THE SAVANNA FARMER

acdep

Publication of the Association of Church Development Projects (ACDEP)

A Magazine on Sustainable Agriculture

July - December 2006, Vol. 7 No. 2

Promoting Local Innovation in Northern Ghana

ISSN 0855-5900

Knowledge of Farmers in the Utilization of Crop Residues and Agricultural By-products for Dry Season Feeding of Ruminants: A Case Study in the Yendi District

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Abstract

A total of 60 questionnaires were administered in10 communities in the Yendi District to determine the knowledge of farmers in the utilization of crop residue and agro by-product for feeding ruminants. The result from the study indicates that 55 of the farmers (91.7%) use legume crop residue (groundnut haulm) and 19 (31.7%) use cereal crop residue (maize stover). A total 43 (71.7%) of the farmers use root and tuber by-product (cassava peels), 38 (63.3%) use cereal by-product (corn husk) whiles 14 (23.3) use legume by-product (pigeon pea husk). Majority of the farmers (73%) use bicycles in transporting crop residue and agro by-product. The peak collection periods of the crop residues and by-products were noted to be from September to December. Chopping and drying were also noted as the basic processing methods adopted by farmers. It was also noted that the recommended treatment of crop residues with alkali and fertilizer grade urea were not practised by farmers.

1.0 Introduction

The agriculture sector is crucial for the achievement of development programmes for developing countries. Among these programmes are enhancing overall economic growth and poverty reduction, improving food security and conserving natural resources. In such low-income countries the agriculture sector is the primary engine of overall economic growth employing about 68% of the labour force and contributing 24% of Gross Domestic Product (GDP), (Marlinda *et al*, 2005)

In Ghana, agriculture plays a leading role in the national economy. It is expected to grow by 14% per annum, compared with the current growth rate of 7.5%, if Ghana is to achieve a middle-income status (Fynn and Akpabi, 2005). Livestock production forms an integral part of the farming systems of Ghana, contributing an estimated 7% to Agriculture Gross Domestic Product. Wilson (1995) indicated that more than 80% of smallholder mixed farmers own tropical livestock. In Ghana most of these categories of farmers are found to reside in the rural areas of Northern Region. The livestock commonly raised by farmers in Northern Ghana are cattle, sheep and goats under the three distinct management systems; herding, tethering and confinement. Considering the benefits of livestock production especially with the realization for increased animal protein in the average diets of Ghanaians, it is becoming increasingly important to adopt efficient methods such as improved management and husbandry practices as well as the provision of adequate and appropriate health schemes to improve animal production. In connection with this, successive governments have made various policies aiming at increasing livestock production, but still the country imports animals and animal products as a means of meeting the high demand of animal protein in the diet of Ghanaians. As many, as 30% of

Cassava peels stored for livestock feeding

Ghanaian children are malnourished, with the figure reaching almost 50% for children in the Northern sector of the country (Fynn and Akpabi 2005). Livestock feed and feeding have always been constraints in animal production in sub-Saharan Africa with inadequate feeding leading to reproductive waste, low birth weight, and high pre-weaning mortalities (Sumberg, 1985; Reymond, 1986). In Ghana, particularly in the Northern Region, livestock production is associated with lots of constraints among which feed is a crucial factor. It is now the view of some farmers in the Northern Region that even in the rainy season ruminants are not only being underfed, but also they ingest fodder of poor quality. Furthermore, the feeding problem becomes more serious in the dry season due to inadequate standing hay caused by annual bush fires and low quality roughages.

In fact, it has been established that the low quality roughage coupled with bush burning, which reduces the biomass availability, could lead to weight losses ranging from 300-400g per head per day in cattle (Zemmelink *et al.*, 1992). More so, majority of livestock do not receive supplementary feed especially during the dry season. This could also result in loss of body weight, high susceptibility to disease conditions, production of weak off-spring and high pre-weaning mortality.

Feeding livestock with crop residues, urea treated straw, agro by-products, browse plants and forage tree legumes are expected to address the feeding problems. A lot of the crop residues and by-products such as cassava and yam peels, groundnut tops, cotton seed and pigeon pea waste are generated from crop farming and processing activities of farms in the Northern Region. Unfortunately, little or no effort is made by most farmers at conserving feed or improving upon its quality for additional feeding to their animals in the dry season (A.I.S. Technical Bulletin, 1995). Even though several studies have been carried out on dry season feeding in the country, few of them outlined the indigenous ways farmers approached this problem. This kind of information is, however, needed by Ministry of Food and Agriculture (MoFA), breeding institutions, farmers and other stakeholders in ruminant production in order that they direct their decisions towards solving the dry season feeding problem, which is a major limiting factor to increasing ruminant production, hence the need for this project.

2.0 Objectives

2.1 Main objective

To investigate the knowledge of farmers in the utilization of crop residues and agro by- products to meet the dry season feeding requirement of ruminants.

2.2 Specific objectives:

- To identify the types of crop residues and agro-by products offered to ruminants in the dry season.
- To determine the availability and accessibility of the various crop residues and agro-by products used to feed ruminants in the dry season.
- To determine the collection period and methods of storage of the crop residues and agro-by products.
- To determine the methods of treatments used by the farmers to improve upon the crop residues and agricultural by-products used as feed for farm animals.

3.0 Material and methods

3.1 The study area

The study was carried out in the Yendi District in the Northern Region of Ghana. It lies approximately between longitude 0°, 32'W to 0°, 25'E and latitude 9°, 1'N and 9°, 45'N with a total land area of approximately 535,000ha. Arable land constitutes 481,000 ha of the total area, out of which only 15% is under cultivation (YDPCU, 2005).

3.2 Climate

The climate is tropical with the high temperatures throughout the year in the range of 21-36°C. The district is characterized by a unimodal wet season, with a mean annual rain-fall of 1,125mm with the peak period being April to October (YDPCU, 2005). The dry season is rather long stretching from November to March (YDED, 2004).

3.3 Vegetation

The vegetation is of the Guinea Savanna type which consists of tall grasses with scattered fire-resistant economic trees such as the shea tree "dawadawa", mango, neem and baobab (YDPCU, 2005).

3.4 Socio-economic activities

Over 80% of the people rely on agriculture for their livelihood practising largely a crop-livestock mixed production system. The main crops cultivated include

maize, groundnut, yam, cassava, cowpea and rice. Livestock reared include cattle, sheep and goats as well as poultry of various kinds. Medium and small scale economic activities such as weaving, shea butter and groundnut oil extraction, meat processing among others, are carried out in the area of study (YDPCU, 2005).

3.5 Sampling procedure

Ten communities were purposively sampled. A total of 60 questionnaires were administered. The questionnaire was pre-tested, and the necessary adjustments and corrections made to suit the objective of the study. The data collected was analyzed using descriptive statistics in Ms. Excel.

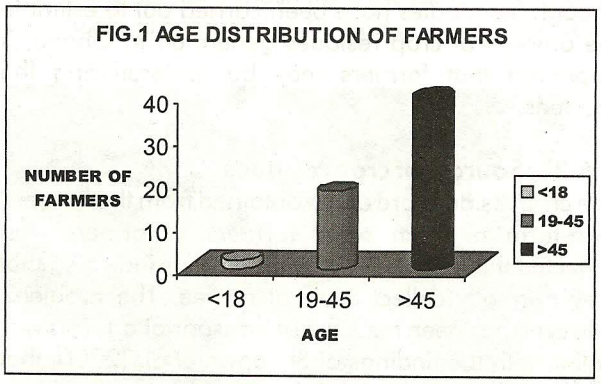
4.0 Results and discussion

4.1 Background information of farmers

4.1.1 Age distribution of respondents

From figure 1, it was observed that most of the farmers (68%) were within the ages of 46 years and above. The lower level of representation of the youth could be attributed to the ownership pattern of ruminants in the catchment area, where in most households ruminants generally belonged to the household head. It could also be attributed to the perception of most young people that livestock production is for the elderly.

Fig.1: Age distribution of respondents.



4.1.2 Gender of farmers

It was observed that 93% of the farmers were males while 7% of them were females. The lower proportion of female respondents could be due to the fact that men are usually family heads and therefore take charge of livestock belonging to their wives. It was found out that the few women engaged in livestock production were unmarried, and were therefore considered free to take decisions on their own. Another observation made was that the farm animals kept by these women were mainly small ruminants and poultry, but did not include cattle. The involvement of women in small ruminants and poultry rearing may also be due to the relatively lower initial capital investment as compared to that of large ruminants.

4.1.3 Educational status of the respondents

Majority of the respondents (58%) had no formal education (Table 1). Among the few respondents who had formal education, only 5% reached the tertiary level, whilst as high as 30% dropped out at the primary level. The high illiteracy rate among the farmers could slow down the rate at which they receive and adopt new and improved methods of livestock production. This could also explain why farmers took very little care of the livestock in terms of provision of housing facilities and supplementary feeding.

Table 1: The Level of education of farmers

Level of education	No. of farmers	Percentage
Primary	18	30.0
JSS/Middle school	3	5.0
SSS	1	1.7
Tertiary	3	5.0
Illiterates	5	58.3
Total	**60**	**100**

4.2 Types of livestock kept by farmers

Table 2: Types and numbers of ruminants reared by farmers

Type of animal	Number	Percentage
Cattle	392	19
Small ruminant	1631	81

It was realized from Table 2 that sheep and goats were the most reared livestock among farmers in the study area. The higher proportion of small ruminants (81%) could be due to the fact that it requires a relatively small land area and a low initial capital investment since care and management of the small ruminant is also relatively easier and cheaper. Returns from the small ruminants according to the farmers were faster as compared to the cattle. The use of small ruminants for religious festivities and other cultural purposes could also be the reason for the high number of small ruminants (Oppong-Anane, 1993).

4.3 Feed supplement for ruminant livestock

Farmers, in their attempt to address the feeding problem of ruminant livestock, use various feedstuffs

such as crop residues, agro-industrial by-products and fodder from tress and shrubs. Table 3 below illustrates the types of feedstuffs used by the farmers as feed supplements.

Table 3: Category of feedstuffs used by farmers

Feedstuff	No. of Farmers	Percentage
Crop residue	56	94
Fodder	16	27
Agro by-product	42	70

NB/ Total > 100% due to multiple responses

It was realized that 94% of farmers use crop residues. This was because of the availability of the crop residue since most of the farmers practised mixed farming. Seventy percent (70%) of the farmers used agro by-products. Fodder was used by 27% of the farmers. Most of the farmers indicated that fodder was used much in the rainy season when animals are tethered to prevent them from destroying crop farms.

4.4 Types of crop residues used

Table 4 shows the various types of crop residues used by farmers. The major types of crop residues used by the farmers were cereal crop residues and leguminous crop residues (CCR).

Table 4: Utilization of crop residues

Crop Residue	No. of Farmers	Percentage
Cereal crop residue(CCR)	19	31.7
Legume crop residue (LCR)	55	91.7

NB/ Total > 100% due to multiple responses

It was noted that 91.7% of the farmers used LCR, and 31.7% of the farmers used CCR as a supplement for ruminants. The reasons for the higher utilization of LCR could be attributed to the fact that it is easy to carry, handle and store. The low level of utilizing cereal crop residue could also be because of its usefulness as organic manure.

4.5 Usage of agro by-products

The various agro by-products identified in the area of study included yam and cassava peels, corn bran, "pito" mash, rice bran and groundnut haulm. Others were pigeon pea husks and cowpea husks obtained from initial processing at farm level. Even though a considerable amount of cotton is produced in the study area, farmers do not use cotton seeds. The distribution of farmers with regard to the utilization of by-products is illustrated in Table 5 below.

Table 5: The Various categories of agro by-products used by farmers

Agro by-product	No. of farmers	Percentage
Cereal by product	38	63.3
Legume by-product	14	23.3
Root tuber by-product	43	71.7

NB/ Total > 100% due to multiple responses

It was noted 63.3% of the farmers used cereal by-products, 23.3% used legume by-products and 71.7% used root and tuber by-products. The use of more root and tuber by-products was attributed to the fact that farmers normally get them from their homes when cooking. Legume by-products are sometimes incorporated into the soil to improve its fertility thereby placing high demand on it.

4.6 Availability and accessibility of crop residues and agro by-products

4.6.1 Availability of crop residues

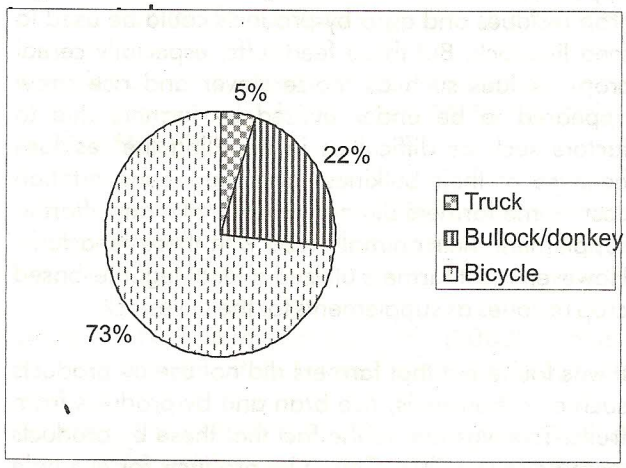
Most of the farmers practised mixed farming, as such, large quantities of the various crop residues such as maize stover, sorghum and millet stover, groundnut haulm, rice straw etc. were generated from the farm. Though few studies have been carried out to estimate the amount of crop residues generated in Ghana, it appeared that farmers may be underutilizing the residues.

4.6.2 Sources of crop residues

The crop residues are either obtained from the farmers' own-farm or from other farmers. Farmers who collected the residue from other farmers indicated that they normally collect them at no fee. The problem, however, has been the issue of transportation. This was in line with the findings of Siulapwa *et al.* (2000) that the cost of transportation becomes an issue if residues had to be moved over long distances.

The various means employed by farmers to cart feedstuffs from crop farms to homesteads is illustrated in Figure 2 below. These included the use of bicycles, bullock or donkey carts or trucks.

Fig. 2: Means by which feedstuffs are



From Figure 2 most farmers (73%) resorted to the use of bicycles in transporting crop residue and agro by-product due to the high cost involved in the use of trucks. The use of bicycles usually leads to loss of leaves, especially when harvesting was delayed or residues not collected immediately after harvest. The result is in line with the findings of Williams *et al.*, (1992), who indicated that delayed harvesting led to greater loss of leaves and leaf sheaths with a consequent reduction in nutritive value.

4.6.3 Sources of agro by-products

The farmers obtained agro by-product from various sites. Yam and cassava peels were obtained from the kitchen when cooking. Maize bran was obtained from the milling site, pito mash from the pito brewery, and corn husk, groundnut haulm and cowpea husk from the farm.

Pigeon pea shade-dried for livestock feeding

4.6.4 Period of collecting residues and by-products

Figure 3 indicates the collection period of crop residues while Figure 4 indicates that of by-products with the exception of corn chaff which was collected as and when available. It was noted that the peak collection period of both crop residues (e.g. groundnut haulm, maize stover and rice straw) and by-products (e.g. yam peels and cow pea and pigeon pea husk) was from September to December. However, some farmers also collected crop wastes and agro by-products between January and March. These periods corresponded to the post-harvest season when crops harvested are processed for preservation and storage. However, neither crop residues nor agro by-products were colleted within the period of April-August simply because this period corresponded with the main cropping season.

Fig. 3: Collection period of crop residues

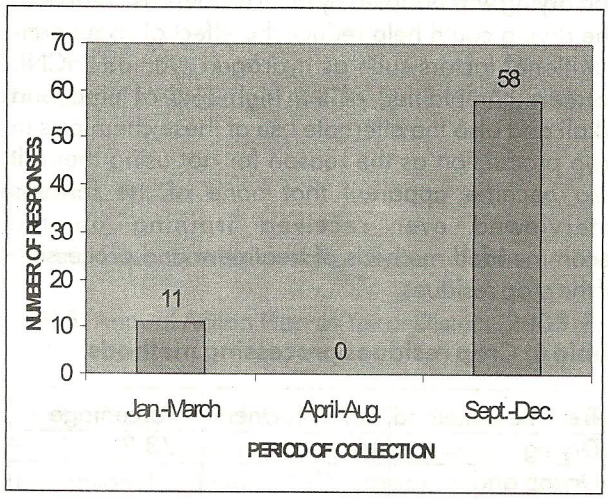
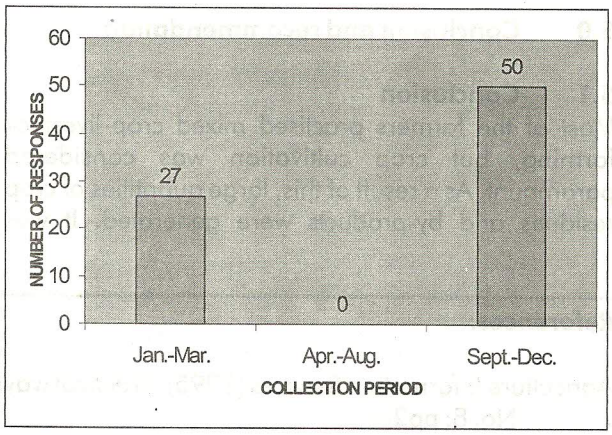


Fig. 4: Collection period of by-products.



It was noted that farmers delayed in collecting these feedstuffs after harvest, largely due to transportation constraints. This has nutritional implications because the nutrient content of the residues were likely to deteriorate due to losses in leaves.

4.6.5 Processing and treatment of residues and by-products

Generally, the recommended treatment of crop residues with alkali and fertilizer grade urea was not practised by farmers in the study area. This is in spite of the report of Agricultural Information Service Technical Bulletin (1995) that 4% treatment of straw with urea is commonly practised in Northern Ghana. Thirty-five percent (35%) of the farmers merely added common salt to the crop residues and by-products with the aim of increasing the palatability. All the farmers fed their animals with crop residue and agro by-product without treating them chemically. The practice of some physical treatment such as chopping and drying was adopted by most farmers as in Table 6. The drying could help reduce the effect of some anti-nutritional factors such as hydrogen cyanide (HCN). Farmers complained of the high cost of urea and alkali and also the alternate use of these chemicals in crop production as the reason for not using them. It also became apparent that none of the farmers interviewed ever received training on the recommended methods of treatment and processing of the crop residues.

Table 6: Crop residues processing methods

Treatment method	No. of farmers	Percentage
Drying	44	73.3
Drying and chopping	16	26.7
Total	60	100

5.0 Conclusion and recommendation

5.1 Conclusion

Most of the farmers practised mixed crop-livestock farming, but crop cultivation was considered paramount. As a result of this, large quantities of crop residues and by-products were generated. It was apparent that most of the farmers were aware that crop residues and agro by-products could be used to feed livestock. But these feedstuffs, especially cereal crop residues such as maize stover and rice straw appeared to be under utilized by farmers due to factors such as difficulties in handling the residues because of their bulkiness and high transportation cost. Some farmers did not simply make any effort to supplement their animals' feed with these feedstuffs. However, most farmers utilized a lot of legume-based crop residues as supplements for their livestock.

It was found out that farmers did not use by-products such as cottonseeds, rice bran and by-products from fruits. This was due to the fact that these by-products were not accessible. Cotton by-products for example are not used because of the absence of cotton-processing industries in the study area.

It was found out that basic processing methods like chopping and drying were employed by farmers to process feed resources like rice straw, maize stover, groundnut haulm among others. Most of the respondents however, did not use the generally recommended chemicals for treating crop residues e.g. alkali and urea.

5.2 Recommendations

- District Agricultural Development Unit (DADU) of MoFA should train farmers on the need to use alkali and urea in treating crop residues in order to improve the digestibility
- Farmers should be encouraged to use bullocks or donkeys in carting crop residue and agro by-product to minimize the loss of leaves.
- Storage facilities should be constructed to encourage farmers to store more crop residue agro by-product to last for the period of feed shortage.
- Further studies be carried out to quantify the amount of crop residues and agro by-products generated against the quantity used in the District.

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