

Comparative Behavioural Signs and Physical Manifestation of Estrous in Nigeria Breeds of Goats

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ABSTRACT

Fourty (40) weaned female goat kids aged 3 - 4 months belonging to four local breeds of Nigerian goats (Bornu White, Sokoto Red, Kano Brown, and West African Dwarf) served as subjects. Ten (10) goats from each breed were used for this study. The parameter used were age and weight at first estrus, signs and duration of estrus and length of estrous cycle over a period of two year. Vulva congestion, vulva secretion and tail wagging were to be the most consistent and highly noticeable estrus signs with a percentage of 80 - 100% in all the breeds. Mounting of other animals, frequent urination and searching for bucks were the most inconsistent behavioral estrus manifestations, with a percentage of 35 - 40% in all the breeds. The mean age at first estrous of 240.5 ± 5.0 days was observed to be the shortest and 405.1 ± 9.0 days the longest in Bornu White and West African Dwarf goats, respectively. The highest and lowest mean weight at first estrous was 28.6 ± 3.0 kg and 18.8 ± 2.0 kg in Bornu White and West African Dwarf goats, respectively. The duration of estrous as well as length of estrous cycle was 36.8 ± 4.0 hrs and 25.4 ± 2.0 days for Bornu White and 46.2 ± 5.5 hrs and 21 ± 2.0 days for West African Dwarf goats. The values of all the parameters obtained in Sokoto Red and Kano/Savannah Brown goats were between the values recorded for the Bornu White and West African Dwarf breeds. In conclusion, the comparative base-line data obtained in this study may be of value in predicting the onset of puberty and timing for breeding, diagnosis and control of impairment of estrous phenomena in local breeds of goats in Nigeria.

Key words: Comparative, estrous manifestation, signs, Nigeria breeds of goats

INTRODUCTION

Nigeria has a wealth of agricultural resources with a vast area of arable and pasture land for livestock production. It is widely documented that small ruminant production is both profitable and economically viable.

It provides direct cash and also serves as a living bank for many rural farmers. Hence, small ruminants and their products are one of the pillars upon which rural economy is being built (Mustapha and Mustapha, 2006). One of the exciting developments in livestock reproduction is embryo manipulation and genetic engineering. As a result female animals can be synchronized and super-ovulated for breeding (Gonzalez *et al.*, 1982). Biotechnological research is making it possible for temperate goats known to be seasonal breeders to be bred in other periods of the year, thus alleviating seasonal limitations in production of goats and marketing of their products. All these advantages can only be achieved when does show signs of estrus (Amoah and Gelaye, 1990). Estrous (sexual receptivity to the male) is limited to a short period in most animal species and shows that female sexual behaviour is specifically hormonal-dependent. Therefore, the secretion and action of hormones are essential for the triggering and expression of female sexual behaviour (Chemineau and Cagnie, 1991). It has been shown that evaluation of estrus phenomenon in all the available breeds of goats will provide an important and useful information to breeders and inseminators in achieving optimum performance in breeding (Ngere and Mbap, 1982). In order to realize these objectives researchers have worked on some of the local breeds, but their findings appeared scattered in the literature (Otchere and Nimo, 1975; Molokwu and Igono, 1978; Perera *et al.*, 1978; Amoah and Gelaye, 1990; Fasanya *et al.*, 1992; Akusu and Ajala, 2000; Umaru *et al.*, 2006). Also some variations in estrous phenomena exist in these breeds which have not been documented. The aim of the present investigation was to provide comparative base-line data on the age and weight at first estrous, duration of estrous and length of estrous cycle, and also to highlight the variations in the behavioral exhibition and manifestation of estrous signs in local breeds of goats of Nigeria.

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MATERIALS AND METHODS

A total of 40 weaned female goats comprising 10 of each breed of Nigerian goats (Bornu White, Kano/Savannah Brown, Sokoto Red and West African Dwarf) and four vasectomized adult male goats (1 per each breed) were used in this study. The animals aged three to four months' old were housed in individual pen according to their breed. This study was carried out at the faculty of Veterinary Medicine Ahmadu Bello University Zaria, Nigeria. They were allowed to graze during the day and local concentrate (Dusa: maize and corn bran) was supplemented in the evening and water provided *ad libitum*. The animals were observed for signs of estrus twice daily (07:00 and 19:00 hr) with the aid of vasectomized males introduced about 1 hr to the commencement of observation (Amoah *et al.*, 1990). This was done to make sure that the intended estrous signs were picked within the period of observation. The behavioural signs and physical estrus manifestations were observed and recorded, including vulva congestion, vagina mucus discharge, tail wagging, restlessness, bellowing, frequent urination, immobility posture, mounting of other animals and search for bucks. The age and weight at first behavioral estrus as well as duration of estrus and length of estrous cycle were also recorded. Does were considered to be in estrous only when they allowed the males to mount them. Data obtained were expressed as percentage and mean \pm standard error of the mean (mean \pm SEM). Values of $p < 0.05$ was considered significant.

RESULTS

The results are presented in Tables 1 - 5. Wide ranges of behavioural signs and manifestations of estrous were observed and recorded for the four local breeds of goats in Nigeria. The commonest manifestations of estrous were vagina mucus discharges and vulva congestion observed in 95.0 and 92.5% of all the goats, respectively, while the commonest behavioural sign of tail wagging was recorded in 87.5% of the entire goats. Vulva mucus discharges, vulva congestion and tail wagging were closely followed by the moderate and consistent signs of standing to be mounted, restlessness and bellowing, while the least common signs of estrus were mounting of other animals, frequent urination and search for bucks observed in 35 - 40 percent of the goats. The behavioural signs of mounting of other animals, frequent urination and searching for bucks exhibited by the goats in percent did not differ significantly from one another. The percent values were lower when compared with the other signs and manifestations of estrous obtained in the four local breeds of goats ($p < 0.05$) (Table 1). The age at first estrus was highest in the West African Dwarf goat and lowest in the Bornu White goat with the values of 405 ± 9.0 and 240.5 ± 5.0 dafs, respectively ($p < 0.01$) (Table 2). The highest weight of 28.6 ± 3.0 kg at first estrus was attained by the Bornu White goat, while the lowest weight of 18.8 ± 2.0 kg ($p < 0.05$) was recorded in the West African Dwarf goat (Table 3). The maximum and minimum duration of estrus were recorded in the West African Dwarf and Sokoto Red/ Kano Brown goats, respectively (Table 4). The longest duration of estrous cycle was found in the Bornu White goat, while the lowest was recorded in the West African Dwarf goat (Table 5). Although the duration and length of estrus obtained in the breeds were different, the differences in the values recorded among the breeds were not statistically significant ($p > 0.05$).

Table 1. Percentage (%) of does exhibiting behavioral changes and characteristic signs of estrus in four local breeds of goats in Nigeria (n = 10)

| Behavioural signs/ manifestations | Bornu White | Sokoto Red | Kano/Savanna Brown | WAD | Mean \pm SEM |
|--------------------------------------|-------------|------------|-----------------------|-----|------------------|
| Vulva congestion | 90 | 90 | 90 | 100 | 92.5 ± 2.5^a |
| Bellowing | 40 | 60 | 60 | 70 | 57.5 ± 6.3^b |
| Mounting of other animals | 30 | 40 | 40 | 50 | 40.0 ± 4.8^c |
| Restlessness | 50 | 60 | 60 | 60 | 57.5 ± 2.5^b |
| Frequent urination | 30 | 40 | 50 | 40 | 40.0 ± 4.8^c |
| Standing to be mounted | 70 | 70 | 70 | 60 | 67.5 ± 2.5^b |
| Vagina mucus discharges | 100 | 90 | 100 | 90 | 95.0 ± 2.9^a |
| Tail wagging | 80 | 90 | 90 | 90 | 87.5 ± 2.5^a |
| Searching for bucks | 30 | 40 | 30 | 40 | 35.0 ± 2.0^c |

^{a,b,c} = means with different superscripts are significantly different ($p < 0.05$); WAD = West African Dwarf

DISCUSSION

The behavioural changes and characteristic signs of estrus observed in the present study are similar to the findings of other researchers (Hambolu and Ojo, 1985; Akusu and Ajala, 2000; Umaru *et al.*, 2006). The observed

ability of several animals within the four breeds used in this study to exhibit the characteristic signs of vulva mucus discharge, vulva congestion and tail wagging are prima facie evidence that they were in estrus. This observation agreed with the reports by other investigators (Noakes *et al.*, 1982; Llewelyn *et al.*, 1993; Akusu, 2003; Umaru *et al.*, 2006). Standing to be mounted, restlessness and bellowing are signs that were moderately consistent within and between breeds. This observation agreed with that reported by Noakes (1982), Payne (1990), Hambolu and Ojo (1985) and Umaru *et al.* (2006). Standing to be mounted is usually behavioural sign observed during the ovulation period in most mammals (Amoah and Gelaye, 1990). Bellowing was found to be moderate in Sokoto Red and Kano Brown, slightly high in West African Dwarf goats, but was found low in Borno White goats. Mounting of other animals, frequent urination and search for bucks were observed to be the least common signs of estrus exhibited by all the breeds with $40.0 \pm 4.8\%$, $40.0 \pm 4.8\%$ and $35.0 \pm 2.9\%$, respectively. The observed variations are due not only to animal breed, but also to the environment where they are found and management system. This type of comparison of estrus manifestations has never been reported in Nigerian local breeds of goats, although Umaru *et al.* (2006) reported an increase in frequency of these estrus signs in induced Sokoto Red goats. The inconsistency in the exhibition of these signs may be why previous researchers either did not observe the signs or reported it without elaboration (Umaru *et al.*, 2006). The age and weight of the goats at first estrus represented the onset of puberty in these breeds. The breed variation due to breed observed both in the age and weight of the animals used in the present study agreed with the findings of Amoah and Gelaye (1990) and Fasanya *et al.* (1992) that the type of breed and condition of an animal (that is, the plane of nutrition) are important factors which also influences the age and weight of animals in attaining puberty. Different authors have observed different ranges of estrus duration in does. William and Kenneth (1970) observed 40 h, Hafez and Jainudee (1975); Pandey *et al.* (1985) and Amoah and Gelaye (1990) observed 24 - 48 h and 16 - 48 h respectively. The observed range of 26 - 48 h in the present study fell within the range reported by the investigators. Estrus duration has been reported to be influenced by several factors, including types of breed (Tervit *et al.*, 1986), method of breeding (Smith, 1980) and the condition of the animal, based on plane of nutrition during breeding (Fasanya *et al.*, 1992). The observed variation in duration of estrus in the goats used in the present study may be attributed to breed type because all the animals were placed under the same management conditions.

Table 2. Age at first estrus in Nigerian local breeds of goats (days) (n = 10)

| Breed of goat | Mean \pm SEM | Maximum | Minimum | Range |
|------------------------|-------------------------------|------------------|------------------|----------------|
| Bornu White | 240.5 \pm 10.0 ^a | 246 | 236 | 10 |
| Sokoto Red | 253.2 \pm 10.0 ^a | 261 | 245 | 16 |
| Kano/Savanna Brown | 252.0 \pm 10.0 ^a | 258 | 246 | 15 |
| West African Dwarf | 405.1 \pm 10.0 ^a | 413 | 306 | 17 |
| Overall mean \pm SEM | 287.7 \pm 39.2 ^a | 294.5 \pm 39.6 | 280.8 \pm 38.5 | 14.5 \pm 1.6 |

^{a,b} = = means with different superscripts are significantly different (p<0.05)

Table 3. Weight at first estrus in Nigerian local breeds of goats (kg) (n =10)

| Breed of goat | Mean \pm SEM | Maximum | Minimum | Range |
|------------------------|-----------------------------|----------------|----------------|---------------|
| Bornu White | 28.6 \pm 3.0 ^a | 32.0 | 26.0 | 6 |
| Sokoto Red | 22.7 \pm 2.5 | 26.0 | 20.0 | 6 |
| Kano/Savanna Brown | 23.0 \pm 2.0 ^a | 24.0 | 20.0 | 4 |
| West African Dwarf | 18.8 \pm 2.0 ^b | 21.0 | 17.0 | 4 |
| Overall mean \pm SEM | 23.3 \pm 2.0 | 25.8 \pm 2.3 | 20.8 \pm 1.9 | 5.0 \pm 0.6 |

^{a,b} = = means with different superscripts are significantly different (p<0.05)

The average range of estrous cycle length of 18-28 days obtained in the present study was comparable to 14-26 days, previously reported by Rajkonwa and Borgohain (1998) and Akusu and Ajala (2000). There were, however, breed variations in cycle length in goats. It was also observed that different individual goats within breeds exhibited three types of cycles, namely: long, medium and short cycles. This observation agreed with the observation of Amoah and Gelaye (1990). However, Akusu and Ajala (2000) asserted that short or long cycles should be regarded

as normal in the West African Dwarf goat as observed in Barbari breeds (Prasad and Bhattacharyya, 1977).

Table 4. Duration of estrus in Nigerian local breeds of goats (h) (n = 10)

| Breed of goat | Mean \pm SEM | Maximum | Minimum | Range |
|------------------------|----------------|----------------|----------------|---------------|
| Bornu White | 36.8 \pm 4.0 | 42 | 34 | 8 |
| Sokoto Red | 32.6 \pm 2.5 | 35 | 28 | 7 |
| Kano/Savanna Brown | 32.4 \pm 2.0 | 36 | 26 | 10 |
| West African Dwarf | 41.2 \pm 5.5 | 48 | 35 | 13 |
| Overall mean \pm SEM | 35.0 \pm 3.2 | 41.5 \pm 4.1 | 31.8 \pm 3.0 | 9.8 \pm 1.5 |

^M Means are not significantly different (p>0.05)

Table 5. Length of estrus cycle in Nigerian breeds of goats (days)

| Breed of goat | Mean \pm SEM | Maximum | Minimum | Range |
|------------------------|----------------|----------------|----------------|---------------|
| Bornu White | 25.4 \pm 2.0 | 28 | 23 | 5 |
| Sokoto Red | 23.3 \pm 1.5 | 25 | 22 | 3 |
| Kano/Savanna Brown | 23.1 \pm 2.5 | 25 | 20 | 5 |
| West African Dwarf | 21.4 \pm 2.0 | 24 | 18 | 6 |
| Overall mean \pm SEM | 23.4 \pm 0.8 | 25.5 \pm 0.9 | 21.0 \pm 0.9 | 4.8 \pm 0.5 |

^M Means are not significantly different (p>0.05)

CONCLUSION

In conclusion, the data obtained can be used for timely estrus detection and accurate timing of breeding will allow for successful and increased frequency of conception rate in these indigenous breeds of goat. It will also assist in predicting the onset of puberty as well as diagnosis and control of impairment of estrus phenomena.

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