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Survey of Dry Season Feed Resources for Smallholder Fattening Schemes in Northern Nigeria

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Abstract: A survey study was conducted to monitor the available dry season feed resource options for small holder fatteners in Katsina, Kano and Kaduna states of Nigeria, area partly covering the ecological zones of the Semi-arid, Sudan and Northern Guinea Savannas. The study covered 80 small scale farmers. Structured questionnaire were used to collect information and feed were sampled for laboratory analysis. Cereal crop residue such as maize, sorghum and millet stover and unimproved grass hay were the major basal feedstuffs offered for fattening while sugar cane leaves and tops were predominantly used in the flood plain (fadama) areas. Maize offal and threshed sorghum panicle constitute the main high energy sources used in the dry season fattening schemes. Groundnut, cowpea, soybean haulms and whole cotton seed and to a little extend cotton seed cake were the protein supplements of choice. Combinations of the available crop residue of low nutritive value with the protein and energy supplements ensured moderate levels of weight gain (338.75-360.21 g day^{-1}) and body condition score (4-5) of fattened bulls within two and half months. The result shows that conventional feedstuffs such as cotton seed cake, other oil seed cake and whole Maize are of limited relevance under smallholder fattener conditions. The study underscores the need to develop appropriate supplementation package relevant to each ecological zone. This should emphasize the optimal use of the available non-conventional feed resources at the farmers level in order to guarantee greater productivity and sustainability of the small holder fattening scheme in the increasingly resource limited environment of Northern Nigeria.

Key words: Dry season feed resources, smallholder fattening schemes, Northern Nigeria

INTRODUCTION

Most of the fattened animals regularly offered for sale at local markets across the country are produced by smallholder farmers whose feeding schemes remain largely uninvestigated. On station beef cattle fattening trials have been carried out previously using high energy-high protein rations made up of whole maize, Cotton seed cake, groundnut cake and maize silage (Olayiwole and Fulani, 1980; Olayiwole *et al*., 1981). Although, high biological response of up to 1.05 kg $head^{-1}$ day^{-1} were recorded and thus seem attractive, the adoption rate of this feeding scheme by smallholders had been lukewarm if not completely nil. It is probably that non availability of some of the feed ingredients used in those trials couple with their high cost may be the reason for the rejection of this package. Yet, fattened animals in very good condition are seen or sold at local markets on a continuous basis. The question then arises as to what feedstuffs the smallholder farmers use for feeding bulls on fattening

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operations. In order to answer the above question, an inventory of feedstuffs used in dry season fattening operation was conducted to provide a better understanding of the traditional system of fattening. There is no reported information on the inventory of feedstuff used for cattle fattening under small holder fattening scheme in Northern Nigeria, however, Muhammed-Saleem and Von Kaufmann (1989) reported on the feedstuffs used for feeding draught animals in the middle belt of Nigeria.

The main objective of this trial is to generate information on feedstuffs used by small scale cattle fatteners. This will serve as a useful tool on the basis of which appropriate feeding strategies could be developed to improve the smallholder scheme in Northern Nigeria.

MATERIALS AND METHODS

Eighty smallholders cattle fattners from three states, Katsina (24), Kano (31) and Kaduna (25), areas partly covering the ecozone of the semi arid, Sudan and Northern Guinea Savannas, were visited weekly by trained enumerators between October 2003 and January 2004. By means of structured questionnaires and participant observation, information was collected on the:

- Type and number of animals under fattening
- Type of feeds resources used, the cost and sources
- Daily feed ration
- Duration of fattening

Sample of the feed and feedstuffs offered in each state were collected, similar feedstuffs bulked, dried at 60°C for 48 h and analyzed for dry matter, nitrogen and cell wall contents.

Furthermore, in a preliminary study conducted in the Katsina state study area, the response of 18 bulls under fattening by 11 farmers was monitored for 72 days. Farmers keeping these bulls offered only groundnut haulms and maize offal and or sorghum panicle as protein and energy supplements respectively during the period of the study (Table 1). Animals were fed a basal ration of maize or sorghum stover free choice and were sometimes given also given potash (Kanwa) in water. The quantities of supplements offered by the farmers were recorded daily. Body weight (by weighband measurements) and condition scores of the animals on a scale of 1-9 (Nicholson and Butterworth, 1986) were taken by three scorers at the beginning and at the end of the trial. On this basis, weight gain was calculated. Data collected on the dry season resources was analyzed on percent of occurrence within each state.

Table 1: Weight response of bulls fattened on groundnut haulms, sorghum panicle and maize offal in Giwa Local Government Area of Kaduna State

Parameters	Response
Duration (days)	72
Maize stover/sorghum stover	Ad lib
Supplement consumed day^{-1}	
Maize offal (g)	800-1200
Sorghum panicle (g)	600-1000
Groundnut haulms (kg)	1.0-1.2
Total feed intake (kg)	2.2-3.2
No. of bulls/farmer	2-3
Initial weight (kg)	160.25-200.45
Final weight (kg)	184.78-258.63
Weight gain (kg)	24.53-58.18
Average daily gain (kg)	0.338-0.360
Initial body condition score	3.0-4.0
Final body condition score	5.0-6.0

RESULTS AND DISCUSSION

Animals

Table 2 shows that most of the farmers were observed to keep between 2.3 LU under the fattening operation. The space area utilized for the operations varied across the three states investigated but was generally within the range of 2-7 m^2 $household^{-1}$. Older bulls of about 300-350 kg liveweight were usually purchased from the open markets and reconditioned for about 6 to 8 weeks before they are sold. Only about 20% of the farmers actually fattened younger bulls of live weight between 180-200 kg with body condition score of between 3-4. The animal of choice for fattening were mainly the Bunaji (White fulani) (58%), the Rahaji (Red fulani) (34%) and the Sokoto Gudali (8%) breeds. According to the farmers the Bunaji and the Rahaji breeds are preferred because they respond faster to improve feeding during fattening and in addition, they can be employed as work bulls during the early wet season thus serving a dual purpose. The Sokoto Gudali breed is more available further north, hence the less important among the farmers. Some farmers fattened bulls that were previously used as work bulls.

Feed Resources

Fifteen feed resources were identified from the three states covered (Table 3). They were classified into four categories as follows:

- Basal roughage
- Energy supplement
- Protein supplement
- Mineral supplement

Table 2: Livestock Unit (LU) of fattened cattle per household (%) in Katsina, Kano and Kaduna States

LU	Katsina state	Kano state	Kaduna state
1	50	46	38
2	42	43	40
3	4	7	18
4	4	3	4

Table 3: Proximate analysis (%) of some feedstuffs fed to fattened bulls in Kastina, Kano and Kaduna states

Feedstuffs	Dry matter	Crude protein	ADF	NDF	ASH
Basal roughages					
Maize stover	90.69	2.31	57.14	46.94	4.96
Sorghum stover leaves	95.80	5.89	60.31	53.28	7.37
Millet stover	95.86	3.95			7.48
Sugar cane leave fresh	25.90	4.01	38.50	20.50	2.40
Range grass hay	95.73	2.01	40.80	48.25	6.20
Rice straw	98.21	2.47			
Energy supplements					
Maize offal	88.90	9.60	26.31	21.64	5.48
Sorghum panicle	96.50	3.08	68.51	54.34	18.37
Protein supplements					
Groundnut haulms	98.29	12.88	40.01	28.56	11.41
Cowpea haulms	93.56	8.96	71.95	9.72	10.22
Soybean haulms					
Cowpea vine	98.50	5.62	73.82	40.28	3.58
Whole cottonseed	91.15	20.38	40.99	49.45	5.00
Cotton seedcake	92.16	24.31	54.28	34.42	3.07
Mineral supplements					
Kanwa	na	na	na	na	na
Common salt	na	na	na	na	na

na = not available

Table 4: Occurrence (%) of basal feedstuffs used in fattening cattle in the states

Types of basal feedstuffs	Katsina state	Kano state	Kaduna state
Maize offal	60	38	98
Sorghum stover	100	95	58
Millet stover	50	39	22
Grass hay	35	18	22

Table 5: Occurrence (%) of various energy feedstuffs used in fattening cattle in the states

Types of energy feedstuffs	Katsina state	Kano state	Kaduna state
Cereal offal	100	85	100
Sorghum panicle	59	56	40

Table 6: Occurrence (%) of protein feedstuffs used in fattening cattle in the states

Types of basal feedstuffs	Katsina state	Kano state	Kaduna state
Groundnut haulms	92	100	92
Whole cottonseed	59	60	28
Cotton seedcake	7	20	7
Cowpea haulms	39	59	60

Table 7: Occurrence (%) of Mineral Supplements used in fattening cattle in the states

Types of mineral supplements	Katsina state	Kano state	Kaduna state
Kanwa (potash)	80	70	80
Salt lick block	17	40	10

The frequencies of occurrence of the feed types are shown in Table 4-7. Maize and sorghum stover leaves are the most important basal feeds offered to fattened animals in the three states. However, a higher percentage of farmers used sorghum stover leaves in Katsina (100.00%) and Kano (88.71%) than Kaduna (48.30%) while the reverse was the case with maize stover utilization. This may be a reflection of the types of cereals grown to match the rainfall pattern. The drier areas of Katsina and Kano states favour the planting of sorghum because of the shorter duration of rain season compared to Kaduna state where maize grain are planted due to longer duration of the wet season. The utilization of sugar cane leaves and tops was localized along the flood plain (Fadama) areas of all the three state favorable for sugar cane cultivation. Millet stover had a higher utilization rate in Katsina and Kano for the same reason adduced for sorghum stover use. In Kaduna state the millet grown was harvested before the end of the rains and the residue left on the field is unpalatable to the animals due to wilting and mould growth. Although, cereal crop residue are low in nutritive value, their continued use in ruminant diets has been improved through upgrading by ammoniation and concentrate supplementation (Alhassan *et al*., 1987). Grasses were usually cut at the end of the rains dried and stored on roofs. They were in most cases, the first basal feedstuffs fed to the fattening animals during the early dry season before the cereal grains are harvested to make their residues available.

The two major energy feedstuffs identified during the survey were maize offal and sorghum panicle. Maize offal was the energy supplement of choice for the 95% of the farmers engaged in cattle fattening in the three states. Unlike in the on-station intensive fattening trials (Olayiwole and Fulani, 1980; Olayiwole *et al*., 1981), smallholders never use whole maize grains but the bran of cereals probably because of the cost implications and competition with humans and poultry.

The protein source of choice for fattening in the 3 states is groundnut haulms, whole cotton seed, cowpea haulms and cotton seed cake in that order (Table 6). The low use of cotton seed cake may be related to its high cost and scarcity relative to other protein supplements. At least 50% of the farmers in Kano and Katsina used Whole Cotton Seeds (WCS) at one time or the other as a protein supplement in fattening rations compared to Kaduna (24%). WCS was cheaper than cotton seedcake and farmers had easy access to ginneries located in Funtua and Malumfashi in Katsina state and Zaria and Dakachi in Kaduna state where whole cotton seed are purchased. The use of groundnut haulms was widespread among all the farmers. The fact that it could be easily source at the farm level and at cheaper rates compared to other supplements may be the main reason for its popularity.

Most cattle fattening operators utilized potash either solely or in combination with common salt (Table 7). Potash has been reported to contain many macro and micro nutrients required by animals (Mohammed-Saleem and Otsyina, 1987; Alawa *et al*., 2000). The use of mineral salt lick was not popular with smallholder and usage was mostly reported to depend on its being given as part of Agricultural bank credit.

Feeding System and Feed Regimes

At any point in time, fattened cattle received a combination of some of the feedstuffs mentioned earlier. The basal diet was always fed free choice while the cereal offal and any of the protein supplements were fed solely or in combination. Supplements were offered in troughs made from oil drums. Potash was given to the animals through drinking water.

In a preliminary growth trial monitored in Katsina state (Funtua, Bakori and Malunfashi area), fattened bulls received maize stover and or sorghum stover free choice plus groundnut haulms between 800 g to 1.0 kg day^{-1} and maize offal between 1.5-1.8 kg day^{-1}, given a total of 2.3-2.8 kg of concentrate per day. Average daily weight gain was 365.75 to 403.21 g with final body condition scores ranging between 5.0-6.0. Although the gain recorded in this trial was lower than the range (0.900-1.05 kg day^{-1}) reported by Olayiwole *et al*. (1981) and Lamidi *et al*. (2001) in an on station trial, the cost of the feed resources used by the farmers is lower compared to what was used for the on station study. The weight response in this study was also lower than 500 g day^{-1} reported for cattle fattened on crop residue in Malawi (Nkhonjera, 1986) and those reported by Alawa *et al*. (2002) for cattle grazing the range and receiving supplement. It is important to note however, that farmers actually fatten for longer periods (180-200 day) than the period of observation imposed by this study, so that effectively animal will reach heavier live weight before being sold off.

CONCLUSION

This survey revealed that smallholder cattle fatteners in Katsina, Kano and Kaduna states utilize locally available feedstuffs within the farming system for fattening. Conventional protein and energy concentrates such as cotton seed cake, groundnut cake and whole maize have no relevance under traditional small holder fattening operations. Although, live weight gains under the present method appear to be low, this can be improved by determining optimal combinations of these feed resources that will promote better liveweight gains. It was also observed that animals are hardly dewormed before fattening commences and no any form of medication is given to the animals unless problem arises.

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