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Factors affecting prolificacy and abnormal births in Sirohi goats

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Abstract
The study analyzed 2,162 kidding records of Sirohi goats from the Animal Genetics and Breeding Division of ICAR-CSWRI, Avikanagar. Its aim was to investigate how the year and season of kidding influence multiple births, litter size, and abnormal births. Overall, the average litter size was 1.06, with 6.14% of kids being twins and 1.34% being born with abnormalities such as abortions, stillbirths, and premature births. The year 2010 saw the highest incidence of multiple births (9.94%), while the lowest was observed in 2012 (2.00%). Additionally, the highest percentage of abnormal kiddings (4.08%) occurred in 2012, and there were no abnormal kiddings in the years 2005, 2008, and 2009.

Keywords: Sirohi goats, multiple birth, litter size, abnormal kidding

1. Introduction
Goats play a pivotal role in the rural economy of Rajasthan, and among the diverse goat breeds in the region, the Sirohi breed stands out as exceptionally well-suited for drought-prone areas. Sirohi goats are raised for both meat and milk production, and their distribution extends across various parts of Rajasthan.

Abnormal births, aside from their role in the flock's replacement rate and a goat's selective value, can significantly impact milk production and the reproductive efficiency of goats. Litter size holds immense importance in ensuring an efficient kid production system. It serves as a critical trait for the selection of goats, ultimately contributing to increased milk and meat production.

In particular, litter size appears to be a valuable criterion for enhancing meat production through genetic improvements. The litter size, occurrence of multiple births, and abnormal kidding in goats influence the availability of replacement females in a flock. All these traits collectively contribute to the genetic advancement and economic viability of the flock.

2. Material and Methods
This study made use of data from Sirohi goats maintained at ICAR-Central Sheep and Wool Research Institute, Avikanagar, spanning a 10-year period from 2003 to 2012. The feeding, housing, and management practices were consistent for all the goats. The recorded data focused on kidding performance, including the number of kids born, differentiating between singles and twins, as well as the type of kids born, distinguishing between normal and abnormal births. The data were organized based on the year and the season of birth. Each year was further categorized into two seasons: the first kidding season (January to June) and the second kidding season (July to December). The data regarding abnormal kidding were also categorized by single and twin births.

3. Results and Discussion
3.1 Litter size and Twin births
Out of a total of 2133 kiddings recorded during the period from 2003 to 2012, the incidence of twins in the entire flock was 6.14% (131 out of 2136) (Table I). Notably, only twin multiple births were observed in Sirohi Goats, and there were no cases of triplets or quadruplets, indicating the breed's relatively low prolificacy. These findings align with similar results observed in other goat breeds, such as Marwari (5 to 7%) (Mittal, 1987), Parbatsar (4.67%) (Mittal, 1987), Shekhawati (12.5%) (Mittal, 1987), and Sirohi (18.6%) (DeGroot *et al.*, 1992). As a result, these breeds are considered to be among the less prolific breeds.

Table 1: Litter size and multiple births in Sirohi goats

	Litter size	Single born	Twin born	Single born %	Twin born %	Total normal kidding	Total born
Season							
First	1.14	227	38	85.66	14.33	265	303
Second	1.05	1775	93	95.02	4.98	1868	1961
Year							
2003	1.03	94	3	96.91	3.09	97	100
2004	1.09	134	13	91.16	8.84	147	160
2005	1.08	196	18	91.59	8.41	214	232
2006	1.05	178	9	95.19	4.81	187	196
2007	1.06	196	13	93.78	6.22	209	222
2008	1.07	202	15	93.09	6.91	217	232
2009	1.07	201	14	93.49	6.51	215	229
2010	1.10	163	18	90.06	9.94	181	199
2011	1.07	247	20	92.51	7.49	267	287
2012	1.02	391	8	97.99	2	399	407
Over all	1.06	2002	131	93.86	6.14	2133	2264

Table 2: Abnormal kidding in Sirohi goats

	Normal kidding	Abnormal kidding	Normal kidding %	Abnormal kidding %	Total kidding
Season					
First	265	3	98.88	1.12	268
Second	1868	26	98.63	1.37	1894
Year					
2003	97	1	98.98	1.02	98
2004	147	3	98.00	2	150
2005	214	0	100.00	0	214
2006	187	1	99.47	0.53	188
2007	209	1	99.52	0.48	210
2008	217	0	100.00	0	217
2009	215	0	100.00	0	215
2010	181	5	97.31	2.69	186
2011	267	1	99.63	0.37	268
2012	399	17	95.91	4.08	416
Over all	2133	29	98.66	1.34	2162

The highest incidence of multiple births (twins) was observed in 2010, accounting for 9.94%, while the lowest occurred in 2012, at 2.00%. When considering the percentage of multiple births (twins) in different kidding seasons, it was found to be 14.33% in the 1st kidding season (January to June) and 4.98% in the 2nd kidding season (July to December) (Table 1).

Converting the data into litter size (the number of kids born per kidding), the average litter size was 1.06 kids per kidding. This figure falls within the range reported by Prakash and Singh (1986) [6] and Tomar *et al*. (1995) [7]. The highest litter size, 1.10, was recorded in 2010, while the lowest, 1.02, was observed in 2012. When considering the kidding season, the litter size was 1.14 in the 1st season (January to June) and 1.05 in the 2nd season (July to December) (Table 1).

3.2 Abnormal Kidding

Out of 2162 kiddings, 29 (1.34%) were considered abnormal due to factors such as aborted fetuses, stillbirths, and premature births (Table 2). This percentage is notably lower than the incidences reported by other researchers, which range from 5.6% to 7.7% in Beetal goats (Chawla *et al*., 1982 and Kanaujia *et al*., 1989) [1, 3], 2.1% to 11.3% in various goat breeds (Singh *et al*., 1987, Tomar *et al*., 1995) [8, 7], and 3.9% in Jhakrana goats (Kumar *et al*., 2001) [4].

The year 2012 exhibited the highest percentage of abnormal kidding, reaching 4.08%, while no abnormal kiddings were recorded in the years 2005, 2008, and 2009. Additionally, the percentage of abnormal kiddings in the 1st kidding season (January to June) was 1.12%, whereas it was 1.37% in the 2nd kidding season (July to December) (Table 2).

4. Conclusion

In conclusion, the study found that the overall litter size averaged 1.06, with 6.14% of kiddings resulting in twins, and 1.34% of kids born being classified as abnormal. The year 2010 had the highest incidence of multiple births at 9.94%, while the lowest was observed in 2012 at 2.00%. The year 2012 also had the highest percentage of abnormal kiddings at 4.08%, with no abnormal kiddings recorded in the years 2005, 2008, and 2009.

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