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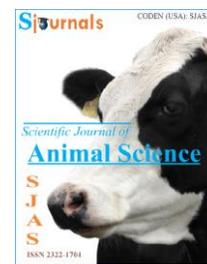
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Original article

Small holding farmers perception on supplementation and feeding sweet potato peels to ruminants in some selected local government areas of Kebbi State, Nigeria

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ABSTRACT

The study was conducted to obtain information on farmers' perception on the utilization of sweet potato peels for livestock feeding. The data were generated by administering a total of 90 structured questionnaires. Results indicated that all the respondents (100%) were males and use sweet potato peel as supplementary feed for their animals. Furthermore, the majority of the farmers were having between 1-10 number of small ruminants (68.9%) feeding them mostly from their crop residues (73.3%) for fattening purposes (53.3%). All the farmers affirm that the peel is available all year round which is solely used for animal feed and usually costs between 42-52 Nigerian Naira per kg. In conclusion, sweet potato peel is a potential feed ingredient in livestock feeding and the involvement of women in crop/livestock production is still a challenge in sub-Saharan Africa since males are still dominating the industry. Thus, women need to be empowered with all the necessary support in the agricultural sector particularly in the study area where the current work was conducted.

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1. Introduction

Due to the competition between man, animal and industries for conventional feed materials in Nigeria, feed is now one of the major problem of intensive livestock production. According to Akinmutimi (2004), the prices of conventional sources of energy and protein in livestock ration have risen exorbitantly. Thus, necessitated the search for alternative feed materials that can meet the nutritional requirements of farm animals. Furthermore, these alternative feed resources should not be in high demand by humans and cheaper compared to the conventional types (Ahamefule, 2005). Therefore, the use of farm or agro byproducts such as cassava peels, sweet potato peels, etc. could provide solution to the current problem.

Small ruminants play a major role in many local economies and build important part of the global agricultural economy (Weaver, 2005). Ruminant animals provide many functions ranging from food, byproducts and income that are essential to human life in both developed and underdeveloped countries (Gatenby, 2002). In the traditional set up, small ruminants served as means of ready cash and a reserve against economic and agricultural production hardship (Hamito, 2008). About 50% of the sheep are found in third world countries where they contribute significantly to the economy of those countries (NRC, 2007; Kwaido and Nasiru, 2016).

Small ruminants usually thrives on low-quality feeds particularly fibrous vegetation which are not normally eaten by non-ruminant animals (pigs, poultry, etc.) and humans. Consequently, smallholding farmers do keep ruminants due to their ability of converting poor quality feeds into desirable products like manure, skin, wool, milk and meat (Kwaido and Nasiru, 2016).

Sweet potato is a sweet-tasting, tuberous root crop that is produced for cash or food. It is adapted well to wide ecological conditions in addition to drought-resistance, versatility and high yielding with a short maturity period between 3-6 months (Laurie et al., 2012).

Sweet potato ranks fourth in production and importance after cassava and yam, hence is regarded as a staple food in Nigeria (Ikwelle et al., 2003). The production level of sweet potato was 2.5 metric tons in the year 2004 (FAO, 2005) of which some fractional parts constitute the peels. The crop residue from sweet potato peels was projected to be about 4.72 metric tons as of the year 2000 (Tewe, 1997). The peels are good sources of quality plant carbohydrates.

Information on the utilization of sweet potato peels for feeding ruminants is very scarce. Major researches conducted on crop residues and agro-industrial by-products had been on sorghum, maize, millet and wheat by-products (Adegbola, 2002). Livestock farmers in Nigeria especially ruminants animals were using sweet potato peels as feed for their animals, but there is no documented information on the quantities used, mode of feeding (sole or in combination with other feeds), sources of the sweet potato peels, results on the use of sweet potato peels as feed etc. In view of this, the present study was designed to evaluate the perception of farmers at a smallholding level on the utilization of sweet potato peels in the diet of ruminant animals.

2. Materials and methods

2.1. Study location

The current work was conducted in some selected local governments areas of Kebbi State, Nigeria. Kebbi state is located between latitude 10° and 13°N and longitude 2°-6°E with a total population of 2,062, 226 (Males: 1,024,334; Females: 1,037,892) according to NPC (1991). The state has an overall density of about 50 persons/sq km which is boarded by Sokoto State, Niger State, and Benin republic with a total land area of 36,800km (Saidu et al., 2009). Kebbi State is divided into 35 districts, four emirate councils (Gwandu, Argungu, Yauri and Zuru) and 21 Local Government Areas (LGAs). The climate of the area is generally characterized by high temperatures (38°C to 42°C) usually between March and May and the area experiences Harmattan wind between late November to early February with temperatures as low as 23°C.

2.2. Sampling method

The selection of three Local Government Areas (LGAs) with three villages each was guided by purposive sampling method based on the availability of farmers who owned ruminant animals and produce sweet potatoes using farmers checklist. The Local Government and villages selected are; Aliero (Marmaro, Kashinzama and Tari),

Jega (Alelu, Gindi and Kimba) and Maiyama (Sambawa, Mayalo and Mungadi). Thirty respondents were chosen from each local government making a total of 90 respondents.

2.3. Data collection

The data was collected from two sources (primary and secondary data). Primary data was collected using a structured questionnaire that sought the following information; the number of animals, occupational status, educational status, availability of the target ingredients, sources of feed, processing method, combination and cost of the target ingredients. While the secondary source was obtained from books, journals, conference proceedings, the internet and past thesis and dissertation.

2.4. Statistical analysis

The data collected were analyzed using IBM SPSS (2015) and descriptive statistics were used to generate mean and percentage (Gomez and Gomez, 1984).

3. Results and discussion

3.1. Socio-economic characteristics of the farmers

Farmers' demographical characteristics indicated that all the respondents (100%) were male having 46%, 21%, 15% and 8% of qur'anic education, primary education, secondary and tertiary education, respectively as shown in Table 1.

Table 1
Socio-economic characteristics of the respondents.

| Parameters | Frequency | Percentage |
|------------------------------------|-----------|------------|
| Sex | | |
| Male | 90 | 100 |
| Female | 0 | 0 |
| Total | 90 | 100 |
| Educational status | | |
| Quranic education | 46 | 51.1 |
| Primary education | 21 | 23.3 |
| Secondary education | 15 | 16.7 |
| Tertiary education | 8 | 8.9 |
| Total | 90 | 100 |
| Occupation | | |
| Farming | 48 | 53.3 |
| Traditional healers | 2 | 2.2 |
| Cattle sheep and goat rearers | 33 | 36.7 |
| Fisher men | 2 | 2.2 |
| Craftsman | 5 | 5.6 |
| Total | 90 | 100 |
| Number of animals possessed | | |
| 1-10 | 62 | 68.9 |
| 10-20 | 23 | 25.6 |
| 20-30 | 5 | 5.5 |
| Total | 90 | 100 |
| Source of feed | | |
| Purchase | 13 | 14.4 |
| Crop residues | 66 | 73.3 |
| Purchase and crop residues | 11 | 12.3 |
| Total | 90 | 100 |

Source: Field survey, 2017

The majority (53.3%) of the respondents are arable crop farmers while 36.7% are livestock farmers, 5.6% are craftsmen, 2.2% represent traditional healers and 2.2% fishermen. The result also indicates that the majority (68.9%) of the respondents had 1 to 10 numbers of animals, 25.6% had 11 to 10 while only 5.5% of the respondents had 20 to 30 animals. On the respondent's source of feed, the majority (73.3%) get their feed from crop residue and 14.4% from the market (purchase) while only 12.3% source their feed from both crop residues and purchase.

3.2. Perception of farmers on the utilization of sweet potato peel as feed for animal

Table 2 shows results on the farmers' perception of sources, quantity offered and mode of feeding of sweet potato peel as feed for their animals. About 41.1% use the potato peels as feed for sheep, 34.4% for goats and 24.5% for cattle. Regarding the respondents' source of sweet potato peel, 87.8% sourced theirs from the farm while 12.2% source it from the market around their villages.

On the quantity offered per day, the majority of the respondents (91.1%) offer 1 to 10kg per day, 5.6% of the respondents offer 11 to 20 kg per day and only 3.3% of the respondents offer 21 to 30 kg per day depending on the number of animals owned by the farmers. The major mode of feeding adopted by the respondents is in combination with other ingredients (90%) but only 10% feed the peel alone. Among the respondents, 24.4% use cowpea hay in combination with the peel, 10% use rice husk, 10% use rice bran, 20% use cowpea husk, 18.9% use wheat offal and 16.7% use maize husk in combination with the peel.

Table 2

Source and quantity of sweet potato peels, mode of feeding and type of animal offered.

| Parameters | Frequency | Percentage% |
|--|-----------|-------------|
| Types of animals offered to | | |
| Sheep | 37 | 41.1 |
| Goat | 31 | 34.4 |
| Cattle | 22 | 24.5 |
| Others | 0 | 0 |
| Total | 90 | 100 |
| Source of sweet potato peel | | |
| Purchase | 11 | 12.2 |
| Crop residues | 79 | 87.8 |
| Total | 90 | 100 |
| Mode of feeding | | |
| Alone | 9 | 10 |
| In combination with other ingredients | 81 | 90 |
| Total | 90 | 100 |
| Quantity offered per day (kg) | | |
| 1-10 | 82 | 91.1 |
| 11-20 | 5 | 5.6 |
| 21-30 | 3 | 3.3 |
| Total | 90 | 100 |
| Potato peel combination with other feed sources | | |
| Wheat offal | 22 | 18.9 |
| Rice husk | 9 | 10 |
| Rice bran | 9 | 10 |
| Cowpea husk | 18 | 20 |
| Cowpea hay | 17 | 24.4 |
| Maize husk | 15 | 16.7 |
| Total | 90 | 100 |

Source: Field survey, 2017

Table 3 indicates the farmer's perception on the purpose of feeding and the availability of sweet potato peels. Results showed that 53.3% of the respondents use the sweet potato peels to fatten the animals, 15.5% for milk production and 31.2% for both fattening and milk production. All the respondents (100%) indicated that sweet potato peels are readily available for feeding livestock.

Moreover, results on the farmers' perception on the cost of sweet potato peel show that 46.7% buy the sweet potato peel at an average cost of ₦48.50 naira per kg while 53.3% of the respondents got it at a higher cost of ₦52.00 naira per kg.

Table 3

Farmers' perception on the purpose of feeding, availability, uses and cost of sweet potato peels.

| Parameters | Frequency | Percentage (%) |
|--|-----------|----------------|
| Purpose of feeding | | |
| Fattening | 48 | 53.3 |
| Milk production | 14 | 15.5 |
| Both | 28 | 31.2 |
| Total | 90 | 100 |
| Availability of sweet potato peel | | |
| Available | 90 | 100 |
| Not available | 0 | 0 |
| Total | 90 | 100 |
| Season available for use | | |
| Dry season | 0 | 0 |
| Rainy season | 0 | 0 |
| All season | 90 | 100 |
| Total | 90 | 100 |
| Other use | | |
| Animal feed | 90 | 100 |
| Medicinal | 0 | 0 |
| Food | 0 | 0 |
| Total | 90 | 100 |
| Cost per kg(₦)* | | |
| 48:50 | 42 | 46.7 |
| 52:00 | 48 | 53.3 |
| Total | 90 | 100 |

Source; Field survey 2017. *1 USD= ₦345 (Nigerian Naira)

3.3. Socio-economic characteristics of the farmers

Males farmers have dominated the livestock production sector compared to the number of females and sometimes farming (crops and livestock production) is culturally considered a man's task (Aguilar et al., 2014). This trend is common in Sub-Saharan African, Cynthia et al. (2019) reported a similar scenario in South Africa and Gebre et al. (2019) in Ethiopia. Furthermore, women face gender-specific constraints related to socio-cultural factors that limit their ability to ensure production. The majority of the respondents engaged in farming as their main occupation with only Quranic education (51.1%) without western education. Our findings were consistent with the previous report of Cattle herd keepers biodata by Garba et al. (2012). It is generally known that crop production or small ruminants' production does not require a high level of western education. Furthermore, results indicated that the majority (68.9%) of the respondent having 1 to 10 number of animals is a trend that was reported by Maigandi (2001). Small ruminants have been reported to form an integral part of the socio-cultural life and farming system of Nigeria's peasantry (Ajala, 2004). The relatively small size of the animals as seen in the present study can be explained by the predominantly Hausa system whereby ownership is fragmented into a small number owned by members of the households (Shittu et al., 2008). On the respondent source of feed, it is observed that the majority of the respondents (73.3%) sourced their feed from the farm and 14.4% source their feed from the market

(purchase) while only 12.3% source their feed from both the farm and market. The quality and the timely availability of the feed have been reported to affect feed cost and livestock productivity (Adesehinwa et al., 2003). The majority of the respondents (41.1%) used the sweet potato peel to feed sheep only. This could be attributed to the fact that the peel is used for fattening and it well-known fact that farmers in the study area are engaged in fattening operations (Shittu et al., 2008). It could also be attributed to the fact that the peel is readily available in the market at a cheaper rate and no further processing is required as the peel is already processed. This reduces the labour incurred during processing, thus reduces the cost of the peel.

3.4. Farmers' perception on the utilization of sweet potato peels as feed for animals

From the results it could be observed that 91.1% of the respondents offer 1 to 10 kg per day, 5.6% of the respondents offer 11 to 20kg per day while the remaining 3.3% of the respondents offer 21 to 30 kg per day. The quantity offered is largely determined by the number of the animals reared by the respondents. The majority of the respondents are rearing 1-10 number of animals as seen in the results, this translates that 1kg of the peel is offered per animal. The relatively small size of the flock as seen in this study can be explained by the management system practiced in the study area which is predominantly extensive or semi-intensive (Shittu et al., 2008). Ninety percent (90%) of the respondents claimed that the feed is available throughout all the seasons fed the peel in combination with other feed ingredients such as cowpea hay and husk, wheat offal, rice bran and husk, etc. Among the ingredients, cowpea hay had the highest (24.4%) frequency of usage while rice husk and bran have the lowest (10%) which may probably be associated to the fact that rice is not widely cultivated in the study area. All the farmers used potato peel as animal feed. Charry et al. (1992) have reported that majority of household in Africa keeps small groups of animals alongside cropping and could be attributed to the fact that most of the respondents are involved in both crop and livestock production as a primary occupation. Thus, the fattening of small ruminants was the major reason for keeping animals alongside crop production. According to a Nigerian livestock resources survey reported that the household fattening of sheep for sale is among the major economic activity (Bourn et al., 1994).

4. Conclusion

In conclusion, sweet Potato Peels is a potential feed ingredient in livestock feeding and shall be fully harnessed as a potential supplementation source of feed. However, our findings have indicated that the involvement of women in agriculture is still a challenge since males are still dominating the industry. Thus, women need to be empowered in the agricultural sector particularly in the study area where the current work was conducted.

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