concentrates use**

Factors	Ajawaa	Lagbedu
First option	Expanding livestock enterprise-100%	Expanding livestock enterprise--60%
Second option	Improve access to livestock farmers and increasing current returns to justify expansion – 43% each	Expanding livestock enterprise-40%
Third option	Improving quality-60%	Improve feed access to livestock farmers-60%
Overall option	1. Expanding livestock enterprise-40% 2. Improve feed access to livestock farmers -25% 3.Improving quality and own enterprise becoming more efficient-15%	1. Expanding livestock enterprise-33% 2. Improve feed access to livestock farmers and improving quality-33% each

### Access to advisory services

The information pertaining to advisory services on feeding and other aspects is summarized in Table 19. Farmers at Ajawaa were more market oriented than those at Lagbedu as evident from the percent of farmers accessing information and visiting neighbouring farmers to learn better management/feeding techniques.

**Table 19. Access to information on feeding at Ajawaa and Lagbedu**

	Ajawaa	Lagbedu
Get advice related to feeds (% of respondents)	75%	12%
Frequency of advice obtained per month	2.1 ( 1-4 range)	2
Visit other farmers` fields (% of respondents)	57%	25%
Number of visits made per HH in the last 12 months	1-36	2-8
Nature of advice obtained from service providers	General aspects of feeding, product use and livestock management	General aspects of feeding and management,
Major sources of information	Government extension staff, dealer, NGO and associations Information is free and farmers don't pay for it.	Government extension staff and the service are free.

## **Feed processing and storage practices**

Compounding of feeds was being practiced by the farmers for commercial poultry and pigs at both the locations. All the feeds for poultry and pigs were in mash form. Only fish feed was being sold in pelleted form and fish feeds were always purchased as readymade feeds and customers did not have the choice to compound them. For roughages, chaffing, ensiling or hay making were not being practiced. Only for legumes like cowpea and groundnut –both of which were minor crops, drying and storing of the crop residues was being carried out. Substantial quantities of available maize stover were not being fully exploited as a fodder resource due to lack of awareness, labor and lack of strong feed demand.

Regarding storage of feeds farmers at both the locations did not complain of any major storage problem as the storage was generally for short durations of 3-4 months. Dried feeds like concentrate, grains and grain offals were properly sun dried and stored in bags in well ventilated rooms. Eri/maize gluten as a wet byproduct was never stored for more than 2-3 days as farmers were aware of the problems associated with the storage of high moisture feeds. Eri was consumed within 2-3 days of the production or purchase. In a few instances farmers were using fresh water to prolong the shelf life of eri by one or two days by soaking the eri in freshwater and draining the excess water.

## **Sourcing of feeds**

Feed was sourced from Ogbomosho the nearest and the largest market for both the surveyed sites. Locally there were no traders and for all purchase they had to go to Ogbomosho which is almost 30 minutes' drive from the sites. Only one palm kernel processing unit was operational at Ajawaa and all the respondents specially the pig owners, were procuring palm kernel cake from the palm kernel processor. Eri/maize gluten was procured locally within the respective villages. The feed producers at Ogbomosho were selling compounded feeds for poultry, pigs and fish and feed ingredients in bulk as well as small quantities to cater to all classes of customers. Awareness and regulations for enforcing the quality standards of feed ingredients and finished feeds was not there and there was no branding of feeds except for fish feeds where the dealers were selling branded feeds for fishes.

## Main features of the feed value chain

The feed value chain has three main components – producers of feeds, traders or processors of feed and finally the consumers of feeds represented by the livestock farmers. Additionally there are many other actors, processes and other influencing factors that affect the functioning of feed value chain. Major characteristics of the value chain at the surveyed sites are summarized in Table 20.

**Table 20. Main features of feed value chain at Ajawaa and Lagbedu**

Factors	Ajawaa	Lagbedu
Producers	No specific allocation of resources for feed production. Only the byproducts of crops like maize, cassava, yam, cowpea etc., were being used as feed resources. Growing of fodder, fodder trees, conservation of grass or maximum exploitation of existing resources was not being followed.	The situation was similar to Ajawaa.
Traders/processors	Locally within the village there were no feed processors or traders and for all the concentrate feeds the source was Ogbomosho. Only one palm kernel cake processor was operating in the locality and palm kernel cake was available.	There were no traders or processors within the village and they had to source all the feeds from Ogbomosho and palm kernel cake from Ajawaa.
Consumers	Food/Cash crop cultivation is the main occupation and livestock rearing was secondary. Majority of the livestock especially small ruminants, cattle and indigenous birds were reared on extensive system and only for commercial poultry, pigs and fishes were being reared for market oriented production utilizing improved animals and better quality compounded feeds.	Food/cash crop was the main occupation and livestock rearing was very traditional similar to Ajawaa. However with regard to the market oriented livestock production using pigs, poultry and fishes the adoption rate at Lagbedu was very weak and the major production system was traditional relying on available resources.
Infrastructure	Well connected by road but access to inputs or sale of produce was far (30 minutes' drive) and transport cost was a significant factor effecting the feed vale chain. Being the headquarters of the Local government area the access to state department staff, inputs and development activities were better.	Well connected by road and was further interior to Ajawaa but access to inputs or sale of produce was far (30 minutes' drive) and transport cost was a significant factor effecting the feed vale chain. Access to department/extension staff and other development activities was relatively poor.

Policies and finance

Policy towards livestock was neutral i.e., it was neither discouraging nor encouraging. Unlike Agriculture where there were specific schemes to promote a particular crop commodity. Quality norms for finished feeds were not being followed. Access to loans for livestock was not there and greater support was given for agriculture.

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The situation was same as Ajawaa.

## Conclusions

Surveys at two sites within the Ogo Oluwa Local government area of Oyo state revealed that the features of the feed value chain are mainly determined by the species of the animals. In the case of ruminants, at both the locations, the feed value chain was still in initial phases of evolution as evident from the limited number of the actors and processes involved in the value chain.

Ruminant and indigenous bird rearing systems were very traditional in both the sites relying heavily on local breeds, free ranging and supplementation with crop by products to a very limited extent.

The drive for using improved breeds, growing fodder, harvesting and storing of fodder resources or maximum exploitation of the crop residues was absent in both the locations indicating the lack of strong demand for feeds from the ruminant sector.

With regard to the commercial poultry, pig and fish production systems the feed value chains were relatively better evolved with greater numbers of actors/processes along the value chain. In these mono-gastric species exploitation of livestock potential was through use of animals with better genetic make-up along with better feed inputs through concentrate ingredients/compound feeds and better management.

Allocation of land/labour and other resources for feed production or many of the agro industries that deal with processing of agriculture produce resulting in production of byproducts that could be exploited as feeds were missing in the surveyed sites. Most of the quality feeds were being purchased and thus adding to high feed costs.

The market competition in terms of more feed processors, availability of multi brands with guaranteed specifications and a series of traders-wholesalers/retailer were missing implying that even in mono-gastric species the feed value chains are still evolving and there is ample scope to expand the chain with more actors and processors along the chain.

Policy support in terms of special schemes for livestock, soft loans, capacity building of the field staff and stakeholders were not strong and greater emphasis was being given for cash and food crops. In the existing scenario the scope for strengthening the feed value chains in the case of ruminants would involve exploiting the existing feed resource base through better management of available feed resources through harvesting and storing of greens during flush season, proper harvesting and storing of crop residues and by products, including fodder trees and grasses within the cropped areas, encouraging better crop livestock integration through selection of dual purpose crops like maize and cassava.

Better management of animals through proper feeding and disease control with improved breeds would improve the income from livestock and motivate farmers to allocate resources for livestock feeding/rearing.

In the case of monogastrics, better feed formulation, quality control of compound feeds sold in the market, better management with market support for ensuring timely availability of inputs – animals, feeds, medicines and assured market prices would strengthen the feed value chain leading to a stronger livestock sector.

Institutional interventions through capacity building of field staff and farmers through short terms trainings and demonstration farms for teaching them practical skills will help in improving the livestock productivity.