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## Mortality rates of Sirohi goats in semi-arid zone

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### Abstract

Analyzing data related to Sirohi goats, archived at ICAR-Central Sheep and Wool Research Institute, Avikanagar, over a span of 15 years from 2001 to 2015, was carried out to assess mortality rates. The investigation of mortality rates encompassed various age brackets, specifically pre-weaning (0-3 months), post-weaning (3-12 months), and adult mortality. The cumulative mortality rate for Sirohi goats was notably elevated in the first 3 months of age (5.69%) when compared to the 3-12 month (1.50%) and adult (2.11%) age groups.

**Keywords:** Sirohi goats, pre-weaning mortality, post weaning mortality, adult mortality

### 1. Introduction

Ensuring the sustainable management of livestock is crucial for preserving the health and productivity of domestic animal populations, especially in regions with environmental challenges, such as semi-arid zones. The Sirohi goat, celebrated for its adaptability and endurance, holds a significant position in supporting the livelihoods of communities residing in these areas. Nevertheless, the effectiveness of Sirohi goat production is inevitably shaped by a range of factors, and one notable aspect is the mortality rate. Mortality rate is defined as percentage of number of animal died in particular age group to the total number of animal present in the beginning of that group. Understanding age-wise mortality patterns is crucial in assessing the overall health and productivity of Sirohi goats in semi-arid regions. The mortality rates of Sirohi goats vary across different age groups, providing valuable insights into the breed's susceptibility to various factors at different life stages. This study focuses on examining age-wise mortality in Sirohi goats, aiming to establish a baseline understanding of the natural mortality trends within the breed. By categorizing mortality data into distinct age groups, this research seeks to contribute essential information for effective herd management and targeted interventions, ultimately enhancing the overall sustainability of Sirohi goat farming in semi-arid regions.

### 2. Material and Methods

The information utilized for this analysis originated from the livestock data repositories specifically dedicated to Sirohi goats. These repositories are meticulously maintained within the Animal Genetics and Breeding Division of ICAR-CSWRI in Avikanagar, Rajasthan. The research site is situated in the Malpura block of District Tonk in Rajasthan, India, positioned at 75°28' E Latitude and 26°17' N Longitude, with an altitude of 320 meters above mean sea level. The climate at the farm is characterized as semi-arid and sub-tropical, featuring significant temperature fluctuations ranging from a maximum of 48 °C to a minimum of 4 °C throughout the year. The annual recorded rainfall in the region amounts to 615.93 mm. Selective breeding techniques were applied, and controlled mating procedures were utilized for the female goats. Health oversight followed the institute's flock health calendar. Comprehensive documentation of day-to-day mortality records was diligently upheld. Mortality rates were calculated both concerning age categories and collectively for each year throughout the research period.

### 3. Results and Discussion

**3.1. Mortality rates:** Mortality rate is defined as percentage of number of animal died in particular age group to the total number of animal present in the beginning of that group.

Elevated mortality rates among young goats pose a significant economic challenge. The extent of kid mortality has risen in tandem with advancements in goat rearing. Nearly half of kid mortalities are attributed to diverse diseases (Lodh *et al.*, 1993) [6]. In addition to diseases, several factors, including age, birth weight, season, and litter size, play a role in influencing the occurrence of kid mortality. Mortality rates were examined across different age groups: pre-weaning (0-3 months), post-weaning (3-12 months) and adult mortality as follows.

### 3.1.1 Pre-weaning mortality (0-3 months)

The pre-weaning mortality rate for the entire Sirohi goat flock was determined to be 5.69% (Table 1). Elevated mortality rates during the first three months of life have been documented by Kumar *et al.* (2010) [5], Sharma *et al.* (2007) [10] in Sirohi field flocks. Kumar *et al.* (2010) [5] reported an overall mortality rate of 4.48% in a Sirohi goat field flock, while Snyman (2010) [11] observed a rate of 11.50% in Angora goats. Comparative findings show slightly higher mortality rates in studies by Mandal *et al.* (2005) [7] (6.6% in Muzaffarnagari sheep), Atashi *et al.* (2013) [2] (7.1% in Ghezel sheep), Mustafa *et al.* (2014) [8] (7.3% in Pak Karakul, 11.2% in Thali sheep, 14.2% in Kacchi sheep), Getachew *et al.* (2015) [3] (12.2% in Menz sheep), Abegaz *et al.* (2000) [1] (8.8% in Menz sheep), Soundarajan *et al.* (2014) [12] (27.89% in Madras red sheep), and Thiruvankadan *et al.* (2003) [14] (40.51% in Mecheri sheep).

The highest pre-weaning mortality among Sirohi goat kids occurred in the year 2004 (19.35%), while the lowest was recorded in the year 2013 (1.77%).

**Table 1:** Pre weaning mortality rates in Sirohi goats

Year	Total no. of animal	Mortality	Mortality%
2001	190	7	3.68
2002	228	8	3.51
2003	233	44	18.88
2004	217	42	19.35
2005	259	12	3.86
2006	228	6	2.63
2007	251	12	4.78
2008	278	20	7.19
2009	261	10	3.83
2010	247	8	3.24
2011	303	33	10.89
2012	293	16	5.46
2013	283	5	1.77
2014	289	7	2.42
2015	321	19	5.92
Overall	3881	221	5.69

### 3.1.2 Post-weaning mortality (3-12 months)

The data presented in Table 2 reveals that post-weaning mortality within the flock was 1.50% during the 3-12 months age range. These figures were notably lower compared to those documented by Sharma *et al.* (2004) [9] (7.4% in Malpura and 8.25% in Garole × Malpura), Taneja *et al.* (1991) [13] (14.59% in Magra sheep), Thiruvankadan *et al.* (2003) [14] (59.49% in Mecheri sheep), and Soundarajan

(2014) [12] (72.11% in Madras red sheep). A nearly equivalent mortality rate was reported by Mandal *et al.* (2005) [7] (6.0%) in Muzaffarnagari sheep.

The highest post-weaning mortality among Sirohi goat kids was recorded in the year 2012 (3.87%), while the lowest occurred in the year 2014 (0.00%) (Refer to Table 2).

**Table 2:** Post weaning mortality rates in Sirohi goats

Year	Total no. of animal	Mortality	Mortality%
2001	453	4	0.88
2002	532	4	0.75
2003	355	2	0.56
2004	354	2	0.56
2005	419	8	1.91
2006	529	5	0.95
2007	554	4	0.72
2008	55	8	1.44
2009	630	9	1.43
2010	562	17	3.02
2011	601	18	3.00
2012	594	23	3.87
2013	725	21	2.90
2014	697	0	0.00
2015	748	11	1.47
Overall	8308	125	1.50

### 3.1.3 Adult mortality

The mean mortality rate among adults was determined to be 2.11%. The highest mortality was noted in the year 2007 (5.05%), while the lowest occurred in the year 2006 (0.86%) (Refer to Table 3).

**Table 3:** Adult mortality rates in Sirohi goats

Year	Total no. of animal	Mortality	Mortality%
2001	364	11	3.02
2002	379	9	2.37
2003	368	6	1.63
2004	379	6	1.58
2005	329	7	2.13
2006	347	3	0.86
2007	396	20	5.05
2008	524	15	2.86
2009	575	15	2.61
2010	582	15	2.58
2011	569	22	3.87
2012	566	12	2.12
2013	629	13	2.07
2014	641	8	1.25
2015	654	10	1.53
Overall	7302	154	2.11

The cumulative mortality rate from 2001 to 2015 was calculated to be 2.85% (refer to Table 4). In a study by Kumar *et al.* (2016) [4], it was reported that the overall adult mortality in Sirohi goats was 2.56%. The highest mortality was noted in the year 2003 (5.44%), while the lowest occurred in the year 2014 (0.92%).

**Table 4:** Average mortality rate for all the years and age groups in Sirohi goats

Year	Total no. of animal	Mortality	Mortality%
2001	1007	22	2.18
2002	1139	21	1.84
2003	956	52	5.44
2004	950	50	5.26
2005	1007	25	2.48
2006	1104	14	1.27
2007	1201	36	3.00
2008	1357	43	3.17
2009	1466	34	2.32
2010	1391	40	2.88
2011	1473	73	4.96
2012	1453	51	3.51
2013	1637	39	2.38
2014	1627	15	0.92
2015	1723	40	2.32
Overall	19491	555	2.85

#### 4. Conclusion

In summarizing the findings, the pre-weaning mortality for the entire Sirohi goat flock was determined to be 5.69%. Notably, the highest pre-weaning mortality for Sirohi goat kids was recorded in the year 2004 at 19.35%, contrasting with the lowest observed in the year 2013 at 1.77%. Moving on to post-weaning stages, the average post-weaning mortality was identified at 1.50%. The highest post-weaning mortality for Sirohi goat kids was observed in the year 2012 at 3.87%, while the lowest was registered in the year 2014 at 0.00%. Turning our attention to adult mortality, the average was calculated to be 2.11%, with the highest recorded in the year 2007 at 5.05% and the lowest in the year 2006 at 0.86%.

Examining the cumulative trends from 2001 to 2015, the overall mortality rate was determined to be 2.85%. The highest cumulative mortality rate was observed in the year 2003 at 5.44%, in contrast to the lowest recorded in the year 2014 at 0.92%. These findings provide valuable insights into the mortality patterns of the Sirohi goat flock over the specified time frame.

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