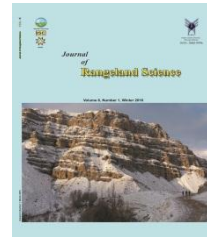




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**Research and Full Length Article:**

## **Assessment of Feed Resources Utilization for Livestock Production by Agro-Pastoralists in Tafa Local Government Area of Nigeria**

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Received on: 06/10/2015

Accepted on: 01/12/2015

**Abstract.** Feed resources availability at cheap and affordable prices for livestock consumption are major factors determining capability of livestock production to supply products for increasing urban and cities consumers in Nigeria. To take advantages of the high demand in urban areas, livestock producers on extensive pastoralism are moving closer to cities and urban communities such as Abuja the Nigeria capital city. As these pastoralists moves closer to places like Abuja, traditional livestock production systems change from complete pastoralism to agro-pastoralism whereby hitherto pastoralists get settle down on suitable land where they can both rear their livestock and cultivate land for crop production. This practice is gaining ground not only among the hitherto pastoralists but among all farmers living closer to Abuja. An example of such location is Tafa Local Government where this study was carried out. But, increasing intensity of agro-pastoralism in the area is causing poor range productivity and livestock performance due to overstocking, poor pasture utilization and seasonal variability effects on pasture plant yield. Therefore, an assessment of current feed resources use and farming practices in the area by agro-pastoralists was carried out for the purpose of suggesting positions for improved range and livestock performance through nutritional manipulations. The study confirmed that proximity of the study area to the Nigeria federal capital city is a factor supporting growth of agro-pastoralism in the area, it was discovered that between January and May annually; there is shortage of feeds and feed resources for livestock consumption, it was also discovered that prices of livestock is reasonable year round and average price of milk per litre is highest between January and April annually. The study concluded that livestock feed resources management practices such as protein supplementation, processing of green fodders into silage and improve utilization of crop residues and by-products are suitable for reducing shortage of feeds and feed resources between January and April annually in the area.

**Key words:** Agro-pastoral, Feed resources, Seasonal availability, Feeds supplementation

## Introduction

Agricultural production today in Nigeria comprises of a system whereby there is integration of crop and livestock for provision of food, housing and shelter. This system is witnessing high rate of acceptability in many rural communities across Nigeria whereby people who are traditionally crop farmers now engage in livestock production and traditional pastoralists cease to be complete pastoralists by settling down at suitable locations where they can sell some of their animals and practice integrative livestock-crop production. This engagement in crop production is against intensive pastoral system in which labour, capital and or technology inputs per unit of land and or animals are increased (Moritz, 2009). Agro-pastoralism can be describe as a response to enduring socio-economic pressures associated with livestock management such as reduce range productivity and non-availability of animal feed resources due to seasonal variability.

Increased integration of crop and livestock production can be attest to by huge population of people involve in crop-livestock integration and products output; in Sub-Saharan African countries, it was reported that 140million people are involve in production of 92million cattle, 194million sheep and goats under integrative system of crop-livestock management for supply of meat and milk for human consumption (Thornton, 2002). Under integrative crop-livestock production system, agro-pastoralists share risks from their farming operations between crop and livestock, they use animals as draught and sources of farm power, they use residues from crop as animals feed resources and they pack manure from animal husbandry for use in crop production.

Residues from crop production by agro pastoralists is not use in livestock production but also use as building materials, pesticides and insecticides

(Oyasola, 2009). Benefits such as these are immense and not only derived by the traditional pastoralists who migrate to a location but also by the traditional crop farmers in the area. Even dwellers of towns and cities where their camps are located also benefits from closeness of the agro-pastoralists as in the case of towns and cities in south west Nigeria where provision and supply of protein-rich products such as meat, milk and cheese to the cities dwellers becomes easy due to closeness of the agro-pastoralists (Fabusoro, 2007). But, due to mobile nature of traditional pastoralists to continue search for greener pasture; discovery of better grazing land may led to their movement from locations close to urban areas and cities and huge advantages associated with their settling down can be loss; improve utilization of their resources becomes a highly desirable exploration.

The objectives of the study was to evaluate current feed resources utilization and management practices employed by the agro-pastoralists in order to identify challenges and or constraints affecting livestock productivity in the area as well as analysis of socio-economics parameters of the agro-pastoralists in the study area. This is important because the study area lie in-between Abuja (high animal products demand city) and Kaduna State of Nigeria. The proximity to Abuja (*Nigeria capital*) makes the study area a hub of livestock production activities because of huge market in the federal capital city while it boundary with Kaduna makes it a greener land for livestock production since its vegetation cover is better than that of some parts of Kaduna and other northern states which is making the area to witness migration of pastoralists from other parts of Nigeria especially northern states. Therefore, an assessment of range and livestock management practices in the study area was envisioned in order to come up with solutions to challenges militating against

improved livestock productivity in the area.

## Materials and Methods

### Description of study area

Tafa Local Government is among 774 local government areas in Nigeria and its headquarter is Sabon-Wuse in state of Niger, Nigeria. The local government is a place where Niger state is sharing boundary with Abuja and Kaduna state. Sabon-Wuse the headquarter of Tafa Local Government area is approximately 84km from Minna the capital of Niger state and approximately 25km from Abuja (the federal capital city of Nigeria). Geographically, Tafa Local Government is located on Latitude 9.33° north and longitude 7.26° east. Rural communities around where agro-pastoralists in the local government are predominantly found includes but not limited to Kwalada, Bwakoro, Chawa, Kawudna, Dogon-Kurmi, Garam, Chauma, Ija Gbagyi, Ija Koro, Azu, Gyeadna etc. The soil and vegetation in most of these areas support commercial crop-livestock production; that is why agro-pastoralism is a popular practice among migrant Fulanis and indigenous Gbagyi people in the local government area.

### Methodologies

The study was carried out using Feed Assessment Tool (FEAST) developed by International Livestock Research Institute, Kenya which comprises of a database software and two sets of questionnaires (Duncan *et al.*, 2012). It follows two levels of interaction with the respondents (Agro-Pastoralists) in which the first level is a focus group interaction and the second level is individual interview for selected agro-pastoralists from the focus group. The focus group interaction was Participatory Rural Appraisal (PRA) of agro-pastoral activities while the interview was individual Personal Appraisal by the selected agro-pastoralists.

### Organization of focus groups and administration of questionnaire

Agro-pastoralists in the local government area are predominantly Fulanis who have migrated to the area over some decades ago as well as indigenous Gbagyi people of the area. So, both categories of agro-pastoralists were invited to participate in Participatory Rural Appraisal (PRA) of their livestock and crop production activities. The Fulani agro-pastoralists were invited through the office of the Chairman of Miyetti Allah Cattle Breeders Association of Nigeria (MACBAN) in Sabon-Wuse while the indigenous Gbagyi people were invited through their village heads and community leaders.

Two focus groups were established; the first was at Kawudna (a rural community surrounded by many agro-pastoralists household) and the second focus group was at the office of Miyetti Allah Cattle Breeders Association of Nigeria (MACBAN) in Sabon-Wuse. In Kawudna, 12 Agro-Pastoralists participated in the Participatory Rural Appraisal (PRA) among which 9 of them were selected for individual interview. In Sabon-Wuse, 35 Agro-Pastoralists participated in the Participatory Rural Appraisal (PRA) among which 12 were selected for individual interview. At each of the focus group and individual interviews, administration of the questionnaire was done with Hausa language which is a local *lingual-franca*.

### Data analysis

Raw data were collected and inputted into the Feed Assessment Tool (FEAST) then analyzed.

### Results and Discussion

The assessment study carried out showed that throughout the year, feed resources availability in the study area is never available in excess for livestock consumption and availability of feed

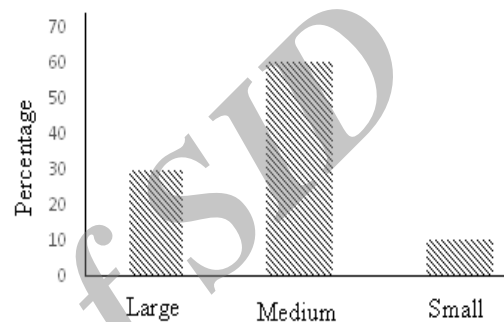
resources is determined greatly by rainfall. Between January and May annually, feed resources availability is below adequacy; however, by June through December, the availability of feed resources becomes adequate in fact from the grazing pasture alone.

At the beginning of the year in January, rainfall availability is zero, grazing is grossly inadequate because the rangelands are under natural management and utilization. Grazing animals during this period depends on few remaining pasture forages, weeds, natural fodder crops and leaves prune naturally growing shrubs and browse plants by herdsman. During this period, crop residue from harvested crops are made available for livestock consumption; agro-pastoralists whose crop residues are inadequate usually purchase residues from local markets or pay to farmers so as to get access to farmland from which food crops has been harvested.

Although feed availability is below adequacy for period between January and April but grazing still remain highest source of livestock feed resources. Farmers in the study area don't usually purchase any factory made feeds or supplemental diet for their livestock because such feeds are not available, it is only cereal crop residues and leguminous crop residues that the agro-pastoralists usually purchase to supplement livestock grazing. But understanding of the importance of feeding adequacy by the agro-pastoralists showed that they are will to purchase factory compounded livestock feeds for their animals during this period if available.

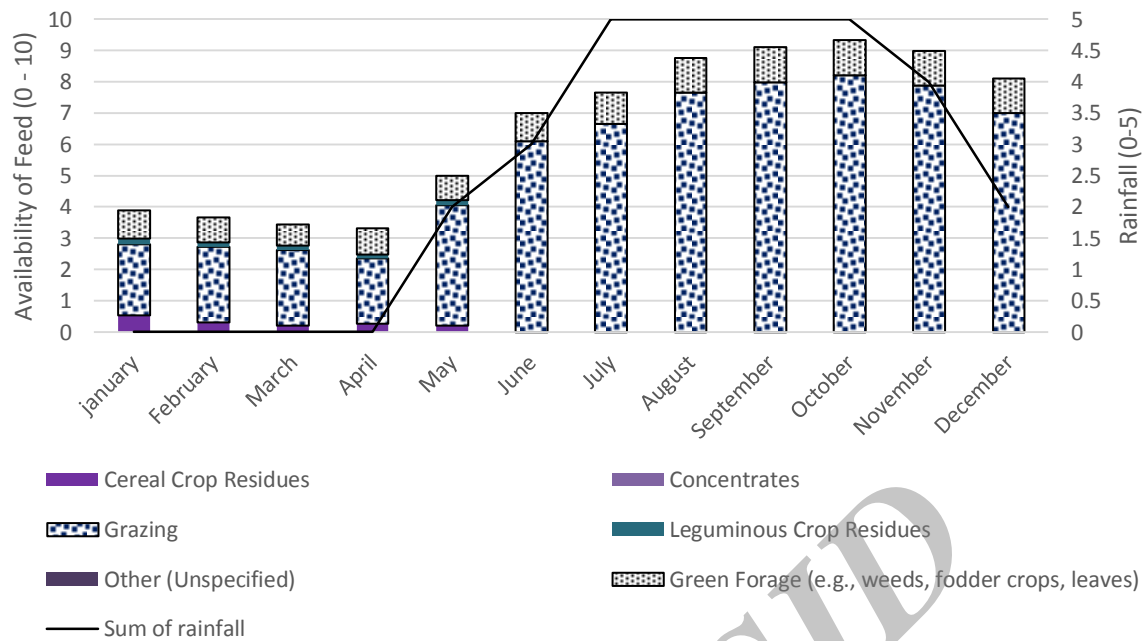
During dry season, grazing contributed between 58 – 70% feed resources for livestock in the study area while in the wet season, it contributed between 80 – 90% feed resources. The higher contribution during wet season is because of the increasing rainfall during this period; this observation is in agreement with what is obtainable in

many similar locations across sub-Saharan African countries (Ayantunde *et al.*, 2012 and 2014). Tesfaye (2008) also reported that natural pasture is the largest contributor of feeds for livestock in developing countries of Africa and pasture share contribution is usually between 80– 90% of feed resources. Therefore, during wet season, animals perform better and gain more weight which by dry season lost due to non-availability of feed resources and poor nutritive value (Fig. 1).



**Fig. 1.** Land holding category of agro-pastoralists in the study area. Small farm (0 – 2ha), Medium Farm (2.5 – 10ha) and Large farm (10ha and above)

Apart from inadequate pasture during dry season, there is inefficient utilization of crop residue as alternative feed resources or supplements because from the assessment, it was found out that some of the respondents burn their crop residues while to some of them the residues are too small when compare with their herd population. There is also no fodder cultivation by the respondents either as community or individually as well as non-availability of factory compounded feeds; as a result of these, livestock production performances are greatly limited especially during dry season as shown in the Fig. 2 below for milk production average annually.



**Fig. 2.** Rainfall and feed resources availability in the study area

Because some of the agro-pastoral also have household members that migrate southwards for greener pasture, crop residues for livestock consumption are in competition with sheltering because some of them make use of residues as building roofing materials and fencing. They are used also as fuel and as fertilizers or as surface mulch in cropland (Van and Hans, 1974).

Average daily milk yield also decrease between January and April annually and become high by May and again drop by September and October. Unfortunately, the period when milk yield is low is when average price per litre of milk is the highest in the study area. The decrease in milk between January and April can be linked with inadequate feed availability during the period while the research showed that reduction in milk between September and October is due to parturition of cow by this period.

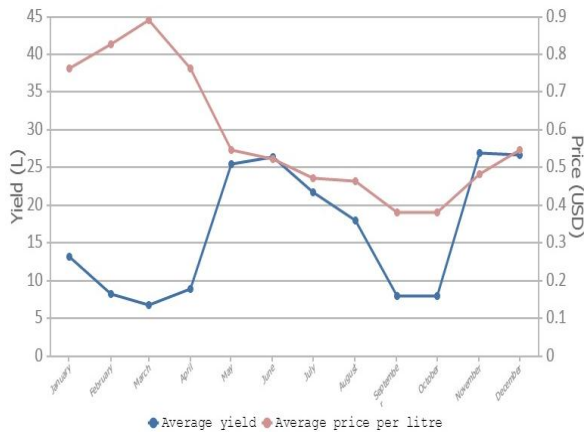
Average prices of milk per litre is higher for period between January and April annually however this period is when the milk yield is lower; this condition require improvement so that the agro-pastoralists in the study area can

take advantages of the higher price during this period. To achieve this, supplemental feeding with cheap feed resources such as brewer dried spent grains, crop residues mix with industrial prepared protein concentrate.

Mixing of high quality protein concentrate with cheap industrial waste and crop residue can be use to produce high quality nutrients for animals consumption at very cheap cost. The study area is not far from a Kaduna which is an industrial city where by-products such as brewer dried spent grains is available at cheap or low cost. Acceptability of this nutritional management can also create new business oppourtunity for ruminant animal concentrate in the Nigeria livestock ventures because the production scenario of livestock in the study area is common across different agro-ecological zones of Nigeria.

Nutritional and management manipulation that will contribute to higher income generation from milk is not only importance for taking advantage of higher milk prices between January and April but also to promote improved animal performance because local dairy

cattle are the most predominant livestock in the study area as shown in the Fig. 3.

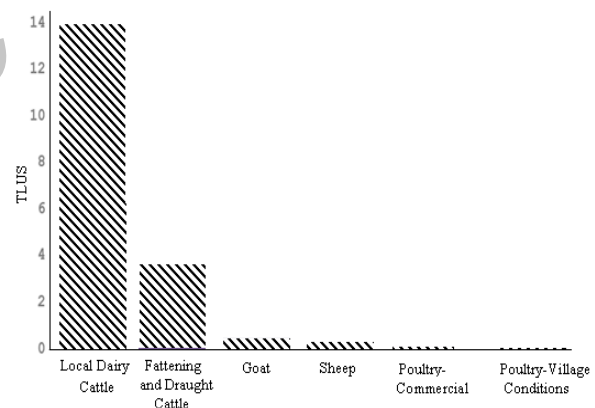


**Fig. 3.** Average daily milk yield versus average price of milk in the study area

The result of the study showed that local dairy cattle white Fulani is the most predominant in the study area. This breed of cattle is one of the best local milk producing breed of cattle in Nigeria but however, challenges of insufficient feed resources during a period when agro-pastoralists can derive highest income from the local dairy cattle therefore manipulation of their nutrition with protein concentrates can enhance livestock utilization of hitherto feed resources to become more useful. Although, milk production capacity of this local breed of cattle is very poor when compare with exotic foreign breeds but the performance differences cannot be linked totally with breed distinction because the exotic breed are usually under better nutritional management compare with the local breed, so nutritional improvement with protein concentrate may be use to enhance milk production potential of the local dairy cattle.

Livestock production in the study area required improved management because from the figure below, livestock production rank below labour but higher than crop production. Improving animal feed resources utilization can therefore create ground for better uses of crop residues produce by the agro-pastoralists.

To household income of the study area, livestock production contribute 33.78%, off-farm business contribute 14.78%, labour 34.44% and crop production contribute 17%. The highest position of the labour was discovered during the study that some household members especially younger people do go into the federal capital city and its environs to work on construction sites and established commercial farms during shortage of livestock feed resources between January and May annually. During this period, they leave their animals to older household members while they go into the city to work so that their family can get money for provision of food and other basic needs. In the past these young people were reported to be group that moves with their livestock southwards in search of greener pasture but increasing violence associated with this movement has led them into working as construction workers (Fig. 4).

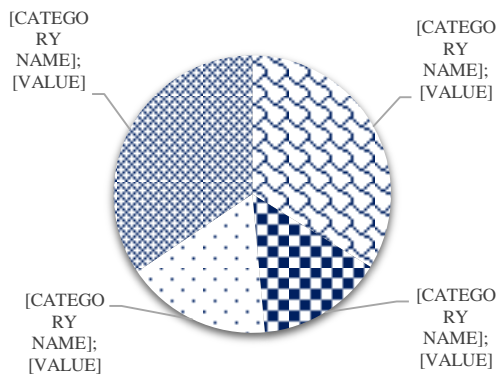


**Fig. 4.** Average household livestock holding by category in Tropical Livestock Units (TLUs) in the study area

However, their participation in construction work in the city is just an alternative which majority of them complain of not enjoying but they need to engage themselves for the period of dry season when they will go back to their real agro-pastoralism. For this reasons, there is need for improve management policies and programmes that will ensure stay of these young people in the rural areas for reasons

including supply of quality livestock products for human consumption and mitigation of rural-urban migration.

The agro-pastoralists in the study area produce common staple foods for their households' consumption whereby they use the crop residues and by-products for the consumption of their animals. Predominantly nearly all household produce crops as presented in the Fig. 5.



**Fig. 5.** Average household income by activity category in the study area

Maize, millet and cowpea are the most highly cultivated crop in the study area, they are equal in terms of hectares under cultivation because the farmers inter-crop the crops for soil conservation and land management. Field planted with cowpea can provide fertility for the soil to nourish for other crops such as maize and millet. The agro-pastoralists also uses industrial waste products from processing of these crops for their livestock consumption such corn bran, maize stover and corn-cob.

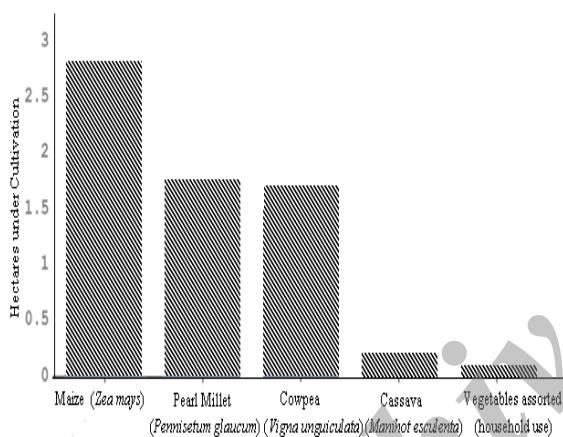
The study area is characterized by massive agro-pastoral system because of its closeness to the Nigeria capital city of Abuja. Abuja a modern city have consumers with higher income which is a factor responsible for increased demand for livestock products in response to livestock revolution described by (Delgado *et al.*, 1999) that the higher the income of people in developing countries, the higher the demand for livestock products will be since most people in developing countries are consuming below their per capita

recommended level. Also, increase demand for crop products such as starch, cotton etc. for industrial use as well as basic household consumption; huge crop residue and by-products are generated all which are highly suitable for livestock consumption. These situation promote integration of crop – livestock farming because farmers living close to urban centers and cities are willing to take maximum advantages of cities and urban areas demand for crop and livestock products (Tiffen, 2004). So, since both Fulani pastoralists and Gbagyi farmers saw advantages in producing crops and livestock in the study area, agro-pastoral communities in this area is growing in response to the increasing demand and income generations.

This is similar to reports of how Fulani and Hausa farmers integrated their agricultural production systems in Nigeria earlier in the 70s; during this period, it was reported that integration of crop and livestock become so encourage among herdsmen and farmers then because it was discovered that cultivation of cotton and sorghum in some part of Nigeria then was a big money spinner therefore, the Fulani and other tribes farmers found out that they could cultivate more of these crops and get higher yields if they adopted the ox plow – a production practice that later led to growth of crop-livestock integration. Plow oxen can be trained quite quickly, and as they are specially fed in the dry season to keep them in condition for the plowing, they fatten up quickly. After two or three years it is profitable to sell them, and start again with younger beasts. Thus, plowing leads to fattening, and sales by farmers not previously associated with the cattle trade (Tiffen, 2004).

The agro-pastoralist hardly process these residues before they fed it to their animals as result they are not deriving maximum benefits therefrom; hence processing of these residue before

feeding them to their livestock stands an important position to contribute feed resources for their livestock especially between January and April that they normally face challenges of feed shortages (Mortimore and Adams, 1999). Processing of the residue into silage is an option for improving quality and life-span of the crop residues, also enzymatic treatment of the residue can also enhance their degradation and subsequent nutrients derivation by livestock. Livestock nutritional management in the study area extensive grazing and use of by-products from most commonly grown food crops produce in the area as shown in the Fig. 6.



**Fig. 6.** Dominant crop types by hectares cultivated in the study area

To ensure optimum livestock performance, since bulk of dry matter intake is from grazing, supplementation of minerals and protein for the livestock is very important because some vital minerals may be limiting in the range pasture. Another challenge facing the agro-pastoralist as discovered by this study is non-availability of veterinary drugs and animal health services providers. Majority of the herdsmen indiscriminately use drugs and chemicals to treat their livestock of ailment which is potential public health problem that need to be overcome. In order to enhance utilization of green fodders, the farmers can be harvesting green fodder crop

between May – September when they are most abundant; process them into silage and store for feeding their livestock during dry season. They can group themselves into cooperatives so as to facilitate funds and financing the project from local microfinance institutions or non-governmental organizations. To overcome challenges of cattle rustling, governments in Nigeria can create livestock owners database and made them available at all abattoirs in Nigeria in online system then made laws that forbid slaughtering of livestock especially cattle anywhere outside accredited abattoir; therefore, anybody taking cattle for slaughtering can be query about the source of the cattle which will be search in the database for confirmation. Although, this approach can work but require cooperation and collaborations between governments, livestock owners, governments, butchers union and general public as well as security agencies.

## Conclusion

Agro-pastoralism is a predominant agricultural production system in the study area, majority of the agro-pastoralists are medium farmers cultivating between 5 and 10 ha of land. Local dairy breed of cattle are the most predominant livestock kept by the Agro-pastoralists they also cultivate maize, cowpea and millet in almost same sizes. The study discovered that lack of veterinary and animal health services and cattle rustling are leading challenges facing livestock production in the area; and these call for establishment of veterinary services centres across the area and establishment of strong security network for checkmating cattle rustlers' activities in the area.

The study also revealed that because of large population of youths and closeness of the study area to the Nigeria capital city; youth participation as construction site labourers is contributing



higher to households income compare with livestock and crop production. However, livestock rearing contributes next then crop farming and other activities such as off-farm businesses. Proximity to Abuja is a contributing factor supporting growth of agropastoralism in the study area therefore, livestock nutritional management that will ensure better livestock performance especially between January and May annually is highly desirable.

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## ارزیابی کاربرد منابع غذایی برای تغذیه دام توسط کشت-دامداری در منطقه تافا، کشور نیجریه

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تاریخ دریافت: ۱۳۹۴/۰۷/۱۴

تاریخ پذیرش: ۱۳۹۴/۰۹/۱۰

**چکیده.** در دسترس بودن منابع غذایی ارزان و مقرون به صرفه برای مصرف دام از عوامل اصلی تعیین قابلیت تولید دام برای افزایش عرضه محصولات دامی به بازارها جهت مصرف کنندگان شهری در نیجریه است. بهره بردن از تقاضای بالا در نواحی شهری، تولید کنندگان را در جهت حرکت دامداری به سمت شهرها و نزدیکی به مناطق شهری مانند منطقه آبوجا در پایتخت نیجریه سوق می‌دهد. این دامداران جهت نزدیک شدن به مکان‌هایی نظیر شهر بزرگ آبوجا، سیستم دامداری سنتی را از صرفا دامداری به دامداری کشاورزی سوق دادند که به موجب آن زمین مناسبی بدست آوردند. بنابراین آنها می‌توانند هر دو منظور را هم دامداری و کشت زمین برای تولید محصول را با هم انجام دهند. حفظ خاک و سرزمین قبلا فقط توسط دامداران صورت می‌گرفت اما اکنون کشاورزانی نیز که نزدیک آبوجا زندگی می‌کنند و به دامداری نیز روی آورده‌اند هم به حفظ خاک می‌پردازند. نمونه چنین کاری در منطقه دولت محلی تافا صورت گرفته است. جایی که در آن، این مطالعه انجام شده است. اما افزایش شدت دامداری کشاورزی در منطقه باعث بهره‌وری ضعیف عملکرد دام، با توجه به دامن زدن به استفاده بیش از حد از مرتع و اثرات تغییرپذیری فصلی بر عملکرد گیاه مرتع شده است. بنابراین ارزیابی استفاده از منابع غذایی فعلی و فعالیت‌های کشاورزی در مناطقی که توسط دامداری-کشاورزی صورت گرفته است به منظور بهبود منابع غذایی نظیر خاک و عملکرد دام از طریق دستکاری در تغذیه مهم است و نیز پیشنهاد می‌شود. نتایج این تحقیق نشان داد که مجاورت منطقه مورد مطالعه با پایتخت فدرال نیجریه عامل حمایت از گسترش کشت-دامداری در منطقه است. همچنین نتایج نشان داد که بین ماه‌های ژانویه و مه ممکن است کمبود منابع غذایی برای مصرف دام، وجود داشته باشد. نیز مشخص شد که قیمت دام در طول سال و بطور متوسط از قیمت هر لیتر شیر بین ماه‌های ژانویه و آوریل در سال بالاتر است. این مطالعه نشان داد که مدیریت منابع خوراک دام مانند مکمل‌های غذایی پروتئین، شیوه‌های تبدیل علف تازه به علوفه، نگهداری علوفه سبز، غنی سازی و بهبود مواد باقی مانده از محصول برای تولیدات دیگر، جهت کاهش کمبود منابع غذایی بین ماه‌های ژانویه و آوریل در منطقه نیاز است.

**کلمات کلیدی:** کشت- دامداری، منابع غذایی، در دسترس بودن فصلی، مکمل‌های خوراکی