



International Journal of Veterinary Sciences and Animal Husbandry



ISSN: 2456-2912

NAAS Rating (2025): 4.61

VET 2025; 10(11): 16-18

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www.veterinarypaper.com

Received: 23-09-2025

Accepted: 24-10-2025

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Effect of birth type on body measurements and growth in Surti goat kids

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DOI: <https://www.doi.org/10.22271/veterinary.2025.v10.i11a.2691>

Abstract

The goat contributes 4% of the total milk and 16% of the total meat production in India. As Goat is called as poor man's cow because it provides milk, manure and protein source at low cost. Goat is gaining recognition in backyard industry because of less space necessities and better efficiency than cattles. The current study set out to investigate the goat's body weight as well as the biometry of the twin kid and singlet. 14 Surti goats were used in the data analysis, and the mean body weight values of the Surti kids on days 0, 7 and 15 did not differ significantly ($p>0.05$) between the twin and singlet groups (2.21 ± 0.10 vs. 2.07 ± 0.07). When twins were 60 days postpartum, their height at wither was significantly ($p<0.05$) higher (45.00 ± 0.48 vs 42.28 ± 0.89). According to the findings, the increased muscle and fat deposits in uniparous goats that give birth to singlets may be the reason why Surti goats that bear them have larger body weights.

Keywords: Surti Goat, body weight, biometry, singlet, twin, kid

1. Introduction

For farmers and landless workers who cannot care for one or two dairy animals, small ruminants like goats offer a valuable source of income. There were 148.88 million goats in the nation as of the 20th livestock census, a rise of 10.1% over the previous one. Goats are said to be incredibly adaptive creatures. Goats are regarded as the "poor man's cow" in India and the "wet nurse" of infants in Europe due to their low rearing costs and high-quality animal protein.

According to reports, small ruminants, such as sheep and goats, occupy a distinctive place among other domesticated animals raised by humans, not only because they provide meat to the growing population, particularly in rural areas, but also because they primarily support the home economy or peasant farmers in these areas (Akpa *et al.*, 2011) ^[1]. Body measures for weight estimate and the precision of body weights for size estimation. Growth is the total of the size increases of the various structural body parts as determined by linear body measures and weight gain (Al-Tarayrah and Tabbaa, 1999) ^[2]. The animal's weight is crucial for calculating a balanced diet, assessing growth and monitoring health. Body Length (BL), Chest Circumference (CG) And Height at Withers (HW) are the biometric measures that are frequently used to predict Body Weight (BW) in small ruminants (Banerjee and Jana, 2010) ^[3]. It is intended to critically analyse changes in body weight and biometric parameters for Surti goat singlets and twin kids in light of the necessity to address these researchable concerns holistically.

2. Materials and Methods

The current study was conducted at the livestock production management department. From a flock kept at Kamdhenu University's Livestock Research Station in Navsari, the experimental animals were taken. The geographical coordinates of Navsari are 20°57'0" north latitude and 72°54'0" east longitude, with an elevation of 11.89 meters above mean sea level. This region experiences humid to sub-humid weather. In the summer, the temperature can reach 40 °C, while in the winter, it drops to 10 °C.

The months of June through September see the most of the region's 2000 mm of annual precipitation. The seemingly healthy Surti goats were kept in a pucca shelter with a concrete floor and their diet followed the 2013 ICAR feeding guidelines. Following kidding and sorting the dams according to singlet and twin kid births of seven each, the study was conducted on fourteen Surti goats. At 0, 7, 15, 30, 45 and 60 days after giving birth, measurements of body weight and kid biometry have been taken. A measuring tape was used to take the biometry of the kids. Kids' length, height and heart circumference were measured. An electronic weight balancing equipment was used to measure the kids body weight.

3. Statistical Analysis

The t-test and DMRT were used to compare the means of the data in accordance with standard statistical methods (Snedecor and Cochran, 1994)^[4].

4. Results and Discussions

4.1 Kid body weight and biometric measurements

4.1.1 Kid body weight (kg)

Table 1 displays the outcomes of the body weight change. On days 0, 7, 15, 30, 45 and 60 after parturition, the average kid weight in the singlet-bearing group was 2.18 ± 0.15 , 2.64 ± 0.09 , 3.67 ± 0.42 , 3.78 ± 0.61 , 5.1 ± 0.51 and 5.74 ± 0.76 kg, respectively. On days 0, 7, 15, 30, 45 and 60 following parturition, the twin bearing group's mean kid body weight was 2.02 ± 0.02 , 2.62 ± 0.13 , 3.35 ± 0.08 , 2.64 ± 0.17 , 4.92 ± 0.30 and 7.58 ± 0.24 kg, respectively. There was no significant difference ($p > 0.05$) in Surti kid's mean body weight between the singlet and twin groups. The mean body weight values for the singlet and twin groups varied considerably between 0 and 60 days after parturition and between 0 and 15 and 45 days after parturition. At 0, 7 and 30 days after parturition, the average kid weight was comparable. On the other hand, the twin carrying group's mean values at 45 and 60 days after parturition were indistinguishable. The average kid weighs between 2.10 and 5.60 kg.

4.1.2 Heart girth of Kid (cm)

Table 1 shows the results of the Surti goats' kid's changes in heart girth. The average heart girth in the singlet-bearing group was 28.71 ± 0.52 , 30.28 ± 0.64 , 31.28 ± 0.64 , 34.28 ± 0.71 , 40.28 ± 0.71 and 39.28 ± 0.28 cm on days 0, 7, 15, 30, 45 and 60 following parturition, respectively. On 0, 7, 15, 30, 45 and 60 days right after parturition, the twin having group's mean heart girth assessments were 28.42 ± 0.57 , 31.85 ± 0.85 , 38.85 ± 0.85 , 35.42 ± 0.78 , 40.42 ± 0.78 and 41.42 ± 0.78 cm, respectively. Despite being higher on all test days except the 0 day, the mean heart girth values in Surti goat kid did not differ significantly ($p > 0.05$) between the singlet and twin groups. While comparing within group the mean values of heart girth of kids were similar on 0 and 7 day; 15 and 30 day; 45 and 60 day of parturition in both singlet and twin group. The range of the heart's girth is 28.64 to 40.28 cm.

4.1.3 Length of kid (cm)

The results of change in length of kid after kidding have been presented in Table-1. In singlet bearing group mean values of length of kids were 26.71 ± 1.14 , 31.0 ± 0.48 , 33.37 ± 0.64 , 37.42 ± 0.42 , 39.28 ± 0.68 and 41 ± 0.57 cm on 0, 7, 15, 30, 45 and 60 day after parturition respectively. The mean values Length of kids in Twin bearing group were 25.71 ± 1.47 , 31.85 ± 1.03 , 33.42 ± 0.29 , 36.14 ± 0.91 , 42.85 ± 0.63 and 43.14 ± 0.63 cm on 0

day, 7 day, 15 day, 30 day, 45 day and 60 day after parturition respectively. The mean values of length of kid in Surti doe did not differ significantly ($p > 0.05$) between singlet and twin group. While comparing within group the mean values of length of kid significantly differed on 0, 7, 15, 30 and 60 day of parturition in singlet and twin group. Similar mean values were recorded on 15 and 60 day of parturition in singlet group. However, in twin the mean values were similar on 7, 15, 45 and 60 day of parturition. Overall length of kid varies from 26.07 on 0 day to 42.07 cm on 60 days.

4.1.4 Height at wither of kid (cm)

Following kidding, change in height at wither has been shown in Table 1. In the Singlet group, the average height at wither was 30.0 ± 0.97 , 36.28 ± 0.97 , 36.28 ± 0.83 , 37.57 ± 0.71 , 41.85 ± 0.85 and 42.28 ± 0.89 cm on 0, 7, 15, 30, 45 and 60 days post parturition, respectively. After parturition, the twin group's average height at wither was 29.57 ± 1.06 , 34.00 ± 1.11 , 36.57 ± 0.75 , 38.42 ± 1.44 , 42.85 ± 0.63 and 45 ± 0.48 cm on days 0, 7, 15, 30, 45 and 60. In Surti, twin-bearing goats kid had considerably ($p > 0.05$) higher mean height at wither on day 60 of parturition than singlet-bearing goats kid.

When comparing within groups, there was a significant difference in the mean height at wither on 0, 7, 15 and 45 days after parturition for the singlet group and 0, 7, 30 and 45 days after parturition for the twin group. The singlet group's means were comparable on days 15, 30, 45 and 60 after parturition. In contrast, the twin group's mean values on days 0 and 7 of kidding were comparable. The range of overall height at wither is 29.64 to 43.64 cm.

The current study found that singlet kids weighed more than twins, though the difference was not statistically significant. Male kids weighed more than female kids and similar results were found in Sirohi (Banerjee and Jana, 2010)^[3], Jamunapari (Rawat and Singh, 2014)^[5] and Tellicherry (Thiruvankadan, 2009; Sundaram, 2012)^[6, 7] goats. Male sex hormones were thought to have an anabolic impact, which is why male kids had higher body weights (Hafez, 1962)^[8].

One possible explanation for the sexual dimorphism seen in this study is the typical differential hormonal action that causes male and female animals to grow at different rates. There have also been reports of sexual variations in Awassi lambs (Al-Tarayrah and Tabbaa, 1999)^[2]. However, there were no discernible sex-based differences in goat kid's body weight or dimensions, according to Thiruvankadan (2005)^[9] and Yakubu (2009)^[10]. Body weight seems to vary significantly between the sexes, which may not be unconnected to how the environment affects these factors.

It is possible that the higher correlation between body weight and chest girth was caused by the comparatively considerable weight contribution of the chest girth, which is made up of muscles, viscera and bones (Thiruvankadan, 2005)^[9]. Additionally, Kunene, *et al.* (2009)^[11] found that the main factor for precisely calculating the live body weight of Zulu young sheep with a milk dentition was heart girth. The significance of heart girth was further highlighted by Sowande and Sobola (2008)^[12], who found that in the fitted multiple linear regression models, heart girth, head length and hindquarter breadth accurately predicted the live weight of West African dwarf sheep.

5. Conclusion

According to this study, there were no statistically significant differences in body weight between singlet and twin Surti goat offspring at 0, 7, or 15 days of age. However, by 60 days

of age, there were noticeable differences in morphometric characteristics, especially with twins showing noticeably higher wither height. According to these results, birth type may not have a significant impact on postnatal weight right away, but it may have an impact on growth patterns and structural development over time. The slightly higher body

weight of singlet kids may be due to better food availability during pregnancy. In backyard goat farming systems, where goats continue to be a vital source of reasonably priced meat, milk and livelihood support, body biometry and body weight are helpful tools for assessing kids health, productive potential and selection criteria.

Table 1: Mean $\pm$ SE of Biometry of Surti goats kids during post-partum periods

Parameters	Groups	Days					
		0	7	15	30	45	60
Body weight (kg)	Singlet	2.18 $\pm$ 0.15 ^a	2.64 $\pm$ 0.09 ^{ab}	3.67 $\pm$ 0.42 ^{bc}	3.78 $\pm$ 0.61 ^{bc}	5.10 $\pm$ 0.51 ^{cd}	5.74 $\pm$ 0.76 ^d
	Twin	2.02 $\pm$ 0.02 ^a	2.62 $\pm$ 0.13 ^a	3.35 $\pm$ 0.08 ^b	3.64 $\pm$ 0.17 ^a	4.92 $\pm$ 0.30 ^c	5.58 $\pm$ 0.24 ^c
	Over all	2.10 $\pm$ 0.08	2.63 $\pm$ 0.07	3.51 $\pm$ 0.21	3.21 $\pm$ 0.34	5.00 $\pm$ 0.28	5.60 $\pm$ 0.41
Heart girth (cm)	Singlet	28.71 $\pm$ 0.52 ^a	30.28 $\pm$ 0.64 ^a	31.28 $\pm$ 0.64 ^b	34.28 $\pm$ 0.71 ^b	40.28 $\pm$ 0.71 ^c	39.28 $\pm$ 0.28 ^c
	Twin	28.42 $\pm$ 0.57 ^a	31.85 $\pm$ 0.85 ^a	38.85 $\pm$ 0.85 ^b	35.42 $\pm$ 0.78 ^b	40.42 $\pm$ 0.78 ^c	41.42 $\pm$ 0.78 ^c
	Over all	28.64 $\pm$ 0.35	31.07 $\pm$ 0.51	33.42 $\pm$ 0.49	34.85 $\pm$ 0.53	40.21 $\pm$ 0.44	40.28 $\pm$ 0.47
Length of kid (cm)	Singlet	26.71 $\pm$ 1.14 ^a	31.0 $\pm$ 0.48 ^b	33.37 $\pm$ 0.64 ^c	37.42 $\pm$ 0.42 ^d	39.28 $\pm$ 0.68 ^{de}	41.00 $\pm$ 0.57 ^e
	Twin	25.71 $\pm$ 1.47 ^a	31.85 $\pm$ 1.03 ^b	33.42 $\pm$ 0.29 ^b	36.14 $\pm$ 0.91	42.85 $\pm$ 0.63 ^d	43.14 $\pm$ 0.63 ^d
	Over all	26.07 $\pm$ 0.93	31.42 $\pm$ 0.56	33.5 $\pm$ 0.34 ^c	36.78 $\pm$ 0.51 ^c	40.35 $\pm$ 0.68	42.07 $\pm$ 0.50
Height at wither(cm)	Singlet	30.0 $\pm$ 0.97 ^a	36.28 $\pm$ 0.97 ^b	36.28 $\pm$ 0.83 ^c	37.57 $\pm$ 0.71 ^c	41.85 $\pm$ 0.85 ^d	42.28 $\pm$ 0.89 ^{d*}
	Twin	29.57 $\pm$ 1.06 ^a	34.00 $\pm$ 1.11 ^b	36.57 $\pm$ 0.75 ^b	38.42 $\pm$ 1.44 ^c	42.85 $\pm$ 0.63 ^d	45.00 $\pm$ 0.48 ^{d*}
	Over all	29.64 $\pm$ 0.73	33.28 $\pm$ 0.64	36.42 $\pm$ 0.54	38.00 $\pm$ 0.78	42.35 $\pm$ 0.68	43.64 $\pm$ 0.61

Mean bearing different superscript within same row differ significantly (abcd p <0.05)

Mean bearing * within same column significantly (* p <0.05)

6. Acknowledgement

In order to finish this work, the authors would like to express their gratitude to the Department of Livestock Production Management and the Livestock Research Station, College of Veterinary Science and Animal Husbandry, Kamdhenu University, Navsari, for their invaluable assistance and infrastructure.

Conflict of Interest

Not available

Financial Support

Not available

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How to Cite This Article

Gamit KC, Solanki TH, Thakre BJ, Gamit VV, Parmar MR. Effect of birth type on body measurements and growth in Surti goat kids. *International Journal of Veterinary Sciences and Animal Husbandry*. 2025;10(11):16-18.

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