SOCIO-ECONOMIC FACTORS AFFECTING THE ADOPTION BEHAVIOUR OF SETTLED PASTORALIST FULANI IN KACHIA LOCAL GOVERNMENT AREA OF KADUNA STATE

BY

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DEDICATION

Kwanashie, Kaka, Sha'aba, the Usmans; for Good

Ideas, Good Advice and Good Times, And for

Creating A Space Where everyone could be more.

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ABSTRACT

This study is an attempt to investigate strategic questions relating to the introduction of new animal husbandry practices to traditional cattle rearers; the adoption of the different components of the package of innovations. These packages are the supplementation feeds, fodder bank and the exotic cross-breeds. In finding out the factors that affect adoption some socio-economic factors (age, household size, herdsize, source of income, farm size) and pastoralist's perceptions of the innovations, studied in terms of his perception of the advantages, acquisition and availability of inputs, veterinary services, and family support, were tested using the correlation matrix to find out which of these variables were related and significant at the .01 percent level explaining the variability in adoption.

Besides, in explaining the variability in adoption, the regression analysis was used. We found that three variables perceived ability to manage, perceived acquisition/availability of inputs, and additional sources of income, explained 46, 8 and 6 percent respectively, of that variability in adoption.

In testing the thirteen hypotheses we found that ten were supported and three not supported. Those supported were that; there is a positive relationship and significance at the .01 percent level between: level of schooling, household size, farm size, perceived

veterinary services, additional sources of income, perceived advantages, perceived ability/acquisition of input and adoption of innovation.

The hypothesis not supported at the .01 percent level were: there is a positive relationship and significance between respondent's chronological age, level of living, and herd size with adoption of innovation.

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CHAPTER I

THE SOCIO-ECONOMIC FACTORS AFFECTING THE ADOPTION BEHAVIOUR OF SETTLED PASTORALIST FULANI IN KACHIA L.G. AREA OF KADUNA STATE.

1.1 INTRODUCTION

Crop and livestock production are the centre of Nigeria's economy. The magnitude of the output from these enterprises could be the single most important determinant of overall economic growth. A recent World Bank report indicates that sluggish growth in the agricultural and livestock sectors is the primary factor underlying the poor economic performance of most African countries (ILCA Annual Report, 1981). The productivity of cattle in Africa compared to those in the developed countries is poor, though cattle in the former accounts for 11.2% of the world's cattle production. Cattle in Africa produces only 4.3% of bovine meat and a mere 1.5% of cow milk. Annual herd off-take in Africa averages 11.4% representing about 126 kg of slaughter weight per head as against 34.1% and 240kg. in developed countries. Only 12.6% of an average herd in Africa are lactating cows, yielding a milk off-take of 377kg per year compared with 20.6% and 3,975kg in western countries. In addition to the low productivity, our livestock are faced with malnutrition and diseases. With the traditional ways of managing the herds, being fed on range-land and browse, supplemented by seasonal crop residues and by-products, very little formal supplementary feeding is practised in deficit areas or during the protracted dry season or droughts. This inadequate malnutrition is reflected in high mortality, especially among the

young, and low productivity and growth rates. It is reported that a number of important dieseases peculiar to our livestock are trypanosomiasis, theilerosis, dematophilosis and various parasites. For others such as rinderpest and foot-and-mouth, though curative measures have been discovered, they are not often readily available to livestock producers (IIC', 1981:2).

The afforementioned problems call for attention given the important role of livestock in our social and economic life. Livestock provides high foods and clothing; they provide drought power; transport; manure for fertilization and fuel; security against seasonal shortages of food crops; a capital resource and a means of investment; and the basis for building social relationship in pastoral societies. The monetary equivalent of cattle earned by pastoralists is put at ₦3.4 billion (David West, NN 11/7/81). This is quite a large investment, and the inability of the nation to meet her beef supply as a result of the astronomical population growth of 3% per annum (Ibalu, 1981) calls for attention.

1.2 Strategy for Livestock Improvement

In an effort to solve our livestock problem, the government embarked on importation. In 1980 alone the food importation bill stood at ₦1.5 billion (NN 19/2/80). In previous years the food importation bills were neither encouraging. Nigeria imported 5,636.16 kg of meat and meat products worth ₦7,126,910; and 87,755 kg worth of ₦11,126,625 of milk and dairy products in 1975.

The amount of live cattle imported between 1970 - 1975 is shown in Table 1.1.

Table 1.1: Live cattle imported between 1970-1975.

Year	Live Cattle (ND)
1970	276,148
1971	282,434
1972	286,048
1973	285,112
1974	230,077
1975	139,246

Source: Nigerian Livestock and Meat Authority (NIMA) Quarterly, 1977.

Our inability to feed the increasing population with the required livestock product becomes another issue of concern as it is reported that the minimum protein requirements of an adult Nigerian varies between 65 gm and 75 gms per day. Of this minimum requirement, 35 gm should be obtained from animal products (F/O, 1975, Series 37).

In conjunction with various state governments and World Bank agencies (Canadian, ILC/, etc), the Federal Government has designed projects aimed at making the nation self-sufficient in food production. The Green Revolution is a comprehensive programme. The constitutents of the "Green Revolution" are the River Basin Development Authorities (RBD/) and the Agricultural Development Project (/DPs) which concentrate on the supply of input packages to the farmers and facilitate

marketing of their product with a strong emphasis on the development of infrastructures such as transportation, irrigation, etc. in the project areas. Through the RBDA and the Federal Livestock Department (FLD), the Federal Government has "acquired" the following hectares of land in different states of the country as grazing reserves for fear of overstocking. The hectares "acquired" are shown in Table 1.2.

Table 1.2: Hectares of land acquired by Federal Government in Nigeria as grazing reserves.

Hectares	State
57,051	Bauchi state
399,900	Benue state
213,725	Borno state
57,300	Gongola state
181,899	Kwara state
50,140	Niger state
159,288	Plateau state
1,857,811	Sokoto state

Source: FID 1980:7.

The Federal Government also intends to improve natural pastures through the introduction of cultivated pasture areas, and the adoption of forage and conservation practices and stepping up the use of protein supplements and crop residues (Awogbade, 1981).

The Federal/State Governments have launched the National Accelerated Food Production Program (NAFPP). Before the "Green Revolution Programme" was launched the 'Operation Feed the Nation' (O.F.N.). The "Green Revolution" launched in 1980 was aimed at making Nigeria self-sufficient in food crops. It is hoped that with the "Green Revolution Programme" it would be possible to make Nigeria an exporter of some products and regain her leading position in the production and export of palm oil, ground nuts, cocoa, cotton and other crops.

The objectives of the 'Green Revolution Programme" include among others to promote increased production of food and raw materials to meet the needs of a growing population and rising industrial production; increased production and processing of export crops with a view to expanding and diversifying the country's foreign exchange earnings. The program also aimed at the expansion of employment opportunities to absorb the increasing labour force of the nation and the evolution of appropriate institutional and adminstrative apparatus to facilitate the rapid development of the country's agricultural potential (NPOD/FMNP., 1981).

To enhance achievement of these objectives the Federal and State Governments planned to invest ₦9.031 billion with allocations of ₦5.620 billion to crops, ₦2.22 billion to irrigation and Water Resources development for which a new Ministry of Water Resources has been created.

Livestock has an allocation of ₦0.675 billion, ₦0.171 billion to forestry and ₦0.299 billion to fishery. There are various provisions to ensure success of the plan including credit support, agricultural processing, the development of appropriate rural structure through integrated rural development including the integrated development programs (ADPS) for which ₦2,342.29 million has been allocated. The Federal and State Governments and the World Bank are involved in the scheme (Okigbo, 1981).

Constraints to the "Green Revolution" Program:

It has been observed that the "Green Revolution Strategy" is that of a package deal since it needs the application of imported seeds, fertilizer, tractor and others. These imported and expensive inputs have adverse effects on certain chemicals on soil/crops. Besides this importation adversely affects the indigeneous varieties of food crops which tend to be neglected.

Others opined that, though the program sounds noble, it has not benefited the majority of small farmers. The inputs did not get to the farmers, and if not at the right time. The millions of naira expended on the program found their ways into the hands of unscrupulous agents and some government officials.

Besides, the program lacks a meaningful degree of political commitment and effective backing of meaningful research and development projects. It also lacks an effective communication between Scientists and policy makers.

There are also the physico-chemical constraints which include the effects of climate and soil type on production. Crops and livestock productivity could also face some biological constraints. Other constraints are the socio-economic which include the effects of the land tenure system, lack of credit, poor extension services, poor transportation and lack of a farmer's organization.

To therefore make the "Green Revolution Program" a success, there is the need to mobilize farmers through setting up a national office for peasant mobilization. The program should also aim at growing food varieties adaptable to the farmers and our environment. The setting up of farmers co-operatives at village level will facilitate the procurement of inputs and credit facilities. There is the need to creat credit institutions solely to aid in getting loans at subsidized rates (Abalu et al., 1981).

The International Livestock Center For Africa (ILCA)

Established in 1973 at the initiative of the Consultative Group on International Agricultural Research, ILCA, with its headquarters in Ethiopia operates in Botswana, Kenya, Mali and Nigeria. ILCA operates within the following mandate: "to assist national efforts which aim at effecting a change in production and marketing systems in tropical Africa so as to increase and sustain the yield and output of livestock and improve the quality of life of people of the region" (ILCA, First Year, 1980:4). In early 1978, ILCA came into agreement with the government of Botswana to apply the beef cattle production model development at Texas A & M University (TAMU). This model can be used to predict animals and herd productivity under a variety of management regimes in diverse environments. Economic analyses can then be made, based on these [illegible] predictions. Under the agreement ILCA sponsored the application of the TAMU model in Botswana with the objectives of introducing computer-based modelling techniques would assist research and development activities (ILCA System Study 1, 1978).

ILCA's interest in the Subhúmid Zone of West Africa has been stimulated by the potential of this unexploited region for expanded and improved livestock production. An expanded livestock industry in this zone would serve not only to increase the overall supply of livestock products in West African countries, but would also serve to reduce the pressure on the more densely populated and

more heavily grazed semi-arid zone to the north, which has been particularly affected by the droughts of the early 1970s (ILCA, System Study 2, 1979).

In Nigeria, ILCA's program centre around Kaduna (sub-humid zone) and Ibadan (Forest zone). The sub-humid program is concerned with the design and improvements of livestock production system. Areas identified as case study areas in the sub-humid zone include Abet, Karmin Biri (Kaduna state), Mairiga (Niger state) and Lafia (Plateau state). This study covers only the Abet and Kurmin Biri areas which are some of the operational areas of ILCA in the sub-humid zone. ILCA established contact with National Animal Production Research Institute (NAPRI) and other research institutes of Ahmadu Bello University and instituted a research programme on livestock production in the sub-humid zone in 1978, centred at Kaduna. It was recognized that considerable information had already been generated concerning livestock production in the sub-humid zone, but this information needed to be brought together so that remaining gaps could be identified for further research.

1.3 Background to the Sub-humid Programme by ILCA.

ILCA considers the natural grasses of the sub-humid zone are capable of giving high dry matter yields, although they are notoriously low in digestible crude protein. The fibre content is reduced to critical levels during the dry season. ILCA sees the solution to this as lying in the introduction of feed supplements or in growing improved grasses and legumes (Fodder-bank). To overcome milk shortages, reserachers carried out at Vom (Kaufman, 1979:17)

show that milk yield is higher when Bunaji is crossed with Friesian (i.e. exotic cross-breeding). The result of the researches are indicated in Table 1.3.

Table 1.3: Milk Yield (kg) in Cross-Breeding Bunaji and Friesian.

Bred	Length of Lactating Day	Milk Yield Kg
Bunaji	246	840
½ Friesian	262	1,690
¾ Friesian	271	1,900
Pure-bred Friesian	281	2,440

Source: Kaufman: 1979:17.

ILCA attempts to improve animal nutrition through forage, agro-industrial by-products and legume supplements. Agro-industrial by-products used include molasis and urea, groundnut and cotton seed cake. Forage legumes were planted on crop farms of pastoralists and some arable farmers. Supplementation feeds were given to animals during the dry season when mild supplies decrease. Separate corrals were built for the selected animals, the feed was weighed daily and delivered to each of co-operating pastoralists. ILCA field officials paid constant visits to co-operating pastoralists to get acquainted with problems and to offer help. In the study areas, ILCA invited all pastoralists to join in its schemes. Few did co-operate.

In adopting the supplementation feeds, a pastoralist is supposed to buy a 50 kg bag of cotton seed cake either

on credit (payable after a month) or in cash. He is instructed by ILCA to feed only animals on pressure i.e. lactating cows, heifers, pregnant cows. He is supposed to feed each animal on pressure on a 3 kg of cotton seed cake per day.

The fodder bank concept is new to the area. The normal procedures are to clear a vast area of land, fell the trees and corral animals on the site for a period of not less than 2 weeks. It is fenced with stalks cut from the nearby forests. Those who are financially strong could purchase iron fencing or the tough fencing poles from the forestry Ministry. The pastoralist is supplied the stylo seed by ILCA (at the initial stage) which he boils and spreads out to dry before mixing with fertilizer superphosphate). He broadcasts the seeds over the entire area. As the seeds germinate, there is the need to get rid of weeds and hence the pastoralist "recalls" his animals to eat up the weeds. He is also instructed to allow only animals on pressure in the bank.

The exotic cross-breeding concept which is also new to the area demands the pastoralist offering his cows or heifers to mate with the exotic breed. If he needs to preserve one, he has to dip, fence, and feed it on the modern feeds. ILCA officials pay regular visits to the herders animals. The calves are usually the pastoralist's possessions.

1.4 Statement of the Problem

In an attempt to increase cattle production, the Federal/State governments through her agencies (research institutes) have introduced improved animal packages to the pastoral Fulani. Attempts have also been made to persuade the Fulani to accept these packages. Results, however, have shown that the Fulani are not ready to accept these packages (Sule, ILCA, No. 22:7). Animal scientists confirm that the traditional livestock producer in Nigeria is confronted with two problems: feed availability and the quality of the available feed. With the attendant low palatability and low nutritive quality due to high fibre content, our natural grasses contain low contents of nitrogen and other nutrient elements. Despite the abundant evidences supporting heavy weight losses during the dry season for animals depending on natural grasses alone (Oyedipe, et al., 1982, Topp, 1977, Zakari, 1981; Illesmade, 1981), and the failure of the previous schemes e.g. Ruma Kukar Jengarin in Kaduna State set up by the then Northern Nigeria Government (Awogbade, 1981), there is the need to find out why the pastoralist is still reluctant to accept these inventions. Common practices aimed at increasing animals productivity among the pastoralists include animal selection, inbreeding and to a lesser extent, cross-breeding. The purpose of animal selection which is to improve the average level of a livestock population for a specific trait or combined traits is referred to as heritability of the trait (Williamson, et al., 1978:175). The specific traits

considered by the Fulani are milk yield and growth rate among the bulls. This practice no doubt explains the existence, in herds, of old bulls uncastrated. These bulls are products of damns with high milk off-take, kept to fertilize other selected heifers in the herd. The in-breeding practice is the most commonly found among the [illegible] pastoralists. Okaiyeto (1980:47) reported that two dominant breeds (White Fulani and Sokoto Gudali) dominated pastoralists herds.

The logic behind this is to ensure adequate information on the type of curative measures in case of epidemics. Besides, there is the adaptability factor which enables the pastoralist to herd only animals suitable for his environment; he also find it easy to trace his misplaced cattle as a result of the emotional bond and affection developed with his cattle. The cross-breeding practice which involves matting unrelated livestock and meant to upgrading livestock production and developing new breeds is not a common practice among the pastoralists. Oyenuga (1967) reported that the Fulani are familiar with the white Fulani or Bunaji, which he terms as good stock and a good dual purpose animal. He also reported yields of 1,082 kg in 305 days at 7.5% butter fat for some Bunaji cows kept at the University of Ibadan farm. ILCA (1978) also reported an above average for all the main production traits such as calving interval, milk production and growth when the Bunaji breed was compared with more than twelve other indigenous breed under

It is an attempt to provide answers to these research questions that has prompted this study.

1.5 Objectives of study

In general this study aims at finding out factors which either facilitate or inhibit the farmers' adoption of three agricultural packages (the ILCA type).

1.6 Specific Objectives:

(1) To study the nature of the innovation and how it affects the adoption behaviour of pastoralists.

(2) To determine the socio-economic characteristics of the pastoralists which influenced the adoption of the innovation.

(3) And on the basis of the findings make suggestions as to how the adoption process can be accelerated to increase the number of adopters which will subsequently improve our livestock production.

1.7 Justification of Study:

In order to promote and facilitate the adoption of agricultural innovations, it is necessary to first identify the incentives perceived by farmers; secondly, to design a strategy to strengthen the influencing power of incentives and simultaneously weaken the forces of disincentives. In achieving objective one, the procedures involved in adopting the three packages (supplementation feed, fodder bank and exotic cross-breeds) are studied. The complications in the innovations as related to factors affecting

adoptions are also studied. These include rationing of feeds to only animals on pressure, management of the innovation in terms of the procurement of the inputs, dipping, fencing and veterinary attentions needed by the animals. Others are the procedures involved in setting up the fodder bank - corralling of animals, broadcasting of feeds, fencing and 'recalling' the animals to feed on the weeds. Rationing of the sillage - feeding only animals on pressure are part of the factors studied in achieving this objective.

Objective two is achieved by asking questions related to the socio-economic characteristics of the pastoralists. Attempts are also made to see how these socio-economic variables affect adoption. These variables are age, level of schooling, literacy level, number of farm sites, level of living, household size, herdsize. Other variables include the effect of pastoralists' perception of the innovation in terms of the availability of inputs, veterinary services, management, and the effect of the advantages of the innovations on adoption. Identifying reasons for adoption or non-adoption of innovations will place the change-agents in better position to tailor their communications to suit their local setting. It is through such process of assessment and redirection (where necessary) that livestock production can be expected to increase, thereby making the nation save her foreign reserves and improve the rural life. Our research and government agencies require information regarding the outcome of their innovations to enable

improvement in their programmes. Socio-economic studies which identify the obstacles most likely to act as blockages when the innovations are introduced, will no doubt benefit this body of change-agents.

1.8 Organization of Thesis:

This thesis is divided into five chapters. Chapter one deals with the introduction, the strategies to livestock development, the statement of the problem and objectives of study.

Chapter two focuses on the literature review, theoretical framework, the operational indices and the working hypotheses. Chapter three deals with the methods and procedures of data collection, while chapter four is on the findings. In chapter four an attempt is also made to test the working hypotheses.

Chapter five is the final chapter and focuses on the discussions of findings, implications of findings and recommendations.

CHAPTER II

A REVIEW OF LITERATURE

2.1 Introduction:

One of the major stumbling blocks embodied in the "transfer of technology" to a farmer is getting him to accept and practise the agricultural innovations. This problem emanates from an inadequate understanding of the relationship between the biological, economic and social components of the production system. As regards plans to increase livestock production, there is a disregard (to use) for the pastoral populations' own knowledge in animal production (Awogbade, 1981). It therefore becomes difficult to understand why farmers fail to adopt certain interventions since most of the efforts at solving the agricultural problems tend to be too technical in nature (Abalu, et al., 1981). In order to therefore assess why farmers adopt or do not adopt innovations, we have to look at the inhibitors (limiting factors) and the facilitators to innovation adoption.

Rogers and Standfied (1968:41-46) noted that education, high income, higher level or living, higher achievement motivation, mass media exposure and participation in group activities are factors that affect adoption. According to Lionberger (1960:1-23), social factors such as neighbours, communities family social cliques; cultural factors such as values and attitudes, personal factors including age,

education, psychological characteristics and situational factors including farm size, farm income, social status, community prestige are among forces that encourage or discourage ! adoption. Mosher (1971) upholds that education, credit facilities, membership of associations and co-operations affect adoption.

Research findings on adoption of innovation reveal that one of these incentives/inhibitors is the socio-cultural factor. The Nigerian farmer is surrounded by many deep rooted social and cultural factors which could hinder him from adopting modern technologies; the most important here being the land tenure system. Norman's (1980:15) and Williams' (1978:5-6) studies confirm that people who do not possess land were among the non-adopters of improved agricultural technologies. This issue cuts across the pastoralists viewed as "having no permanent abode". Expressing the same view Tivor (1978) observed that the problem of planting improved grasses and legumes lies not only in the expensiveness of bush clearing and seed bed preparation, among other things, but also in the ability of the target group to possess land. Another socio-cultural factor is the village/family structure. In most traditional households, decisions come from the household head, who act as both legal and political spokesman on all matters (Awogbade, 1981). His decisions are influencing, and therefore might dictate either to adopt an innovation or not. The effect of this structural arrangement is seen in Williams' study (1978:5-6) where villagers refused an innovation since "no one in the village did so".

The land tenure system in Nigeria remains a very strong bottleneck to agricultural development. This is a problem that even the latest Land Use Act of 1978 has not been able to resolve. The cattle producers do not have title to land. Usually land is communually owned. With the existing pastoralist notion of the pastoral free range philosophy which implies free access to water and fodder resources of forest, fallowed land and harvested fields (Van Ray, 1975:27), conflicts arise with the indigenes who feel the pastoralist own no claim to land (Kaduna State Land Report, 1981). Very closely related to the tenured problem is the problem of feed resources for beef cattle in Nigeria. Despite the fact that cultivatable land is estimated at 74.00 million hectares (Land Use Decree, 1978) of which a large proportion can support grain, Nigeria is still one of the grain-deficit parts of the World. About 2.6 million tons of grain equivalents are being imported annually and a deficit of 5.5 million is expected by 1985 (Federal Ministry of Planning, 1981, 4th Development Plan, 1981-1985). The supply of by-products are irregular and inadequate and price highly fluctuating.

There is the conflict between the goals of the subsistence Fulani and the national objective of raising the nation's standard of living. The Fulani holds his cattle in form of wealth and in trust for future generation which does not simultaneously meet the nation's objectives. Ekpere (1979), noted that the fact that Fulani rarely sell

cattle was substantiated in their survey. Okaiyeto (1979), also noted that sales of cattle were not regular but were towards specific need and erratic. Von Raay (1975), noted that cattle occupies a position beyond its utilitarian or pecuniary value in the life of a traditional pastoralist. According to Raay, the acquisition of stock and the continuous assurance of its well-being is both a means to an end in itself. Hopen (1970), noted that the pastoralists hold their cattle in trust for the future generation. Hence any innovation which would involve a pastoralist tampering with his animals is frowned at.

Based on this "cattle complex" concept, Pino (1970: 39-42), noted that the "livestock keeper be assured of cultivating no fear that the threadline on which his survival depends will be broken".

Related to this also, is the notion held theoretically that pastoral Fulani women do not own cattle. In practice, they own cattle allocated to them either as their dowry, rights by status as a wife, and their children's cattle (Okaiyeto, 1980:4). This practice is an important factor while studying adoption of innovation, since the usual thing is to see the household head decision as final; the female owners could refuse any innovation and hence inhibit a adoption. This implies that unlike in the arable farmers household where the household head is the overall decision-maker, a lot of differences occur in the pastoralist household.

In places where innovations are adopted reasons adduced for the success are the profitability of such innovations. William (1980:6), Clark and Akinbode (1968:22), reported that most farmers that adopted felt they could make more money. Other reasons for successes include ownership of large parcels of land, good liquidity and some education (D'Silva and Raza, 1980). Other disincentives to adoption include consumers' distate of the products and hence making it difficult for the farmers to sell (Williams, 1972), lack of credit facilities to implement the innovations (Kidd, 1968:5).

Other studies carried out on adoption try to relate personal and socio-economic characteristics of the farmers to adoption. Voh, (1980:18-20), reported a positive relationship between level of formal education, level of literacy, number of farm sites, size of the farmily household, urban contact, socio-economic status and additional occupation, to adoption. Basu (1969), in his study of four villages in the former western state found that size of farm, ownership and full time occupation were important factors associated with adoption of farm practices. Alao (1971), found family size, exposure to mass media, participation in voluntary organizations, cosmopolitanism, farm size and level of awareness to be positively and sifnificantly associated with farmer's adoption score. Atala (1980), reported statistically significant association between awareness and accessibility to change object and adoption. Atala (1980), Voh (1979), in their various studies reported that adopters were younger than non-adopters.

Gefu's (1980), study on goat managment practices in Kano State, reported that level of education, visits to veterinary office, household size, investment on goat, number of goats started with, goat herdsize, income from goat, and distance of veterinary office and government goat farms affect adoption. Clark and Akinbode's study (1968), found among poultry and egg farmers (of Western Nigeria) high adoption to be significantly ocorrelated with size of poultry enterprises, value of form products sold and size of family.

Rogers and Shoemaker (1971) found a positive relationship between level of living and adoption. Essentially, level of living refers to the variety, quantity and quality of the goods and services used to meet the physical and psychic needs of an individual or an individual family (Atalat, 1980). This variable is referred to as socio-economic status (Voh, 1979 and Raza, 1969:37). Voh (1979), Atala (1980) and Raza (1969), reported this variable to be positively related to adoption.

In summary, the major factors related to the adoption of agricultural innovations include formal educational literacy, usage of certain sources of informations, farm size, household size, and hordsize, farm income, cosmopoliteness, community status, awareness and farm visits and socio-economic status.

2.2 Theoretical Framework

A close look on theories of social change reveal that societies exhibit two kinds of forces: those which seek to promote change, and those that strive to maintain the status quo. These forces, according to Foster (1962:58-59) "are locked in perpetual combat, the former trying to throw the latter off-balance, to gain ascendancy, and the latter trying to prevent this from happening". To attain a desirable level in the alteration in structure and functions of social system, deliberate and systematic efforts (i.e. planning) are needed. In achieving its mandate, ILCA operates a planned system model which addresses itself to three broad types of problems: the first is the herd-level model representing a complex set of biological processes in an environment. This is to study the different productivity assumptions and to make preliminary assessments of research and development options.

The second is the farm planting model whereby livestock production is closely integrated with crop farming. The third model addresses itself to policy issues. This evaluates aggregate implication of possible changes in livestock production system (ILCA First Year, 1980:4). Rogers (1971:6), asserts that imminent (internal) social change occurs when members of a social system with little or no external influence create and develop a new idea which then spreads within the social system. Contact change occurs, according to Rogers, when sources external to the social system introduce a new idea. It may be either selective or directed. Selective contact results

when members of a social system are exposed to external influences and accept or reject a new idea from that source on the basis of their needs. The directed social change, or planned change, is caused by outsider t who, on their own or as representatives of change agencies, intentionally seek to introduce ideas in order to achieve goals they have defined. Rogers (1971:9) also asserts that social change consists of three sequential steps: invention, diffusion and consequences. By invention he meant the process by which the ideas are created or developed; by diffusion he meant the process by which these ideas are communicated to members of a social system while the consequences are the changes that occur within a social system as a result of the adoption of innovation.

Different disciplines follow different approaches to explain the phenomena of change. Miles (1964:13) suggests that change according to a sociological standpoint occurs by the alterations of goals, structures, or processes in a social system. Cultural anthropologists view it as "spontaneous change" caused by the diffusion process. They suggest that change is inevitable as long as there is contact and when there are elements (culture, facts, materials, social structures) to be diffused (Liton, 1963:334). Many economists support a theory of economic determinism. "The mode of production" according to Etzioni and Etzioni (1976:7) "in material life determines the general character of socio-political and spiritual processes of life. With change of the economic foundation, the entire

immense superstructure is more or less rapidly transformed". The social psychologists assert that interaction among human beings is the basis of social change. "Interaction", according to Lambert and Lambert (1962:84), "is the process by which people influence one another through mutual interchange of thoughts, feelings and reactions".

Lippit (1953:6) recognizes three types of such forces: change forces that motivate people to change by creating dissatisfaction with the status quo and favourable judgement of potential future situations; resistance forces; which motivate people not to change, that rise from uncertainty of the unknown and inability to change, and interference forces which obstruct change without being directly related to it. To therefore understand these forces, there is a need to understand "farmer circumstances defined as those factors which affect farmers' decisions with respect to agricultural technology - their natural environment (such as rainfall), their economic environment (such as product market) and their own goals, preferences and resoruce constraints (Winkhelman, 1968:3). These "farmer circumstances" should dictate, in a planned change and contact change like the ILCA type, innovations' appropriateness. This is so since technologies bring about change. And according to Marris (1973:21-26), "change is not threatening to the man whose purposes it expresses and whose expectations it confirms, but it may be profoundly disturbing to those who do not understand its purpose, interprete their lives in different terms and have no experience of relationships which to him are familiar".

Rogers and Shoemakers (1971:9), Fliegel and Kivlin (1966:41-42) gave other relevant attributes of innovation. These include the cost (financial and social), the returns to the investment, the efficiency of an innovation, the risks associated with the innovation, and its visibility. These attributes act as incentives or discentives to adoption.

The foregoing theories and concepts of social change have pervasive propositions, expressed or implied that the essence of change is the dynamic interaction of two sets of opposing forces perceived cummulatively as incentives for change. These theories and concepts focus on strategic questions relating to the introduction of new practices to traditional farmers, their adoption and use of those practices, and factors that influence the adoption of the different components of the package of innovations.

2.3 Operational Indices

(a) Socio-Economic Variables: The socio-economic variables investigated in this study were age, household size, years of schooling, level of literacy, level of living, herdsize, additional sources of income and number of farm sites.

(b) Age: This refers to the approximate chronological age in years of the respondent as given at the time of data collection. It was measured as actual age given in years.

(c) Household Size: This refers to the number of wives, children, relatives and dependents actually living with the respondent in his household at the time of investigation. It was measured by adding up the numbers reported. The total number constitutes the respondents' score on the variable.

(d) Level of Schooling: This refers to the number of years the respondent spent in the Koranic and Western Schools. Respondents who attended Koranic schools alone were scored on the actual numbers of the year such attendance was made. Those who had both the Koranic and Western education were scored on the number of years spent attending both. The total number of years spent schooling constituted the respondents' score on the variable.

(e) Level of Literacy: This refers to the pastoralist's ability to read in Hausa, Fulbe, Ajami and English. It was measured by a score of one for each of the languages he purported to read and write. The scores therefore ranged from 0 - 4.

(f) Level of Living: For the purpose of this stidy, level of living was measured by checking how many of the durable goods and farming equipment listed in the questionnaire were possessed by an individual pastoralist's household. Raza (1969:39) used variables like income, and landholdings, material style of life and education. Voh (1979) and Atala (1980) used durable good items like radio, bicycle, motor-cycles,

car, zinc-roof, refrigerator, sewing machine, tractors, ploughs, cutlasses, hoes, stores among others to see the relationship between level of living with adoption. The durable good items were (a) Radio, (b) Bicycle, (c) Motor-cycle, (d) Car, (e) Zinc roof, (f) Mattress. The four equipment items were (a) Ox-plough, (b) Tractors, (c) Cutlasses, (d) Hoes, (e) Sprayers, (f) Knives, (g) Axe and (h) "others".

Each item was given monetary value based on its current market value in 1983 as determined by the investigator. The monetary value of each item was multiplied by the total number of the same items possessed by the individual pastoralists household. The products for all the items possessed were summed up to give the individual pastoralist household level of living score.

(g) Herdsize: This refers to the total number of goats, sheep and cattle owned by the respondent at the time of data collection. It was measured by the total number of livestock reported by the household.

(h) Additional Occupation: This refers to the number of additional or subsidiary occupation a respondent is engaged in. It was measured by the number of additional or subsidiary occupations reported.

(i) Number of Farm Sites: This variable refers to the actual number of farm sites (cultivated, uncultivated)

possessed by the respondent at the time of survey. Norman (1980:15), Williams (1978:5-6), D'Silva and Raza (1980), laid emphasis on the relationship of this to adoption. For the purpose of this study a respondent was asked to give the actual number of farm sites he possessed. His scores corresponded to his actual number of fields given at the time of survey.

Perception Variables

For the purpose of this study perception refers to respondent's view of the innovation. This is seen in terms of its advantages, management, availability of veterinary services, availability of inputs and family support.

(j) Perceived Needs and Availability of Inputs: This variable refers to how the respondent perceived ease or otherwise of getting the inputs and the perceived inputs needed. The respondent was therefore asked two questions; firstly, he was asked to mention the inputs he perceived he needed for adopting the innovations. These inputs were feeds, fencing stalks, barbed wire, stylo seeds, fertilizer, land, the exotic cross-breeds, dipping equipment and veterinary care. The inputs were eleven (11) in number and therefore a respondent's score corresponded to the number of inputs he perceived he needed.

He was also asked if getting these inputs (the eleven above), were easy or difficult. He gets a score

of one for each of the perceived easy inputs and a zero for the perceived difficult inputs. His total sources on this variable therefore corresponded to the total number of scores on the two set of questions.

(k) Perceived Availability of Veterinary Services: This variable refers to the respondent's perceived availability of veterinary services. He was asked these sets of questions; firstly he was asked whom he consulted when his animals were sick. He gets a score of 2, 1 and 0 for mentioning veterinarian, local medicine men refers to non-veterinarians or animal scientists who prescribe some animal medications to pastoralists and self cure respectively. He was also asked if getting the veterinarian was easy, difficult or impossible. This is cscored 2, 1 and 0 respectively. Thirdly he was asked to give his general impression on the veterinary services in the area. This is scored 2, 1 and 0 for mentioning satisfactory, indifferent and not satisfactory respectively. His total scores on this variable therefore corresponded to his total score on the three sets of questions.

(l) Perceived Advantages of Innovations: This variable is defined as the perceived positive benefits accruing from adopting the innovations. These are more milk off-take, healthier calves, shorter-calving period, starvation avoidance, bigger carcases, sedentarization, early maturing and more valuable animals. The advantages are

eight (8) and therefore a respondents' score corresponded to the number of advantages he mentioned.

(m) Perception of Ability to Manage: This variable refers to how the respondent perceived adopting the innovations He was therefore asked two sets of questions. Firstly, he was asked to give his general impression on managing each of the three packages. He gets a score of 2, 1 and 0 for mentioning easy, difficult and impossible respectively for each of the packages. Besides he was asked to give his perception of each of the procedures in adopting the innovation. These were (a) getting the feeds (b) rationing of feeds (c) credit availability (d) getting land (e) seeds (f) controlling the effects of disturbance growing (g) guidance (h) Fencing materials (i) the seed bed preparation (j) weed control (k) disease prevention (l) prompt veterinary services (m) dipping (n) fencing and housing. The scores on the procedures are fourteen (14) (i.e. a score for mentioning "easy" for each procedure). The respondent's total number of scores on the two sets of questions.

(n) Perceived Family Support: For the purpose of this study, this variable refers to how the family members can influence respondents' acceptability or rejection of the innovation. A respondent was therefore asked two sets of questions, first, if he found it easy, difficult or impossible to generally sought family support. This

is scored 2, 1 and 0 respectively. Besides he was asked to indicate the supports he perceived he would receive. Items on the questionnaire were five (5) i.e. family labour, financial, advisory, inputs and veterinary helps. Each item was scored one. [illegible] respondents' score on the two sets of questions corresponded to his score on the variable.

(o) Adoption: This variable is not a perception variable. It is the reported use of recommended modern animal husbandry packages. Three recommended packages were studied; and the adoption index for each respondent was calculated by adding up the number of recommendations included in each package and adopted by the respondent. Voh's study (1979) of factors associated with adoption of recommended farm practices among Giwa farmers assigned unit weights to all items. Rogers and Rogers (1961) have shown that the effects of unequal weighting are negligible on a statistical point. On these bases, each recommendation was assigned a score of one. For the supplementations package, the recommendations are:

(a) buy supplementation feeds

(b) feed only animals on pressure (rationing)

The recommendations for the fodder bank package were:

(1) Clearing/fencing an area of land

(2) Corralling animals on site

(3) Broadcasting style seeds

(4) "Recall" animals to corral

The exotic cross-breed recommendations were:

(1) Allow your cows/heifers to mate with the exotic bull

(2) Possessing one exotic cross-breed

(3) Dipping

(4) Fencing and housing

(5) Feeding

(6) Veterinary Services.

Since each practice adopted was credited with a unit score, scores on this ranged from 0 - 12. The index so constructed forms the dependent variable.

2.3 Hypotheses

(i) There is a relationship between the socio-economic characteristics of the individual pastoralist and the adoption of innovation.

(ii) There is a relationship between how a pastoralist perceives the innovation and adoption of innovations.

2.4 Specific (Empirical) Hypothesis

a) There is a positive relationship between years of schooling and adoption of innovations, i.e. the higher the respondent's years of schooling the higher the level of adoption.

b) There is a negative relationship between pastoralist's age and adoption of innovation, i.e. the younger the respondent the higher the level of adoption.

c) There is a positive relationship between household size and adoption of innovation, i.e. the larger the size of the household the higher the adoption of innovation.

d) There is a positive relationshp between pastoralist's herds size and adoption of innovation, i.e. the larger the herdsize of a pastoralist, the higher the adoption of innovation.

e) There is a positive relationship between pastoralist's other sources of income and adoption of innovation, i.e. the more secondary occupations a pastoralist engages in to augment incomes earned from his primary occupation (pastoralism), the higher the adopting of innovation.

f) There is a positive relationship between a pastoralist's level of living and adoption that the higher the level of living of a pastoralist, the higher the level of adoption.

g) There is a positive relationship between the number of land sites possessed by a pastoralist and adoption i.e. the greater the number of land owned by a pastoralist the higher the level of adoption.

h) There is a positive relationship between pastoralist level of literacy and adoption, i.e. the more literate the pastoralist the higher the level of adoption.

i) There is a positive relationship between perceived availability of inputs and adoption of innovation, i.e. adoption of innovation is high when a pastoralist perceives it easier to acquire the inputs.

j) There is a positive relationship between perceived available veterinary services and adoption of innovation, i.e. adoption of innovation is higher when a pastoralist perceives it easier to get the veterinary services.

k) There is a positive relationship between pastoralist's perception of management of innovation and adoption i.e. the easier it is to manage the innovation the higher the adoption.

l) There is a positive relationship between pastoralist's perception of the advantages of innovation and adoption, i.e. the greater the advantages perveived by a pastoralist the higher the adoption.

m) There is a positive relationship between pastoralist's perception of his family support and adopters of innovation, i.e. the more supports a pastoralist received from his family, the higher the adoption.

CHAPTER III

METHODS AND PROCEDURES

This chapter focusses on the description of the study area, method of selecting the sample, and the questionnaire utilized to collect data. The procedures used in analysing data are also enumerated.

3.1 Data Collection

A reconniasance survey of the study area was undertaken under the sponsorship of ILC' between January and April 1981. During this period, the number of households which fell within the operational areas of ILC' were identified. This included areas where at least a pastoralist was adopting one of the three packages.

Interview schedule was administered on the village chiefs (Ardo). Their opinions as to how they felt or interpreted their subjects perceptions of the innovations were sought. In places where it became difficult to administer questionnaire on respondents, the village chiefs had to intercede by assuring the respondents of the significance of the research. On ILC' and Livestock Project Unit (ILCA) officials, the interview schedules focussed on the channels followed in passing the message of the new innovations to the target-group. It also focused on how prompt attention was paid to deserving pastoralists who complained on any of the innovations.

Questionnaire was administered to all the household heads (the unit of analysis), who were assumed to be the main decision makers as far as livestock operations are concerned. Though the female members have a right to say on how best to manage their cattle, the unit of analysis is the household head, which by the tradition of the pastoralist is the male.

3.2 Village Selection

In selecting a village for this study, certain criteria were decided upon. One of those criteria was that the village should fall within the operational area of ILCA. Secondly, in each village there should be at least a pastoralist adopting one of the packages. This was determined during the reconniasance survey. Thirdly, the pastoralist must be a settled Fulani i.e. (Katchekerie).

3.3 Area of Study

The areas of study are (areas where) the interventions - cross-breed, fodder bank and supplementary feeds have been introduced with the objective of transforming the traditional systems of production. The areas are all in Kachia Local Government Area of Kaduna State specifically referred to by the institutional organisation as sub-humid zone - Abet, and Kurmin Biri areas.

Abet:

Abet is a territorial section of Kaje land, administratively included in Zangon Katab district. The zone is

more densely populated and heavily cultivated than the Kurmin Biri area. Bourn, et al. (ILC/ 36) found 24% of the land to be under cultivation and 33% fallow. The density of humen habitation was about 2.5 compounds per sq. km. Below is a Table showing livestock population at different times of the year.

Table 3.1: Livestock Population (Dry and Wet Seasons) in Abet Area

Livestock	Dry Season	Wet Season	% Change
Total cattle population	292,440	56,275	- 39%
Cattle density	37.4	27.7	9.7%
Total cattle herds	1,940	915	53%
Herd density	0.78	0.37	0.41%
Mean cattle herd size	47.8	60.7	- 27%

Note: Differences between dry and wet seasons counts are mainly due to influx of nomadic Fulani.

Sources: ILC/ (Intern. Comm. 36).

The Kurmin Biri Grazing Reserve:

The Kurmin Biri Grazing Reserve extends roughly from the Kaduna - Kachia highway to the Kaduna River, through uninhabited bush covering an area of 2,300 sq. kilometers. The few settled areas are Kurmin Biri, Unguwar Bala, Unguwar John, and the Sabon Kaura which is partly within the pheriphery of the reserve and Aduwa which is right in the middle of it. Kurmin Biri has a railway station. An area

survey conducted by Bourn et al. (ILCA 36) puts approximately 15% of the land under cultivation and 15% under fallow; human habitation was at a low 0.5 compound per sq. km. Most of the cultivation and human settlements were situated on the southern and northern boundaries of the reserves, near the railway line and the main road respectively. Crops grown here are millet and guinea corn, yam, earth peas, beans, rice in the fadamas and some groundnuts.

The pastoralists live in a zone reserved by government solely for cattle keeping; but which does not exclude the possibility of pastoralists growing food crops. Below in Table 3.2 is livestock population on Kurmin Biri reserve.

Table 3.2: Livestock Population on Kurmin Birin Reserve

Total Cattle Count	
Number of Cattle	3,885
Cattle density	9.74
Numbers of Herds	106
Herds Density	0.265
Mean Herd Size	38.8

Source: ILCA 36.

3.4 Respondents in the Study

On the basis of the criteria, the areas selected were Ibet and Kurmin Biri. The total number of settled Fulani in the entire area (including the outskirts) were 97. This

was made up of 14 households in Kurmin Piri (staying in the reserve), and 83 households in the Abet area.

3.5 Statistical Analysis

Percentages, means and standard deviation were used to report the demographic and livestock characteristics of the respondents. Percentages were also used to report the extent of awareness of the packages. In testing the hypotheses for ascertaining factors associated with adoption of the packages, the Pearsons correlation and the regression analysis were employed to test the extent of the relationships. For convenience the .01 level of significance is used to accept or reject the hypotheses.

In Table 3.3 below is indicated the mean, standard deviation of some of the socio-economic variables.

Table 3.3: The Mean, Standard Deviation of Some Socio-economic Variables

Socio-economic Variables	Mean	Standard Deviation
Age (years)	42	11.415
Size of Household	10	4.576
Level of schooling (years)	.57	1.576
Livestock population	57	46.626
Additional sources of income	.58	1.032
Number of farm sites	3	0.984
Wealth (possessions, naira)	264	2.411

CHAPTER IV

FINDINGS

This chapter focusses on the findings in relation to the stated objectives in chapter 2. It also reports the distribution of respondents according to the percentage that have heard of the innovations and tried the packages; also reported is the distribution of respondents according to the percentage of perception of the innovations in terms of the advantages, management, availability of inputs, veterinary services and family support.

The relationship between variables hypothesized, and the amount of variation in the independent variables as explained by the independent variables with a view to support or not support the hypotheses stated in chapter 2 is also the focuss of this chapter. These variables are age of respondent, farm size (number), household size, herdsize, years of scholing, level of literacy, level of living, sources of incomes (number), perceived advantages perceived veterinary services, perceived management, perceived availability and acquisition of inputs and perceived family support. All these variables were hypothesized to be positively related to adoption of the packages (fodder bank, cross-breed and supplementation feeds).

4.1 Findings as Related to Objective 1

Objective 1 of this study is to study the nature of the innovation and how it affects the adoption behaviour

of pastoralists. In achieving this objective the study looks at the nature of the innovation in terms of the distribution of respondents according to percentages that have tried, seen and heard of the innovation, perceived advantages, management, veterinary services, family support, and ease or difficulty of acquiring the inputs.

In Table 4.1 is reported the distribution of respondents according to their awareness of the innovation and the percentage of the number that have heard and adopted. The Table reports that out of the 93 (94.8%) respondents that heard of the recommendation of buying feeds only 16 (16.4%) adopted this aspect of the innovation. Out of the 81 (83.6%) respondents that heard of rationing of feeds only 16 (16.4%) adopted. The Table also reports that out of 82 (84.5%) that heard of the clearing/fencing land for fodder bank only 10 (10.3%) adopted. All the 10 (10.3%) sample that heard of the corralling animals on the site, broadcasting stylo seeds, 'recalling' animals to corral adopted these three aspects of the innovation. Out of the 71 (72.3%) of the respondents that heard of mating their animals with the exotic bulls only 9 (9.3%) adopted. Also only 3 (3.1%) out of the 16 (16.4%) that heard of the dipping aspects of the innovation adopted while no respondent out of the 16 (16.4%) sample that heard of fencing/housing the exotic breeds adopted. All the respondents 97 (100%) heard of the veterinary services of the innovation but 55 (56.7%) adopted.

In Table 4.2 is reported the distribution of respondents according to perceived advantages of the packages

(exotic breed, supplementation feeds and fodder bank).

The Table reports that the advantages of the supplementation feeds include avoidance of starvation 40 (41.2),

Table 4.1: Distribution of Respondents According to the Percentages that Heard of the Innovation and Percentage of those Aware that Adopted.

Recommended Animal Husbandry Innovations	No.	% that Heard of the Innovations	No.	% of those Aware that Adopted
Buy feeds	93	94.8	16	16.4
Rationing of feeds (to animals on pressure)	81	83.6	16	16.4
Clearing/fencing land for fodder bank	82	84.5	10	10.3
Corralling animals on the site	10	10.3	10	100
Broadcasting stylo seeds	10	10.3	10	100
"Recall" animals to corral	10	10.3	10	100
Mating with the exotic bulls	71	72.3	9	9.3
Dipping	16	16.4	3	3.1
Fencing/housing the exotic breeds	16	16.4	0	0
Veterinary services	97	100	55	56.7

increase milk 62 (63.9), improve calf 50 (51.5), improve health 47 (48.4) and others 14 (14.4). The advantages reported of fodder bank include avoidance of starvation 31 (31.9), increase milk 23 (23.7), sedentarize 19 (19.5), improve calf 15 (15.5) and improve animal health 19 (19.5). For the cross-breed the perceived advantages are - more milk 23 (23.7), bigger carcass 34 (34.1), more fertile 18 (18.5) more valuable 23 (23.7) and early maturing 11 (11.3).

Table 4.2: Distribution of Respondents' According to Perceived Advantage of the Three Packages

Package	Advantages	No.*	%
(a) SUPPLEMENTATION FEEDS	Avoid Starvation	40	41.2
	Increase milk	62	63.9
	Improve calf	50	51.5
	Improve health	47	48.4
	Others	14	14.4
(b) FODDER BANK	Avoid starvation	31	31.9
	Increase milk	23	23.7
	Sedentarize	19	19.5
	Improve calf	15	15.5
	Improve health	19	19.5
(c) CROSS BREED	More milk	23	23.7
	Bigger carcass	34	34.1
	More fertile	18	18.5
	More valuable	23	23.7
	Early maturing	11	11.3

*Number of responses for each advantage out of a sample of 97 respondents.

4.1.1 Respondents' Perceived Management of Innovation

In Table 4.3(b) is reported the distribution of respondent's according to their perception of management of innovation. The Table shows that 63 (64.2%) perceived it easy to manage the veterinary services, and 83 (84.5%) to manage the fencing materials. Others are getting the seeds 29 (30.9%), seed-bed preparation 19 (20.6%), getting

land 22 (23.4%), guidance/supervision 15 (16.4%) credit 11 (11.4%), control diseases 10 (10.3%), disturbance grazing effects 10 (10.3%), dipping 3 (3.1%), feed requirements 19 (20.6%) and rationing of feeds 15 (16.4%).

Table 4.3(a): Distribution of Respondents' According to an Perceived Management of the Innovation

Inputs for Innovation	NO.	%
Credit	11	11.4
Control diseases	10	10.3
Disturbance grazing effects	10	10.3
Guidance/supervision	15	16.4
Fencing materials	83	84.5
Seed-bed preparation	19	20.6
Getting the seeds	29	30.9
Weed control	14	14.3
Getting land	22	23.4
Veterinary services	63	64.2
Dipping	3	3.1
Feed requirement	19	20.6
Rationing of feeds	15	16.4

In Table 4.3(b) is reported the respondents' general perception of the packages. The Table shows that 10 (10.3%) perceived the adoption of supplementation feeds as very difficult, 1% (difficult), 46 (46.2%) (easy) while 40 (41.2%) have no idea of its ease or difficulty. In constructing and managing a fodder bank 6 (6.2%) perceived it very difficult, 6 (6.2%), easy 20 (20.6%), the majority have expressed lack

of knowledge. In managing an exotic cross-breed 26 (26.8%) perceived it very difficult, 9 (9.3%) difficult while 6 (6.2%) perceived it easy and don't know 56 (57.7%).

Table 4.3(b): Distribution of Respondents' According to General Perception of the Three Packages

Packages	Very Difficult	Difficult	Easy	Don't Know	Total
Sup. feeds	10(10.3)	1(1.0)	46(46.2)	40(41.2)	97(100.0)
Fodder bank	6(6.2)	6(6.2)	20(20.6)	65(67.0)	97(100.0)
Cross-breeds	26(26.8)	9(9.3)	6(6.2)	56(57.7)	97(100.0)

4.1.2 Respondents' Perceived Veterinary Services

In Table 4.4(a) is reported the distribution of respondents according to perception of veterinary services. The Table shows that 55 (56.8%) consulted veterinarians on animal diseases. Others consulted are herb hours 6(6.2%), traditional medicinemen 12 (12.3%) and traditional/veterinarian 24 (24.7%).

In terms of what is used in treating animals the table also shows that 2 (2.1%) did not apply any medication on their sick animals. Others are - treating with traditional mediciene 12 (12.2%), proprietory drugs 54 (54.7%), proprietory/traditional medicines 31 (31.0%).

In Table 4.4(b) is reported the distribution of respondents' general perception of the veterinary services, The Table shows that 43 (45.6%) felt satisfied, 33 (33.3%) felt indifferent while 21 (21.1%) felt it is not satisfactory.

Table 4.4(a) Distribution of Respondents According to Perception of Veterinary Services

Veterinary services	No.	%
Who Consulted		
Veterinarian	55	56.8
Neighbours	6	6.2
Traditional medicinemen	12	12.3
Traditional/Veterinarian	24	24.7
	97	100.0
Treated With		
Self-care	2	2.1
Traditional medicine	12	12.2
Proprietory drugs	54	54.7
Proprietory/trad. medicine	31	31.0
	97	100.0

Table 4.4(b) Distribution of Respondents According to their General Perception of Veterinary Services

Perceptions	No.	%
Satisfactory	43	45.6
Indifferent	33	33.3
Not satisfactory	21	21.1
	97	100.0

4.1.3 Respondents' Perceived Availability and Acquisition of Inputs

In Table 4.5(a) is reported the distribution of respondents according to their perception of availability and acquisition of inputs. The Table reports that the inputs that are easy to acquire are: family support 80 (82.4%), veterinary services 39 (40.2%). Others according to percentages are: feedstuffs 23 (23.7%), land 28 (28.9%), stylo seeds 12 (12.3), fertilizer 12 (12.3), fencing materials 25 (25.7), the exotic cross-breeds 16 (16.4), credit 26 (26.8), labour 20 (20.4) and supervision/guidance 19 (19.5).

Inputs reported to be easy to acquire according to percentages are: feedstuff 4 (4.1), land 4 (4.1), stylo seeds 4 (4.1), fertilizer 12 (12.3), fencing materials 6 (6.1), cross-breeds 6 (6.1), veterinary services 10 (10.3), credit 11 (11.3), labour 7 (7.2), family support 17 (17.6) and supervision/guidance 15 (15.4).

In terms of difficulty in getting the inputs, 51(52.5) felt it difficult to get feed stuffs. Others are according to percentages: land 33 (34.0), stylo seeds 40 (42.2), fertilizer 24 (24.7), fencing materials 18 (18.6), cross-breeds 21 (21.3), veterinary services 31 (31.9), credit 15 (15.4), labour 29 (29.9) and supervision/guidance 10 (10.3).

The inputs that are impossible to acquire are feed stuff 1 (1.0), land 16 (16.6), stylo seeds 1 (1.0), fertilizer 12 (12.3), fencing materials 7 (7.2) and cross-breeds 17 (17.6).

Table 4.5(a) Respondents' Perceived Availability and Acquisition of Inputs According to Percentages

Inputs	Easy		Easy Diff.		Diff.		Impossible		Don't Know		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Feed stuffs	23	(23.1)	4	(4.1)	51	(52.5)	1	(1.0)	18	(18.6)	97	(100.0)
Land	28	(28.9)	4	(4.1)	33	(34.0)	16	(16.6)	16	(16.6)	97	(100.0)
Seeds (stylo)	12	(12.3)	4	(4.1)	40	(42.2)	1	(1.0)	40	(42.2)	97	(100.0)
Fertilizer	24	(24.7)	12	(12.3)	24	(24.7)	12	(12.3)	25	(25.1)	97	(100.0)
Fencing materials	25	(25.7)	6	(6.1)	18	(18.6)	7	(7.2)	39	(41.2)	97	(100.0)
Cross-breeds	16	(16.4)	6	(6.1)	21	(21.3)	17	(17.6)	37	(39.1)	97	(100.0)
Veterinary Services	39	(40.2)	10	(10.3)	31	(31.9)	-		17	(17.6)	97	(100.0)
Credit	26	(26.8)	11	(11.3)	15	(15.4)	-		39	(41.2)	97	(100.0)
Labour	20	(20.4)	7	(7.2)	29	(29.9)	-		41	(43.2)	97	(100.0)
Family Support	80	(82.4)	17	(17.6	-		-		-		97	(100.0)
Supervision/guidance	19	(19.5)	15	(15.4)	10	(10.3)	-		53	(54.8)	97	(100.0)

The percentage of the respondents who perceived they had no idea of the difficulty or ease of acquiring the inputs are: feeds 18 (18.6), land 16 (16.6), stylo seeds 40 (42.2), fertilizer 25 (25.1), fencing materials 39 (41.2), labour 41 (43.7) and supervision/guidance 53 (54.8).

In Table 4.5(b) is reported the respondents' general perception of the three packages. The Table reports that respondents' perception of acquiring the inputs for the adoption of the supplementation feeds are: 25 (25.4%) perceived it very difficult, 66 (70.1%) (difficult), and 4 (4.5%) (impossible). In constructing a fodder bank, 28 (28.9%) perceived it easy to acquire the inputs, 53 (54.7%) (difficult), 16 (16.4%) (impossible) to acquire the inputs. As for adopting the exotic cross-breeds 16 (16.4%) perceived it easy to acquire the inputs while 41 (42.4%) perceived it difficult and 40 (41.2%) impossible to acquire the inputs.

Table 4.5(b): Distribution of Respondents According to their General Perception of Acquisition of Inputs of the Three Packages

Packages	Easy No. %	Difficult No. %	Impossible No. %	Total No. %
Sup. feeds	25 (25.4)	68 (70.1)	4 (4.5)	97 (100)
Fodder bank	28 (28.9)	53 (54.7)	16 (16.4)	97 (100)
Cross-breeds	16 (16.4)	41 (42.4)	40 (41.2)	97 (100)

4.1.4 Respondents' Perception of Family Support

The respondents' perception of family support is viewed in terms of: the ease or otherwise of soliciting family support and the aspects of support the respondents perceived they could get from the family. These supports are financial, advisory, labour, veterinary services and land.

In Table 4.6(a) is reported the distribution of respondents according to their perception of these supports. The Table reports that 16 (16.2%) perceived getting 65 (66.2%) veterinary services and 9 (9.3%) land.

Table 4.6(a): Distribution of Respondents According to their Perceived forms of Family Support

Supports in the Form of:	No.	%
Financial	16	16.2
Advisory	50	51.3
Labour	19	19.4
Veterinary services	65	66.2
Land	9	9.3

In Table 4.6(b) is reported the distribution of respondents' general perception of soliciting family support in terms of ease/difficulty. The Table reports that respondents' general perception of soliciting for family support in adopting the supplementation feeds is high with 78 (81.2%) perceiving it easy while 19 (19.7%) difficult. In constructing a fodder bank 29 (29.7%) perceived it easy while 68 (71.3%) perceived it difficult.

As for the adoption of exotic-breeds 15(15.4%) perceived it easy, 79 (81.4%) difficult and 3 (3.2%) impossible.

In conclusion, a large number of respondents had heard of the innovation while a few adopted. On perception of innovation variables, it is found that a large number of respondents perceived it difficult to acquire the inputs and manage the innovation. The general perception of veterinary services is not satisfactory. The perception of respondents of the advantages of the innovation is high. The respondents also perceived it easier to get family support in adopting some aspects of the innovation while they perceive it difficult to get family support in adopting others.

Table 4.6(b): Distribution of Respondents According to their General Perception of Family Support for the Three Packages

Packages	Easy No. %	Difficult No. %	Impossible No. %	Total No. %
Supplementary feeds	78 (81.2)	19 (19.7)	-	97(100.0)
Fodder bank	29 (29.7)	68 (71.3)	-	97(100.0)
Cross-breeds	15 (15.4)	79 (81.4)	3 (3.2)	97(100.0)

4.2 Findings as Related to Objective 2

Objective 2 of this study is to study the socio-economic factors related to adoption of innovations. The socio-economic factors stated are age of respondents, literacy level, years of schooling, level of living, household size, herdsize, sources of income, number of farm sites,

respondents' perceived advantages of the innovation, perceived management, availability and acquisition of inputs, veterinary services and family support. All these individual variables were hypothesized to be related to adoption.

Adoption of the three packages is hypothesized to be positively related to the following variables - age, household size, herdsize, sources of income, farm sites, level of living, level of literacy, years of schooling, respondents' perceived advantages, perceived management, acquisition and availability of inputs, veterinary services and family support.

In Table 4.7 is reported the relationship between selected variables. The Table reports that ten variables (literacy, years of schooling, household size, land size, perceived veterinary services, additional income, perceived advantages, perceived management, family support and acquisition/availability of inputs) are positively related to the adoption of the innovation and are significant at the .01 percent level.

The Table also reports that level of literacy, household size, land size, additional sources of income and the perception variables (advantages, management, family support and acquisition/availability) are positively related to the adoption of supplementation feeds and are significant at the .01 percent level.

The Table also reports that level of literacy, household size, landsize and the perception variables are positively related to the adoption of fodder bank and are

significant at the .01 percent level.

The variables significantly related to the adoption of the exotic-breed are land size and the perception variables. The relationships are also positive.

4.2.1 Age and Adoption

This variable was hypothesized to be negatively related to adoption. In adopting each of the packages it was found that this variable is negatively related to the adoption of supplementation feeds (r = - .124), fodder bank (r = - .125) and cross-breed (r = .070). In adopting the three packages (innovation), age is still found to be negatively related (r = - .195). This finding corraborates previous studies (Voh, 1979; Atala, 1980;Gefu, 1981 and Akinbode et al., 1968). The finding also reveals that, though negatively related, this variable (age) is not significant at the .01 percent level (r = - .195). This indicates that in adopting an innovation, the hypothesis that there exists a positive relationship between age and adoption does not hold.

4.2.2 Respondents' Level of Literacy and Adoption

This variable was hypothesized to be positively related to adoption. In adopting each of the packages it was found that this variable is positively and significantly related to the adoption of supplementation feeds (r = .210) and fodder bank (r = .220). It is however, found to be positively and not significantly related to adoption of the exotic-breed (r = .069). In adopting the three packages (innovation),

Table 4.7 Relationship Between Selected Variables

Variables	Supplementation Feeds	Fodder Bank	Exotic Cross-Breeds	Adoption of Innovations
Age	-.124	--.125	-.070	-.195
Literacy	.210*	.220*	.069	.365*
Years of schooling	.079	.113	.034	.224*
Level of living	.069	.046	.069	.137
Household size	.228*	.201*	.074	.266*
Land size	.315*	.302*	.309*	.418*
Perceived Veterinary Services	.279*	.010	.056	.251*
Additional sources of income	.221*	.151	-.003	.425*
Herdsize	.171	.139	.168	.095
Perceived total advantages	.459*	.619*	.605*	.651*
Perceived management	.404*	.535*	.439*	.675*
Perceived family support	.272*	.323*	.381*	.331*
Perceived acquisition/availability of inputs	.422*	.552*	495*	.656*

*Variables significantly related to adoption at .01 percent level.

of the pastoralists. The amount of his possession does not mean he has to adopt modern techniques. In a pastoral society, ones level of living cannot be used to ascertain his willingness to buy new animal techniques in increasing animal productivity. A pastoralist sees his animals as a separate source of wealth.

The finding also indicates that we fail to accept the hypothesis that there is a positive relationship between a respondent's level of living and adoption at the .01 percent level of significance.

4.2.5 Household Size and Adoption

This variable is found to be positively and significantly related to adoption of supplementation feeds ($r = .228$) and fodder bank ($r = .201$). It also is positively related to adoption of cross-breeds ($r = .074$) though not significant at the .01 percent level. The variable is also found to be positively and significantly related to adoption of the three packages (innovations) ($r = .266$). This finding is attested to by previous studies (Gefu, 1981:79, Clark et al., 1968, and Rao, 1971). This relationship is explained in terms of the labour demand of the packages. Delgado (1979), for instance, observed that the sizes of households could be viewed as an important factor determining the scope of economic activities of a stock owning household since most of the labour used in productive endeavours are household labour. In adopting a supplementation feed, one needs labour to separate animals on pressure from the rest of the herd. A respondent needs labour to effect the purchase of the feeds.

Besides, to enable a household head to attend meetings, visit market places to collect information on animal inputs, he needs extra hand to look after his cattle.

To adopt the fodder bank, a respondent needs labour to fell trees, clear the site, to get stalks from the nearby forest for fencing. He also needs labour to look after his animals as he corralled them on the site for a certain period of time. In broadcasting the stylo seeds, a respondent also needs labour. This implies that constructing a fodder bank is labour demanding.

To adopt the exotic cross-breed, a respondent needs labour to look at its grazing activity, to dip it of ticks, to supply its feeds regularly and to keep its fenced area neat. He also needs labour to frequent the veterinary station since the breed needs constant veterinary attention.

The finding reveals that we accept the hypothesis that there is a positive relationship between household size and adoption of the innovations.

4.2.6 Number of Farm Sites and Adoption

This variable is positively and significantly related to adoption of supplementation feeds (r = .315), fodder bank (r = .302) and cross breed (r = .309). The variable is also positively and significantly related to the adoption of the three packages (innovations) (r = .418). This finding corraborates previous studies (Raza et al., 1979, and Clark et al., 1968).

4.2.7 Perceived Veterinary Services and Adoption

This variable is found to be positively and significantly related to adoption of supplementation feeds r = .279). It is however positively related to adoption of fodder bank (r = .010) and cross-breed (r = .056), but not significant at the .01 level. It is surprising as to how this variable is not significant to adoption of cross-breds, and fodder bank. This could be attributed to the unsatisfactory respondent's perception of the veterinary services in the area. It is however positively and significantly related to the adoption of the three packages (supplementary feeds, fodder bank and exotic-breed) (innovation) (r = .251) at the .01 percent level.

The hypothesis that there is a positive relationship between respondents' perceived veterinary services and adoption of innovation is supported at the .01 percent level.

4.2.8 Additional Sources of Income

This variable is positively related to the adoption of supplementation feeds (r = .221) and fodder bank (r = .151). It is however found to be only significantly related to the adoption of supplementation feed at the .01 percent level. The variable is negatively related to adoption of exotic breed. The pastoralists complained as to the rationale behind feeding only animals on pressure. Viewing the cost of feeding an animal on 3 - 4 kilogrammes worth of cotton - seed cake per day, at a controlled price of ₦7.50 per 50 kilogram, a pastoralist needs other sources of income to enable him purchase the feeds. This variable is important

in studying the adoption of fodder bank as one realises that the herdsmen co-operating with ILCA appreciated being employed in the milk-recording and grazing activities of the body. This finding is in line with previous findings (Voh, 1979:20 and Atala, 1980).

This variable is also positively and significantly related to adoption of the three packages (innovations (r = .425). We therefore have support for the hypothesis that there is a positive relationship between additional sources of income and adoption of innovation at the .01 percent level.

4.2.9 Total Herdsize and Adoption

This variable, though positively related to the adoptions of supplementary feeds (r = .171), fodder bank (r = .139) and cross breed (r = .168) is found to be insignificant at the .01 percent level (r = .095). It is traditional for the pastoralists not to sell their animals to enable them get money to buy the inputs for adoption of an innovation (Ieter, 1981; Ekpere, 1980). The hypothesis that there is a positive relationship between total herdsize and adoption of innovation is not supported at the .01 percent level.

4.2.10 Respondents' Perceived Advantages of Innovation and Adoption

This variable is positively and significantly related to adoption at the .01 percent level - supplementation feeds (r = .459), fodder bank (r = 619), and cross-breeds (r = .605). Voh (1979) and Williams (1978) observed that respondents adopt an innovation which they view as advantageous.

The finding also shows that the variable is positively and significantly related to adoption of the three packages (innovations) (r = .651). It can therefore be deduced that the hypothesis that there is a positive relationship between respondent's perceived advantages of the innovations and adoption is supported at the .01 percent level.

4.2.11 Respondent's Perceived Management of Innovations and Adoption

This variable is positively and significantly related to the adoption of the three packages - supplementary feeds (r = .404), fodder bank (r = .535) and cross-breed (r = .439). In managing the packages, the adopters need credit, animal feeds, veterinary services, supervision among others. They also need to know how to manage the packages in the absence of the officials, where to get the feeds and other items needed for adopting the innovations.

The finding also shows that there is a positive and significant relationship between the variable and adoption of the three packages (innovation) (r = .675). It therefore holds that the hypothesis that there is a positive relationship between respondent's perceived management of innovations and adoption of innovation is supported.

4.2.12 Respondent's Perceived Family Support and Adoption

This variable is positively and significantly related to the adoption of the three packages - supplementary feeds (r = .272), Fodder bank (r = .323) and exotic-breeds (r = .381). A pastoralist needs the support of his family

to buy the feeds for the animals, to be encouraged to set up the fodder bank and keep an exotic breed. This support is important as one realises that the household wives own cattle and hence can decide concerning what should happen to their animals.

This variable is also positively and significantly related to adoption of the three packages (innovations) (r = .331). It can also be deduced that the hypothesis that there is a positive relationship between respondent's perceived family support and adopition of innovation at the .01 percent level is supported.

4.2.13 Respondent's Perceived Acquisition and Availability of Inputs and Adoption

This variable is positively and significantly related to the adoption of the three packages - supplementation feeds (r = .422), fodder bank (r = .552) and exotic breed (r = .495), at the .01 percent level. This implies that as respondent's perceive it easier to get inputs, the higher the adoption.

The finding also shows that the variable is positively and significantly related to the adoption of the three packages (innovations) (r= .656). It holds that the hypothesis that there is a positive relationship between ease and availability of inputs and adoption is supported.

To conclude, the relationships between selected variables as reported in Tables 4.8, 4.9, 4.10, 4.11 indicate that the following variables are significantly related to the adoption of supplementation feeds - level of literacy, household size,

land size, perceived veterinary services, additional sources of income, perceived advantages, management family support and acquisition/availability of inputs.

The variables significantly related to the adoption of fodder bank are level of literacy, household size, land size, and the respondent's perception of advantages, management, family support and acquisition/availability of inputs.

As for the adoption of cross-breed it was found that farm size, and the respondent's perceived variables were significantly related to adoption.

The variables that are found to be significantly related to the adoption of all the packages (innovations) are level of literacy, years of schooling, household size, farm size, additional sources of income, and the respondent's perceived variables.

The hypotheses that were supported were that there is a positive relationship between level of literacy, years of schooling, household size, farm size, additional source of income, and the respondent's perceived variables (veterinary services, management, family support, total advantages and ease of acquiring the inputs). These variables were found to be significantly related to adoption at the .01 percent level.

The hypotheses not supported are: that there is a positive relationship between respondent's age, level of living and herdsize with adoption of innovations.

Table 4.8 Intercorrelation Between Selected Variables

		X03	X05	X06	X07	X08	X09	X10	X11	X12	X21	X25	X26	X27	X17
Age	X03	1.00													
Literacy	X05	.003	1.00												
School	X06	.156	.685	1.00											
Level of living	X07	-.016	.246	.179	1.00										
Household size	X08	.078	.338	.258	.310	1.00									
Land size	X09	-.119	.194	.126	.259	.200	1.00								
Vet. Services	X10	-.197	-.066	-.023	-.057	.223	.302	1.00							
Add. Income	X11	.014	.401	.355	.083	.292	.232	.160	1.00						
Herd size	X12	.047	.190	.256	.163	.477	.193	.072	.226	1.00					
Advantage	X18	-.004	.256	.155	.045	.123	.258	.082	.285	.111	1.00				
Mgt. Perception	X22	.185	.352	.194	.017	.252	.264	.314	.311	.126	.772	1.00			
Family Supp.	X26	-.079	.061	.081	.082	.131	.261	.161	.189	.102	.430	.412	1.00		
Input Acqui.	X27	-.138	.226	.106	.116	.208	.322	.208	.155	.032	.697	.660	.469	1.00	
Adoption Index of Supp. Feed	X13	-.124	.210*	.079	.069	.228*	.315*	.279*	.221*	.171	.459*	.404*	.272*	.422*	1.00

*Variables significantly correlated with adoption at .01 percent level.

Table 4.9 Intercorrelation between Selected Variables

		X01	X02	X03	X04	X05	X06	X07	X08	X09	X10	X11	X12	X13	X14
Age	X01	1.00													
Literacy	X02	.003	1.00												
School	X03	.156	.685	1.00											
Level of living	X04	-.016	.246	.179	1.00										
Household Size	X05	.078	.338	.258	.310	1.00									
Farm size	X06	-.119	.194	.126	.259	.200	1.00								
Vet. services	X07	-.197	-.066	-.023	-.057	.232	.160	1.00							
Add. Income	X08	.014	.401	.355	.083	.292	.232	.160	1.00						
Herdsize	X09	.047	.190	.256	.163	.477	.193	.072	.226	1.00					
Advantage	X10	-.157	.368	.209	.001	.172	.288	.102	.240	.098	1.00				
Mgt. Perception	X11	-.183	.261	.218	.081	.269	.335	.285	.427	.124	.677	1.00			
Family Supp.	X12	-.079	.061	.081	.082	.131	.261	.161	.189	.102	.307	.301	1.00		
Input Acq.	X13	-.138	.226	.106	.116	.208	.322	.208	.155	.032	.645	.615	.489	1.00	
Adoption index for fodder bank	X14	-.125	.220*	.113	.046	.201*	.302	.010	.151	.139	.619*	.535*	.323*	.552*	1.00

*Variables significantly correlated with adoption at .01 percent level.

Table 4.10 Intercorrelation between Selected Variables

		X01	X02	X03	X04	X05	X06	X07	X08	X09	X10	X11	X12	X13	X14
Age	X01	1.00													
Literacy	X02	.033	1.00												
School	X03	.156	.685	1.00											
Level of living	X04	-.016	.246	.179	1.00										
Household size	X05	.078	.338	.258	.310	1.00									
Farm size	X06	-.119	.194	.126	.259	.200	1.00								
Vet. Services	X07	-.197	-.066	-.013	-.057	.223	.302	1.00							
Add. Income	X08	.014	.401	.355	.083	.292	.232	.160	1.00						
Herdsize	X09	.047	.190	.256	.163	.477	.193	.072	.226	1.00					
Advantage	X10	-.049	.158	.234	.009	.149	.154	.157	.182	.127	1.00				
Mgt. perception	X11	-.070	.208	.261	-.006	.129	.182	.306	.124	.029	.588	1.00			
Family Supp.	X12	-.079	.061	.081	.082	.131	.261	.161	.189	.102	.325	.344	1.00		
Input Acq.	X13	-.138	.226	.106	.116	.208	.322	.208	.156	.032	.496	.475	.489	1.00	
Adoption index for cross-breed	X13	-.070	.069	.034	.069	.074	.309*	.056	-.003	.168	.605*	.439*	.381*	.495*	1.00

*Variables significantly correlated with adoption at the 0.1 percent level.

Table 4.11 Intercorrelation between Selected Variables

		X01	X02	X03	X04	X05	X06	X07	X08	X09	X10	X11	X12	X13	X14
Age	X01	1.00													
Literacy	X02	.003	1.00												
School	X03	.156	.685	1.00											
Level of living	X04	-.016	.246	.179	1.00										
Household size	X05	.078	.338	.258	.310	1.00									
Farm size	X06	-.119	.194	.126	.259	.200	1.00								
Vet. Services	X07	-.197	-.066	-.023	-.057	.223	.302	1.00							
Add. Income	X08	.014	.401	.355	.083	.292	.232	.160	1.00						
Herdsize	X09	.047	.190	.256	.163	.477	.193	.072	.226	1.00					
Advantage	X10	-.062	.343	.249	.028	.181	.385	.145	.311	.138	1.00				
Mgt. perception	X11	-.179	.313	.238	.039	.245	.301	.340	.351	.111	.791	1.00			
Family supp.	X12	-.079	.061	.081	.082	.131	.261	.161	.189	.102	.430	.412	1.00		
Input Acq.	X13	-.138	.226	.106	.116	.208	.328	.208	.155	.032	.697	.660	.489	1.00	
Adoption of innovation	X14	-.195	.365*	.224*	.137	.266*	.418	.251*	.425*	.095	.651*	.675*	.331	.656*	1.00

*Variables significantly correlated with adoption at the .01 percent level.

Table 4.12 Summary Table of Step-wise Regression Analysis

Step	Variable Entered/Removed	F To Enter or Remove	Significance	Multiple R	R^2	R^2 Change	Simple R	Overall F
1	Advantages	25.43187	.000	.45953	.21117	.21117	.45953	25.43187
2	Perceived Vet. Services	7.58496	.007	.51968	.27007	.05890	.27963	17.38982
3	Perceived input acquisition	4.25054	.042	.54952	.30197	.03190	.42229	13.41096
4	Landsize	1.54194	.217	.55989	.31348	.01151	.31485	10.50232
5	Household size	1.08900	.299	.56710	.32160	.00812	.22783	8.62778
6	Literacy	.38320	.537	.56963	.32448	.00288	.21085	7.20495
7	Perceived management	.18409	.669	.57085	.32587	.00139	.40436	6.14599
8	Perceived family support	.05975	.807	.57125	.32633	.00046	.27182	5.32839
9	Add. sources of income	.01427	.905	.57135	.32644	.00011	.22085	4.68488

5 percent respectively of that variability in adoption. This is shown in Table 4.14.

In the adoption of the three packages (innovation) ten variables explain 62 percent of the variability in adoption. These variables are: perceived ability to manage, perceived input acquisition, additional sources of income, farm size, literacy, perceived family support, years of schooling, perceived advantages, perceived veterinary services and household size. It is found that three variables are significant and explain much of that variability in adoption. These are: perceived ability to manage, explaining 46 percent, perceived input acquisition explaining 8 percent and additional source of income explaining 5 percent of that variability in adoption. This is shown in Table 4.15.

In conclusion, it could be deduced that out of the nine variables explaining 33 percent of variability in the adoption of supplementation feeds, two variables explain much of the variability. These are: perceived advantages explaining 21 percent, perceived veterinary services, explaining 6 percent of that variability.

Two variables perceived advantages, perceived input acquisitions explain 38 and 4 percents respectively of the variability in adoption of the fodder bank, and were found to be significant.

Out of the five variables explaining 43 percent of the variability in adoption of the exotic cross-breed, we found that the two variables that explain much of the

Table **4.13** Summary Table of Step-wise Regression Analysis

Step	Variable Entered/Removed	F To Enter or Remove	Significance	Multiple R	R^2	R^2 Change	Simple R	Average F
1	Perceived advantages	58.89486	0	.61862	.38270	.38270	.61862	58.894
2	Perceived input acquisitions	6.52649	.012	.65021	.42277	.04008	.55193	34.523
3	Perceived management	1.61613	.207	.65775	.43263	.00986	.53473	23.638
4	Land size	1.03346	.312	.66252	.43893	.00630	.30154	17.993
5	Perceived family support	.36221	.549	.66420	.44116	.00222	.32257	14.3674
6	Household size	.19630	.659	.66511	.44238	.00122	.19138	11.899
7	Level of literacy	.09501	.759	.66556	.44297	.00059	.21935	10.111

Table 4.14 Summary Table of Step-wise Regression Analysis

Step	Variable Entered/Removed	F To Enter or Remove	Significance	Multiple R	R^2	R^2 Change	Simple R	Overall F
1	Perceived advantages	54.7663	0	.60471	.36568	.36568	.60471	54.7663
2	Perceived input acquisition	8.1205	.005	.64507	.41612	.05044	.49489	33.4958
3	Perceived family support	2.1316	.148	.65514	.42920	.01308	.38078	23.3099
4	Farm size	.4077	.525	.65705	.43172	.00252	.30864	17.4730
5	Perceived management	.24769	.620	.65823	.43326	.00154	.43921	13.9136

variability are: perceived advantages, explaining 37 percent and perceived input acquisition, explaining 5 percent of that variability in adoption.

It is found that two variables feature prominently in explaining each of the three packes - viz: perceived advantages of the packages and perceived availability/ acquisition of inputs.

Ten variables are found to explain 62 percent of the variability in adoption of the innovation. We found that three of these ten explain much of that variability. These are: perceived management explaining 46 percent, perceived input acquisition, explaining 8 percent and additional income explaining 5 percent of that variability in adoption.

Table 4.15 Summary Table of Step-wise Regression Analysis

	Variable Entered/Removed	F To Enter or Remove	Significance	Multiple R	R^2	R^2 Change	Simple R	Overall F
1	Perceived management	79.62097	0	.67525	.45596	.45596	.67525	79.62097
2	Perceived input acquisition	15.70167	.000	.73064	.53383	.07787	.65547	53.82217
3	Additional income	12.17644	.001	.76668	.58780	.05397	.42474	44.20651
4	Farm size	4.86078	.030	.78008	.60849	.02069	.41788	35.74646
5	Literacy	1.29907	.257	.78358	.61400	.00551	.36538	28.94995
6	Perceived family support	.80615	.372	.78576	.61747	.00343	.33103	24.20792
7	Years schooling	.32965	.567	.78666	.61886	.00141	.32423	20.64219
8	Perceived advantages	.31288	.577	.78752	.62019	.00135	.65126	17.96158
9	Perceived Vet. Services	.04107	.840	.78763	.62037	.00018	.25115	15.79644
10	Household size	.01269	.911	.78767	.62042	.00006	.26588	14.05672

CHAPTER FIVE

DISCUSSIONS OF FINDINGS, CONCLUSION, IMPLICATION OF FINDINGS AND RECOMMENDATIONS

The focus of this chapter is the discussions of findings reported in chapter 4. This chapter also focuses on the conclusion derivable from the findings in the previous chapter. The implications of the findings and recommendations also form part of the chapter.

In discussing objective I of this study - to study the nature of the innovation and how it affects the adoption behaviour of pastoralists, we found that majority of respondents had heard of some of the recommendations. These include - buying of feeds, rationing of feeds, clearing land for the construction of the fodder bank and mating the local breeds with the exotic cross-breeds. It was, however, found that few respondents adopted the innovations. The recommendations that few heard of and all adopted were corraling of animals on the site, broadcasting of stylo seeds and recalling animals to corral on the site.

We also found that respondents perceived the packages as advantageous. For the supplementation feeds majority of the respondents felt it increases milk, improves calf/animal health and avoid starvation. For the fodder bank, few realized it avoids starvation and increase milk-off-take. Few of respondents also realized that the exotic breed increases milk and produce bigger carcass.

According to respondents' perceived ability to manage the innovation, we found that majority respondents

needed fencing materials, veterinary services, seeds and the feeds. It is also found that majority of the respondents had no idea of managing the packages. Their perception of veterinary services is that its fair but they also call for improvement.

The respondents had difficulty in acquiring the inputs. Majority of the respondents, however, felt that it was impossible to acquire the exotic cross-breeds.

In getting family support, majority respondents felt it easy to get the advisory and veterinary services, It was however found difficult getting land and labour from the family.

In discussing objective 2 - to study the socio-economic factors related to adoption of innovation, we found that these variables are influencing - in adopting the supplementation feeds the variables significantly correlated with adoption at .01 percent level are: level of literacy, household size, land size, veterinary services, additional source of income, perceived advantages, perceived ability to manage, perceived family support and perceived availebility/acquisition of inputs.

Variables influencing the adoption of fodder bank are level of literacy, household size, farm size, perceived advantages, perceived ability to manage, perceived family support and perceived availability/acquisition of inputs.

For the exotic cross-breeds the variables that are significant with adoption are: farm size, perceived advantages, perceived ability to manage, perceived family support and perceived input acquisition.

We however found that ten variables are significant in adopting the packages (innovation). These are level of literacy, level of schooling, household size, farm size, perceived veterinary services, additional income, perceived advantages, perceived ability to manage, perceived family support and perceived input acquisition.

The findings in chapter 4 reveal that the nine significant variables that influence adoption behaviour of pastoralist in adopting the supplementation feeds account for 33 percent of variability. We however found that two variables explain much of that variability. These are the perceived advantages, explaining 21 percent and perceived veterinary services explaining 6 percent of that variability in adoption.

Seven variables explain 44 percent, using the step-wise regression analysis, of the variability in adoption of fodder-bank. It was found that two variables explain much of that variability. These are perceived advantages, explaining 38 percent of the variability and perceived input acquisition explaining 4 percent of the variability in adoption.

We also found, from the step-wise regression analysis, that the five significant variables that influence adoption of cross-breed explain 44 percent variability in adoption. Two variables explain much of that variability. These are perceived advantages, explaining 37 percent and perceived input acquisition, explaining 5 percent of that variability in adoption.

From the results of the step-wise regression, we can deduce that two variables explain much of the variability in adoption of each of the three packages. These variables are respondents' perceived advantages of the packages and respondents' perceived availability/acquisition of inputs. This is to say that people adopt innovations that are advantageous (Voh, 1979; Williams, 1980) and those innovations with available inputs (Raza et al., 1979).

From the findings in chapter 4, we also found that in adopting the three packages (innovation), using the step-wise regression, the ten significant variables explain 62 percent of variability in adoption of these, three variables explain much of that variability. These are perceived ability to manage, explain 46 percent, perceived input acquisition, explaining 8 percent, and additional income explaining 5 percent of that variability in adoption.

These three variables are singly discussed to show their significance to adoption.

5.1 Respondent's Perceived Management of Innovation

This variable explains 46 out of the 62 percent of the variability in adoption. The nature of the innovations demands the ability of the adopters to be able to manage the fodder bank, the exotic breed and the feeds, It demands the pastoralists to know how and where the inputs can be obtained. During the field survey it was observed that ILCA officials paid constant visit to the co-operating herds, supplied them with the veterinary services and also act as a go-between with the L.P.U. officials thereby enabling the pastoralist

to buy the feeds and fencing materials on credit. ILCA is also credited for introducing the concept of the fodder bank and the rationale behind rationing of feeds. ILCA has therefore made the pastoralists to realise that if they grow pasture, use and ration the supplementation feeds and pay regular attention to veterinary services there will be improvement in the livestock sector. ILCA has therefore propelled the base-line data to be followed in livestock. The contribution of ILCA towards Livestock Improvement Programmes made pastoralists to view her exit as tantamount to discontinuity of the programme. We found out in chapter 4 (Table 4.5a) that some responses are easy/difficult to get inputs. This implies it is easy getting the inputs with the aid of ILCA, while difficult if ILCA is not contacted. This notion might explain the field observations and general comments that 'there is no rationale adopting an innovation which would eventually die off with the exit of the whiteman'.

This finding reveals that the respondent's perceived ability to manage an innovation is a significant variable affecting adoption and explains much of the variability.

5.2 Respondent's Perceived Input Acquisition

The respondent's perceived input acquisitions variable explains 8 percent of the variability in adoption. Previous studies have shown that difficulties in acquiring inputs for innovations contribute to rejection of such innovations. This was the position of the Katsina scheme (Ruwan - Kukar Jangari Ranch) in Kaduna state. This scheme failed among

other reasons because of the pastoralists inaccessibility to the sources of feeds supply. Gefu (1981) reports that adoption of innovation is positively related to how accessible the change agents and inputs are to the target group.

In this respect it was observed that pastoralists complained of reduction in milk-off take of the exotic breed in Kurmin Biri as a result of the inability of the L.P.U. to supply the animal feeds. This no doubt can act as a disincentive to adoption of the exotic breed since it survives solely on feeds which supplies are not regular and reliable. Other inputs needed include land, labour, credit and fertilizer. Although the pastoralist finds it difficult to acquire land, he might find it difficult to acquire extra labour not because it is costly but also because in areas like Kurmin Biri, the local population felt insulted selling their labour on their expropriated soil. This therefore means that the pastoralist is left alone to fell the trees, clear the vast area of land on the reserve to enable him become agro-pastorial. And since he is unaware of the institutions that sell or distribute the other inputs - fertilizer, barbed wire, stylo seeds, dipping materials, the pastoralist is at a disadvantage.

To therefore adopt an innovation the pastoralist will perceive the ease and difficulty of acquiring the inputs, and this is significant in adoption.

5.3 Additional Sources of Income

This variable (additional sources of income) explains 5.4% of variability in adoption. Previous studies (Voh, 1979; Atala, 1980; Akinbode et al., 1968) report that respondents with other sources of income are more likely to adopt an innovation than those without. Since traditionally a pastoral society is one interested in the quantity of cattle one owns, it is therefore unlikely for a pastoralist to sell his animals to enable him purchase inputs for adopting an innovation. The usual complaint is that any innovation demanding buying inputs places the pastoralist in an unfavourable situation since he has little or no secondary occupation. He therefore perceives it as tantamount to destocking. As said earlier in chapter 4, the co-operating herds pressured ILCA to employ them in the milking and grazing activities of the programme. This implies that a pastoralists with other sources of income is more prone to buy the inputs and adopt the innovations than others since his herd would not be destocked. With additional sources of income it is possible for the pastoralists to negotiate for a piece of land and erect permanent structures among other things.

What could be drawn from the three independent variables is that from thestatistical analysis the respondents' perceived ability to manage innovation is the best predictor of adoption behaviour. We expect to find a high level of adoption behaviour when the innovation can be easily managed.

Managing an innovation includes how the household can organize itself as a production unit. This entails the ease at which the inputs could be procured, the ease at which livestock products could be disposed of, and as to how the household could get acquainted with the technicalities involved in the operations of an innovation.

To accelerate adoption behaviour change agents need to incorporate into their schemes the involvement of the local representatives to help in streamlining their target group as to how and where the inputs could be got; how to tackle technical problems and so forth.

5.4 Conclusion

From the discussions of findings we found that the nature of the innovation is one which entails difficulty in acquiring the inputs. Respondents who got the inputs are the co-operating herders of ILCA. Most respondents felt satisfied with the advantages of the innovation. The results of the correlation matrix reveal that ten of our hypotheses were supported while three were not supported. We also found that two variables featured prominently in explaining variability in adoption of each of the three packages. These are the perceived advantages and the perceived availability/acquisition of inputs. It was also found that the best predictor of adoption behaviour from the statistical analysis is the respondent's perceived ability to manage the innovation. This variable explains 46 percent of the 62 percent of the variability in adoption.

It could therefore be concluded that three significant variables explain much of the variability in adoption. These are perceived ability to manage, perceived availability/acquisition of inputs and additional sources of income.

Indicated in Table 5.1 is a breakdown of the variables hypothesized to be related to the adoption of each of the packages/innovation.

5.5 Implications of Findings

As earlier on discussed, ten of our thirteen hypotheses were supported. These variables are the level of respondent's schooling, literacy level, household size, additional sources of income, farm sizes, the respondent's perception of the advantages of innovation, acquisition/availability of inputs, perceived ability to manage the innovation and perceived family support. These variables were found to be significantly related to adoption. It implies that to introduce innovations the change agents have to consider these variables.

We also found that perceived ability to manage innovations explains 46 percent of the variability in adoption behaviour. It is the fear of managing the innovation with the exit of ILC/ that made pastoralists to view the programme as a short-term measure to improving livestock production. ILC/'s exit tantamount to <u>discontinuity</u> of the programme.

This implies making and persuading the pastoralists to accept the programme as a permanent measure to solving our livestock problems. To achieve this objective,

Table 5.1: Variables Significant or not Significant to Adoption

Variables	Supp. Feeds	Fodder Bank	Exotic Breed	Adoption of Innovation
Age of respondent	NS	NS	NS	NS
Literacy of respondent	S	S	NS	S
Schooling	NS	NS	NS	S
Level of living	NS	NS	NS	NS
Household size	S	S	NS	S
Farm size	S	S	S	S
Perceived Vet. services	S	S	NS	S
Additional sources of income	S	NS	S	S
Herdsize	NS	NS	NS	NS
Perceived total advantage	S	S	S	S
Perceived management	S	S	S	S
Perceived family support	S	S	S	S
Perceived acquisition of inputs	S	S	S	S

S = hypothesis significant at the .01 level (supported)

NS = hypothesis not significant (not supported).

Voh (1979:23) sees the importance of involving the local representatives since they will provide valuable information on local conditions, traditional attitudes and so on. This will enable change agents plan their programmes more effectively.

By including the local community representatives, the state government can seek their opinions as to the effective way of preventing indiscriminate fire-outbreaks (a threat to fodder bank) water pollutions and land disputes. Their representation will also help solve how excessive milk (result of the use of supplementary feeds) could be disposed of. Through this representation, the pastoralist would find it easier to dispose of his surpluses, earn more income and thereby increasing his adoption rate.

Respondents' age was found not to be significant to adoption. This implies that the age of a pastoralist may not be an inhibitor to adoption. The notion generally held that the older farmers tend to be conservative and likely not to adopt an innovation may not apply to innovation meant to increase the productivity of herders' animals. The pastoral fulani is going agro-pastoral and hence needs land to make this possible. Thus variable - land, should be of major concern to change-agents (federal, state and World Bank agencies).

In the discussions of findings, we found that the fulani pastoralists had no access to land due to their cultural background. To therefore make the pastoralists

go agro-pastoral (one objective of the Green Revolution) land has to be made available to the livestock farmers.

The packages studied required labour as a form of input. This has to be organized by the family head. The family head has to be aware of the advantages of the innovation; the means of acquiring the inputs and the managment aspects. It is through this awareness that household labour can be assigned in the production process.

The implications of these variables - management, input acquisition, advantages and family support - reveal that information has to exist between the change agents and the pastoralists. The household labour need be studied to ascertain the effect of too much labour demanding innovation or adoption. This is significant in view of the growing rural infrastructures (schools, hospitals etc). The younger members of the household are likely to attend schools and this will upset their labour contribution as we view a household size as a production unit.

The significant relationship between additional sources of income and adoption reveals that the pastoralists had to engage themselves in other secondary occupation (except farming) for lack of land. This has an implication on the change-agents. In an attempt to develop the lots of the rural population, there is the likelihood that non - agricultural projects would affect farming since majority farmers would take up jobs and forego farming. This would not tally with the objectives of the "green revolution" program. The local population has to be employed as workers in agricultural programmes. This makes them feel as participants in

the programs.

The findings also reveal that there was a significant relationship between literacy level, years of schooling and adoption. This implies that better educated respondents are more likely to adopt an innovation. The change - agents therefore need to incorporate into their rural development schemes adult literacy/education (extra-mural) classes with focus on agricultural education.

Our findings imply that information is lacking between the change agents and the pastoralists. The pastoralists lack information on how to get the inputs and as regards the fate of the programme on the exit of ILCA/LPU. And since the uncertainty that stems from lack of information inhibits innovation, it can be concluded that "better informed people will innovate more in cases where the innovation will be to their advantage" (Cancian, 1979:13). As more and more people adopt an innovation, information spreads, uncertainty is reduced, and the inhibiting effect would gradually disappear.

5.6 Recommendations

The steps taken by ILCA to solve livestock feed problems is a welcome idea and to be encouraged. It seems as if the Federa and State governments are yet to be involved. ILCA has identified the ways in which the pastoralist population could be integrated into an agro-pastoral enterprising unit. The findings reveal that acquiring the inputs and managing the innovation form part of the significant variables in adoption.

A critical look at the stylo seeds needed for the fodder bank reveal that only the IPU/ILCA could afford the seeds to the pastoralists. It is the view of this study to see how possible the Federal/State governments could explore ways of having a stylo bank for sale to the public. The technicalities involved in establishing a fodder bank has been demonstrated by ILCA. What is left to be done is extending the ideas to the public. To succeed the seeds need be available on request.

A possible avenue of solving this problem is the funding of the proposed NAPRI's System Research Indigeneous Livestock Sector Study Project (ILSSP). The project has the broad objective "to better understanding the existing traditional systems of animal production and help improve cattle, sheep and goat production" (A System Research Project, ILSSP, NAPRI, 1983). The project should also incorporate into its strategy the possibility of having a feed bank (stylo, straw, sillage) that could be sold to the public. *This is to ease replication of the scheme elsewhere* in the country by the public viewing the costs involved.

There is the need to mobilize the pastoral peasantry. To achieve this aim, it is the recommendation of this study that the Fulani Association - Meyetti Allah Club be involved in the programme. The club could be useful in designing the teachings of the aims and objectives of livestock innovation. The ways of acquiring and managing the innovation should also form part of the teaching philosophy. The various State Ministries of Agriculture and Natural Resources are to be

involved in mobilizing the livestock producers. The Ministries should focus attention on extension programmes.

During the course of study, it was found that only pastoralists on the Grazing Reserve (Kurmin Biri) had access to the loan fattening scheme and that this amount is small. The study recommends that the amount be increased and extended to other pastoralists not in the reserve. However a study be initiated to ascertain its profitability and proper utilization.

IICA's areas of operation could be extended to Walego and Kafanchan areas by the Federal/State Ministry of Agriculture. A larger percentage of the pastoralists had heard of the programme and might show interest in establishing a fodder bank.

The general complaint of the livestock producer is not only inadequacy of water but its pollution. In this area of study water pollution is a common practice. Laws prohibiting water pollution should be instituted. Besides to solve indiscriminate bush burning during the dry season the public should be educated as to its negative effects.

5.7 Limitations of Study

This study is limited to only the sample of farmers residing within the operational areas of ILCA. The reactions of pastoralist outside these areas is yet to be studied.

Besides, there is the need to study the utilization of the "fattening scheme loan" by pastoralists with a bid to assessing its correct utilization. The study did not cover

the female pastoralists. Further studies need give cognisance to the female since by tradition they own cattle too. To make the study effective and objective female researchers need be incorporated into the team.

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APPENDIX

QUESTIONNAIRE DESIGNED FOR ALL RESPONDENTS

Enumerator ..... Date .....

A. DEMOGRAPHIC INFORMATION

1. Respondent .....

CODE

a. Age .....
b. Village .....
c. Division .....
d. State .....

2. Literacy

a. Ajami .....
b. English .....
c. Hausa .....
d. Kufulde .....
e. Kaje .....
f. Others .....

3. Schooling — Years

a. Primary .....
b. Post-Primary .....
c. Arabic .....
d. Bible .....

4. CHILDREN IN EDUCATION

	MALE	FEMALE
a. Primary	.....	.....
b. Post-Primary	.....	.....
c. Post-secondary	.....	.....
d. Univ/Poly.	.....	.....

5. CHILDREN EDUCATION COMPLETED

	MALE	FEMALE
a. Primary	.....	.....
b. Post-primary	.....	.....
c. Post-secondary	.....	.....
d. Univ/Poly.	.....	.....

6. IF THE PASTORALISTS OR ANY MEMBER OF HIS HOUSEHOLD OWN ANY OF FOLLOWING ITEMS, THEN COMPLETE THE FOLLOWING TABLE:

	Quantity owned (No)	Purchase price when new (each)
Radio	.....	.....
Bicycle	.....	.....
Car/Bus/Lorry	.....	.....
Zinc roof	.....	.....
Mud roof	.....	.....
Hurricane lamp	.....	.....
Wooden bed	.....	.....
Iron Bed	.....	.....
Mattress (Straw)	.....	.....
Mattress (Foam)	.....	.....
Sewing Machine	.....	.....
Wrist Watch	.....	.....
Table Clock	.....	.....

7. FARM EQUIPMENT:

Tractor	.....	.....
Ox-Plough	.....	.....
Hand-Plough	.....	.....
Sprayers	.....	.....
Hoes	.....	.....
Cutlass	.....	.....
Granary or Store	.....	.....
Milling or Grinding Machine	.....	.....
Axe	.....	.....
Knieves	.....	.....

Sickles	.....	.....
Seed Drill	.....	.....
Thresher	.....	.....

8. FARM TENANCY/NUMBER: SOME FARMERS HAVE FIELDS WHICH THEY CALL THEIRS: OTHERS DO NOT HAVE. THOSE WHO DO NOT HAVE FIELDS OF THEIR OWN CAN OPERATE THROUGH RENT, PLEDGE, LOAN OR LEASE. NOW, HOW EXACTLY DO YOU COME TO POSSES THE FIELDS YOU OPERATE?

	No. of Fields
Owned directly (inherited)	.....
Rented in cash	.....
On loan	.....
On lease	.....
In pledge	.....
Communual land	.....
Gift	.....
Family land	.....
Purchase	.....
Other sources (specify)	.....

9. HOUSEHOLD MEMBERS:	M	F
a. Adults	.....	.....
b. Children working	.....	.....
c. Children not working	.....	.....
	.....	.....

10. B. FARMING ACTIVITIES

CROPS GROWN/SOLD	SALES (₦)/SACK
a. Sorghum	.....
b. Millet	.....
c. Maize	.....
d. Soyabean	.....
e. Yam	.....
f. Lima bean	.....
g. Groundnut	.....

h. Rice .....
i. acca .....
j. cocoyam .....
k. ginger .....
l. okra .....
m. sweet potato .....
Total sale (₦) .....

11. MAJOR FARM PROBLEMS

a. weeds .....
b. labour shortage .....
c. cash shortage .....
d. infertile land .....
e. insufficient land .....
f. land conflicts .....
g. cattle trespass .....
h. seed shortage .....
i. fertiliser shortage .....
j. marketing difficulty .....
l. pests/diseases .....
Total No. of problems .....

12. HIRED LABOUR

a. harvesting .....
b. sowing/transplanting .....
c. land clearing/ridging .....
d. threshing .....
e. weeding .....

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13. PAYMENT PER

a. day .....
b. area .....
c. labourer .....
d. ridge .....

(most appropriate response)

14. NON-SALE USES

a. insufficient for family .....
b. keep for animals .....
c. religious obligation .....
d. lack of markets .....

15. USE OF CROP RESIDUES

a. burn them .....
b. fulani cattlegrazed .....
c. sold to herdsmen .....
d. grazed own livestock .....
e. piled as farm-manure .....
f. firewood/con. materials .....

16. DO YOU USE

a. cow dung on land .....
b. fertilizer .....
c. house refuse (ashes) .....
d. cow dung & fertilizer .....

17. PREFERENCE FOR MANURE OR ARTIFICIAL FERTILISER

a. cow dung .....
b. fertilizer .....

18. REASON

a. accessibility .....
b. known application .....
c. taste of farm output .....
d. weed control .....
e. relative quantity .....
f. think its better .....
g. residual effect .....
h. higher yield .....
i. cheaper .....

19 LIVESTOCK ACTIVITIES

Livestock population	Total
cattle	.....
goats	.....
sheep	.....
Total No.	.....

20. TREATMENT OF DISEASES

Who?	Veterinary	.....
	Vet/traditional	.....
	Traditional	.....
What with?		
	Proprietory drugs	.....
	Traditional medicine	.....
	Self-cure	.....

21. PERCEIVED VETERINARY SERVICES

a. Satisfactory
b. indifferent
c. Not satisfactory

22. MAJOR PROBLEMS WITH LIVESTOCK

a. health
b. crop damage
c. herding
d. pasture
e. water
f. marketing

23. LIVESTOCK SALES

	Number	₦ Cost
cattle	.....	.....
sheep	.....	.....
goats	.....	.....
Total Sales (₦)(1981)	.....	.....

24. NON-LIVESTOCK INCOME — Amount Realised (₦)

a.	trading	.....
b.	craft	.....
c.	loans	.....
d.	gifts	.....
e.	remittances	.....
f.	wage employment	.....
g.	house rents	.....
h.	others (native doctor)	.....
	Total amount realised (₦)	.....

25. INNOVATIONS

Awareness (packages)	Tried	Seen	Heard	No. Idea
supplementary	.....	.....	.....	.....
fodder bank	.....	.....	.....	.....
cross-breeds	.....	.....	.....	.....

26. *RECOMMENDED INNOVATIONS*

		Heard of	Adopted
a.	buying feeds	.....	.....
b.	rationing of feeds	.....	.....
c.	clearing/fencing of land for fodder bank construction	.....	.....
d.	corralling of animals on proposed fodder bank site	.....	.....
e.	broadcasting stylo seeds on site	.....	.....
f.	"recalling" animals to eat up weeds on proposed site	.....	.....
g.	matting your cows with the *exotic cross-breeds*	.....	.....
h.	possessing an exotic cross-breed	.....	.....
i.	fencing/housing of the breed	.....	.....
j.	veterinary services	.....	.....
	Total	.....	.....

27. HOW TO INCREASE MILK PRODUCTION

a. buy feeds
b. sedentarise
c. veterinary attention
d. grow fodder
e. cross breed
f. more cattle
g. more demand/mkts
h. others
i. don't know

28. INCREASE CATTLE NUMBERS

a. veterinary care
b. supp. feeding
c. quality pasture
d. dipping
e. fencing
f. cross-breeds
g. others
h. don't know

29. ADVANTAGES

(i) Supplementation Feeding

a. avoid starvation
b. increase milk
c. improve health
d. improve fertility
e. improve calf-health
f. other
g. don't know

30. (ii) Fodder Banks

a. avoid starvation
b. increase milk
c. improve health
d. improve calf health

e. sedentarise

f. other

g. don't know

Total

31. (iii) Cross-breeds

a. more milk

b. bigger carcass

c. more fertile

d. more valuable

e. early maturing/grow fester

f. don't know

Total

			Easy	Diff.	Imp.	Don't Know
32.	MANAGEMENT OF INNOVATIONS					
	(A)	Supplementation Feeds				
		a. price rates	....	.....	.....	.....
		b. getting the feeds	....	.....	.....	.....
		c. rationing the feeds	....	.....	.....	.....
33.	(B)	Fodder Bank				
		a. getting land	....	.....	.....	.....
		b. disturbance grazing effect	....	.....	.....	.....
		c. credit availability	....	.....	.....	.....
		d. getting stylo seeds/ seed bed preparation	....	.....	.....	.....
		e. fencing materials	....	.....	.....	.....
		f. weeding control	....	.....	.....	.....
34.	(C)	Cross-breeds (Exotic)				
		a. preventing diseases	....	.....	.....	.....
		b. housing/fencing	....	.....	.....	.....
		c. dipping	....	.....	.....	.....
		d. veterinary services	....	.....	.....	.....
		e. supervision	....	.....	.....	.....
		f. the breed	....	.....	.....	.....

35. GENERAL MANAGEMENT PERCEPTION:

	Easy	Diff.	Impossible
Supplementation feeds	....	.....	.....
Fodder bank	....	.....	.....
Cross-breeds	....	.....	.....

36. PERCEPTION OF FAMILY SUPPORT

Getting the Family Support

easy

difficult

impossible

Don't know

37. ASPECTS OF SUPPORT

loan

advice

labour

veterinary services

38. ACQUISITION OF INPUTS

	Easy	Diff.	Impossible	Don't Know
a. supplementation feeds	....	....	.....	.....
b. land for fodder	....	....	.....	.....
c. Veterinary officials	....	....	.....	.....
d. Supervision	....	....	.....	.....
e. Family support	....	....	.....	.....
f. Credit	....	....	.....	.....
g. Seeds	....	....	.....	.....
h. cross-breeds	....	....	.....	.....
i. fencing materials	....	....	.....	.....
j. labour	....	....	.....	.....
k. fertilizer	....	....	.....	.....

39. INPUTS NEEDED FOR

Input Code	1,	2,	3,	4,	5,	6,	7,	8,	9,	10,	11
Suppl	-	-	-	-	-	-	-	-	-	-	-
feeding	-	-	-	-	-	-	-	-	-	-	-

fodder banks 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11
cross-breeds - - - - - - - - - - -

40. General Comments on the Innovation

a. .....

b. .....

c. .....

d. .....

e. .....

f. .....