

Full Length Research Paper

Evaluation of herd structure of white Fulani cattle holdings in Zaria, Nigeria

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Accepted 16 July, 2012

A survey of 20 Fulani households in Zaria and environs revealed that the maximum and minimum herd size of Fulani cattle holdings in Zaria is 69 and 16, respectively, with the mean herd size of 41.5. The cattle stock composition showed a gender imbalance, with a preponderance of female stock than males. On the average, female animals constituted 60 to 75% in each herd type. The young animals contributed about 50% of the herd size, with more females (35%) than males (15%). The proportion of breeding cows in the herd was 44% while the proportion of the breeding bulls was 6%; this showed that the proportion of the males in the herd reduced as they reached breeding age. The mean values for the breeding bulls, breeding cows, young males and females per herd were 2.6, 18.5, 5.7, and 14.7, respectively. There was however, high variability amongst the herd structure attributes with respect to herd size (CV= 36.8%), number of breeding bulls (CV= 40.2%), breeding cows (CV= 49.1%), young males (CV=42.3%) and young females per herd (CV= 44.5%). The bulls in the Fulani herds reached considerable high age (average age at first breeding 4.05 years) before breeding; the mean age of the breeding bulls in the Fulani herds was 5.98 years. Although older bulls of up to 12 years were found in some of the herds, majority of the bulls were within 5 years age bracket. The high percentage of breeding and rearing females in the herd implies that the Fulani herdsmen are conscious of keeping only those animals which are productive for the sake of increasing their herd.

Key words: White Fulani, herd size, herd structure, herd composition.

INTRODUCTION

The name Fulani has become synonymous with grazing and cattle ownership. The primary occupation of the Fulani is herding, followed by farming. Less than a tenth of the Fulani have jobs other than herding or farming. Non-herding jobs are seasonal and opportunistic. For example, during the wet-season, the Fulani take advantage of the abundant rain and manure to plant corn, millet, sorghum, and home gardens in their backyards.

Most Fulani livestock in the same ecological region are genotypically identical. Mono-species herding and species specialization are the result of a long history of inbreeding among the Fulani. The failure of the exotic species to adapt to the environment, their susceptibility to

diseases, and their demand for large space and special care discourage the Fulani from species diversification.

Having raised livestock for centuries, the Fulani have evolved a herding system that withstands time, weather, social change, and government intervention. Although having fixed residence, the Fulani engage in extensive pastoral movements. Analyses of the Fulani herding system indicate that short- and long-distance trips dominate. These movements are, however, not random, as is the case with pure-nomadic Fulani (Iro, undated).

The movement of the Fulani over the years has led to a pastoral calendar in which the location and the grazing habits of the Fulani herds can be predicted. They move southwards during the dry season to search for grazing land where the prevailing climate still support vegetation growth even in the dry season. At the onsets of rains, they move northwards to escape tsetse fly infestation

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during the rainy season in the South (Payne, 1993).

The Fulani movement varies according to individual circumstances, dictated by the seasonal distribution of grass and water. Mobility is necessary because pastoral resources are non-static and access to them requires movement. By extensive spatial grazing, the pastoralists optimize spatial resource use, allow the soil to rejuvenate, and prevent permanent land damage (Payne, 1993).

Society's awareness of the detrimental effects of this extensive livestock system has changed methods and aims of researchers and even in research institutes, trying to focus on the improvement and sustainability of the systems instead of just increasing the productivity (Sorensen and Kristensen, 1992). Therefore, the improvement of this extensive and / or semi extensive systems without the loss of their traditional values (re-evaluation of little-productive land, environmental conservation) requires a good knowledge of their characteristics and of their strengths and weaknesses at the farm level and within the frame work of the overall farming sector (Rubino and Haenlein, 1996).

Therefore, the aim of this study was to evaluate the herd structure of White Fulani cattle and their contribution to herd size.

MATERIALS AND METHODS

Study site

This study was conducted in six villages (Mile-goma, Sabon fage, Biye, Rafin Tukurwa, Ungwan makada and Kwakwaranmanu) in Zaria, Kaduna State, Nigeria, located within the sub-humid Northern Guinea Savanna, lying between latitude 11° and 12°N of the Equator and longitude 7°49'E at an altitude of 640 m high above sea level. The mean annual rainfall is 1100 mm between May and October and reaches its peak between July and September. During this period, the relative humidity is about 72% with an average temperature of 25°C, following the rainy season, is a period of dry cool weather (harmattan) which marks the beginning of the dry season (IAR, 2008).

Animal management and data collection

A total of 20 white Fulani herds were randomly selected in six villages in Zaria and environs, and studied between May and August 2008 covering 12 weeks. This was to take advantage of the seasonal migration of the herdsman. The herdsman were interviewed on their respective herd with regard to their herd management practices, herd size, and herd composition. The sample size comprised 52 bulls, 370 cows, 480 young cattle which composed of 294 females and 114 males. This gave a total of 830 animals for the study. Initial records of age and number of breeding males and females in each herd were obtained by interviewing the farmers. The ages of the animals were verified or modified after the animals' teeth were examined.

The herds in the case study areas are routinely penned at night, released after milking each morning and herded to the grazing ground. Un-weaned calves are tied in order from youngest to the oldest to a rope called *dangwali* situated near the enclosure for the adults. The enclosure is often a single strand of barbed wire.

Breeding is not controlled, allowing cows to become pregnant any time within the year and spreading the income from the milk sales. Calves usually wean themselves when the dam ceases milking but pastoralist resort to artificial weaning when the dam is in advanced stage of pregnancy and the previous calf is still suckling. This is done by smearing the dung of young calves on the dams' teats every day until the calf stop suckling. After milking, the pastoralist put out *kanwa* a local mineral supplement that is high in calcium (23.7%) and also contains a little phosphorous (0.6%) to the cows. At sunrise, the Fulani free the animals from the tether and take them out to graze until sunset. Throughout the night, the pastoral Fulani must keep vigil on the animals, protecting them from night marauders. Daily herding tasks vary according to seasonal changes.

Data analysis

The data collected were analyzed using Statistical Package for Social Sciences (SPSS, 2006). The statistical tools used were descriptive statistics such as means, standard errors of means, frequency and percentages.

RESULTS

The summary statistics of the herd structure attributes is presented in Table 1. The mean herd size, age at 1st breeding, age of breeding bulls and age at first calving were 41.5, 4.05, 5.98 and 4.75 years, respectively, while the mean values of breeding cows/herd, breeding bulls/herd, young cattle/herd, young males/ herd and young females/herd were 18.5, 2.6, 20.4, 5.7 and 14., respectively. There was however, high variability amongst the herd structure attributes with respect to herd size (36.8%), number of breeding bulls per herd (40.2%), breeding cows (49.1%), young males (42.3%) and young females per herd (44.5%). The minimum and maximum herd size of Fulani cows in Zaria was 16 and 69, respectively.

Table 2 shows the cattle stock composition of Fulani herd structure in Zaria. The herd composition shows that the high proportion of Fulani herds in the study area were young cattle and breeding cows which together constituted 93% of the total herd composition. The least was breeding bulls which constituted only 6% of the herd.

The estimated ratios of the herd attributes measured are shown in Table 3. The ratios of breeding bulls to breeding cows and breeding bulls to young cattle were 0.15 and 0.14, respectively, while the ratios of cows to young cattle and young males to young females were 0.98 and 0.42, respectively.

DISCUSSION

Many variables must be included to estimate the optimum herd size for an area and for a population. A theoretical concept of optimum herd size takes account of the prevailing environmental condition, biological capacity (performance) of the species, herd management practice,

Table 1. Summary statistics of herd structure attributes.

| Characteristic | Mean±SE | CV (%) | Minimum | Maximum |
|------------------------------|------------|--------|---------|---------|
| Herd size | 41.5±3.4 | 36.8 | 16 | 69 |
| Age at first breeding(years) | 4.05±0.12 | 21.9 | 2.5 | 5 |
| Age of breeding bulls(years) | 5.98±0.31 | 37.4 | 3 | 12 |
| Age at first calving(years) | 4.75 ±0.21 | 35.2 | 4 | 6 |
| Breeding cows | 18.5±2.00 | 49.1 | 8 | 42 |
| Breeding bulls | 2.6±0.20 | 40.2 | 1 | 4 |
| Young cattle | 20.4±1.8 | 40.3 | 7 | 33 |
| Young males | 5.7 ± 0.5 | 42.3 | 3 | 11 |
| Young females | 14.7 ±1.5 | 44.5 | 4 | 26 |

CV = coefficient of variation, N: number of records.

Table 2. Cattle stock composition of Fulani herd in Zaria.

| Attribute | Proportion | Ranking |
|---------------------|------------|---------|
| Breeding cows/herd | 0.44 | 2 |
| Breeding bulls/herd | 0.06 | 5 |
| Young cattle/herd | 0.49 | 1 |
| Young males/herd | 0.14 | 4 |
| Young females/herd | 0.35 | 3 |

Table 3. Estimation of ratios of the herd attributes.

| Attribute | Ratio | Ranking |
|------------------------------|-------|---------|
| Breeding bulls :Cows | 0.15 | 2 |
| Breeding bulls: Young cattle | 0.14 | 5 |
| Cows : Young cattle | 0.98 | 1 |
| Young males: Young females | 0.42 | 2 |

and resource use and distribution.(Iro, 2009). For the Fulani of northern Nigeria, none of these factors are static; therefore, optimum herd size is dynamic, varying by a wide margin, depending on the circumstance of the individual Fulani. A survey of 20 Fulani households reveals that the Fulani herd size ranged from 16 to 69 cattle per herd. Although cattle size ranged from 16 to 69, the average Fulani household in the study area own about forty-one cattle.

This survey also attempted to find the expected optimum herd size, by asking the Fulani rather than by computing it from the data collected. The optimum herd size according to the Fulani in this sampled area lies between 70 and 100 cattle. This range is well above the average household holding of 41.5 computed from the data collected, but is within the range of 3 to 339 as reported by Iro (2009). That the Fulani think of seventy or hundred as the optimum cattle size underscores their need to increase the number of their stock.

The summary of the data collected suggest that the bulls in the Fulani cattle herds reached considerable high age (average 4.05 years) before breeding. This is probably due to poor nutrition and other environmental stress. Blezinger (2008) reported that nutrition and feed intake of young bulls affect the age at which they reach puberty. However, Neumann (1990) suggested that bull calf of about 15 months of age should not be allowed to run with the cows, where control breeding is being practiced. The mean age of the breeding bulls in the Fulani herds was 5.98 years. Although older bulls of up to 12 years were found in some of the herds, majority of the bulls were within 4 years age bracket.

The average age at first calving of the breeding cows was 4.75 years. This agreed with data earlier obtained from Bunaji herds in Jos plateau (Synge, 1980), but higher than the 37 month reported in Government Farm at National Veterinary Research Institute, Vom (Ologun, 1980).

An examination of stock composition in the study area showed a gender imbalance, with a preponderance of the female stock than the males. On the average, the female species constituted 60 to 75% in each herd. The advantages of keeping more females in the herd are obvious. A simulation of herd dynamics proved that the rate of growth of the herd peaks when female calves dominate the kraal (Iro, 2009). The young animals contributed about 50% of the herd size, with more females (35%) than males (15%). The proportion of breeding cows in the herd was 49.1% while the proportion of the breeding bulls was 6%. The profitability of any cattle enterprise is highly determined by the number of breeding cows and young females in the herd (Whitley, 2008). This explains why the large proportion of the Fulani herd is composed of breeding cows and young females.

The males which were reasonably much in number at younger age but became fewer as they reached breeding age suggested that bulls in the herd were sold out when they reached breeding age as a source of income to the family and only few were retained in the herd as breeding bulls. It is not economical to keep many bulls in the herd since one mature bull can service at least 20 cows in natural mating (Neumann, 1990).

From the results obtained, the number of cows and young animals in the herd were almost equal (0.98). The proportion of breeding bulls to young animals was small (0.14), which also gave an approximately equal proportion of breeding bulls to cows (0.15). The ratio of young males to females was 0.42, indicating a higher number of young females than young males.

Conclusion

The study of the herd structure of Fulani cattle in Zaria and environs revealed that the herd size of Fulani cattle holdings in Zaria ranged from 16 to 69 with the mean herd size of 41.5. On the average, the female species constituted 60 to 75% in each herd. The young animals contributed about 50% of the herd size, with more females (35%) than males (15%). The proportion of breeding cows in the herd was 44% while the proportion of the breeding bulls was 6%, of the herd size. Therefore, the cattle stock composition of Fulani herds showed a gender imbalance, with a preponderance of the female stock than males. The high percentage of breeding and rearing females in the herd implied that the Fulani are conscious of keeping only those animals which are productive for the sake of increasing their herd.

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