Analysis of Dairy Pilot Scheme in Some Agro-Pastoral Communities in Nigeria

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Abstract

Pilot dairy development schemes in Nigeria are alternative interventions aimed at addressing the inadequacy of agro-pastoral production systems. The study sought to find out the extent to which the dairy pilot project interventions can improve access to extension services, production inputs, improve milk production, milk collection/bulking, processing and marketing. The study used qualitative and quantitative methods such as, focus group discussions, pastoralist organization into registered cooperative groups, and animal production support activities to generate data. Group production dynamics and disseminating of proven dairy technologies were monitored for changes. The findings showed that there are vibrant agro-pastoral groups providing milk and dairy products to their immediate communities. There were also environmental and social issues in some of the sedentary communities. Farmers groups were linked to sources of inputs, markets, external services and other stakeholders. The schemes the study established in most of the communities were found to be the main link between the formal market for raw milk collection and bulking and external agents. The most dominant extension service methods in the study area were on crop-residue processing and utilization, feed supplementation, animal health care, fodder crop production, milk collection, bulking, processing and marketing. State extension agents were least motivated to work with pastoralists because of the difficult nature and associated costs. The study recommended that motivation packages such as pasture promotion and production should be encouraged by government and stakeholders; that government should promote more sedentary and modern strategies for achieving improved productivity and profitability, especially for peri-urban agro-pastoralists; and that agro-pastoralists should be linked to relevant institutions for fund generation activities.

Keywords: Dairy pilot scheme, agro-pastoral communities

Introduction

The basic food policy objective of Nigeria since independence has been to achieve self-sufficiency in food production and this include food from animal sources. To achieve this end, Nigeria is also endowed with estimated 19.5 million cattle, 72.5 million goats, 41.3 million sheep, 7.1 million pigs, 278,840 camels and 145 million chickens, 11.6 ducks, 2.1 million turkeys, and 974,499 donkeys (National Agricultural Sample Survey, 2011). These statistics make Nigeria the top livestock producer in West Africa (Aishat, 2016). Nigeria has adequate ruminant livestock resources to generate the needed animal protein in her diets.

But the intake of protein of livestock origin still remains at 3.5g/head/day as against the recommended FAO's 27.2g/head/day (Yahuza, 2001 and Lawal-Adebowale, 2012). Common indigenous cattle breeds in Nigeria are the White Fulani (Bunaji), Sokoto Gudali (Bukoloji), Red Bororo (Rahaji), Kuri, Adamawa Gudali, and some Taurine breeds found in the southern and north-eastern parts of the country. The white Fulani cattle breed shows characteristics of a dairy breed though reared for both meat and milk (dual purpose). The productive characteristic of the breed varies extensively from farm to farm depending

on the level of management and nutrition (Ojo et al., 2016: Dutse, 2016). Under a typical pastoral setting where animals are rarely supplemented, daily milk offtake averages 1.5-3 litres. In government farms and research stations where supplementation with concentrate along with mineral sources and 50% genetic crossing with exotic dairy breeds occur, offtake of milk could be 7-10 litres daily (Iyayi, 2003; Alphonsus et al., 2016).

Reproductive parameters of the White Fulani breed for example are unsatisfactory under the pastoral system, essentially due to management constraints conditioned by the socio-economic factors prevailing in the agro-pastoral environment. Semi-intensification with or without crossing with exotic dairy breeds have been demonstrated to produce crosses that exhibit superior productive capacity and amenable to agro-pastoral management practices. Yearly calving ability and up to 300 days in lactations have been reported in the White Fulani crosses on demonstration farms. Herding on natural range by the pastoralists is a feature of the dairy farming system in Nigeria (Iyayi, 2003; Olorunnisomo et al, 2016; Madziga et al, 2013).

The past two decades have witnessed increased sedentarization of agro-pastoral cattle herders. Experts at a recent conference on pastoralism estimated that 4.5% of the nomads are already settled, and more than 35% transit on seasonal basis, while less than 20% are said to still wander about for the welfare of their stock and possibly as a way of life (Anon 1992 and Yahuza 2001; Yusuf, 2016).

According to the works of Yusuf (2016), the settled pastoralists now engage in arable crop production, have fewer (manageable) stock holding and greater stock productivity compared with their nomadic counterparts. This group of pastoralists are commonly described as 'agro-pastoralists'. They constitute a good target for any intervention aimed at stimulating measurable improvement in livestock production. Nigerian government has in recent times strongly encouraged integration of these production systems so that research-extension efforts in livestock farming could be optimally realized. An integrated approach for small-scale dairy production and marketing could definitely enhance performance of the existing rudimentary cattle production structures on ground (Sani, 2014; Jamagani, 2014).

This study was therefore designed to study the characteristics of the agro-production systems and introduce improved management interventions at some pilot location in Katsina State, Nigeria. The overall objective was to develop improved intervention approaches that would lead to establishment of sustainable integrated agro-pastoral dairy production system through improve milk yield and market-oriented production.

The study objectives were to: identify factors and elements which determine or constrain agro-pastoral dairy production in selected Agro-ecological regions of Nigeria; develop improved intervention practices or models in order to stimulate increased dairy production through efficient management of available natural resources for improved living standard of the agro-pastoralists; mobilize beneficiaries into registered cooperative associations to manage, ensure and sustain ability of the scheme; facilitate capacity building of the local research-extension personnel through customized training designs and exposures; promote the dissemination and adoption of proven dairy farming technologies; and evaluate the socioeconomic impact of the intervention.

Methodology
The project was implemented in three phases within 24 months. The first phase was the need assessment stage, which required guided reconnaissance survey to identify suitable locations and a careful development of survey instrument using participatory rural appraisal approach to capture and quantify needs and factors that constrain agro-pastoral production and marketing systems. The second

phase was the evaluation and prioritization of identified needs and development of strategies for interventions at three levels: the farmer's, the researcher's and the expert development levels. The third phase was the intervention stage revolving around farmers organization into registered cooperative groups, animal population studies, production supports, promoting and disseminating proven dairy technologies in selected sites.

Moreover, four states were purposively selected for preliminary survey, two from the northwest and two from the southwest. The selected states were Kano and Katsina in the north and Osun and Oyo in the south. Ranking of the states was based on pastoral household population, dairy cow population, dairy activities, easy access and proximity to markets, nearness to urban infrastructure etc.

Based on the results of the preliminary survey (table 1), a benchmark survey was conducted at two sites in Katsina State. The method used in the sites included the education of farmers, formation of farmers' cooperatives, fortnightly and monthly visits, ambulatory veterinary clinic, introduction of salt lick, Crop Residue Processing and Utilization (CRUProcess). Also the scheme promoted hybrid maize as viable option or fodder production, arbitration in inter-communal conflict, mission visit, workshop in cooperative dairy development. Data collection is important in dairy production the project introduce the concept of logbooks in dairy management, and training for agro-pastoral households on how to use the support of the extension agents.

Results and Discussion

Benchmarking of dairy sites
The results of the multi-locational benchmarking showed that agro-pastoral settlements varied in the number of household members from as few as 4 families at Akufo in Oyo State to as many as 300 at Larabawa in Kano State. The average per household members was 8

persons. The major cattle breeds identified in the sampled communities were the White Fulani, Sokoto Gudali and Wadara in the north and White Fulani, Kenana and Keteku in the south west. Average milk off take recorded was 3 litres /day per cow in the wet season when forage is readily available. The national average herd size was 10 milking cows per household. In the north, milk off take per cow was higher in the wet season while in the South West; milk offtake tends to be restricted to levels that could be marketed because of better feed year round supplies. In the north the major dairy products were fresh milk and locally fermented products, while in the southwest, fresh milk and local cheese (*wara*) were the major products.

The major problems reported by agro-pastoralists included the scarcity of feed resources for all year round feeding, limited carrying capacity of available land resources, resulting in high cattle density in some favourable locations. There were recorded cases of animal diseases and very low level of milk yield in the north, especially during the dry season. There were also milk marketing problems in the south. The score criteria established for the priority State ranking in terms of cattle population, homogeneity of sampled population, ease of assess, markets for inputs and produce accessibility herds and ministry staff supports, ranked Katsina State as first choice for interventions. These were followed by Oyo, Kano and Osun in the order of their priority rankings.

Formation of farmers' cooperatives
Farmers were educated on the importance of producers' cooperatives. They were then encouraged to organize themselves into cooperative groupings. For example, at the request of the cattle rearers in Funtua, and with the cooperation of the Funtua zonal office of the Katsina State Agricultural and Rural Development Authority (KTARDA), a meeting was convened for all interested stakeholders at the Funtua zonal office. The result of the meeting was that a group of cattle rearers organized

themselves within three weeks and registered a cooperative Association with the name 'Zamfarawa Funtua Wardille Hulbe Kautil Hore' (which means: Cattle Breeders Cooperative Society) with fourteen members. Between February and April in the first year of intervention, five Cooperative Associations were formed by farmers at Kayawa, at the far northern end of the state. Efforts were also made to form more groups in the Funtua in Katsina state. The aim was to expand the number of farmers and work with more farmers to ensure the availability of sufficient quantities of milk that will facilitate the establishment of milk marketing groups.

Fortnightly visits
Two extension workers (one in agricultural extension and the other a veterinary doctor) were engaged by the project. They were assigned to the project by the Katsina State Government to work with the research team. These specialists visits two registered cooperative groups every fortnight to monitor herd health, measure of milk yield from selected animals and cooperative society development progress. A total of 50 fortnightly visits were made for the two year period (Table 2).

Monthly visits
Multidisciplinary research team from NAERLS joined the two state extension workers mentioned above visit the cooperatives to monitor the progress of each group and supervise the data collection and also check the entries. A total of 30 visits were made during the two years of the project interventions (table 2). These visits enable the study team to facilitate acceptance of intervention programmes, consolidate existing cooperative groups, monitor herd health and carryout any other assignments as may be required. It is noteworthy of note that Agro-pastoralists in the study area were generally very suspicious of outside influence and hence refusing direct access to their animals by visitors, except for veterinary check.

Therefore, the extension agents that worked with the communities were impressed by the level of success achieved by this scheme in terms of getting the community to allow the project specialists to handle their animals for data collection. This achievement is quite significant for extension research in the study area. This supports the earlier position of Anosike 2015 that active youth involvement in support service delivery is a key to actualization of sustainable development drive in this sector (Anosike, *et al* 2015)

Salt lick, CRUProcess and fodder production technology
Scarcity of hay and fodder in agro-pastoral production systems are the primary factor contributing the migratory habits of pastoral herdsmen, especially in Nigeria. Feed scarcity was identified as the number one problem of the agro-pastoralists in the northwest agro-ecological zone (Dutse, 2016). Consequently, the team's first major intervention was the introduction of methods of improving the nutritional status of the animals. It was observed during the visits that the animals were eating soil and licking sweaty fur of other animals in the herd. This is an indication that the animals are suffering from mineral deficiencies.

Thus, the research team had to educate the farmers about the use of mineral salt lick blocks which were available in the market. It was also observed that the farmers were reluctant to buy the blocks because of the cost. Therefore, the team decided to give out some salt blocks free to the farmers as an incentive to motivate them and develop trust in the team. Fifty blocks were given to the 14 farmers that constituted members of the first registered cooperative. Extension documentaries were recorded on the importance of salt lick in animal husbandry showing the initial symptoms and the indicated result after the salt lick interventions.

Crop-residue-urea processing

The CRUProcess technology was selected for promotion. The goal was to improve the quality of crop residues preservation and used during the dry season. The result of the technology demonstration and the trial were well received by the famers. All the crop residues treated with urea were gradually accepted by the animals. However, the time of introduction (June) was rather too late, as the rainy season started shortly after. This require additional labour to pack the treated straw to safe place to prevent was damages. It was followed up in early December of the same year.

It was observed that farmers that grow crops and keep animals were more resilient to climate change than farms that only rear and milk cows. The singularly reason was farmers that grow crops and herds animal has enough residues for the dry season feeding. As part of the strategy to increase the feed resource base, the cultivation of hybrid *Zea mays* (Obasuper 2) was introduced to the communities the maize variety has higher seed and herbage yield than conventional maize grown in the area. The intervention was received by all the group members. A total of 2.6ha were cultivated. The data on seed and herbage yield were computed to be 3ton/ha for seed, while the herbage yields of 15tons were CRU-processed in January of the second year of the intervention. Because of the good result, the technology recommendations were adopted most other plot sorghum were replanted in the subsequent years.

Veterinary ambulatory services

At the time of intervention in Katsina in Katsina state, there were shortages of state veterinary personnel. The herdsmen do not usually have regular access to veterinary services. This was coupled with the culture of herd inaccessibility. Farmer practise self-medication and use of quack for veterinary support. The result was that many farms recorded serious drug abuse, disease outbreaks coupled with malnutrition. The scheme introduced two veterinarians to visit the farms once a month. Cases of diarrhoea, mineral deficiency symptoms, ticks and mastitis were treated routinely. The records after 6 months showed marked improvement in the herd status. All the recommended treatments such as deworming, de-ticking, vaccination and supplementary feedings regime were adhered to There were reported cases of diseases that were known to spread primarily through human activities; they were prevented and controlled through the application of biosecurity measures along the production and marketing chain, coupled with increased awareness and education. This affirms the suggestion that biosecurity can help prevent, control and check zoonosis, with the focus on changing the habits and behaviours of cow handlers in such a way that the risk of diseases is reduced (Salisu et al., 2015).

Inter-communal conflict resolution

Conflict between the settled agro-pastoral and the crop farmers neighbours and between Agro-pastoralist and the more migrant neighbours is real and can be serious. Arbitration, as used here, refers to the process of resolving disputes between migratory herdsmen and crop farmers. Cases are referred to the research team for the purpose of amicable conflict resolution. Such conflicts often arose over land use because the migratory herdsmen tend to encroach into farmlands with their animals, destroying crops in the process. For example the Ungwan Zamfarawa *g*roup which was the first to form a cooperative society happened to settle on a piece of land which the Bakin Dutse group claimed was their own. Conflict arose in the first year of intervention, when the team requested the Zamfarawa group to identify a suitable site for the digging of a pit for demonstration of CRUProcess technology. As soon as they started digging the pit, the Bakin Dutse group opposed the action on the grounds that they were the owners of the land and therefore no such activity should be

carried out without their involvement. It took two weeks of negotiations and dialoguing with the community leaders, village heads and the district heads of Funtua before the conflict was resolved and the digging of the pit was allowed to continue. The Bakin Dutse group to form its own cooperative society and to dig its own pit for the CRUProcess demonstration—this was part of the method for the resolution of the conflict.

Mission visit
Several mission visits were carried out and were involved in the following assignments:
1. Meeting with the entire team to review progress and agree on itinerary of visits
2. Visits to the Funtua and Kayawa sites to interact with farmers' cooperative societies and have a feel of the Agro-pastoral dairy production systems in the area
3. Participated in the one day workshop on the development of small-scale agro-pastoral dairy development in Nigeria
4. Presentation of an invited paper that drawn from the vast experiences of the activities of CORUS Team members..
5. Meeting of the research team to review mission observations and recommendations with emphasis on the need to build more in-depth research activities into the project.

Workshop on cooperative dairy development in Nigeria
A one-day workshop was held on Small-Scale Agro-Pastoral Dairy Development Scheme in Nigeria. The workshop was attended by livestock scientists from France and major stakeholders of dairy development in Nigeria. The overall objective of the workshop was to discuss the improved dairy intervention techniques that could lead to establishment of sustainable integrated agro-pastoral dairy production system with improve milk yield and market-oriented production. The specific objectives were to (i) identify factors and elements that determines or constrain agro-pastoral dairy production in the selected Agro-ecological regions.(ii.) promote improved intervention and practices or models in order to stimulate increased dairy production through efficient management of available natural resources. As part of the achievements, the workshop recommended that high income farmers that are ready to acquire land and settle for dairy farming and work with improved skill should be encouraged to adapt prototype farming methods using Bunaji/Friesian crosses and That the prospects are high and most likely to break even within short period. The workshop also recommended that the project should support cattle feed supplementation using whole cotton seed which is abundant, cheap and rich source of nutrients (Corus Report, 2006).

Agro-pastoral household training
A two-day training workshop was organized for farming households on cooperative management, animal husbandry, herd health management, maize and forage production and milk handling. The training was attended by about 30 farming households, including women and youths, who participated in milk handling, bulking and quality control exercises. The training was repeated with a focus on dry season feed conservation, processing and utilization.

Use of logbooks for data collection
In order to improve the quality of data collection, two logbooks were introduced for on-farm data collection. Twenty-six milking animals from ten sedentary farmers in two cooperative groups were purposively selected for long term average data collection. Entries were directed at household formation and herd structure, cooperative membership and activities, herd health monitoring and disease treatment and daily milk collection. The results showed that the values of the variables scored agreed with findings in the study report of Iyayi et al. (2016) that logbook keeping in dairy activities increases productivity and profitability.

Conclusion and Recommendations

Pilot Dairy Development Schemes in Nigeria are alternative intervention studies aimed at addressing the inadequacy of agro-pastoral production systems. This study sought to find out the extent to which the dairy pilot project interventions can improve access to extension services, production inputs, improve milk production, milk collection/ bulking, processing and marketing. The study used qualitative and quantitative methods such as focus group discussion, pastoralist organization into registered cooperative groups, animal production support activities to generate data. Group production dynamics and dissemination of proven dairy technologies were monitored for changes. The study involved key informant interviews and use of questionnaire. The main findings of the study are;

1. The modal age group of the Agro-pastoralist farmers is the elderly within age group 30-39. Reasons were attributed to gerontocracy in the traditional leadership system which allows for the elderly in succession.
2. The predominantly dairy farming cultural practice is still subsistence farming. Majority of respondents (79.7%) are into livestock farming as the main occupation.
3. Milk processing and marketing is exclusively reserves for the women.
4. The most dominant extension services delivery carried out by the state ADP in the entire study area were in crop production and very little activities in dairy development.
5. In crop production, specific activities engaged by agro-farmers farmers include; manure harvesting, crop residues management, and promotion of dual purpose crops.
6. In dairy production activities identified include; crop-residue processing and utilization, feed supplementation, animal health care, De-worming, animal traction, feed storage, preparation of local salt leak, fodder crop production, milk collection, bulking, processing and marketing.

There are well established criteria for selecting agro-pastoral group members.

7. Membership of the schemes is mainly residents in the community who offer voluntary services. The criteria for selecting members of cooperatives among others include; being a members of the community, preparedness to offer voluntary services, proven expertise in crop and livestock production and ability to work with other members outside the group.
8. The Schemes reach out to community members on milk production farming and animal husbandry practices through information dissemination, sensitization at group meetings in their communities associations.
9. The Schemes were found to be the main link between the cooperatives and extension agents. It was however, reported that cooperatives formation evolve stronger links with the community and input dealers.
10. The study identified institutions such as milk marketers as performing the roles of enhancing enhance sustainability support for dairy projects. If demand for milk collection stops, the farmers stop all related cooperative works.
11. There are well established criteria for selecting agro-pastoral group members.
12. State Extension Agents were least motivated to work with pastoralists partly because of the difficult nature and associated costs.
13. The motivations NAERLS work were not economic; rather, the desire to make positive changes in the lives of pastoral community members was a key motivation to drive sector development. Community members are very co-operative and willing to give their support to enhance their performance.

The achievement recorded in the study area showed that it is possible to work with rural dairy farmers as partners.

Public-Private-Partnership arrangements work better to reduce producers' and consumers' risks, enhance milk quality and productivity, and also generate regular income for farm families. Based on the findings and conclusion, it is recommended that:

1. Good milking practices should feature regularly in dairy extension outreach projects.
2. The importance of mastitis control in dairy herd was noted; hence, government should mount ambulatory veterinary services and disease campaigns on the control of mastitis.
3. Government should promote known and established milk hygiene practices among rural dairy farmers. For milk from local herds to be acceptable commercially, issues of personal hygiene and health should be dealt with.
4. There should be the provision of regular and continuous farmer education, especially on the dangers of self-medication
5. There should also be intervention programmes for the effective control of ectoparasites
6. For milk collection to be successful, farmers' groups in remote locations should be encouraged to identify milk vendors that can be trained to collect and manage raw milk from several sources and transport safely, timely and efficiently to the market.
7. There should be deliberate effort on the part of government to curb the activities of fake and illegal drug peddlers. There should be a government policy on the regulation of sales of veterinary drugs.
8. Biosecurity can help control milk-related zoonosis, with the focus on changing the habits and behaviours of milk handlers in such a way that the risk of diseases is reduced. Thus government should work with farmers to adopt biosecurity measures and develop with them sets of safe practices in production that are seen as practical, cost-effective and sustainable in such areas as milk hygiene, milk handling, pasteurization of milk, dairy processing and storage, grading standards, and packaging.
9. Frequent cases of abortion reported in some.

Acknowledgements

References

Anon. (1992). Baseline study report, livestock subsector. Fed. Min. of Finance and Economic Development/UNDP. Abuja.

Aishat, O. (2016). Keynote address delivered by the hon. minister of Agriculture and Rural Development, Chief Audu Ogbeh. Retreat on Livestock and Dairy Development in Nigeria, Musa Yar'Adua Centre, Abuja. 7th to 8th June.

Alphonsus, G.N., Akpa P.P., Barje B.I., Nwagu M., Orunmuyi I.A., Adeyinka M., Alphonsus R.J., Tanko A.M., Hassan N.P. (2016). Genetic evaluation of fertility traits of Friesian x Bunaji dairy cows using multivariate milk composition-based models. *Journal of Animal Production Research,* 28(1): 112-122.

Anosike, F.U., Grace R.Z., Sani A., Tayia O.L., Opeyemi B.O., Charles D.N (2015). Youth in livestock production: Key to the actualization of the Agricultural Transformation Agenda. A review. *J. Amin. Prod. Res.* Vol. 27: 213-218.

Dutse, K.P., Duniya K.P., Duniya E.Y., Dodo E.Y., Dodo P., Saleh P., Saleh S.A. and Ahmed S.A. (2016). Effects of moringa leaf meal inclusion in dairy cattle meal among dairy farmers in Kumbotso Local Government Area of Kano State, Nigeria. *Journal of Animal Production Research,* 28(2).

Iyayi, E.A., Okoruwa V.O., Babayemi O.J., Busari A.A. and Peters O.F. (2003). Livestock production pattern of agro-pastoralist in peri-urban centres of southwest Nigeria. *Nigeria Journal of Animal Production* 30(1): 87-92.

Jamagani, Z.B., Sani R.M., Omokore D.F. and Achi N.P. (2014). Training needs of extension workers: A case study of Maigana and Samaru zones of Kaduna State Agricultural Development *Project J. Anim. Prod. Res.* 26(1): 46-53.

Lawal-Adebowale, O.A. (2012). *Dynamics of Ruminant Livestock Management in the Context of the Nigerian Agricultural System.*

Madziga, I.I., Fayomi A., Amodu J.T., Voh (Jr.) A.A., Barje P.P., Alawa C.B.I., Lamidi O.S., Goska D.Y., Mohammed D. (2013). Influence of breeds of beef cattle on nutrient utilization. *J. Amin. Prod. Res.* 25 (1): 52-58.

NAERLS, 2006, Progress Report of November, 2006.: The Corus Integrated Agro-Pastoral Dairy Pilot Scheme In Nigeria. (CORUS project no. 02 320 063).

Ojo , V.O.A., Jolaosho A.O., Onifade O.S., Amodu J.T.l., Olanite J.A., Arigbede O.M., Anele U.Y., Adeoye S.A., Dele P.A. and Amole T.A. (2016). Dry matter yield, botanical and chemical composition of natural forages of the southwest Nigeria as influenced by topography, land use and season. *Journal of Animal Production Research.* 28(1): 138-150.

Olorunnisomo O.A., Adewumi A.S. and Oladimeji A.O. (2016). Efficiency of evaporative cooling on zebu heifers sprinkled with different volumes of water in a tropical environment. *J. Anim. Prod. Res.* 28(1): 340- 347.

Salisu, M.D., Junaidu A.U., Mohammed A.K., Lamidi O.S., Suleiman A., Goska D.Y., Mustapha H., Madziga I.I., Yusuf M., Sani R.T. and Wunti Z. (2015). *Wunti* microbiological quality assessment of commercially prepared yoghurt retailed in Sokoto State, northwest Nigeria. *J. Anim. Prod. Res.* 28(1): 78-83.

Sani, R.M., Omokore D.F. and Achi N.P. (2014). Training needs of extension workers: A case study of Maigana and Samaru zones of Kaduna State Agricultural Development Project. *J. Anim. Prod. Res.* 26(1): 46-53.

Yahuza, M.L. (2001). Smallholder dairy production and marketing: Experience of dairy cooperative organization in Kaduna State, Nigeria. Paper at the NDDB - ILRI south–south workshop on smallholder dairy production and marketing, 13–16 march.

Yusuf, O., Yusuf H.O., Abdulrahman S. and Dutse F. (2016). Market structure and performance of value chain actors in hides and skins processing and marketing in Nigeria. *J. Anim. Prod. Res* 28(2): 245-253.

Table 1: Site selection score criteria

Scoring criteria	Oyo	Ekiti	Katsina	Kano
Suitability of Locations visited	4	3	4	4
Local breeds of dairy cattle mainly kept by the agro-pastoralists	4	4	5	4
Nearness to support service	2	2	5	3
Exposure to previous extension interventions	4	3	4	3
Distance between settlement and the nearest urban centre	2	3	5	5
Nearness to NAERLS	2	3	5	2
Likely cost of project	3	2	4	3
the agro-pastoral settlement all season accessibility	3	2	4	4
Favourable Herd movement pattern	2	1	4	2
pastoralists activity in crop production	2	2	4	3
Easy access to extension agents, veterinary services/clinics sources of information	1	2	4	4
Member of farmer association	2	1	4	3
Rating of the site (%)	31(51.7%)	28(46.7)	52(86.)	40(66)

Score: 5 = Excellent; 4 = Very good; 3 = Good; 2 = poor; 1 = very poor