Phenotypic characterization of white Fulani (Bunaji) and Bunaji x Friesian breed of cattle from National Animal Production Research Institute (NAPRI) cattle herd from Nigeria

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Phenotypic characterization of Bunaji (White Fulani) and Bunaji x Friesian breed of cattle of the institutional herd of National Animal Production Research Institute (NAPRI) Shika; Kaduna State, Nigeria was carried out for the purpose of comparison. A total of 163 cattle were used comprising 20 Bunaji Bulls, 106 Bunaji cows and 37 Bunaji x Friesian. Data measured directly from the animals in the herd include: heart girth (HG), withers height (WH), tail length (TL), body weight (BW), forehead length (FL) and scrotal circumference (SC). Those extracted from the herd’s record corresponding to each animal were: length of productive life (LPD), daily milk yield (DMY), lactation yield (LY), calving interval (CI), number of days dry (NDD) and age at first calving (AFC). HG, WH and BW were significantly different (P < 0.05) between Bunaji bulls and Bunaji cows. HG, WH, CI, NDD and AFC were significantly different (P < 0.05) between Bunaji cow and Bunaji x Friesian cows. However, there was no significant difference (P < 0.05) in TL, LPF, DMY and LY between Bunaji cows and Bunaji x Friesian cows. From the results, it is obvious that the Bunaji can perform comparatively well as the Bunaji x Friesian when managed under the same conditions.

Key words: Bunaji, comparison, cross breeds, phenotypic.

INTRODUCTION

Nigeria, like most African countries, has witnessed an increased form of agricultural development and urbanization during the past few decades before the oil boom (Dackson, 2008). To meet and sustain the increasing demand for livestock products such as milk, importation of special cattle breeds from temperate regions has been the trend (Dackson, 2008). This has placed an excessive selection pressure against indigenous cattle. In turn; it has led to the reduction of genetic variability of indigenous cattle breed through breed substitution (FAO, 1999). According to the same source, once animal genetic diversity has been lost, it cannot be replaced.

The loss of genetic variation within and between breeds is detrimental not only from the perspectives of culture, conservation and investigation but also for utility, since lost genes may be of future economic interest (Hetzel and Drinkwater, 1992). Within breeds, high rate of loss of genetic variation leads to reduced chances of breed survival due to decreased fitness through inbreeding.
depression.

Globally, there has been an increased awareness of the importance of indigenous animal breeds and the need to properly utilize and manage these resources. Awareness of the value of genetic resources in livestock has stimulated the study of the genetic diversity of native breeds. Very little information is available concerning the genetic diversity of cattle breed native to Africa (Dackson, 2008). However, recently there has been an increase in the number of programs and studies on livestock genetic diversity in several African countries (Gwakisa et al., 1994; Gwakisa et al., 1997; Hanotte et al., 2002; Belemsaga et al., 2005; Mburu and Hanotte, 2005; Dagrís, 2007; Dackson, 2008; Sambulo, 2011).

Before the advent of genetic studies, the classification of breeds was based on historical and anthropological evidence and morphological characterization that were and are still not satisfactory or significant for the purpose and objective of conservation, parentage and future monitoring of breeds (Mwacharo et al., 2006). In order to ensure proper conservation and utilization of indigenous breeds, it is important to evaluate genetic variations that exist within and among breeds. Most of the indigenous livestock populations in developing countries have not been characterized and evaluated at phenotypic and genetic levels (Hanotte and Jianlin, 2005).

One of the predominant cattle breed found across Northern Nigeria is the White Fulani also known as the Bunaji (Williamson and Payne, 1989). This breed is commonly used for meat, milk and draught and its dung used as manure. It is known for its adaptive characteristics in this part of the country hence it is found in both institutional research farms and established individual farms. To achieve productivity gains (high milk production), this breed is silently being upgraded via artificial insemination with semen of Bos Taurus breeds especially Friesian (Maozami-Goudarzi et al., 1997). The end product is a cross breed (Bunaji x Friesian) which is a common feature in most of these farms. This constitutes a significant threat to the Bunaji resources.

In spite of the availability and importance of these two cattle breeds (Bunaji and Bunaji x Friesian), very little work has been carried out to characterize them phenotypically. Characterizing them will give a good knowledge of the diversity and relationship that exist between them. It will enable quick identification and their productive performance within limits would also be known (Mbpap and Bawa, 1999).

The importance of maintaining such diversity had been emphasized in several reports (Gwakisa, 1994; Notter, 1999; Hassen et al, 2007).

**OBJECTIVE OF THE STUDY**

The objectives of this study was to characterize and compare the productive performance of Bunaji and Bunaji x Friesian found in National Animal Production Research Institute (NAPRI) herd of cattle in Shika Zaria, Nigeria.

**MATERIALS AND METHODS**

The animals used in this study were from the institutional herd of National Animal Production Research Institute (NAPRI), Shika, in the Northern Guinea Savannah Zone of Nigeria. A total of One Hundred and Sixty three (163) cattle including 20 Bunaji bulls, 106 Bunaji cows and 37 Bunaji x Friesian, all at productive ages were studied.

Parameters taken directly from each animal were: heart girth, wither height, tail length, body weight, forehead length and scrotal circumference. Linear measurement was taken using a measuring tape and a rular which were all calibrated in centimeter. The rular was used to measure the height at wither of the cattle in a crush.

Body weight was obtained using a weighting bridge consisting of an Avery weighing scale (2.2 × 1.5 m) that weighs up to 500 kg. Wither height was determined as the distance from the navel flap of the stomach to the ground. Tail length was measured as the distance from the pin bones of the sacrum to the base of the tail twitch. Body circumference was measured by placing the tape round the medium immediately posterior to the shoulder blade at the sixth to seventh ribs. Scrotal circumference was determined by placing the tape round at the mid length of the scrotum, while length of the forehead was measured as the distance between the base of one horn and the other.

Other traits such as length of productive life (years); daily milk yield (liters), calving interval (days), number of days dry (days) and age at first calving (days) were extracted from the farm’s production records for each animals. These were defined as: the amount of milk (in liters) secreted by a cow per day, as the daily milk yield. The amount of milk (in liters) secreted by a cow within her lactation period as lactation yield; the time interval (in days) between one calving and another as calving intervals; number of days between which the lactating cow ceased to produce milk to the time she calved again as number of days dry. Age at first calving is the period from which the cows were calved of their first calves.

**Management of animals**

The cattle were semi-intensively managed (Buvanenedran et al., 1981). They were allowed to graze in the day for 6 hours but brought back to the pen and fed with concentrates. Prophylactic treatments against diseases were periodically given.

**Statistical analysis**

The data were analyzed using the (GLM) option of the
Table 1. Mean values of quantitative traits of Bunaji bulls and Bunaji cows.

<table>
<thead>
<tr>
<th>Traits</th>
<th>Bulls</th>
<th>Cows</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heart girth (cm)</td>
<td>141</td>
<td>151*</td>
</tr>
<tr>
<td>Withers height (cm)</td>
<td>60</td>
<td>58*</td>
</tr>
<tr>
<td>Tail length (cm)</td>
<td>111</td>
<td>107</td>
</tr>
<tr>
<td>Body weight (kg)</td>
<td>201</td>
<td>249*</td>
</tr>
<tr>
<td>Forehead length (cm)</td>
<td>17</td>
<td>17</td>
</tr>
<tr>
<td>Scrotal circumference (c)</td>
<td>27.8</td>
<td>-</td>
</tr>
<tr>
<td>Length of productive life (yrs)</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Daily milk yield (Liters)</td>
<td>-</td>
<td>4.8</td>
</tr>
<tr>
<td>Lactation yield (litres)</td>
<td>-</td>
<td>33.6</td>
</tr>
<tr>
<td>Calving intervals (days)</td>
<td>-</td>
<td>543</td>
</tr>
<tr>
<td>Number of days dry (days)</td>
<td>-</td>
<td>253.7</td>
</tr>
<tr>
<td>Age at first calving (days)</td>
<td>-</td>
<td>1724</td>
</tr>
</tbody>
</table>

Source: Field data. *= Significant difference (p<0.05) between Bunaji bulls and Bunaji cows.

Table 2. Mean values of quantitative traits of Bunaji cows and Bunaji x Friesian cows.

<table>
<thead>
<tr>
<th>Traits</th>
<th>Bunaji cows</th>
<th>Bunaji Friesian</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heart girth (cm)</td>
<td>151</td>
<td>169*</td>
</tr>
<tr>
<td>Withers height (cm)</td>
<td>58</td>
<td>62*</td>
</tr>
<tr>
<td>Body weight (kg)</td>
<td>249</td>
<td>491*</td>
</tr>
<tr>
<td>Forehead length (cm)</td>
<td>17</td>
<td>18</td>
</tr>
<tr>
<td>Length of productive life (yrs)</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Daily milk yield (L)</td>
<td>4.8</td>
<td>4.8</td>
</tr>
<tr>
<td>Lactation yield (L)</td>
<td>33.6</td>
<td>33.4</td>
</tr>
<tr>
<td>Calving intervals (days)</td>
<td>543</td>
<td>584*</td>
</tr>
<tr>
<td>Number of days dry (days)</td>
<td>253.7</td>
<td>277.1*</td>
</tr>
<tr>
<td>Age at first calving (days)</td>
<td>1724</td>
<td>1669*</td>
</tr>
</tbody>
</table>

Source: Field data. *=Significant difference (P<0.05) between the two breeds (Bunaji cows and Bunaji x Friesian cows).

ANNOVA program in the Minitab software (Manitab, 2008).

RESULTS AND DISCUSSION

The mean values of some quantitative traits of bunaji bulls and bunaji cows are presented in Table 1. The mean values of measured traits of Bunaji and Bunaji x Friesian cow are presented in Table 2.

Table 1 shows that Bunaji cows showed significantly (P<0.05) higher heart girths (152 cm) than Bunaji bulls (141 cm). Similarly, Bunaji cows had significantly (P<0.05) higher body weights than the bulls (249 and 201 kg respectively).

From these records it shows that there is indeed a linear correlation between heart girth and body weight as suggested by Kashoma et al. (2011) and Abdelhadi and Babiker (2009).

The scrotal circumference of Bunaji recorded in this study was 27.8 cm (Table 1) which is lower than earlier values reported by Mbab and Bawa (1999) for the same breed. In the same vein, the age at first calving of Bunaji cows in this study did not agree with recent report by Mbab and Bawa (1999). This could be due to the fact that the age at first calving is environment dependent and it could also be as a result of differences in nutrition (Williamson and Pyne, 1998). Daily milk yield of both Bunaji and Bunji x Friesian were low, this is in conformity with Maule (1990) assertion that, tropical zebu have low milk yield. The calving intervals in this study agree with earlier report of Rege (1994). Table 2 shows that Bunaji x Friesian have significantly (P<0.05) higher values over Bunaji cows for heart girth, withers height and body weight. The Bunaji x Friesian also show a significantly (P<0.05) shorter age at first calving (1668 days) than the Bunaji cows (1724 days). The Bunaji cows on the other hand have shorter calving interval (543 days) and number of days dry (253.7 days) than the Bunaji x Friesian cows (584 days and 277.1 days, for calving intervals and number of days dry respectively). There is
no significant difference between the two breeds (Bunaji and Bunaji x Friesian) for length of productive life, daily milk yield and lactation yield.

CONCLUSION

From this study, it shows the Bunaji can perform comparatively better when properly managed under same conditions as the Bunaji x Friesian. They also show better indices such as shorter calving interval and number of days dry, meaning that they are likely to have shorter generation intervals than the Bunaji x Friesian.

RECOMMENDATION

It is recommended therefore, that efforts be geared towards preserving this breed (Bunaji) against its eminent genetic dilution and probable extinction in most research and established individual farms.

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