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# Comparative effects of three seasons on seed population and viability of cattle, sheep and goat dungs in South-West Nigeria

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## Abstract

*An experiment to determine the effects of seasonal variations on population and viability of seeds in the faeces of ruminant animals was conducted between April to December 2001 using two breeds of cattle, sheep and goats. Three samples were collected per breed from three animals that were tagged for uniformity of data collection. Sampling took place weekly, in the mornings before the animals were taken out for grazing. The highest ($P<0.05$) total number of seeds, seeds/g dry weights and total number of viable seeds were recovered from cattle, while the least were from goats, but the reverse was the case for percentage viability. The weights of the faeces were significantly ($P<0.05$) higher in the rainy season than the dry season. The weights of the faeces reduced gradually as the dry season sets in. Likewise, there were more seeds in the early rain than in the late rain and early dry season, with the percentage viability higher in the late rains and early dry season than the early rainy season. There were more broadleaved weeds and sedges in the early rain than late rain and early dry season but the reverse was the case for grasses. In conclusion, although there were more faeces and consequently more seed production in the rainy season, however, but the viability was lower than in the dry season. Also, seeds of broadleaved plants were more in the rainy season while those of grasses were more in the dry season. More seeds and number of viable seeds were recovered from the faeces of cattle than sheep and goats in all the seasons due to the higher weights of faeces but the percentage viability was higher for sheep and goat than cattle.*

**Keywords**: Ruminants, Seed population ,seed viability, seed dispersion, seasons.

## Introduction

Ruminant animals ingest large quantity of seeds with their feeds. The digestion or survival of seeds during passage through the digestive tract of grazing animals has important implications on the population dynamics of the plant species involved and for the nutrition of grazing animals (Gardener *et al.*, 1993). The survival of ingested seeds and recovery from ruminant faeces vary with plant species, seed characteristics (shape, size and hardness), animal species, proportion of the seeds in diet and the quality of the associated diet (John *et al.*, 1992). The smaller the seeds, the higher the quantity recovered for small ruminants, but the seed size has no effect on seeds

recovered from cattle. Recovery of seeds in faeces of livestock ranged from nil to high with equally divergent effects on viability (Simao Neto, 1985). The retention in animal gut for longer periods of time may even induce germination while in the gut and death of seeds follow (Janzen, 1982; Michael, 1992).

Wide variations have been recorded in the population and viability of seeds found in animal faeces due to seasonal changes. The population of seeds is highest in the early dry season (November) and lowest in early raining season (April). Viability is higher in the dry season than in the rainy season since most plants produce matured seeds during the dry season (Jones and Bunch, 1977; Foster, 1982; Jolaosho and Olorode, 2000). Therefore, viability of seeds in faeces is influenced by season of the year, species of plant, digestibility and intake, seed characteristics (size, shape, hardness and dormancy) and the diet of the animal. However it is important to know the trend of the population and viability of seeds in the faeces of ruminant animals at the different seasons of the year in the derived savanna areas of South Western Nigeria.

## Materials and Methods

The study to determine the effects of seasonal variations on population and viability of seeds in the faeces of two breeds of cattle (white fulani and N'dama), sheep (Yankassa and West African Dwarf) and goats (Red Sokoto and West African Dwarf) took place at the Teaching and Research Farms of the University of Agriculture, Abeokuta from April to December 2001. The dung of the animals was collected weekly in their paddock in the morning prior to being taken out for the day's grazing. The collected dung was weighed fresh and samples were taken to the laboratory for dry matter determination. Six (6) faecal samples were collected /animal weekly and three (3) animals were used per breed. Three (3) of the samples were dissolved in water and the seeds sieved out using sieve of mesh size 0.25mm. The seeds were air dried at room temperature for 3 hours and counted under a magnifying lens to determine the number of seeds in each faecal sample. The seeds were then planted in petri dishes on wet cotton wool immediately after counting and there were daily counts of germinated seeds until the number of germinating seeds became constant between 5 and 10 days to determine the percentage viability.

The second set of three (3) samples were planted in polythene bags filled with soil with a control experiment having no faecal sample to determine the type of plants that are in the faecal samples. The number of each type of plant i.e.grasses, broadleaves and sedges were determined by counting them each day until the number becomes constant i.e. no more emergences of seeds from the soil after 14 days. Five years rainfall data of the experimental site were collected from the Federal Meteorological Station, Oshodi, Lagos, Nigeria (Table 1).

The experiment was a 2x3x9 factorial experiment, the factors are the breeds, animal types and nine (9) months of the year to determine the three (3) seasons which are the early rains, late rains and early dry seasons and the data were subjected to analysis of variance using general linear model of Minitab computer package (Minitab, 1998).

## Results and Discussion

The dry faecal weights, total number of seeds in the whole faeces excreted, number of seeds/ g of dry weight, total number of viable seeds and number of viable seeds/ g of dry weights for cattle were significantly higher ($P<0.05$) than those of sheep and goat while, goat had the least of all the parameters. However, goat had significantly ($P<0.05$) higher percentage dry matter of faeces and % viability of the seeds (Table 2). This is because cattle, being a larger animal than sheep

**Table 1: Rainfall distribution (mm) of Odeda LGA of Ogun State 1996 – 2001**

| Year/months | Jan | Feb. | Mar | Apr | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1996 | 0.00 | 88.10 | 63.40 | 82.40 | 142.20 | 161.60 | 270.60 | 165.60 | 372.70 | 125.00 | 0.00 | 0.00 |
| 1997 | 0.00 | 0.00 | 70.90 | 254.60 | 117.70 | 187.90 | 145.60 | 130.80 | 184.60 | 182.60 | 8.80 | 71.40 |
| 1998 | 0.00 | 1.10 | 12.80 | 82.80 | 173.60 | 162.20 | 150.00 | 97.50 | 251.20 | 179.90 | 5.60 | 1.70 |
| 1999 | 13.10 | 87.70 | 39.80 | 113.50 | 104.60 | 177.00 | 319.90 | 305.30 | 120.00 | 194.80 | 54.40 | 0.00 |
| 2000 | 4.34 | 0.00 | 74.09 | 113.40 | 78.12 | 144.60 | 166.47 | 284.89 | 238.20 | 97.80 | 0.00 | 0.00 |
| 2001 | 0.00 | 0.00 | 49.09 | 89.30 | 588.50 | 155.40 | 149.30 | 14.39 | 190.55 | 567.50 | 26.20 | 0.00 |
| Average | 2.91 | 29.48 | 51.72 | 122.67 | 200.69 | 164.78 | 200.31 | 166.41 | 226.21 | 224.52 | 15.83 | 12.18 |

Source: Federal Meteorological Station, Oshodi, Lagos, Nigeria

**Table 2: Weights of defecates, population, viability and types of seeds in the defecates of the three types of animals**

| Animal types | Weights of defecates (g) | | %DM | Total No of seeds | No of seeds/g dry weights | Total No of viable seeds | No of viable seeds/g dry weights | % Viability | Population of weed types | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Fresh | Dry | | | | | | | BW | grasses | Sedges |
| Cattle | $630.2^{a}$ | $189.2^{a}$ | $30.20^{c}$ | $1225.01^{a}$ | $6.24^{a}$ | $49.04^{a}$ | $0.26^{a}$ | $4.87^{c}$ | $4.6^{ab}$ | $41.8^{a}$ | 5.1 |
| Sheep | $204.8^{b}$ | $97.2^{b}$ | $47.71^{b}$ | $62.13^{b}$ | $1.65^{b}$ | $13.13^{b}$ | $0.13^{b}$ | $30.97^{b}$ | $5.8^{a}$ | $13.8^{b}$ | 4.7 |
| Goat | $278.6^{b}$ | $180.4^{a}$ | $64.75^{a}$ | $19.20^{b}$ | $0.15^{c}$ | $10.42^{c}$ | $0.06^{c}$ | $48.01^{a}$ | $1.9^{c}$ | $6.1^{c}$ | 3.0 |

$^{a,b,c}$ Means with different superscripts are significantly different ( $P<0.05$)
BW – broadleaved weeds

**Table 3: Variations of weights of defecates, population, viability and types of seeds within the breeds**

| Breeds | Weights of defecates (g) | | %DM | Total No of seeds | Seeds/g dry matter | No of viable seeds | % viability | Weed types | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Fresh | Dry | | | | | | BW | grasses | sedges |
| White Fulani | 598.1$^{ab}$ | 185.7$^{a}$ | 31.0 | 1011.4$^{a}$ | 5.2$^{ab}$ | 44.0$^{ab}$ | 5.1$^{bc}$ | 5.4$^{a}$ | 35.8$^{ab}$ | 4.5 |
| N'dama | 678.3$^{a}$ | 174.0$^{ab}$ | 25.7 | 1376.9$^{a}$ | 7.7$^{a}$ | 54.1$^{a}$ | 4.7$^{c}$ | 3.9$^{b}$ | 47.9$^{a}$ | 5.6 |
| Yankassa | 263.6$^{bc}$ | 114.8$^{b}$ | 43.6 | 567.3$^{b}$ | 1.2$^{b}$ | 16.9$^{b}$ | 34.3$^{ab}$ | 6.1$^{a}$ | 12.2$^{b}$ | 2.5 |
| WAD | 151.2$^{c}$ | 81.2$^{bc}$ | 53.7 | 37.7$^{bc}$ | 0.4$^{bc}$ | 6.9$^{c}$ | 27.2$^{b}$ | 5.6$^{a}$ | 15.3$^{b}$ | 6.8 |
| Red sokoto | 300.7$^{b}$ | 189.9$^{a}$ | 63.1 | 18.3$^{cd}$ | 0.1$^{c}$ | 6.4$^{c}$ | 36.4$^{ab}$ | 1.6$^{b}$ | 4.0$^{c}$ | 2.4 |
| WAD | 273.7$^{bc}$ | 177.5$^{ab}$ | 64.9 | 27.3$^{c}$ | 0.1$^{c}$ | 14.1$^{bc}$ | 53.8$^{a}$ | 2.3$^{b}$ | 8.1$^{bc}$ | 3.5 |

$^{a,b,c}$ Means in the same column with different superscript are significantly different ( P<0.05)

**WAD – West African Dwarf

***BW – Broadleaved weeds

**Table 4: Variations of weights of defecates, population and viability of seeds at different months and periods**

| Periods | Months | Weights of defecates (g) | | % DM | Total No of seeds | Total No of viable seeds | % viability | Weed types | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Fresh | Dry | | | | | Broad leaves | Grasses | Sedges |
| | April | 402.2$^{a}$ | 190.2$^{a}$ | 47.3 | 649.8$^{a}$ | 25.2$^{b}$ | 21.2$^{bc}$ | 8.3$^{a}$ | 10.6$^{c}$ | 5.8$^{a}$ |
| Early rains | May | 377.2$^{ab}$ | 167.7$^{b}$ | 44.5 | 760.3$^{a}$ | 19.3$^{bc}$ | 16.6c | 5.1$^{ab}$ | 12.8$^{bc}$ | 4.2$^{b}$ |
| | June | 396.5$^{a}$ | 156.9$^{b}$ | 39.6 | 498.8$^{b}$ | 26.4$^{ab}$ | 23.7$^{abc}$ | 4.3$^{ab}$ | 19.2$^{abc}$ | 4.3$^{b}$ |
| | July | 382.8$^{ab}$ | 149.3$^{b}$ | 39.0 | 393.0$^{b}$ | 28.7$^{a}$ | 36.6$^{ab}$ | 2.9$^{b}$ | 28.7$^{a}$ | 5.3$^{a}$ |
| Late rains | August | 384.7$^{ab}$ | 147.2$^{b}$ | 38.3 | 309.0$^{bc}$ | 23.3$^{abc}$ | 32.0$^{ab}$ | 2.5$^{b}$ | 19.9$^{abc}$ | 4.2$^{b}$ |
| | Sept. | 355.0$^{ab}$ | 148.1$^{b}$ | 41.7 | 279.9$^{bc}$ | 23.6$^{abc}$ | 29.6$^{abc}$ | 2.1$^{c}$ | 22.5$^{ab}$ | 3.5$^{bc}$ |
| | Oct. | 333.0$^{b}$ | 146.2$^{b}$ | 43.9 | 257.2$^{bc}$ | 21.2$^{abc}$ | 31.8$^{ab}$ | 2.3$^{bc}$ | 23.3$^{ab}$ | 1.9$^{c}$ |
| Early dr | Nov. | 327.7$^{b}$ | 147.3$^{b}$ | 45.0 | 265.6$^{bc}$ | 25.1$^{b}$ | 37.3$^{a}$ | 2.2$^{bc}$ | 23.9$^{ab}$ | 4.5$^{b}$ |
| | Dec. | 327.7$^{b}$ | 148.1$^{b}$ | 45.2 | 258.0$^{bc}$ | 22.5$^{abc}$ | 22.5$^{abc}$ | 2.9$^{b}$ | 24.1$^{ab}$ | 2.7$^{c}$ |

$^{a,b}$ Means in the same columns with different superscripts are significantly different ( P< 0.05)

and goat, ate more than small ruminants and therefore took more seeds with the feed hence more seeds in the faeces. But, despite the highest total number of viable seeds, the percentage viability was lower than in small ruminants, which was between 40 and 50% compared to less than 10% in cattle. Similar trend has been observed by Iyayode. (1999) Oke, (2000) and Adekunle, (2001). The percentage dry matter of faeces ranged from 40% in cattle, 50% in sheep, about 70% in goats. This suggests higher moisture content in cattle faeces than others. There were more seeds of grasses in the dung of cattle (70%) than sheep (20%) and goats (10%). The dung of cattle contained 70% seeds of grasses and 15% each for broadleaves and sedges.

Table 3 showed slight differences among the breeds of the same animal type. N'dama breed of cattle had the higher feacal fresh weight than the white Fulani but lower faecal dry weight. N'dama breed of cattle had the least percentage dry matter of 25% while West African Dwarf breed of goat had the highest of 65% of faeces compared

**Table 5: Variations in population, viability and types of plant species recovered from the faeces of different animals at different seasons.**

| Animal types | Breeds | Parameters | Seasons /months Early rains April | May | June | Late rains July | Aug. | Sept | Early dry Oct. | Nov. |
|---|---|---|---|---|---|---|---|---|---|---|
| Cattle | W. Fulani | Dry wt | 237 | 188.6 | 190 | 187.2 | 176.7 | 173.6 | 182 | 204 |
| | | % Feacal DM | 38.9 | 32.2 | 29.6 | 30.6 | 28.5 | 28.0 | 32.5 | 39.1 |
| | | TNS | 1913a | 1625.2a | 1200ab | 960b | 800b | 760b | 710b | 715b |
| | | N/g DWt | 8.1a | 8.6a | 4.5ab | 3.3b | 3.9b | 4.7ab | 5.3ab | 4.9ab |
| | | TNVS | 39a | 24.8b | 53a | 62.4a | 4.7a | 44a | 37.2a | 39.2a |
| | | % Viability | 2.1c | 1.2c | 6.4ab | 8.6a | 5.9ab | 5.5ab | 3.8b | 3.9b |
| | | Broadleaves | 16a | 8b | 9.5b | 3.4c | 3c | 0d | 2cd | 4cb |
| | | Grasses | 16c | 13.6c | 36.5b | 56.2b | 41ab | 43.8b | 36.3b | 36b |
| | | Sedges | 7a | 4bc | 7a | 4.4bc | 5b | 2cd | 2.1cd | 5.6ab |
| | N'dama | Dry wt | 174.7a | 200.8a | 178.5a | 158.2ab | 154.9ab | 154.7ab | 169.7ab | 183.6a |
| | | % Feacal DM | 24.16 | 29.3 | 25.0 | 23.2 | 23.0 | 23.0 | 26.2 | 29.0 |
| | | TNS | 2711a | 2534.6a | 1676ab | 1294ab | 932.3b | 815b | 730.8b | 774.2b |
| | | N/g DWt | 9.9ab | 13.4a | 9.4ab | 8.2ab | 6b | 5.3b | 4.3b | 4.5b |
| | | TNVS | 52ab | 45.4b | 60a | 55ab | 44.5b | 48.2b | 53.2ab | 61.8a |
| | | % Viability | 1.9b | 1.8b | 3.7c | 5.3ab | 4.5ab | 5.9ab | 7.3a | 7.5a |
| | | Broadleaves | 11a | 4c | 2c | 0 | 0 | 0 | 2c | 7b |
| | | Grasses | 28b | 37.2b | 48.8ab | 63.4a | 41.8ab | 44.8ab | 50.6a | 54a |
| | | Sedges | 13a | 6.2c | 8.5b | 8.6abc | 2.3d | 3.5d | 3d | 2.3d |
| Sheep | Yankassa | Dry wt | 237a | 188ab | 190ab | 187.3ab | 176.7ab | 173.6ab | 182ab | - |
| | | % Feacal DM | 94.9 | 77.1 | 66.4 | 70.7 | 69.6 | 66.8 | 75.2 | - |
| | | TNS | 256a | 109.6ab | 46.8b | 45.2b | 60.3b | 56.5b | 43.2b | 56b |
| | | N/g DWt | 1.3a | 0.9a | 0.4ab | 0.4ab | 0.6ab | 0.5ab | 0.4ab | 0.5ab |
| | | TNVS | 7c | 6c | 13.7b | 21a | 25.5a | 19.8ab | 17ab | 30a |
| | | % Viability | 2.7cd | 6.2c | 37.8b | 46.6a | 43.4a | 35.3ab | 39.9ab | 53.8a |
| | | Broadleaves | 12.8 | 10.6 | 5.9 | 1.3 | 3.8 | 7.3 | 0.8 | 10.8 |
| | | Grasses | 0.6 | 2.1 | 6.9 | 12.8 | 13.5 | 11.2 | 12.5 | 20.9 |
| | | Sedges | 3.5 | 4.4 | 3.9 | 2.2 | 2.0 | 2.4 | 2.9 | 0.1 |
| | WAD | Dry wt | 119.6a | 84.3ab | 76b | 72.9b | 76.8b | 76.8b | 74.6b | 71b |
| | | % Feacal DM | 52.0 | 51.4 | 49.0 | 46.7 | 48.0 | 48.0 | 51.1 | 53.6 |
| | | TNS | 129.0a | 100.8a | 39.5b | 15.8c | 22.8bc | 18.3c | 23.6bc | 21.5bc |
| | | N/g DWt | 1.0a | 1.1a | 0.5ab | 0.2b | 0.3b | 0.2b | 0.3b | 0.3b |
| | | TNVS | 13a | 9.8ab | 4.3bc | 4bc | 4.8bc | 7.3b | 9.2b | 11.3a |
| | | % Viability | 10.5bc | 11.9bc | 12.4bc | 39.5ab | 26.4b | 39.4b | 40.3a | 49.2a |
| | | Broadleaves | 1c | 3bc | 2.1bc | 8.1ab | 5.2b | 3.3b | 7ab | 13a |
| | | Grasses | 6ab | 6.9ab | 6ab | 24.1a | 13.1ab | 27a | 28.3a | 23.2a |
| | | Sedges | 3.5b | 2.0b | 4.3b | 7.3ab | 8.1ab | 9.1a | 11.0a | 13.0a |
| Goat | Red Sokoto | Dry wt | 204.8a | 221.0a | 192.0a | 189.7a | 189.0a | 195.0a | 173.5ab | 158.0ab |
| | | % Feacal DM | 64.0 | 71.3 | 63.0 | 62.0 | 62.0 | 61.9 | 63.8 | 65.9 |
| | | TNS | 11.0c | 22.6a | 15.2b | 21.4a | 19.3ab | 14.8b | 17.9ab | 13.5bc |
| | | N/g DWt | 0.5a | 0.1a | 0.9a | 0.1a | 0.1a | 0.8a | 0.2a | 0.6a |
| | | TNVS | 7.0b | 7.6b | 5.0b | 14.8a | 8.0a | 6.0b | 7.2b | 7.5b |
| | | % Viability | 63.6a | 33.6bc | 32.8bc | 69.1a | 41.5b | 40.5b | 40.2b | 55.5ab |
| | | Broadleaves | 5.0a | 2.0b | 1.0b | 3.2b | 2.0b | - | 1.0b | - |
| | | Grasses | 1.0bc | 4.0ab | 3.0b | 5.2a | 6.0a | 4.0ab | 5.0a | 4.0ab |
| | | Sedges | 1.0b | 1.7b | 1.0b | 6.4a | 2.0b | 2.0b | 1.2b | 3.5ab |
| | WAD | Dry wt | 184.8a | 100.3a | 179.7a | 176.6a | 179.0a | 179.0a | 172.0a | 159.0a |
| | | % Feacal DM | 66.0 | 36.6 | 65.0 | 64.0 | 63.9 | 63.9 | 65.7 | 67.4 |
| | | TNS | 49.0a | 22.6b | 15.2bc | 21.4b | 19.3b | 14.8bc | 17.8bc | 13.5bc |
| | | N/g DWt | 0.3a | 0.2a | 0.2 | 0.2a | 0.1a | 0.1a | 0.2 | 0.5a |
| | | TNVS | 23.0a | 16.0ab | 20.3a | 17.0ab | 11.3b | 8.8b | 9.4b | 7.5b |
| | | % Viability | 46.9ab | 44.9b | 49.2ab | 50.5ab | 70.3a | 51.1ab | 59.8ab | 54.2ab |
| | | Broadleaves | 4.0a | 3.0b | 5.3a | 4.0a | 1.0b | 2.0b | 1.0b | - |
| | | Grasses | 12.0a | 12.a | 13.0a | 14.0a | 10.5a | 4.0b | 4.2b | 7.1ab |
| | | Sedges | 7.0a | 6.8a | 1.0b | 3.0b | 6.0a | 2.4b | 1.3b | 2.2b |

a,b,c Means with different superscripts in the same column are significantly different ($P < 0.05$)
TNS – Total number of seeds recovered from the faeces
TNVS – Total number of viable seeds
N/g DWt – Number of seeds per gramme of dry weight
WAD – West African Dwarf
Wt - Weight

to all the other breeds used in this experiment. This may be due to the differences in the body sizes of these animals. N'dama also, had the highest total number of seeds, seeds/g dry weight and total number of viable seeds, with the least percentage viability of the seeds while, the two breeds of goats and WAD sheep had the least. Similar trend was observed between the fresh faecal weights and total number of seeds, seeds/g dry weights and total number of viable seeds.

Faecal production was significantly ($P<0.05$) more at the early rainy season than the early dry season (Table 4). This could indicate that the grasses had a lot of fresh re-growths with high moisture content at the early and late rainy seasons than the dry season. In addition to the increase in faecal weights in the early rains, the highest total number of seeds recovered from the faeces of the animals was in the early rains. There was reduction of seeds recovered in the late rains and gradual increase in the early dry season. This pattern of seed recovery showed that the animals took in more seeds because there was a lot of feed to consume with the onset of the rainy season and also, plants are still having some of their mature seeds. But with the continuous rain, some of the seeds have started germinating in the late rainy season, while there was gradual seed production with the on set of the dry season. Although, more seeds were recovered in the early rain, the highest ($P<0.05$) percentage viability the early dry season, with the recovered seeds in the early rains having the least percentage viability. This phenomenon as can be seen from previous studies showed that percentage viability reduces with increase in the number of recovered seeds (Jones and Bunch, 1977; Jolaosho and Olorode, 2000).

The highest percentage viability of slightly above 50% was in the month of April which agrees with the findings of Jones and Bunch, 1977; Foster, 1982; Jolaosho and Olorode, 2000). There were more seeds of broadleaved plants in the early rainy season while, grasses were more in the late rains and early dry season. This may be because grasses started seed production from the late rains.

Table 5 showed that there were significant ($P<0.05$) differences in the weights of the faeces within the seasons of the year for all the breeds with significantly higher faecal weights in the rainy season than the dry season. For all the breeds, the seeds recovered reduced from the end of early rains in June except for the two breeds of goats that fluctuate slightly. In almost all the breeds there are little or no broadleaved plants in the late rains except for the two breeds of sheep. Grass plants increased gradually from end of early rains in June except for West African Dwarf breed of goat. This may be because of the increase in the production of grass plants at the onset of the dry season and this is also in agreement with the findings of Jones and Bunch (1977). From this study, Cattle had the highest types of plants in their dung and next to this was sheep then goat (Table 6). Broadleaved weeds plants were common in the faeces of all the animals and they were in equal number and this may be because of the botanical composition of the grazing area of the animals.

## Conclusion

The animals produced faeces with lower faecal percentage dry matter in the late rains unlike early rains and early dry season. The seeds were more viable in the early dry and late rains than early rains. There were more broadleaved weeds in the early rains than late rains and early dry season when they were almost constant while, the grass plants were more in the early dry season and reduced gradually in the early rains. More seeds

**Table 6: Types of plants present in the faeces of each type of animal**

| Animal types | Plant types | | Morphology |
|---|---|---|---|
| | Common names | Botanical names | |
| Cattle | Signal grass | *Brachiaria deflexa* | grass |
| | Crab grass | *Digitaria horizontalis* | grass |
| | Nut grass | *Cyperus tuberosus* | Sedge |
| | Spurge weed | *Euphorbia heterophylla* | Broadleaves |
| | Tridax | *Tridax procumbens* | Broadleaves |
| | Wild amaranth | *Amaranthus* spp. | Broadleaves |
| | Billy goat weed | *Ageratum conyzoides* | Broadleaves |
| Sheep | Signal grass | *Brachiaria deflexa* | grass |
| | Nut grass | *Cyperus tuberosus* | Sedge |
| | Spurge weed | *Euphorbia heterophylla* | Broadleaves |
| | Water leaf | Talinum triagulare | Broadleaves |
| | Wild amaranth | *Amaranthus* spp. | Broadleaves |
| | Billy goat weed | *Ageratum conyzoides* | Broadleaves |
| Goat | Crab grass | *Digitaria horizontalis* | grass |
| | Water leaf | Talinum triagulare | Broadleaves |
| | Pepper | *Piper nigrum* | Broadleaves |
| | Billy goat weed | *Ageratum conyzoides* | Broadleaves |
| | Red acalypha | *Acalypha ciliata* | Broadleaves |

were recovered from the faeces of cattle than the other animal types but the percentage viability of the seeds from cattle was the least. There were more types of plants in the dung of cattle than the other animal types.

From this study, sheep and goats can be used to disperse more viable seeds than cattle and seeds dispersal should be done during the dry season through these animals. More research is also recommended for the use of the animals to introduced seeds for the purpose of biodiversity and on the relationship between seed size and viability of the seeds.

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