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The Effect of Sex, Birthweight and Type of Birth on Neonatal Behaviour of Djallonké Sheep and West African Dwarf Goats

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Abstract: Observations were made on the neonatal behaviour of 127 Djallonké lambs and eighty-seven 87 West African dwarf kids during the first two hours of life. The effects of sex, birthweight and type of birth of the lamb and kid on these behavioural characteristics were analysed using a two-tailed-test. The results of the study on Djallonké lambs revealed that, the newborn lambs took a mean time of 24 minutes to stand up and 35 minutes to successfully suck milk for the first time. The sex of lambs did not influence either the time it took to stand up or to successfully suck milk. Single born and high birthweight lambs stood up and also sucked earlier than twin born and low birth weight lambs. The results of the study on goats showed that kids took a mean time of 14 minutes to stand up and 29 minutes to successfully suck milk for the first time. Though sex did not influence the time kids took to stand up for the first time, high birth weight and single born kids sucked earlier than low birthweight and twin born kids. It was concluded that sex, unlike type of birth or birthweight did not affect the times neonates took to stand up and successfully suck milk for the first time in both species.

Key words: Lambs · Kids · Suck · Stand · Colostrum · Vigour

INTRODUCTION

Many variables have been found to influence lamb survival. Extensive studies have determined the relative importance of sex of lamb, age of dam, genotype of sire and dam, birth weight [1] and maternal and lamb behaviour [2] on lamb survival. In goats both intensively and extensively managed, neonatal mortality may exceed 25% [3]. To survive, the newborn lamb or kid must quickly approach its mother and gain access to a teat. Early suckling not only provides the neonate with food, but also ensures that it obtains maternal immunoglobulins through the milk to protect it against environmental antigens. How soon the neonate stands up after birth could be viewed as a measure of how strong or weak the neonate is [4] and for that matter the level of its vigour.

Studies have shown that, mother-young behaviour during the early post-partum period affects the early survival of the neonate. For instance, the first suckling drive is not related to hunger but a reflex, which slowly subsides [5]. In lambs this suckling drive reaches a peak 2 to 3 h after birth [5]. If contact is not made by this time, sucking becomes difficult to establish and such lambs may die from starvation [4].

Several factors have been shown to affect neonatal behaviour and these include; age of the dam, birth weight of the lamb, sex of the lamb and maternal behaviour. One area of sheep and goat production and indeed in livestock that has not received much attention in Sub-Saharan Africa is early neonatal behaviour of tropical breeds of sheep and goats and the factors that affect them.

The objective of this work therefore was to study the neonatal behaviour of Djallonké lambs and West dwarf kids as affected by birth weight, sex and type of birth of the neonate.

MATERIALS AND METHODS

Experimental Sites and Systems of Management: The study on sheep was conducted at the Ghana National Livestock Breeding Station, at Pong-Tamale in the Northern Region of Ghana (Latitude 9°69' N and

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longitude 0° 83' w), while that on goats was conducted at the Ghana National Goat Breeding Station, at Kintampo in the Brong Ahafo Region of Ghana (Latitude 7° 40' N and longitude 1°05' W). Both stations belong to the Animal Production Directorate of the Ministry of Food and Agriculture (Ghana). The management practices at both breeding stations are similar. Each of the farms has several paddocks ranging in size from 1.2 to 2.5 hectares. The different flocks on each farm are rotated on these paddocks containing grass forages such as *Cynodon nlemfuensis* and *Panicum maximum* mixed with *Stylosanthes hamata* and *Centrosema pubescens*. Two weeks prior to mating animals are flushed (i.e. given extra ration). Ewes or does near term are sent to the holding pen and kept under constant supervision. After parturition neonates are normally allowed to stay with their dams for at least 4 hours before they are weighed, sexed and ear-tagged. This period of non-interference is necessary to allow sufficient time for dams and their offspring to develop mutual recognition before human interference at tagging.

Study Animals

Sheep: The Djallonke breed of sheep was used for the study. A total of 127 lambs comprising 83 singles and 44 twins were studied. Sixty-one of the lambs' studied were females while the remaining 66 were males. The newborn lambs were sexed, ear-tagged and weighed. Lambs were grouped into high body weight (= 2.2 kg) and low body weight (< 2.2 kg) based on the mean birth weight for Djallonke lambs, which is about 2.2 kg [6]. Eighty of the lambs were categorized as low weight class while only 47 fell in the high weight class.

Goats: The West African dwarf breed of goat was used for the study. Eighty-seven kids comprising 51 singles and 36 twins were studied. Forty-five of the kids were females while 42 were males. The newborn kids were sexed, ear-tagged and weighed and based on the mean birth weight of West African dwarf kids, which is about 1.2 kg [7], were classified as either low body weight (= 1.2 kg) or high body weight (> 1.2 kg). Twenty-three of the kids observed fell into the low weight class and 64 in the high weight class.

Experimental Procedure

Early Behaviour of Lambs and Kids: Lambs and kids were observed continuously for the first 2 hours of life and the following neonatal behavioural parameters recorded:

- Time taken for lambs and kids to stand up: The exact time, post-partum, for a newly born lamb or kid to stand up on its four legs.
- Time taken for lambs and kids to suck for the first time: The exact time, post-partum, for a newly born lamb or kid to make a first successful suck.

Other Parameters Recorded

Sex, Birth Weight and Type of Birth of Neonate: The sex of the neonate was recorded and neonates were grouped into males and females. Birth weight was also recorded and neonates were classified as in the above. Neonates were also classified into singles and twins.

Statistical Analysis: The t-test (2-tailes) of Lawes Agricultural Trust [8] statistical package was used to ascertain the effects of sex, birth weight and type of birth of the neonate on the aforementioned neonatal behavioural parameters. All comparisons were done at 5% level.

RESULTS

Neonatal Behaviour in Djallonké Lambs During the First 2 Hours of Life: The times taken for Djallonke lambs to successfully stand up and suck milk for the first time are shown in Figures 1 and 2 respectively. The times taken by newborn Djallonké lambs to stand up ranged from 4 to 79 minutes and averaged 24.01±3.00 minutes. The results showed that within the first 30 minutes of life, majority (75.7%) of the lambs had stood up and by the 80th minute post-partum all of them had stood up.

Newborn lambs made their first successful suck within a range of 5 to 105 minutes. The mean time of first successful sucking was 35.35±3.24 minutes. Most (90.5%) of the lambs made their first successful suck within the first 1 hour of birth and by 2 h post-partum all of them had successes in sucking milk for the first time.

Sex of lambs did not significantly affect the times that they took to stand up and to start sucking. Even though males generally took a longer time to stand up and start sucking than females, the differences between the two sexes were not statistically significant (Table 1).

Lambs with high birth weights stood up and sucked earlier (17.91 minutes and 30.79 minutes, respectively) than those with low birth weights (27.70 minutes and 38.04 minutes respectively; Table 1).

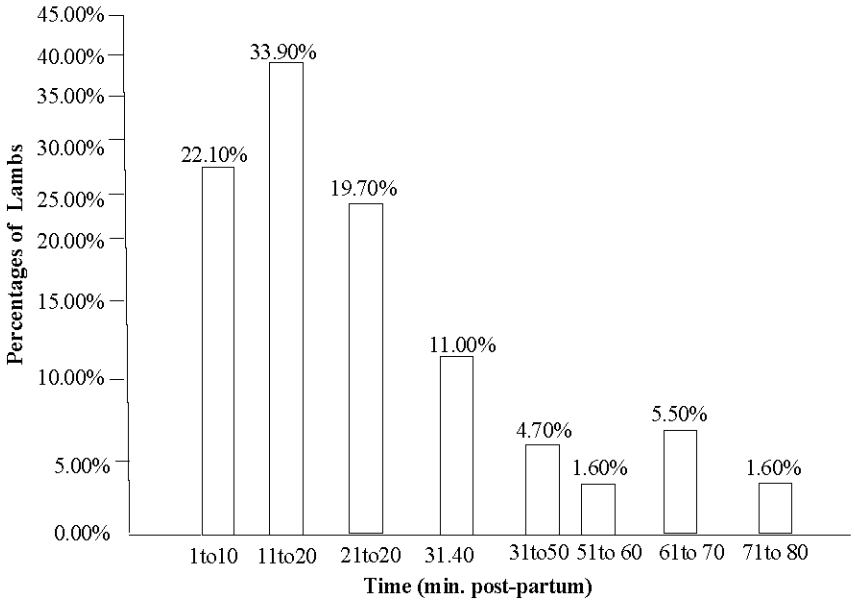

Fig. 1: Times taken for newborn Djallonke lambs to successfully stand up

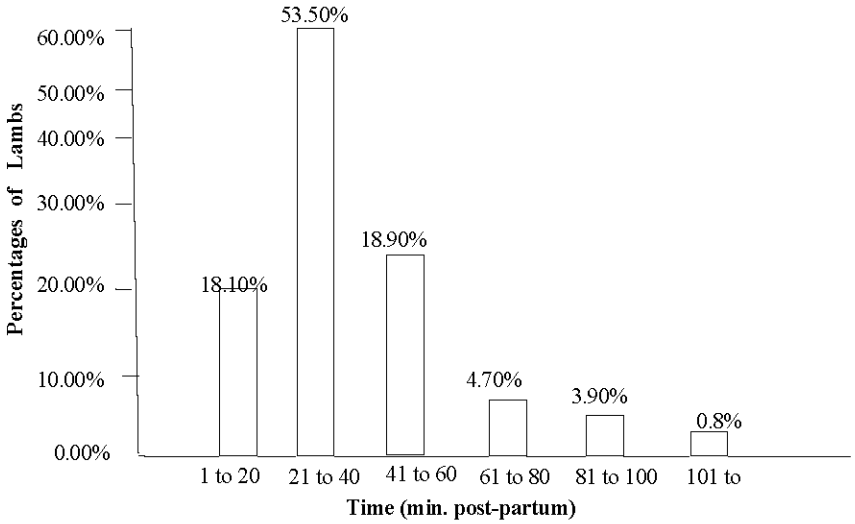

Fig. 2: Times taken by newborn Djallonke lambs to successfully suck milk for the first time

Neonatal Behaviour in West African Dwarf Kids During the First 2 Hours of Life: It took newborn West African dwarf kids a range of 5 to 34 minutes to stand up. The mean time of standing after birth was 14.03±1.37 minutes. Within the first 20 minutes of birth, majority (84.1%) of the kids had stood up and by the 40th minute post-partum all of them had stood up (Fig. 3). The time taken for new born kids to successful suck milk ranged from 7 to 72 minutes with a mean time of 28.66±3. 14 minutes. Within the first 30 minutes of birth 66.6% of the kids had sucked and by the 80th minutes of life all of them had successfully sucked (Fig. 4).

Sex of kids did not significantly affect the times that they took to stand up and to start sucking. Males generally took a longer time to stand up than females, but the difference between the two sexes was not statistically significant (Table 1).

The birth weight and type of birth of kids did not significantly influence the time it took for newborn kids to stand up. Kids with high birth weights however sucked earlier (26.27 minutes) than those with low birth weights (34.17 minutes). Similarly, single born kids sucked much earlier (25.22 minutes) than their twin born (33.53 min) counterparts (Table 1)

Table 1: The effects of sex, birth weight and type of birth on time (min. post-partum) taken for newborn Djallonké lambs and West African dwarf kids to stand up and start sucking

		SPECIES					
		LAMBS			KIDS		
Group of neonates		No.	Times of standing (min. post-partum)	Time of first Successful sucking (min. post-partum	No.	Time of standing (min. post-partum)	Time of first Successful sucking (min. post-partum)
SEX							
I.	Male	66	23.97±4.20[a]	36.29±4.62[a]	45	14.33 ±1.91[a]	28.40±4.60[a]
II.	Female	61	24.07±4.39[a]	34.34±4.81[a]	45	13.84±1.98[a]	28.89±4.45[a]
BIRTHWEIGHT							
(i)	Low	80	27.70 ±4.18[a]	38.04±4.66[a]	23	13.70±2.85[a]	34.17 ±6.97[a]
(ii)	High	47	17.91 ± 3.39[b]	30.79±3.94[b]	64	14.20±1.57[a]	26.67±3.45[b]
TYPE OF BIRTH							
(i)	Single	83	20.70 ± 3.39[a]	33.07±4.14[a]	51	14.43 ±1.84[a]	25.22±3.49[a]
(ii)	Twin	44	40.57± 5.55[b]	40.57 ±5.38[b]	36	13.56±2.10[a]	33.53 ±5.58[b]

Means having superscripts in common within a group and column are not significantly differently (P>0.05)

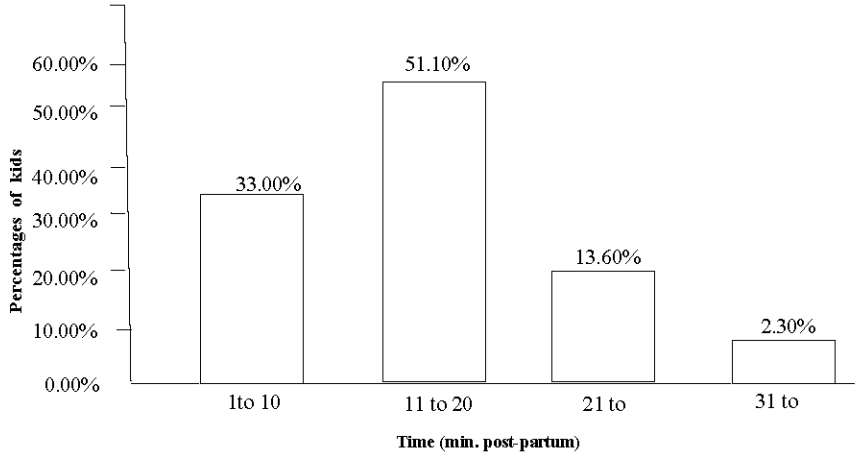

Fig. 3: Times taken by newborn West African dwarf kids to successfully stand up

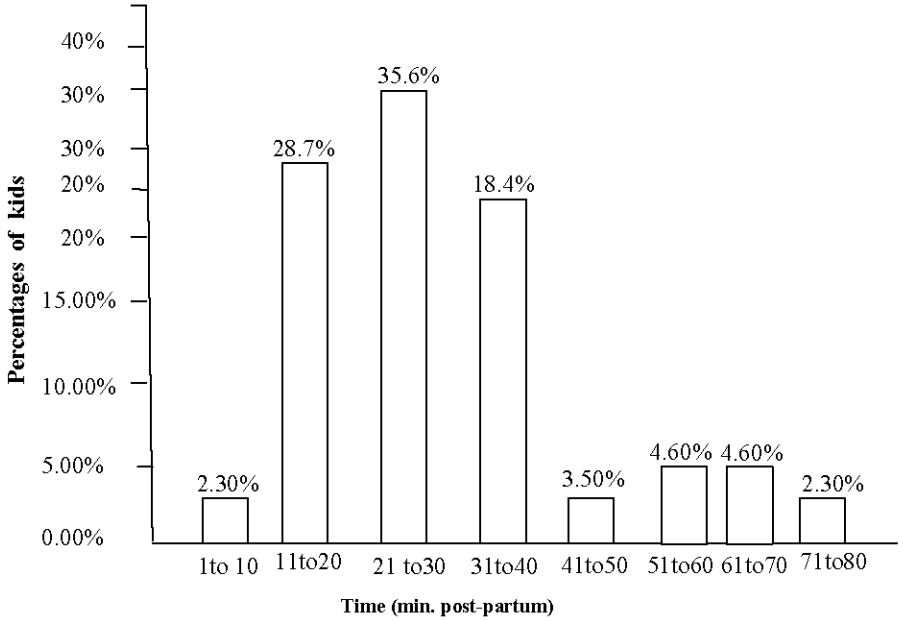

Fig. 4: Times taken by newborn West African dwarf kids to successfully suck milk for the first time

DISCUSSION

Results of this study showed clearly that within the first 30 minutes of life majority of the Djallonké lambs were able to stand up. This agrees with the findings of Arnold and Morgan [2], Slee *et al.* [9], Alexander *et al.* [10] and Frazer *et al.* [11] who reported that within the period of half hour following birth most Merino lambs were able to stand up. Majority of the West African dwarf kids studied stood up within the first 20 minutes of life. This is earlier than what was observed for lambs in the present study. The Djallonké lambs stood up within an average of 24 minutes following birth, which is similar to the 20 minutes and 23.8 minutes reported for Djallonké X Sahelian crossbred and Finn sheep lambs respectively, by Tuah *et al.* [4] and Atroshi and Osterberg [13]. Higher average times of 30 minutes and 38 minutes were recorded in Merino X Suffolk crossbred and California bighorn lambs respectively, by Arnold and Morgan [6] and Shackleton and Haywood [14]. The West African dwarf kids on the average stood up about 14 minutes following birth. This is similar to the 17 minutes reported by Lickliter [15] for Toggenburg kids. Allan *et al.* [16] however reported a slightly higher average of 20.6 minutes for Australian feral goats. These result support the fact that young ruminants are born highly precocial. The time that it takes for a lamb or kid to stand up can be affected by the behaviour of the dam. Grooming for instance May either stimulate the lamb/kid to stand or inhibit it from standing, depending on the part of the body groomed [17]. Grooming of the head promotes forward and upward head movement of the neonate and has a quietening effect; while grooming of the back and hind legs promote leg movement and may stimulate standing [17]. In a study on Merino sheep, Alexander *et al.*[12] observed that old primiparous ewes (5 years old) butted their lambs during the lambs initial attempts to stand and this prolonged the time it took for the lambs to stand up. In the present study, this behaviour was not observed in both ewes and does. This could be a reason why the kids and lambs observed stood up earlier.

The present results showed that most of the Djallonké lambs made their first successful suck within 1 hour post-partum. This is similar to the results of Arnold and Morgan [2] and Fraser and Broom [11] who reported that within 1 hour after birth, 60 to 80% of newborn lambs had begun to suck. Most of the West African dwarf kids made their first successful suck within a shorter time of 30 minutes following birth. On the average, it took lambs 35 minutes to make their first successful suck whilst on the average; it took kids 29 minutes to make their first successful suck. Tuah *et al.* [4] working with Djallonké X Sahelian crossbred lambs reported an average time of first successful suck of 33 minutes. These times are far shorter than the 90 minutes and 82 minutes recorded respectively for Merino X Suffolk crossbred and California bighorn lambs [2, 14]. The average time of first suck of 29 minutes recorded for West African dwarf kids in the present study is also shorter than the 49 minutes and 50 minutes recorded respectively for Toggenburg and Australian feral goats by Licklier [15] and Allan *et al.* [16]. This suggests that tropical breeds of sheep and goats may be more precocious than their temperate counterparts. In a study on Merino sheep, Alexander *et al.* [12] observed that during the early attempts of the lambs to reach the udder, 64% of young primiparas, 27% of multiparas and 39% of old primiparous ewes showed retreating or circling behaviour. This behaviour they observed was rarely seen after the lambs had suck for the first time. This non-cooperative behaviour during the initial suckling attempts of the neonate could also account for the longer times taken for Merino and other temperate breeds of sheep to successfully suck for the first time. The Djallonké ewes, Djallonke X Sahelian crossbred ewes and West African dwarf does appear to be more co-operative in helping their offspring to have their first suck.

Early suckling not only provides the neonate with food, but also ensures that it obtains maternal immunoglobulin (Ig) through the milk to protect it against environmental antigens. According to Robert and Ralph [18], the intestinal wall of the newborn ruminant is quite porous permitting the absorption of colostrum antibodies in to the blood stream. Within a period of 24 hour post-partum, the gut wall becomes less porous allowing little absorption of the antibodies to occur. Thus passive immunity of the new born is dependent on an adequate supply of antibodies in the colostrum and consuming the colostrum within a few hours post-partum. It could be deduced that the Djallonké lambs and West African dwarf kids used in the present study were able to obtain enough Ig, since they were all able to successfully suck within at most 2 hours after birth. The ability of the lamb/kid to stand as early as possible after birth and suck is therefore very crucial to its survival, since the earlier it starts sucking, the more the antibodies absorbed through the intestinal wall into the blood stream and the higher its chances of survival. If lamb/kid is not able to stand early enough by itself, it is imperative that it is assisted to do so, so as to increase its chances of survival.

In goats even though birth weight did not significantly affect the time it took for kids to stand up, heavier kids sucked earlier than lighter kids. In sheep, heavier lambs stood up earlier and also sucked earlier than lighter lambs. Similar results were obtained in the study of Tuah *et al.* [4]. A possible reason for these findings is that heavier lambs and kids have more vigour and are therefore able to stand up and suck earlier than their lighter and weaker counterparts. Vigour in lambs is often, though not always related to body weight [19].

The sex of neonates did not significantly influence the times it took for lambs and kids to stand up and successfully suck milk for the first time. In contrast, Tuah *et al.* [4] and Alexander *et al.* [12] reported that female lambs stood up and sucked earlier than male lambs but gave no reason for their observation.

In sheep, single born lambs stood up earlier and also sucked earlier than twin born lambs. In goats on the other hand, even though type of birth had no effect on the time taken for newborn kids to stand up, single born kids sucked earlier than their twin born counterparts. A shorter time is spent grooming twin born and since grooming facilitates standing [20], it is not surprising that the single born lambs stood up earlier than the twin born lambs. In general single born lambs are heavier than twins and this could also have given them more vigour to enable them stand up earlier than their lighter and weaker twin counterparts. A possible reason why twin born lambs and kids sucked later than their single born counterparts is that beside their low vigour levels they also have the tendency to obstruct each other in their respective attempts to suck, thereby prolonging the times of sucking by either of them.

In conclusion, the times taken by newborn Djallonké lambs to stand up and successfully suck averaged 24 and 35 minutes respectively, while the West African dwarf kids took an average of 14 and 28 minutes to stand up and suck respectively. Tropical breeds of sheep and goats generally appear to be more precocious than their temperate counterparts. There are no differences between males and females in times they took to stand up and successfully suck in both species. High birthweight and single born lambs however stood up and sucked earlier than low birthweight and twin born lambs. In goats, even though birthweight had no effect on time of standing by kids, high birthweight kids still sucked earlier than their low birthweight counterparts. Similarly, no influence of type of birth was observed on time of standing in kids, but single born kids sucked much earlier than twin born kids.

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