Analysis of Pig Marketing in Zango Kataf Local Government Area of Kaduna State, Nigeria

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Summary

This study examines the profitability and efficiency of pig marketing in Zango Kataf Local Government Area of Kaduna State, Nigeria. A market survey of 50 pig traders from an urban market (Katsit) and two rural markets (Zonkwa and Samaru Kataf) was conducted to evaluate the structure, conduct and performance of the markets. Data were collected from the respondents through the use of a structured questionnaire. The data collected were analyzed using Gini Coefficient, marketing margin and marketing efficiency. Empirical finding indicated that producer's share of what the final consumer paid was high (61%). The average marketing margin was 39%. The retailers had higher market margin than the wholesalers. The margin at Katsit (41.5%) was higher than Zonkwa (36.74%) and Samaru-Kataf (38.5%). Katsit market was more efficient than both Zonkwa and Samaru markets. Pig marketing is therefore, profitable but inefficient as shown by the market margin and efficiency analyses. The pig market was found to be oligopolistic. There were many buyers and sellers. Entry into marketing of pigs was easy except for the high size of operating capital. The market was found to be vertically integrated as various participants played some other roles besides their principal roles. Flow of information was free and widespread between assemblers and wholesalers. The market structures measured by Gini Coefficient of 0.59 for wholesalers and 0.66 for retailers indicated that there was a high degree of concentration in the market. The problems confronting pig marketers were also highlighted.

Résumé

Analyse de vente de porcs dans la municipalité de Zango Kataf, Etat de Kaduna, Nigeria

Cette recherche a pour but d'examiner la rentabilité et l'efficacité du marché de porcs dans la municipalité de Zango Kataf de l'Etat de Kaduna, Nigeria. Une enquête sur 50 vendeurs de porcs provenant d'un marché urbain (Katsit) et deux marchés ruraux (Zonkwa et Samara-Kataf) a été entamée pour évaluer la structure, la conduite et la performance de ces marchés. Des données ont été recueillies auprès des personnes via des questionnaires structurés. Les données collectées ont été analysées en utilisant le coefficient Gini, la marge du marché et l'efficacité du marché. La conclusion empirique a indiqué que la part du producteur, dans ce que le consommateur a payé revenait à (61%). La marge du marché était de 39%. Le détaillant a eu une marge de marché plus élevée que celle du vendeur en gros. La marge du marché à Katsit (45,5%) était plus élevée que celle de Zonkwa (36,7%) et Samaru Kataf (38,5%). La vente de porcs est donc rentable mais inefficace comme le démontre la marge du marché et les analyses d'efficacité. Se lancer dans la vente de ce type d'animal n'est pas difficile mais nécessite un gros capital. Les structures de marché, mesurées en fonction du coefficient Gini de 0,59 pour la vente en gros et 0,66 pour la vente en détail, ont indiqué qu'il y avait un dégré élevé de concentration sur le marché.

Introduction

Pig (*Sus scrofa*), is one of the sources of animal protein in Nigeria. The production which is both in the hands of government institutions and private individuals represents the fastest way of increasing animal protein since pigs grow at a faster rate and reproduce sooner with large number of offsprings than cattle, sheep or goats (5, 8).

The pig industry in Nigeria has not yet developed like the ruminants and poultry industries because pigs are not generally used for meat purposes by majority of the population (2). This is based on culture and religion which make it a taboo for pigs to be eaten by some people.

Pig is traditionally a scavenger, having been raised as a means of utilizing human food wastes in early domestication. However, current production involves the use of foodstuff or waste product of human food as feeds. The production in Nigeria is relatively less (3,406,381 herds of pigs), compared to other classes of livestock such as cattle (13,885,813), goats (34,453,724), sheep (22,092,602) and poultry (104,257,960) (4). Nigeria has the second highest population of pig in Africa. It accounts for 4.5% of the total meat supply of the country (5, 6). Pig marketing in Nigeria is dominated by live sales and largely controlled by middlemen (4). Participation of any modern entrepreneurship in actual trade is limited to only very few government owned limited liability companies which control a negligible proportion of the trade. Most of these firms are beset by poor performances.

Specific ways in which efficient marketing systems play a leading role in economic development have been widely documented (4, 10, 12, 19). Essentially, it is within marketing systems that prices are generated and the allocation of resources, income distribution and capital accumulation are determined. It is therefore of great importance for researchers in developing countries to provide adequate information on the efficiency and constraints of the marketing systems on which effective policies and strategies can be based.

Empirically, this is often done by comparing characteristics of a given system with those of a perfectly competitive market model. This approach is utilized in this paper. Pig marketing in Nigeria is entirely in the hands of traditional middlemen. Government involvement is limited to the areas of disease surveillance and provision of public market infrastructures in a few major towns, with no major direct participation or regulatory measures. Thus, the Nigerian pig marketing system is essentially indigenous, with strong cultural control.

It was noted that indigenous marketing systems in developing countries are generally exploitative, collusive and economically inefficient (14). The extent to which this assertion is true for pig marketing in Nigeria is uncertain, for the state of knowledge on livestock marketing largely comes from studies on cattle (11, 17), poultry (6, 16), sheep and goat (3, 9, 21). There is dearth of literature on

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pig marketing. Therefore, study on pig marketing will be essential for objective and reliable or adequate assessments of market performance and the consequent formulation of policy guidelines. This study is an attempt to evaluate the performance of the pig marketing system in Kaduna State. Therefore, the specific objectives are to:

(1) determine the structure and conduct of the pig market;
(2) determine the market margins and efficiency of pig marketing;
(3) identify the problems affecting pig marketing and;
(4) suggest control measures.

Theoretical and conceptual framework to market study
Structure-Conduct-Performance (SCP) Paradigm

A large number of agricultural marketing studies rely on the theoretical foundations laid by the "perfect competition" model. This is particularly true in studies based on the structure-conduct-performance paradigm. The SCP paradigm originated from the work of Bain (7). The SCP approach postulates that as market structure deviates from the paradigm of a perfect competition, the degree of competitive conduct will decline and there will be a consequent decrease in output (supply) and allocative efficiency, and an increase in prices. This implies that the performance of markets can be assessed based on the level of competition and efficiency in those markets (24).

Material and methods

The study area

The study was conducted in Zango Kataf Local Government Area of Kaduna State, which is one of the states in the northwest agro-ecological zone of Nigeria. The Zango Kataf Local Government Area is bounded in the north by Kajuru LGA, in the west by Kachia LGA, in the east by Kauru LGA and in the south by Jema'a LGA, all of Kaduna State (Figure 1). The location was specifically chosen for several reasons. First, the region is known for its high pig production in Nigeria (5). Out of the total of 2,368 farm families identified in Zango Kataf LGA, 1804, representing 76%, rear pigs (13) and second, the area is a known potential pig market in the country. The Katsit (Kafanchan) weekly pig market is the largest of its kind in Nigeria. The market is located in Aduwan and Katsit on the outskirts of Kafanchan town. The market serves the surrounding towns of Kwoi, Manchok, Kagoro, Zonkwa and Kachia in the southern part of Kaduna state. The Kafanchan pig market has remained an important pig market centre since colonial days. Two other local (rural) markets located at Zonkwa and Samaru Kataf were also parts of the markets studied.

Sampling technique and size

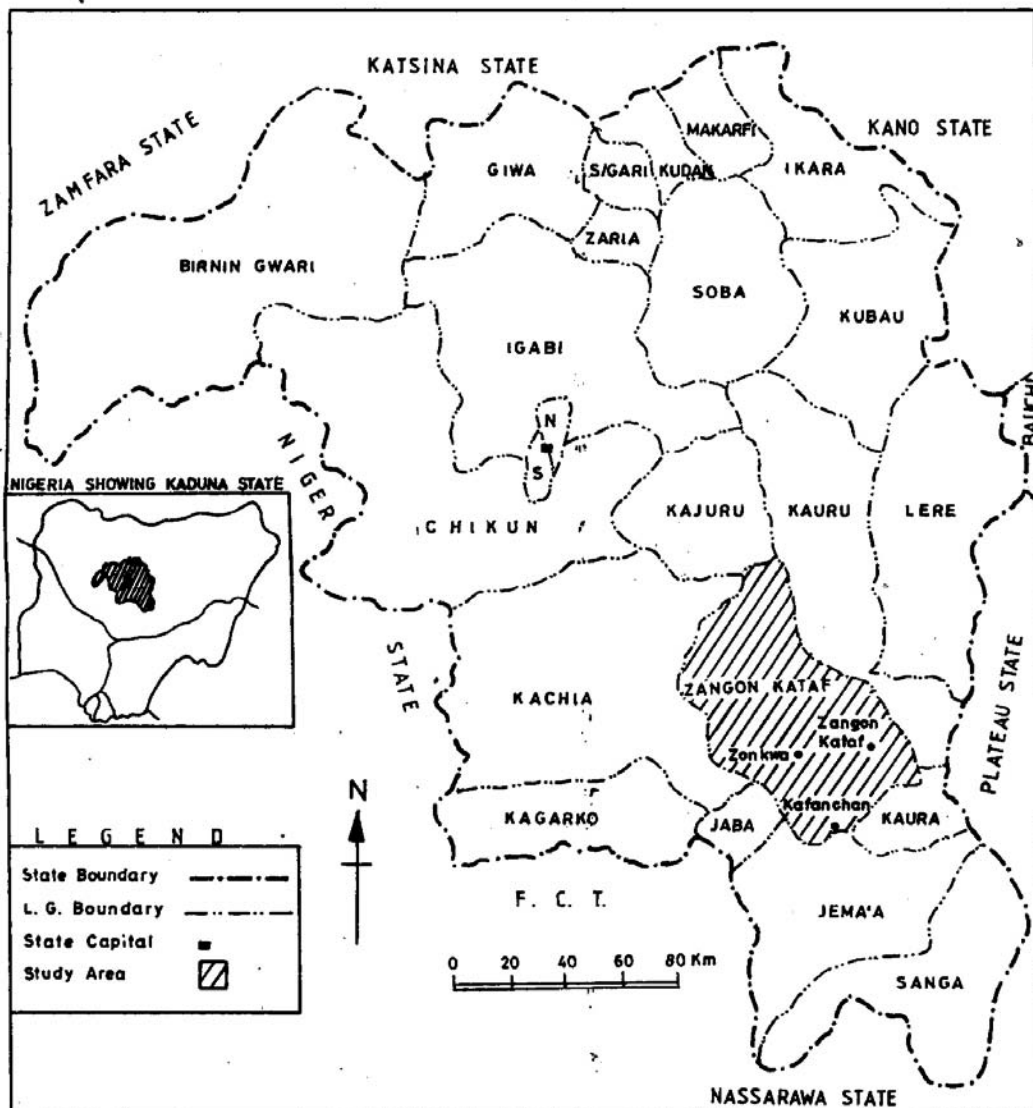Market survey approach was employed for this study. One

Figure 1: Kaduna State showing the study area.

urban assembly market (Katsit-Kafanchan market) and two rural assembly markets (Zonkwa and Samaru Kataf markets) were selected based on their relevance in terms of pig production and marketing.

A list containing registered pig traders were obtained from market officials. The list revealed that there were 92 traders from Katsit market, 30 traders in Zonkwa and in Samaru-Kataf, there were 28 traders, totalling 150 registered traders. From the 150 registered traders in the studied markets, 50 traders were randomly selected based on the population of traders in the three selected markets, that is, Katsit 30, Zonkwa 10 and Samaru-Kataf 10.

Data collection
A survey involving 50 pig traders was conducted from October 2003- March 2004. Structured questionnaires and oral interviews were used to collect data on marketing channels, monthly pig sales, type of marketing services and their costs.

Through market visits on market days (Katsit – Thursdays, Zonkwa – Saturdays and Samaru Kataf – Tuesdays), these (that is the already selected) traders and other market participants were interviewed. In addition to questionnaires, a checklist was also used to collect information from key informants such as the market chiefs in the rural markets (Zonkwa and Samaru Kataf) and from urban commission agents in the urban market (Katsit). These data were supplemented with participant observation of exchange activities in the market.

The structure, conduct and performance of a market are interrelated elements that determine the level of competition and efficiency of marketing system. Thus parameters such as number of firms, channels, entry and exit conditions and degree to which market information is available to participants were analyzed to assess the nature of markets in the study area.

Definition of concepts
Market structure: market structure can be defined as those characteristics of the organization of a market which seem to influence strategically the nature of competition and pricing within the market. Among the parameters considered important in determining market structure are:
(i) the number, and relative size of buyers and sellers;
(ii) the degree of product differentiation (that is, nature of product – whether products are standardized (homo-genous) or differentiated;
(iii) the ease of entry and exit of buyers and sellers into and out of the market (i.e. entry and exit conditions); factors that may influence entry or exit include absolute cost advantages held by existing participants (firms) or absolute entry costs that are prohibitive. An example of the latter is the substantial capital requirements associated with entry into some business ventures, that is size of operating capital.
(iv) Status of knowledge about costs, prices and conditions among the participants in the market (that is, market information).

Market structure relates essentially to the following:
(i) the degree of competition in a market;
(ii) whether the number of firms producing pig/pork is large or whether the firms are of equal sizes or dominated by a group;
(iii) whether entry for new market participants is easy or difficult;
(iv) whether the purchases of pig/pork is in a competitive state or not.
(v) degree of market information (knowledge) available to the participants, e.g. information concerning prices and the actions that competitors take as well as information about future market conditions;
(vi) degree of integration (whether vertical or horizontal integration).

Vertical integration: when a firm owns two or more levels of production or marketing, it is vertically integrated. Hence vertical integration simply means "ownership."

Market information: this refers to the information available to buyers and sellers that enables them to take decisions in the market environment in which they operate. It is believed that buyers and sellers will make more rational decisions if they have more information at their disposal pertaining to prices in different markets. Parameters for assessing market information include:
(i) prices of pigs in the different markets;
(ii) knowledge of the actions that competitors (other market participants) take;
(iii) information about future market conditions.

Market conduct: market conduct refers to the actions which market participants can take out of their own discretion or patterns of behaviour which they follow in adopting or adjusting to the market in which they buy and sell. The most important parameters used in assessing market conduct in this study are:
(i) exchange functions;
(ii) methods of determining price (i.e. price determination);
(iii) product differentiation.
Market conduct is heavily influenced by market structure and is the link between market structure and performance.
Market performance: this concept is related to structure and conduct. It is defined as the strategic end result of market adjustment engaged in by buyers and sellers. Hence it is the appraisal of the extent to which the interactions of buyers and sellers in a market stimulate results that are consistent with social purposes.
The parameters used in assessing market performance in this study are:
(i) the marketing margin:
(a) level of profits;
(b) marketing costs.
(ii) market efficiency.

Hypothesis
This study tests the following two hypotheses:
(i) There is no significant difference in size distribution of pig sales among wholesalers and retailers.
(ii) There is no significant difference between rural and urban market prices of pigs.
(iii) There is no significant difference in the profits made by wholesalers and retailers of pig/pork.

Analytical techniques
(1) The Gini Coefficient technique that gives a more precise measure of the market structure was employed to measure the level of buyers and sellers concentration in the market in order to determine the degree of competition or monopoly in the market.
The Gini coefficient is given by:
$$G{\bullet}C = 1 - \sum xy$$
where;

x = Percentage of distribution of pigs per period of study;
y = Cumulative percentage of all distributors' sales or revenue.

The Gini Coefficient ranges between 0 and 1. A Gini Coefficient of 0 implies perfect equality in distribution, while a coefficient of 1 means perfect inequality. The closer the value is to unity, the greater the degree of inequality

and therefore, the higher is the level of concentration. In other words, higher Gini coefficient means higher level of concentration and consequently high inefficiency in the market structure.

The concept of Concentration Ratio was also used to determine the structure of a market. The formula is as follows:

Concentration Ratio (CR)= $\underline{\text{Sales volume of largest four firms}}$ X 100
                                  Total sales volume   1

If the result is less than 33%, the market is said to be unconcentrated or perfectly competitive. If it is between 33% and 50%, there is strong oligopoly. If it is greater than 50%, it is monopoly.

(2) Marketing margin and marketing efficiency were used in measuring the marketing performance in the study area.
(i) Marketing margin was used to determine the marketing cost structure as well as the marketing margin spread between all the participants in the market. The marketing margin refers to the difference between the prevailing prices at the two ends of the marketing ladder at the time when transactions take place. The marketing margin shows the fraction of the consumer expenditure as a commodity that is received by the producer and each of the marketing agents. Thus, the marketing margin represents the price paid for a collection of marketing services and its size reflects the structural efficiency of the marketing system. The marketing margin is used to give a close approximation of the market performance. The marketing margin can be expressed either in nominal terms or in percentages. The percentage was used in this study to aid the achievement of objective 2. A high marketing margin indicates inefficiency because a high cost is incurred in the provision of marketing services.

Marketing Margin= $\underline{\text{Selling Price - Supply Price}}$ X 100
                              Selling Price
      where;
      Selling price is the retail price.
      Supply price is the producers' price.
(i) Marketing efficiency: this is defined as the maximization of the ratio of output to input in marketing. Marketing inputs include the resources used in providing marketing services while marketing outputs include time, form, place and the possession utilities which consumers derive from the marketing of the products. Thus, marketing inputs are the cost of providing marketing services whereas the market outputs are the benefits or satisfaction created or value added to the commodity as it passes through the marketing system (9).
In this study, the efficiency of marketing was measured in percentages for Katsit, Zonkwa and Samaru Kataf markets to achieve objective 2.

Marketing Efficiency(ME)=$\underline{\text{Value added by marketing}}$ X 100
                                  Cost of marketing services
where;
Value added is measured by the prices that consumers are willing to pay in the market for farm products.
Marketing cost is measured by cost of resources used in providing marketing services in Naira. Hence it is the current expenses incurred in the performance of the marketing functions as a commodity moves from the producer (farm) to the ultimate consumers. It includes the costs of transportation and handling, marketing charges (i.e. security/ guard), costs of assembling, processing (butchering) and distribution. Marketing costs consist of fixed and variable costs.
The ratio was used to compare with what obtained in Katsit

(urban/major market), Zonkwa and Samaru Kataf (rural markets).
(3) Analysis of Variance (ANOVA) on the other hand is used in the evaluation of the statistical significance of the difference between a pair of variances. This type of statistical problem arises most directly and obviously in the comparison of two methods of measuring the same thing.
ANOVA consists of a formalized system of statistical analysis designed to evaluate the contributions of various sources of variation to the estimated variance. This system depends on the operations of two basic principles, namely:
(i) the variance of the sum of two variables is equal to the sum of the variances of each of the variables;
(ii) the variance of a distribution curve is independent of its location on the abscissa.
The system of ANOVA is then a method of experimental design which holds each variance unvariant for a series of simultaneous observations.
(4) Descriptive statistics such as percentages were used to analyze problems of marketing in the study area.

Results and discussion

Market structure and conduct
The structure, conduct and performance of a market are interrelated elements that determine the level of competition and efficiency of marketing system (20, 24). In this section, parameters such as number and size distribution of buyers and sellers, barrier to entry, nature of product, degree of vertical integration and market information were analyzed.

Number and size distribution of buyers and sellers
The market was found to have numerous buyers and sellers. Size distribution of wholesalers and retailers are represented in tables 1 and 2 respectively. Pig wholesaling and retailing in the study area can be said to be oligopolistic, for only a few handle the bulk of the trade. The computed values of the Gini coefficients for wholesalers and retailers were 0.59 and 0.66 respectively (Tables 1 and 2). The results show marked inequality in size distribution and seller concentration which is a reflection of inefficiency of the pig markets structure. Thus, the non-competitive structure implies a poor market performance. For example in table 1, only 3% of all traders had 32.7% of the total monthly sales which implies that 97% of the traders handled 67.3% of the sales. Although in absolute terms there are many sellers in the pig market, the structure is not competitive but is oligopolistic, for only a few handle the bulk of the trade.
Generally, proponents of large scale firm operations have argued in favour of higher seller concentration in relation to competitiveness where economic growth in firms will lead to elimination of inefficient small-scale firms (15). The tenability of this argument would depend largely on the empirical evidence of a given market where the existing large holders are not exploitative but more efficient than the small holders. Where this empirical evidence is not available we may conclude that there is need for improvement in the nature of competition for better performance in pig market. The concept of the Concentration Ratio (C.R) was also used to determine the structure of the market. The concentration ratio was found by computing the monthly sales of the four largest firms (₦847,812 + ₦309,011.25 + ₦201,000 + ₦119,000) divided by the monthly total sales volume of ₦4,093,212.26 (total sales of both wholesalers and retailers). The result revealed a C.R of 36.08% which further indicates that the market for pig is oligopolistic.

Barrier to entry
There was no monetary barrier to becoming a commissioned agent because the agents purchase with funds supplied by

Table 1
Distribution of pig wholesalers by value of monthly sales in Zango Kataf LGA

Sales range (₦)	Number of wholesalers	% of wholesalers (x)	Cum. %	Total value of monthly sales (₦)	% of Total sales	Cum. % (y)	$\frac{\Sigma xy}{10,000}$
0 – 49,000	9	27.27	27.27	469,212.26	18.10	18.10	0.0494
49,001 – 98,000	14	42.42	69.69	611,262	23.58	41.68	0.1768
98,001–196,000	9	27.27	96.96	664,192	25.62	67.30	0.1835
Over 196,000	1	3.03	100.00	847,812	32.70	100.00	0.0099
Total	33	100.00		2,592,478.26	100.00		0.4108

Gini Coefficient= 1 – 0.4108= 0.5892   ±0.59
₦139 = US $1 at survey time. ₦ = Nigerian currency, Naira.
Source: Fieldwork, 2004.

Table 2
Distribution of pig retailers by value of monthly sales in Zango Kataf LGA

Sales range (₦)	Number of retailers	% of retailers (x)	Cum. %	Total value of monthly sales (₦)	% of Total sales	Cum. % (y)	$\frac{\Sigma xy}{10,000}$
0 – 49,000	2	11.76	11.76	59,386	3.96	3.96	0.0047
49,001 – 98,000	5	35.30	41.17	202,121	13.47	17.43	0.0513
98,001 – 196,000	6	41.18	76.47	400,544	26.69	44.12	0.1557
Over 196,000	4	23.53	100.00	838,683	55.88	100.00	0.1315
Total	17	100.00		1,500,734	100.00		0.3432

Gini Coefficient= 1- 0.3432 = 0.6568 ± 0.66
Source: Fieldwork, 2004.

the pig merchants. Although it is found that there was no apparent restriction into and exit from pig trade, integrity, honesty, experience and confidentiality among participants as demanded by both marketers and market officials seem to significantly influence the conduct of the marketing participants. Becoming a wholesaler demanded more money (operating capital) and risks than retailers. More than 60% of the traders interviewed indicated that they started the trade as retailers, about 29% of them were still operating as retailers while others (31%) have moved to the status of rural wholesalers, commission agents and rural assemblers. Traders indicated that changing status in the marketing systems of pig is largely influenced by size of operating capital. Analysis showed that the estimated mean value of operating capital was ₦81,864.24/trader/month; the value for the biggest trader in the sample was ₦847,812/month while the value for the smallest trader was ₦42,064/trader/month. The implication of this is that traders with less than the operating capital of ₦42,064/month may be out of business except they have access to credit facilities. Thus, the only barrier to entry is monetary in relation to the size of the operating capital which was high and not affordable by many. It may therefore be expected that provision of credit facilities to small traders will improve the nature of competition. The rural wholesalers were few in numbers compared to the rural retailers, but more urban wholesalers. They were therefore oligopolies and have created a strong web along the major channels of pig trade; a web which is tied by capital, information and kinship. Interviews and observations of these participants indicated that more than 80% were Southern Kaduna indigenes and a strong social alliance exist among them; an alliance which is based mainly on kinship, friendship and capital. This affects the performance of the market in terms of access to market information. There is, therefore, collusion. The effect of collusion is high market concentration which impacts on the producer and consumer just as the multiplicity of market links escalates the mark-up on prices between production and consuming centres.

Integration in the market
Analysis revealed that 29 (58%) out of 50 traders sampled were pig producers while the remaining 21 (42%) were only buyers who assemble to sell in the Thursday weekly market at Katsit (Kafanchan). It was found that 33 of the traders were wholesalers while 17 were retailers. This implies that most of the producers are also traders operating in the same market. The market could therefore be said to be integrated since majority of the respondents coordinate production and marketing decisions in the industry. This vertical integration could result in higher marketing margin because the traders through integration could gain market power and control over the price paid by consumers.

Market information
Another element of market structure is the level or degree to which market information circulates among participants. In this study, it was established that information concerning prices, demand and supply circulates freely and rapidly among some of the market participants operating within the marketing systems. The flow of information was found to be more rapid and effective among the wholesalers and assemblers. Majority of the inter-regional traders, interviewed indicated that they obtained reliable information concerning market conditions at regional levels from co-traders and commission agents who passed the information from urban market (Katsit) down to the rural assembly markets (Zonkwa and Samaru) through verbal (phones) and written messages. The rural assemblers and wholesalers controlled the flow of information, which is found to be discriminating. Information about market condition obtained by the traders was in most cases reliable but it may lag because of the inefficient means of communication.

Market conduct

Buying and selling activities of pig in the study area take place under free marketing system, hence no restriction in time and place of buying and selling. It was observed that marketers bought pigs directly from any of the market participants-rural assemblers, retailers or farmers. Although farmers are required by market officials to take pigs to the respective markets for sale to any distributor, it was found that some farmers (68%) sold at the farm gate while others (32%) transport their pigs to the urban market (Katsit) where they expected higher prices. This is because there were no stipulated marketing arrangements.

The marketing channel

Most of the traded pigs brought to the markets are from pig farmers living in Kafanchan and the surrounding villages. At village levels, itinerant traders visit the homes of pig farmers to buy animals in small numbers such as one or two. They are then sold at local village markets to intermediate traders who are assemblers with more funds and capacities for bulking larger numbers. These intermediate traders visit similar smaller (rural) markets, such as Zonkwa and Samaru markets, and gradually build up a herd for sale in the Katsit (urban) market. Ownership of pigs may in some cases change hands two or three times before reaching Katsit, while in other cases it may be a direct supply from buyers at the village to the Katsit (Kafanchan) market.

Traders themselves rarely own vehicles for transportation, they use the services of other transporters. Transportation of animals to markets is usually by trucks. In some cases animals are trekked from neighbouring villages directly to the markets. Two principal buyers in the Katsit market are wholesale traders who take animals to the south and the local butchers (retailers) who slaughter for fresh pork sales in open markets both in Katsit and in the neighbouring villages (Zonkwa and Samaru Kataf). In addition to these, some traders buy for resale either immediately or after some minor fattening operations. Direct purchases by some hoteliers for slaughtering also occur. Some

pork consumers purchase pigs co-operatively for slaughter and distribute among the group members.

The pig marketing channel in the study area follow a centralized pattern in which the farmer's (producer's) pigs are brought together in larger central and terminal markets. There they are purchased by the wholesalers or retailers from commission agents and brokers who act as the producer's selling agents. The marketing chain for pigs in the study area is a long chain in that pigs pass through many market participants or succession of markets before reaching the final consumers. The longer the chain the higher the price the consumer will have to pay.

The major actors in the channelling of pigs in the study area therefore include the assemblers, the wholesalers, the retailers and the producers. Field data collected delved into the most prominent of these market channel actors. To this end producers were requested to indicate the major buyer of their animals. A large proportion of the producers opined that they prefer selling their animals to assemblers and urban wholesalers. The main reasons adduced is that of quick and guaranteed payment for their animals, the reduction of risks associated with transportation and the reduction of costs associated with the performance of marketing functions that could well be efficiently undertaken by assemblers.

The assemblers sell to the rural wholesalers and the commission agents. These two set of intermediaries sell either to the rural retailer or urban wholesalers. The rural retailers then sell to the rural consumers. The urban wholesalers sell to the urban retailers. Finally, the urban retailers sell to the urban consumers. Figure 2 is a diagrammatic representation of the channels of pig movement in the study area.

In terms of number, there are many of each of the above categories of middlemen operating in the rural and urban markets. A limiting factor to the number of animals a middleman is able to buy at any given time is the amount of operating capital available to him.
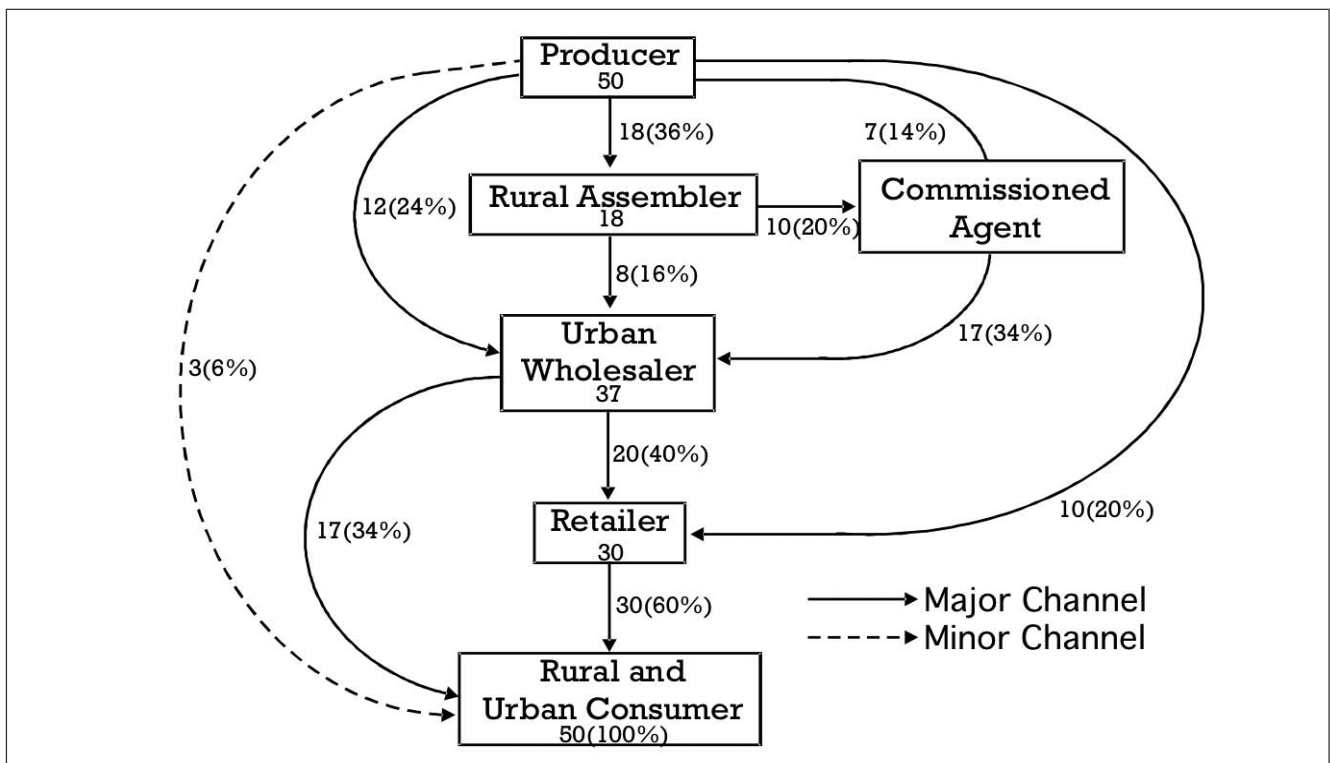

Figure 2: Marketing channel for pig in Zango Kataf LGA, Kaduna State, showing the number of respondents in the flow.
Note: The percentages shown in figure 2 have been calculated to add to 100 percent from each box.
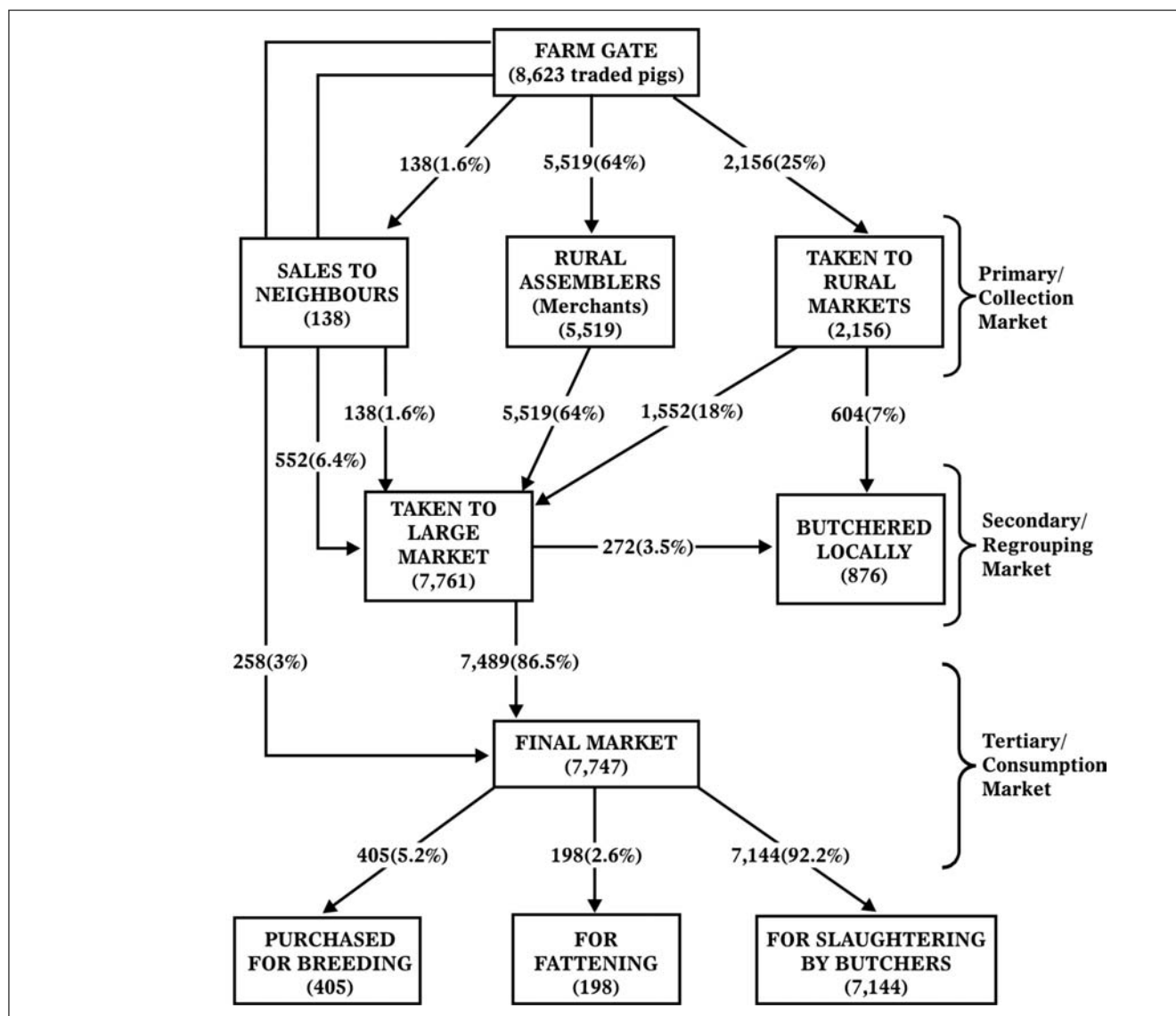Source: Fieldwork, 2004.

Figure 3: Livestock market structure and volume of flows of pigs into Katsit-Kafanchan terminal market.
The percentages shown in figure 3 have been calculated to add to 100 percent from each box, for example for figure 3, the 7,747 traded pigs that reached the terminal market were made up of 5.2% for breeding, 2.6% for fattening and 92.2% slaughtered for consumption.
Source: Fieldwork, 2004.

Livestock flows in the marketing channel

Although producers are expected to take animals to the market for sale, there was no known regulation compelling them to sell or buy from particular markets (e.g. farm gate or collection market) or through particular agents (e.g. the small itinerant trader or assemblers). Thus the volume of animal flow through the channel reflected efforts by producers to sell their animals through channels that provided more profit and also traders strive to buy through channels where they had a higher chance of making more profit.

Out of the 8,623 pig transactions recorded in Katsit-Kafanchan market during the study period, 258 (3%) were purchased by traders directly from the farm gate while 7,813 (90.6%) passed through primary/collection markets (Figure 3). From the point of view of the relative contributions of the various sources of the 8,623 pigs from the farm gate, it was calculated that 3% (258 pigs) were purchased directly from farm gate, 86.5% (7,489 pigs) entered the tertiary/consumption market from the secondary/regrouping market, while 10.5% (876 pigs) were butchered at the secondary/regrouping market. It is clearly shown that traders operating the Katsit/Kafanchan market bought most of their pigs from the rural assemblers and other agents.

From the point of view of the relative contributions of various sources to the 7,747 pigs that entered the tertiary/consumption market, it was calculated that 258 (3%) were directly from the farm gate, while 7,489 (86.5%) came directly from secondary/regrouping market. Collectors played a prominent role in the marketing channel, about 7,813 (90.6%) of the pigs passed through the collection markets, and even at the secondary or regrouping markets, collectors remained active and purchased 6,333 (80.9%) of the pigs that reached there, with the sole aim of reselling them in the same market for a profit.

The high level of involvement of collectors in the marketing system of pigs in the study area is not unconnected with the fact that most traders at the primary market are indigenes who know and understand both the terrain and local languages well.

It is clear that the major value-added activity was the transfer of pigs from one location or market to the other as the trade is based mainly on live animals.

Exchange functions, price determination and product differentiation

Two different sale agreements were noted between buyers

and sellers depending on the existing relationship between the parties. While most of the traders sampled (84%) generally sold on the basis of cash and carry condition, some sold on credit. Most of the traders that sold on credit had regular buyers. Sales on the market are through the usual haggling over prices without weighing the animals or any other standardization. Product differentiation was in the form of visual assessment of animal size, health and condition score. These findings conform to a report on a study of goat marketing in Zaria, Kaduna State where the price of goats depends on different groups of factors, such as sex, visual appraisal of size and age (16). Analysis revealed that another group of factors found to affect pig prices were seasonality and festivals. Pig prices are generally expensive in the dry season (September to April) when Fulani herdsmen have moved to the wet areas of the south, and are away from the north. This creates partial scarcity of cattle leading to higher prices of pig and pork. The prices of cattle and goats fall, due to excess supply when Fulani herdsmen return to the north at the beginning of the rainy season (May). Prices are lowest between January and March (₦80/kg live weight). In the months of November, December and April, pig prices are high (₦105/kg live weight) as these months correspond to the festive periods of Christmas and Easter respectively. During pricing, other buyers and sellers could contribute in the estimation in order to arrive at acceptable prices for sellers and buyers. This pricing mechanism is attributable to the fact that in developing countries, prices of most agricultural commodities are arrived at through the interplay of other market actors known in Northern Nigeria as "*dilalai*" (market/price hagglers).

Market performance
Two measures, namely marketing margin and marketing efficiency were employed in this study to measure market performance.

Marketing margin analysis
Marketing margin represents the difference between what the consumer pays for a commodity and what the farmer gets. The size of the marketing margin reflects the structural efficiency of the marketing system.
Empirical findings indicate that producer's share of what the final consumer paid was high (61.04%). The average marketing margin was about 39%. The retailers' marketing margin was higher than that of the wholesalers. The margin at Katsit market (41.58%) was higher than both Zonkwa and Samaru Kataf (Table 4). This means that pig markets are very integrated over space and this may be due to the presence of adequate market information. Considering the services provided in the production and marketing of pigs, the contribution of the margin was considered high in comparison to costs of marketing and the percentage received by the farmers. The results obtained are the coefficients of the distribution efficiency. Thus, the high marketing margin, high Gini coefficients, and high income inequality of sellers, are all associated with poor market performance (18). All the findings have supported the hypothesis that the marketing of pigs in the study area is not competitive but oligopolistic.
Analysis at the various markets (Table 4) show the marketing margins for Katsit (41.58%), Zonkwa (36.74%) and Samaru-Kataf (38.56%). Put in another way, it means that 41.58% of consumers expenditure in Katsit market

Table 3
Average prices and costs in Naira per pig at Zango Kataf LGA

Marketing prices/costs	Markets		
	Katsit	Zonkwa	Samaru Kataf
Producer	3,260	2,980	2,900
Rural Assembler	3,710	3,190	3,025
Production costs			
Drugs and veterinary services	124	128	100
Hired mating boar	72.50	-	72.50
Cost of labour in production	205.80	150	192.10
Repairs and maintenance	21.30	15.60	18.00
Marketing costs			
Commission agent	100	70	50
Transport cost	250	200	185
Loading and off-loading	100	80	80
Market charges (i.e. security/guard)	10	10	10
Feeding cost of animals awaiting sales	220	195	187
Tapeworm inspection	10	10	10
Cost of butchering (slaughtering)	150	130	130
Wholesale price	5,280	4,245	4,115
Retail price	5,580	4,710	4,720

Source: Fieldwork, 2004.

Table 4
Average marketing margin per pig in percentage of markets in Zango Kataf LGA

Market participants	Markets			Average
	Katsit	Zonkwa	Samaru Kataf	
Producer's share	58.42	63.26	61.44	61.04
Assembler's share	8.06	4.46	2.65	5.06
Cost of production	7.59	6.23	8.11	7.31
Cost of marketing	15.05	14.76	13.81	14.54
Wholesaler's share	5.5	1.42	1.17	2.70
Retailer's share	5.38	9.87	12.82	9.35
Consumer's share	100.00	100.00	100.00	100.00
Market margin	41.58	36.74	38.56	38.96

Source: Computed from survey data, 2004

Note: Assembler's share= $\frac{\text{Rural Assembler x Producer}}{\text{Retail price}}$ x 100 (From Table 3).

goes to the middlemen, while 58.42% was received by the pig producers. Middlemen's share of consumers payment is acceptable for Zonkwa and Samaru-Kataf markets. The share of middlemen of consumers payment appears high for Katsit. This is probably one of the reasons why middlemen are sometimes called exploiters who get more than their normal share of consumers payment. But this is not a good enough reason to conclude that middlemen are exploiters. The best way to decide would have been to calculate the profits of middlemen. Since detailed and accurate information on costs are not available, it was not possible to obtain the profit of middlemen. However, with the available information two hypotheses were tested (that is hypotheses (ii) and (iii). Hypothesis (ii) investigated the differences between farm gate, rural and urban markets' prices of pigs. Hypothesis (iii) examined the difference between profits made by wholesalers and retails.

Hypothesis (ii): there is no significant difference between the rural and urban prices.
This hypothesis was tested for each market. The Analysis of Variance (ANOVA) technique was used to test whether prices depended on source of pigs. The ANOVA table is given in table 5.
Table 5 reveals that the mean prices of pigs at various markets are significantly (P< 0.05) different. Since the calculated F-statistics is higher than the F-table value at 5%

level of significance, the mean prices from various markets were further compared using Duncan's Multiple Range Test as seen in table 6.
The prices of pigs at the 2 rural markets (Zonkwa and Samaru Kataf) were not different but significantly (P< 0.05) higher in the urban market (Katsit Kafanchan market). It could therefore be concluded that it is cheaper to buy pigs at the rural markets than at the urban market. The price margin could likely be higher if pigs were bought from the rural markets.

Hypothesis (iii): there is no significant difference in the profits made by wholesalers and retailers of pigs.
The Analysis of Variance (ANOVA) technique was used to test whether there were differences between wholesalers and retailers and wholesalers/ retailers profits.
Table 7 shows that there were significant differences in the mean profits of the 3 types of marketers since the calculated F (8.99) was higher than the table value (3.24). The Duncan's Multiple Range Test was done to compare the mean profit in table 8.
The table of mean profit shows that retailers made slightly more profit ₦1,376.1 than wholesalers who made ₦1,300.

Market efficiency
The result in table 9 indicates that Katsit market had the coefficient of marketing efficiency of 183.60% and was

Table 5
ANOVA table for comparing pig prices in three markets in Zango-Kataf

Source of variance	Degree of freedom (Df)	Sum of squares (SS)	Mean square (MS)	F-statistics	F-table
Katsit-Kafanchan					
Between market	2	203,814	101,907	3.96*	2.34
Residual	28	950,826	25,698		
Zonkwa					
Between market	2	251,313	125,656	4.8*	4.7
Residual	8	183,248	21,178		
Samaru-Kataf					
Between market	2	41,668	20,834	4.5*	4.0
Residual	8	50,927.6	4,629.8		

F-table at 5% level of significance

Table 6
Comparing mean prices of pigs by sources in Zango-Kataf LGA using Duncan's Multiple Range Test

Commodity	Katsit-Kafanchan market	Zonkwa market	Samaru-Katafb market
Pig	4,457[a]	3,781[b]	3,940[b]

a,b means with same superscript in a row are not significantly (P< 0.05) different.

Table 7
Comparing profits by type of markets in Zango-Kataf LGA

Source of variance	Degree of freedom (Df)	Sum of squares (SS)	Mean square (MS)	F-statistics	F-table
Types of marketers	2	298,37.6	14,918.8		
				8.99*	3.24
Within marketers	48	64,682.0	1,658.59		
Total	50	94,519.6			

Table 8
Table of mean profits by three types of marketers in Zango Kataf LGA

Type of marketers	Wholesaler	Retailer	Wholesaler/Retailer
Mean	1,300.0[a]	1,376.1[b]	1,299.4[a]
N	30	17	3

a,b means with same superscript in a row are not significantly (P< 0.05) different.

Table 9
Marketing efficiency at Zango Kataf LGA

Prices/cost	Katsit	Zonkwa	Samaru Kataf
Producer's price (₦)	3,260	2,980	2,900
Cost of production	423,60	293,60	382,60
Cost of marketing	840	695	652
Retail price	5,580	4,710	4,720
Value added	2,320	1,730	1,820
Market efficiency	183,60%	180,47%	175,91%

Source: Computed from survey date, 2004.

therefore more efficient than both Zonkwa (180.47%) and Samaru Kataf (175.91%) markets which are more of rural markets and attract less buyers and attention unlike the urban (main) market. Considering the margins and efficiency ratio, the pig marketing can be said to be both efficient and profitable.

Problems of pig marketing
Pig marketing in the study area are bedeviled by so many problems. Table 10 shows the basic problems confronting pig marketers in the study area. The most important marketing problems identified by the respondents were lack of capital, high cost of transportation, lack of standardization, lack of functioning abattoir, lack of storage facilities and lack of price information.
The main difficulty of the traders is the high cost of transportation. This problem has been accentuated by the increase in the price of petroleum and spare parts of vehicles.
Slaughtering facilities are grossly inadequate especially in the rural markets. The level of hygiene in the markets is very low and inadequate.
There is also inadequate storage facilities in the markets. Meat is highly perishable, yet the pig markets in the study

Table 10
Problems associated with pig marketing in Zango Kataf LGA

Problems	Percent*	Ranking
Lack of capital	71	1st
High cost of transportation	68	2nd
Lack of standardization	61	3rd
Lack of functioning abattoir	58	4th
Lack of storage facilities	57	5th
Lack of price information	52	6th
Fluctuating prices	42	7th
Lack of shade	39	8th
Poor hygiene	30	9th
Mistrust and cheating	8	10th

*Multiple responses were allowed.

area lack cooling facilities where unsold products could be stored.
Poor hygiene: the condition of the markets is filthy and very unhygienic especially the Katsit pig market.
Lack of standardization/grading of animals and lack of price information in the various markets all constitute problems to traders.

Policy implications and conclusion
Government involvement in livestock marketing has been limited to the areas of prevention of diseases and provision of public market infrastructures in a few towns, with no major direct participation or regulatory measures. The government need to do more than this.
(1) Government should play more active role in the provision of physical infrastructure in the market such as modern abattoirs and slaughter slabs well supplied with portable water and drainage facilities.
(2) The proper maintenance of the abattoirs and slaughter slabs should be the responsibility of market officials.
(3) There is the need for the traders to form cooperatives to provide cold stores in the market where meat retailers could store their meat. Such cold storage services should be paid for, by the retailers (butchers). The development of the processing facilities such that vertical integration enhances value added, not only in terms of value of the product but in terms of greater storability of pork at source. The expected effect is that more of the final products can be moved directly to the terminal markets thereby reducing links on the market chain.
(4) The government should promulgate and enforce a decree on the use of weights in the retail of pork in all markets. Such a law is necessary in order to guarantee that the consumer gets value for his/her money.
(5) The spatial dispersion of the supply and demand centres underscores the need for effective transportation necessary for a better integrated market.
(6) Information about prices of produce should be widely disseminated by market officials through radio and television.
(7) Government and private sectors should jointly fund research on livestock marketing.
Finally, to bring out modern marketing operation such as meat shops, cold stores, meat processing industries, the government has a greater role to play. Intensive promotion of such desired entrepreneurship is necessary through credit financing schemes. Most importantly, maintaining the existing nitch of retailers is necessary on the short run in order to enlist their cooperation. It is expected that these would be in a better position for transforming from traditional to modern systems giving the necessary support.

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