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## SUPERNUMERARY TEATS IN KALAHARI RED GOATS IN THE HUMID TROPICS

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### ABSTRACT

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Supernumerary teats (SNT) are additional to the usual number of teats found on a cow (four), goat or sheep (two). Information has been provided on the occurrence of teat abnormalities in the indigenous goat breeds in Nigeria but there remains a dearth of information on the incidence of teat abnormalities in the Kalahari red goats (KRG). Fifty two female lactating KRG aged between 2-5 years were classified on the basis of the number of SNT by visual appraisal. Data was analyzed using descriptive statistics and independent sample T-test. 76.1% of the population possesses SNT, 10.9% had one, 43.5% had two, 10.9% had three while 10.9% had four SNT. 60% of the population of KRG with SNT had none of such teats functional/patent. 11.4% had one patent SNT, 25.7% had two patent SNT, 2.9% had four patent SNT. The location of the SNT in relation to the primary teat reveals that 86.3% of the SNT are cranial, 1.3% of the SNT are caudal, 10.0% of the SNT are medial while 2.5% of the SNT are lateral. 74.36% of KRG studied had symmetrical udders while 25.45% had asymmetrical udder. The study concluded that possible reproductive implications of high percentage of SNT in KRG may include neonatal death of kids especially in multiple births and higher risk of mastitis in does. Reproductive Veterinarians and breeders should watch out for goats with SNT when carrying out breeding soundness examination.

**Contribution/Originality:** This study is one of the few studies which have investigated the occurrence of Supernumerary teats in the Kalahari red goats with its reproductive implications. The study also provides one of the earliest reports of Supernumerary teats that are positioned lateral and medial to the primary teat in the goat.

## 1. INTRODUCTION

Supernumerary teat (SNT) have been described as teats that are additional to the usual number of teats found on a cow (four), goat (two), or sheep (two). Such SNT's can most of the times be non-functional and rudimentary although sometimes they may produce milk [1]. SNT's that have no duct connecting them to the main gland cistern are usually non-functional irrespective of their sizes while SNT's that are functional may be connected to small gland or the main gland cistern thereby possessing the ability to produce milk. The primary teat is a functional teat properly connected to the gland cistern with external orifice. It is usually larger and easily distinguishable from the SNT. Presence of supernumerary teat also known as Hypertelia, is a common teat abnormality in certain species of livestock which has been reported to have detrimental effects on milking functionality especially with the milking machine. It reduces the machine milking efficiency thereby increasing

milking time and potential injury to the teat. Such injury can be sources of infection and can predispose the animal to mastitis [2]. SNT has been reported as a congenital condition resulting from combination of some recessive homozygous genes [3]. Presence of SNT may not affect milk yield and kids suckling [4] except when SNT's are large in size and non-functional where it potent a danger of emaciation and death to kids that holds on to such teats for suckling. Frequency of SNT varies between species, breeds and geographical location.

Seventeen percent (17%) of animals out of 398 Turkish Saanen goats from the same herd were discovered to have SNT [5]. 1.65% of the population of goats examined in Bihar, Indian were found to possess SNT among other udder abnormality [6]. Several studies have reported the presence of SNT as a major udder abnormality in both WAD and RS goat [7, 8] which are our indigenous breeds in Nigeria. Ozoje [8] also reported the occurrence of SNT in 44% of the population of goat he studied. In a survey of 589 WAD goats, Bemji and Popoola [9] reported an incidence of 7.3% of SNT. The result of Oseni, et al. [10] revealed that 64.3% of goats in the southern part of Nigeria possess extra teat. Adebayo and Chineke [11] in a similar work discovered the presence of extra teat in 5% of goats sampled in the South Western part of Nigeria. The Kalahari red goat is a newly introduced breed of goat into Nigeria few years ago with certain unique features such as ability to adapt easily to the arid and semi-arid savannah, high-quality foraging tendency and excellent mothering aptitude [12] consequently it is popularly known as a "minimum care/maximum profit" breed [13]. The Kalahari red goat has been found to have coat colours similar to the indigenous red sokoto goats but tending more towards the reddish brown colour. This breed is being kept for both meat and milk purposes. Baseline information has been provided on the occurrence of teat abnormalities in the indigenous breeds of goat (West African Dwarf and Red Sokoto) in Nigeria over the years.

However there is dearth of information on the incidence of teat abnormalities in the Kalahari red goats following its introduction into South Western Nigeria. This study was therefore designed to evaluate the frequency of occurrence of some teat abnormalities in the Kalahari red goat adapted to South Western Nigeria and the possible reproductive implication.

## 2. MATERIALS AND METHODS

### 2.1. Experimental Location

The study was carried out at the Kalahari red goat unit domiciled in the Institute of Food Security, Environmental Resources and Agricultural Research of the Federal University of Agriculture Abeokuta. Abeokuta, capital city of Ogun State in South-west Nigeria is situated at Longitude 7°09'39" N and latitude 3°20'54"W and it is 76m above sea level. It falls within the rainforest vegetation zone of south-western Nigeria [14]. It has a relative humidity averaged of 82%; mean annual precipitation of 1037mm, and a mean annual temperature of 33.7°C, [14].

Experimental Animals and management: Fifty two female lactating Kalahari Red goats were randomly sampled. The goats were reared semi-intensively. They were housed from the evening to early morning in the goat pens and were allowed to graze for about six hours daily on pasture paddocks sown with *Chloris gayana* and *Stylosanthes hammata*. Supplementary concentrate was made available for the animals in the morning offered at 4% body weight dry matter while fresh water was provided ad-libitum.

### 2.2. Data Collection and Analysis

The goats were classified on the basis of the number of SNT (0, 1, 2, 3, and 4) by visual appraisal. Special notice was taken of the location of SNT to the primary teat, distance between SNT and the primary teat, length of SNT, percentage of fused teat and percentage of functional SNT. A teat was considered functional/potent if it oozes out milk when digital pressure is applied on the udder. The primary teat is always conspicuously bigger than the SNT and always connected to the gland cistern, hence always produces milk during lactation. Distance and length was determined using measuring tape. All parameters were taken with the animal being properly restrained with the hindquarters of the animal slightly raised up to allow for proper visual appraisal and accurate measurement of the

length and distance of each SNT. Data was analyzed using descriptive statistics and independent sample T-test. Results were presented in frequencies, percentages, mean and standard error as appropriate.

### 3. RESULTS

**Table-1. Occurrence of SNT and fused SNT in percentages.**

Occurrence of SNT	Yes	No
Presence of SNT %	76.1	23.9
Presence of fused SNT%	8.6	91.4

Table 1 shows the incidence of SNT and the incidence of fused SNT in the population studied. 76.1% of the population of Kalahari Red does possess supernumerary teats while only about 23.9% of the population does not possess SNT. About 8.6% of the SNT observed were fused.

**Table-2. Number of SNT per animal and number of patent SNT in percentages.**

Number	0	1	2	3	4
No. of SNT per animal (%)	23.9	10.9	43.5	10.9	10.9
No. of patent SNT (%)	60	11.4	25.7	0	2.9

Table 2 presents the number of SNT per animal in the population studied. 23.9% had no SNT, 10.9% had one, 43.5% had two, 10.9% had three while 10.9% had four SNT. 60% of the population of KRG with SNT had none of such teats functional/patent. 11.4% had one patent SNT, 25.7% had two patent SNT, 2.9% had four patent SNT.

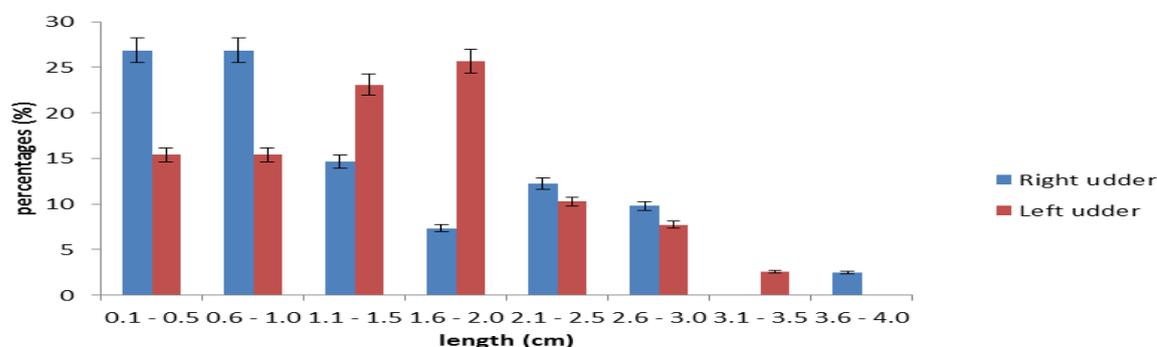
**Table-3. Occurrence of SNT in relation to either side of the animal's udder and udder symmetry in percentages.**

Position	Both side	Right	Left	Asymmetrical	Symmetry
SNT %	83.87	9.68	6.45	25.64	74.36

The occurrence of SNT in relation to either side of the animal's udder and udder Symmetry is presented in Table 3. 83.87% of the SNT observed were on both sides of the udder, 9.68% of the SNT were only on the right udder and 6.45% were only on the left udder. 74.36% of KRG studied had symmetrical udders while 25.45% had asymmetrical udder.

**Table-4. SNT Location in relation to the primary teat in percentages.**

Location	Percentages
Cranial	86.3
Caudal	1.3
Medial	10.0
Lateral	2.5



**Figure-1. Length of SNT on each side of the udder presented in percentages.**

The location of SNT in relation to the primary teat is presented in Table 4. 86.3% of the SNT are cranial, 1.3% of the SNT are caudal, 10.0% of the SNT are medial while 2.5% of the SNT are lateral.

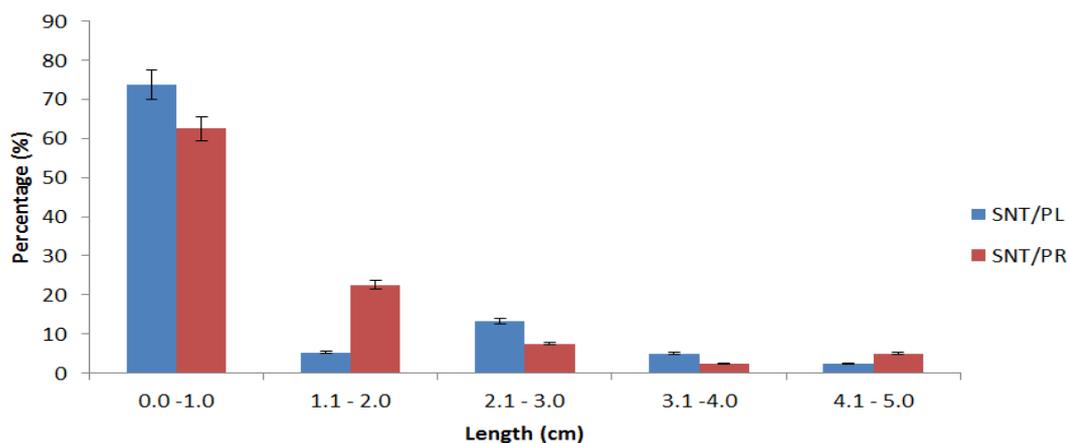


Figure-2. Distance between SNT and primary teat presented in percentages.



Figure-3. Right mastitic udder of a KRG with two SNT.

#### 4. DISCUSSIONS

23.9% of the population studied had normal two teats. This compares favorably with 18.2% previously reported in the KRG [15]. This difference in the occurrence of SNT might be due to the difference in the number of animals investigated. Furthermore, 76.1% of the KRG goat population studied had the presence of supernumerary teats. This incidence is higher compare to other breeds of goats such as 12% in Barbari goats [16] 1.65% in goats in India [6] 0.00% in WAD and Yankasa breed of sheep in southern part of Nigeria [17].

17% in WAD goats in Raheem and Leigh [18] 5% in WAD goats in south western Nigeria (11), 7.3% in WAD in south western Nigeria [9] 30% in WAD goats in Ghana [19] and 11% reported in Red Sokoto goat in Kano, Northern Nigeria [10]. This high incidence of SNT observed in the KRG may be due to breed specification and possible genetic involvement.

The occurrence of fused teat is also known as synthelia. Fused teat may also be called bifid teat or fork teat or bifurcal teat. Fused teats are usually found to split for a short distance near the tip while the remaining parts shares the same shaft which may sometimes be wider than normal. Occasionally a flap of skin is left in the teat canal thereby allowing milk to ooze out of two different orifices [20]. 8.6% of the SNT observed in this study were fused, this similar to the report of Raheem and Leigh [18] in which one out of the eighteen animals studied had a fork teat. Generally occurrence of fused teats is not a predominant teat abnormality in the KRG. Kids usually find it very difficult to suckle from fused teats because they are usually close to each other and therefore too big for the kid to latch on properly. Authors suggest that the population of goats with fused teat may influence pre-weaning kid survival.

In addition, the present study reveals that 10.9% had one SNT, 43.5% had two, 10.9% had three while 10.9% had four SNT. These values are higher compared to the values in the WAD goats which had 5.43%, 1.19% and 0.68% of one, two and four SNT respectively [9]. The values are however similar to previous reports in Kalahari in Nigeria [15]. Occurrence of two extra teats was found to have the highest incidence (43.5%) in this present study. This is similar but slightly lower to previous reports in KRG in which 57.6% of the animals with SNT had two extra teats [15]. The study reports the presence of 6 teats in 10.9% of the population of animals with SNT. This is one of the earliest reports of presence of 4 SNT in the Kalahari red goat.

25.7% of the population with extra teats had two patent/functional SNT. This is lower than the 100% functional two extra teats reported in Sirohi breed in India [21] and lower than 36% functional SNT in cattle [22].

The 100% functional SNT in the Sirohi goats may be due to the fact that the teats were almost as long as the primary teats in which case in the Kalahari goats, the extra teats had varying lengths (0.1 – 4.0cm).

Moreover, percentage of individual animal with symmetrical udder in this study (74.36) is slightly lower than reports of Bemji, et al. [15] on Kalahari red goats (87.4%). On the contrary, the percentage of does with asymmetrical udder was higher (25.64) than previous reports in WAD 4.92% (9), 5.7% [7]. This higher percentage of asymmetrical udder may be influenced by the high occurrence of SNT in the KRG. The predominant location of SNT in the KRG is cranial to the primary teat. This is similar to previous reports in WAD [18, 19]. There were also 1.3% of SNT caudal to the primary/main teat. However, the occurrences of SNT lateral (2.5%) and medial (10%) to the primary teats seem to be a peculiar trait in the KRG. The length of the SNT in this study varies between 0.1cm and 4.0cm. This is higher than earlier values in WAD in which the length of SNT observed varied between 0.2cm and 1.6cm [18]. Evidently 0.1cm -2.0cm constitutes the major length of the SNT in KRG observed in this study as about 75.61% and 79.48% of extra teats on both right and left udder respectively falls within this range of length. 26.8% and 26.8% of the population studied had SNT on the right udder with length varying from 0.1cm to 0.5cm and 0.6cm to 1.0cm respectively Figure 1.

The longest SNT which was about 3.5-4.0 cm was found on the right udder with 2.44% of the population possessing such a long SNT Figure 1.

The distance between the SNT and primary teat in this study varies on both sides of the udder. This result is at variance with the report of Raheem and Leigh [18] in which the distance between the SNT on both sides of the udder was equidistant to the primary teat. The reason for the wide variation (0-5cm) in the distance between the primary teat and SNT in the KRG Figure 2 may not be well understood, the authors suggest that it may be due to certain inherent traits and gene expressions peculiar to the Kalahari Red goat. 73.7% on the left and 62.5% on the right has the distance between the primary teat and SNT to fall in the range of 0-1cm length. This reflects that predominantly in the KRG, the primary teat and the SNT may be less than or equal to 1cm apart Figure 2.

#### 4.1. Reproductive Implications of Supernumerary Teats

1. If new born attach to non-functional teats, they will be unable to access colostrums through which passive immunity should be transferred to the kid thereby making the kid susceptible to diseases which may lead to neonatal death.
2. Continuous attempts by kids to suckle from non-functional teats may result to death, since the kids will not have access to milk. This is more likely to occur in cases of multiple births (twinning and triplets).
3. Occurrence of SNT usually predisposes such animal to ascending infections through the external orifice of the extra teat thereby resulting into udder affections such as mastitis Figure 3. Mastitis will usually affect either one or the two side of the udder such that milk from that side of the udder is unfit for kid consumption. When kids are not having adequate milk daily, it can make them vulnerable to other opportunistic infection and ultimately death of the kid. The cost of treatment and control of mastitis will result into economic loss for the farmer.

4. Since the occurrence of SNT has been linked with some recessive homozygous genes that can be passed down from one generation to another, reproductive veterinarians and breeders should watch out for goats with SNT when carrying out breeding soundness examination. Such animals should be screened out and not to be selected for breeding purposes.

#### 4.2. Suggested Interventions

1. Early diagnosis of this congenital abnormality is important for prompt interventions. Diagnosis is best carried out by routine examination of the animal starting from three [3] to four [4] months of life.
2. Surgical removal of SNT can best be carried out at about 4 months of life, at which time its connectivity with the gland cistern is not necessarily considered [2]. Surgical excision at later age especially post pubertal or after lactation potent a more complex procedure.
3. However, SNTs can be of advantage when there is damage to the primary teat structure, thereby requiring a teat grafting. A SNT can therefore be used to replace the primary teat [23].

### 5. CONCLUSION

Occurrence of SNT constitutes a major teat abnormality in the Kalahari red goat. Prevalence of hyperthelia in the KRG should be considered as a marker when seeking for milk improvement breeds.

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