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Prominent Signs of Oestrus in the West African Dwarf Goat

Research Article

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ABSTRACT

In order to study the signs of œstrus in the West African Dwarf goat, 28 non pregnant females younger than 24 months of age were used. Most of them (94.7%) had waggled the tail during heat. The frequency of micturition was higher in the presence of the male. The swelling of the vulva was observed in 68.4% of goats in heat. The cervico-vaginal mucus was significantly ($P \leq 0.05$) abundant and elastic during œstrus. The duration of œstrus was 1.91 ± 0.07 day and increased with the female age. Signs of heat were less prominent in younger than in older females. Behavioural changes, vulva appearance and the characteristics of cervico-vaginal mucus can be used as criteria for detection of œstrus in the West African Dwarf goat.

KEY WORDS age, heat, signs, West African Dwarf goat.

INTRODUCTION

Livestock plays an important role in the agricultural economy of most African Countries; its contribution to gross domestic product can reach 35% in Saharan Countries, and is estimated between 3 and 16% in central Africa.

In Cameroon, rearing of ruminants has always been extensive, on large areas of pasture. However, due to the continual shrinkage of such areas to the benefit of vegetal crops, a more intensive management of production is foreseen.

Such evolution will necessarily bring the introduction of newly developed reproductive and productive technologies, together with the implementation of more basic activities. The improvement in the efficacy of heat detection is an essential and important step forward that can be properly conducted by the farmer.

In the course of artificial insemination, the detection of œstrus allows the insemination of females at the proper time.

Differently, poor detection or misdiagnosis of œstrus would lead inevitably to lower conception rate, increased number of services per conception, economic loss and longer kidding intervals (Baril *et al.* 1993; Burns *et al.* 2002).

In a tropical environment, the knowledge of the various elements that determine heat behaviour, allows us to choose the appropriate time for breeding, avoiding thus mortalitiy of conceptus or kids caused by possible scarcity of fodder (Delgadillo *et al.* 1997; Jansen and Van Den Burg, 2004).

Signs of œstrus have been reported for many breeds of goats (Rezac and Krivaneki, 2001; Zarrouk *et al.* 2001). However, to our knowledge, there are no data available on heat manifestations in the West African Dwarf goat, with

particular regard to age. Therefore, such investigation represents the aim of the present study.

MATERIALS AND METHODS

Location

The study was carried out at the Farm of Application and Research of Dschang University (Cameroon). This farm is situated at latitude 5° 26'N, longitude 10° 26'E and 1420 m of altitude.

The annual rainfall and temperature fluctuate between 1500-2000 mm and 10-25 °C respectively. There are one dry season from November to March and one rainy season during the remaining months of the year.

Animals, housing and feeding

Thirty two animals (4 bucks and 28 non pregnant females) were used. They were up to 24 months of age, as determined by teeth examination and their weight ranged from 9.5 to 20 kg. Each female was identified by a numbered earring. Males and females were kept apart. All the animals grazed on natural pasture during the day and received a supplement of corn and cottonseed after grazing in the paddock.

Assay

To synchronise œstrus, two doses of 2 mg of alfaprostol (analogue of PGF2α, Gabbostrim and CEVA VETEM) were injected intramuscularly to each female at 11 days interval. Heat was detected eight times daily by exposing intact bucks to goats.

The observation started from the second injection of alfaprostol up to the onset and continued till the end of heat. Each female detected in heat was isolated from the herd for better detection.

Data collection

The anatomo-functional changes such as the characteristics of cervico-vaginal mucus, the aspect of the cervix (closed or opened), swelling and reddening of the vulva were recorded up to 24 hours Post-oestrus. All the data collected earlier than 48 hours before heat signs were not considered in the analysis. The cervix was visualised with the aid of speculum. The elasticity of the mucus was measured with the aid of a caliper rule.

Behavioural elements recorded were: mounting, tail wagging and frequency of micturition. The number of micturition by a female in heat was recorded within one hour in the presence and then in the absence of the male.

This study was performed in accordance with EU directive 2010 / 63 / EU for animal experiments.

Statistical analysis

Data were expressed as means ± SD and analysed with one way ANOVA and Duncan's test at 5% in case of significant difference.

RESULTS AND DISCUSSION

Anatomo-functional changes

The swelling of vulva (Figure 1) was observed in more than half of females in œstrus.

All goats aged more than 20 months expressed vulvar swelling, whereas only a quarter of females aged less than 14 months showed swollen vulva. In addition, irrespective of age, the mucosa of the vulva was red in all the goats in full œstrus, and pink later, whereas the cervix was open only during heat.

The mucus was present in the vagina of all the females starting 36 hours before the onset of heat. It was transparent at œstrus and milky 24 hours later (Table 1).

It was abundant at the onset and up to 12 hours after œstrus. The elasticity of the mucus increased linearly to the peak of heat, and declined thereafter.

The age of the female did not affect any of the studied characteristics of the mucus.

Behavioural changes

Less than half of the females followed the male during heat (Table 2). This behaviour was reduced in goats aged less than 14 months.

Females in heat mounted males as well as other females, but the mounting of the male was the most frequent and did not vary with age of females.

The frequency of micturition of goats in heat was higher ($P<0.05$) in the presence of male than during its absence, and was not related to age. At heat, 94.74% of females waggled the tail, including all females of the lowest and highest age groups.

Goats that did not waggle their tail (5.26%) were part of the middle age group. The average duration of œstrus was 45.84 ± 1.68 hours. This duration varied with the age of the female and significantly increased ($P<0.05$) in the older females (Figure 2).

Reddening and swelling of the vulva

The appearance of the vulva in the West African Dwarf goat is in agreement with available data reported in literature. Indeed, one of the diagnostic elements of œstrus in most mammalian species is the swelling and reddening of the external genitalia (Ball and Peters, 2004; Senger, 2005). The increase of the vulva volume is due to the œdema, caused in turn by hyperemia during œstrus.

Table 1 Characteristics of mucus before, during and after œstrus in West African Dwarf goat

Parameters	Periœstrus period (h)						
	-48	-36	-24	-12	Œstrus)	12	24
Presence of mucus							
0-14 months n= 4	0	1	1	1	1	1	1
14-20 months n= 9	0	1	1	1	1	1	1
20-24 months n= 6	0	1	1	1	1	1	1
Aspect							
0-14 months n= 4	-	Milky	Milky	Milky	Transparent	Cloudy	Milky
14-20 months n= 9	-	Milky	Milky	Transparent	Transparent	Cloudy	Milky
20-24 months n= 6	-	Milky	Milky	Transparent	Transparent	Cloudy	Milky
Abundance							
0-14 m months n= 4	-	Little	Little	Little	Abundant	Abundant	Little
14-20 months n= 9	-	Little	Little	Little	Abundant	Abundant	Little
20-24 months n= 6	-	Little	Little	Little	Abundant	Abundant	Little
Elasticity (mm)							
0-14 m months n= 4	-	1.00 ± 0.00^{Aa}	1.75 ± 1.5^{Aa}	2.50 ± 1.73^{ABa}	8.00 ± 2.94^{Ca}	6.00 ± 4.76^{Ca}	1.50 ± 1.29^{Aa}
14-20 months n= 9	-	1.22 ± 0.67^{Aa}	2.89 ± 0.93^{ABa}	3.56 ± 1.33^{Ba}	7.67 ± 1.80^{Ca}	7.67 ± 2.06^{Ca}	2.72 ± 1.35^{ABab}
20-24 months n= 6	-	1.17 ± 0.9^{Aa}	3.00 ± 2.10^{Ba}	3.00 ± 2.10^{Ba}	6.00 ± 2.28^{Ca}	6.33 ± 2.16^{Ca}	3.67 ± 1.86^{Bb}
Average	-	1.13 ± 0.12^{AB}	2.55 ± 0.69^{BC}	3.02 ± 1.53^{C}	7.22 ± 1.07^{D}	6.67 ± 0.67^{D}	2.63 ± 1.09^{C}

[a, b]: the means within the same column with at least one common letter, do not have significant difference (P>0.05).
[A, B, C, D]: the means within the same column with at least one common letter, do not have significant difference (P>0.05).
n: number of observations.
0: absence and 1: presence.

Table 2 Behavioural changes during heat in West African Dwarf goat

Parameters	Age groups			
	< 14 months n= 4	14-20 months n= 9	20-24 months n= 6	Total n= 19
% of females following the male	25.00^{a}	55.55^{b}	50.00^{b}	47.37
Number of mounting per hour				
On male	3.00 ± 0.82^{a}	2.44 ± 0.88^{a}	2.67 ± 0.82^{a}	2.63 ± 0.83^{A}
on female	0.75 ± 0.96^{a}	1.00 ± 1.12^{a}	1.17 ± 0.41^{a}	1.00 ± 0.88^{B}
Number of micturition per hour				
In the absence of male	1.75 ± 0.50^{Aa}	1.67 ± 0.71^{Aa}	2.17 ± 0.75^{Aa}	1.84 ± 0.69^{A}
In the presence of male	4.00 ± 0.82^{Ba}	3.67 ± 1.87^{Ba}	4.00 ± 1.55^{Ba}	3.84 ± 1.54^{B}
Wagging of the tail (%)	100.00^{a}	88.88^{a}	100.00^{a}	94.74

[a, b]: the means within the same column with at least one common letter, do not have significant difference (P>0.05).
[A, B, C, D]: the means within the same column with at least one common letter, do not have significant difference (P>0.05).

The influx of blood raises the pressure of local capillary and lead consequently to the formation and retention of lymph (Senger, 2005).

Mucus discharge, opening and closing of the cervix

The change of mucus elasticity, colour and quantity during the œstrus cycle is consistent with the data available in cattle (Fischer *et al.* 2008), sheep (Adam and Aizinbud, 1981; Abdel Rahim and Nazir, 1987; Obounou, 1990; Ngoula *et al.* 2008) and goat (Rezac and Krivaneck, 2001). The increase of mucus production during heat is important for copulation.

Physical and biochemical properties of the mucus change with the progression of the sexual cycle: it is liquid during oestrus and become more viscous under the influence of progesterone through diœstrus (Senger, 2005). This explains the change in mucus elasticity, together with the opening / closing of the cervix.

Behavioural changes

Running towards the male, heterosexual and homosexual mounting, increasing micturition and rapid tail movements are among the behaviours commonly exhibited by goats during heat (Adam and Aizinbud, 1981; Mtaallah and Ben Younes, 2001; Zarrouk *et al.* 2001). It appears from the present study that the waggling of the tail is one of the most indicative signs of œstrus in the West African Dwarf goats, as it was present in more than 90% of females in heat.

Duration of oestrus

The duration of œstrus recorded in the present study is within limits (24-48 hours) reported for other goat breeds in general (Zarrouk *et al.* 2001).

It was longer than in certain breeds of tropical latitudes (Tamboura *et al.* 1998; Hafez and Hafez, 2000; Jansen and Van Der Burg, 2004), as well as Japanese and English breeds (Fabre-Nys, 2000).

This difference may be attributed certainly to the breed, but also to the structure of the herd and the age of females (Ball and Peters, 2004).

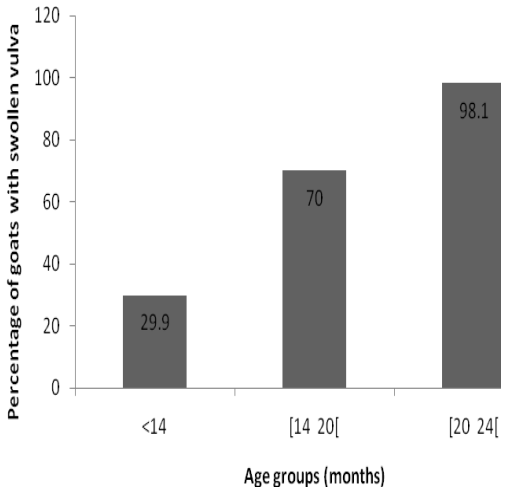

Figure 1 Influence of age on percentage of goats with swollen vulva during heat

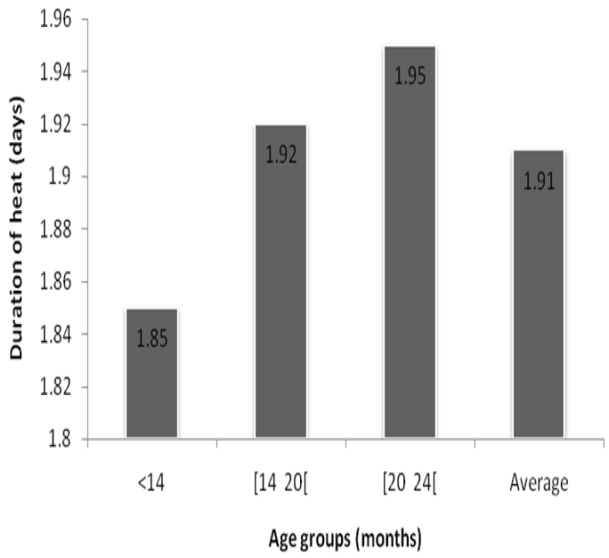

Figure 2 Influence of age on duration of heat in West African Dwarf goat

The observed differences between breeds could also be due to the method used for timing: in fact in the present study, the duration of œstrus has been considered as the time elapsing while the female is standing to be mounted. However, according to Senger (2005), the acceptation of male is considered only at the peak of œstrus behaviour. A mammalian female coming in heat is not immediately receptive, and behaviours other than acceptation of male are not evident proofs of heat.

CONCLUSION

Signs and duration of heat in the West African Dwarf goat are similar to those found in other breeds of goat. The principal manifestations in this study were swelling and reddening of the vulva, increased mucus production, opening / closing of the cervix, waggling of the tail, mounting male / female, acceptance of male, and increased frequency of micturition. The œstrus was less exhibited in younger than in older female.

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