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Effect of birth weight on survivability of Sirohi goat kids

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Abstract
The present study was conducted to investigate the effect of birth weight on survivability of Sirohi goat kids. Under this study data were collected from 370 records of Sirohi kids died out of 21,790 total available Sirohi kids up to age of 0-12 months, maintained at Livestock Research Station, Bojunda, Chittorgarh and field unit of AICRP goat improvement project at College of Veterinary and animal science, Navania, Vallabhnagar (Udaipur) during year 2015 to 2021. The results indicate that birth weight had significant effect on the survivability of kids at 3-6 months of age, whereas non-significant at 0-3 and 6-12 month of age.

Keywords: Survivability, Sirohi, kids, birth weight

Introduction
Animal husbandry is the foundation of social and economic status of the farmers as it provides additional and continuous source of income throughout the year and generate employment opportunities to unemployed youngsters and budding entrepreneurs. India is blessed with tremendous livestock wealth. Goat (*Capra hircus*) is one of the most important livestock species in India and it gives the maximum return with limited input. As per current livestock census (20th livestock census, 2019) [1] population of goat in India contributes around 27.80% (148.88 million) of the total livestock population. Sirohi goat is predominant breed of Rajasthan. It has established as an excellent goat breed in terms of growth, production performance and disease resistance adaptability. Kid mortality is major constrain for goat farming and kids are considered as a most delicate part of goat flock so, insurance of their survivability indicates the increment in production level as well as economic profit. If kid survive more, then more animal and their products will be available for marketing. Birth weight of kid is an important factor that affects the survivability of kids. As the birth weight of kids increases, the mortality rate will be reduced significantly (Chauhan *et al*., 2019; Husain *et al*., 1995; Deribe, *et al*., 2020) [2, 6, 3]. A 1-kg increase in kid birth weight reduces the probability of mortality by 32.5% (Yitagesu and Alemnew, 2022) [16].

Materials and Methods
Collection of data
Under this study data were collected from 370 records of Sirohi kids died out of 21,790 total available Sirohi kids from livestock research station, Bojunda, Chittorgarh and records of All India Coordinated Research Project (AICRP) of goat improvement at College of Veterinary and Animal Science, Navania, Vallabhnagar (Udaipur). The study area located in the western part of India and situated at 582 m above mean sea level (24°35" N and 73°43" E) characterized by semi-arid climatic conditions. Survivability of kids was studied at different age group *viz*. 0-3 months, 3-6 months and 6-12months of age. On the basis of birth weight, data were classified into four groups of kids such as 1,2,3 and 4 had birth weight 1000-1500 gm, 1501-2000 gm, 2001-2500 gm and >2500 gm, respectively.

Statistical model
To study the effect of birth weight on survivability of kids were estimated through least square mean and maximum likelihood method designed by Harvey (1990) [5]. The effect of birth weight on survivability of kid was calculated from the following statistical general linear model:

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$$Y_i = \mu + A_i + e_{ij}$$

Where: Y_i is Survivability of kid of born in i^{th} group of birth weight, μ is Overall Population mean, A_i is Effect of ith group of birth weight and e_{ij} is Residual error, NID $(0, \sigma^2)$.

Duncan's Multiple Range Test as modified by Kramer (1956) was used to make pair wise comparison among the least squares means.

Results and Discussion

The least-squares means of survivability at 0-3 months of age for group 1, 2, 3 and 4th were 97.91±1.611%, 93.91±1.139%, 96.47±0.752% and 96.29±0.677%, respectively as given in Table 1. Birth weight had non-significant ($p \geq 0.05$) effect on survivability of kids at 0-3 months of age. Similar results as effect of birth weight on survivability of kids were reported by Shrivastava et al. (2009) [13] in Alpine x Beetal (AB) and Saanen x Beetal (SB) kids from birth to 6 months of age. On contrary to this study, highly significant effect of birth weight on survivability of kids were observed by Hailu et al. (2006) [4] in Arsi-Bale and Borana kids, Singh et al. (2008) [11] in Jamunapari kids, Petros et al. (2014) [10] in goats, Muthukumar et al. (2016) [9] in Tellicherry kids. Whereas, significant effect of birth weight on survivability of kids at 0-3 months of age was observed by Miah et al. (2003) in Black Bengal kids, Snyman (2010) [12] in Angora goats during 0-4 month of age, Tesema et al. (2017) [14] in Boer x Central Highland goats, Toviesi et al. (2019) [15] in Kalahari Red goats.

The least-squares means of survivability at 3-6 months of age for group 1,2,3 and 4th were 97.50±4.661%, 82.00±4.661%, 85.86±2.749% and 90.50±1.943%, respectively as given in Table 1. Birth weight had significant ($p \leq 0.05$) effect on survivability of kids at 3-6 months of age. Similar results as effect of birth weight on survivability of kids were reported by Shrivastava et al. (2009) [13] in Alpine x Beetal (AB) and Saanen x Beetal (SB) kids from birth to 6 months of age. On contrary to this study, highly significant ($p \leq 0.01$) effect of birth weight on survivability of kids were observed by Tesema et al. (2017) [14] in Boer x Central Highland goats.

The least-squares means of survivability at 6-12 months of age for group 1,2,3 and 4th were 96.00±3.570%, 93.45±1.864%, 95.34±1.212% and 94.84±0.666%, respectively as given in Table 1. Birth weight had non-significant ($p \geq 0.05$) effect on survivability of kids at 6-12 months of age. Tesema et al. (2017) [14] reported highly significant ($p \leq 0.01$) effect of birth weight on survivability in Boer x Central Highland goats.

In Sirohi kids low energy reserves in low birthweight kids could not affect to harsh environmental conditions after kidding and sufficient availability of dams milk to kids fulfill the nutritional requirement of kids in early age might not be effect the survivability of kids.

In 3-6 months of age survivability was significantly affected by birth weight of kids. In this group there is no definite trend was observed. The variation in survivability might be due to number differences in number of animals available and and post-weaning stress might also be responsible for decrease birth weight resulted as higher mortality and lower survivability.

Table 1: Least-squares means and SE for Survivability of Sirohi goat kids at different age groups

Traits	Survivability (%)		
	0-3 months	3-6 months	6-12 months
Overall	96.15±0.554 (159)	88.96±1.850 (85)	94.91±1.064 (126)
Birth weight	NS	*	NS
1000-1500gm	97.91±1.611[a] (12)	97.50±4.661[b] (8)	96.00±3.570[a] (3)
1501-2000gm	93.91±1.139[a] (24)	82.00±4.661[a] (8)	93.45±1.864[a] (11)
2001-2500gm	96.47±0.752[a] (55)	85.86±2.749[a] (23)	95.34±1.212[a] (26)
>2500gm	96.29±0.677[a] (68)	90.50±1.943[ab] (46)	94.84±0.666[a] (86)

The number of observations are given in parentheses, estimates with different subscripts differ significantly. ** highly significant ($p \leq 0.01$), * significant ($p \leq 0.05$), NS = non-significant, SE = standard error

Conclusion

The present study has showed that Sirohi is hardy breed and well adapted in environment. The significant effect of birthweight on survivability at 3-6 month of age indicates that intensive care of youngones after weaning and proper guidelines for optimizing rearing practices are required to mitigate the effect of birthweight.

Acknowledgement

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