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OODS of survival of Marwari sheep lamb in arid region of India

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Abstract
An animal's health and welfare are enhanced by optimal young stock rearing, which also makes the herd more sustainable. Producers require knowledge into their kid's rearing outcomes, ideally based on key indications, in order to assess the rearing process. While mortality is thought to be a valuable metric for evaluating the general well-being and health of animals, less is known about its occurrence and the factors that affect it in the dairy industry. How and when producers record mortality after birth may present additional challenges to calculating the risks of kid mortality. The current study's findings indicate that by taking action to regulate environmental and animal-related factors, mortality losses may be reduced. Since the maximum birthweight has not yet been attained, there is still room to increase birthweight by improved nutrition for the mother, which will lower the infant death rate. The highest observed mortality rates were attributed to respiratory diseases (MTR-I=1.77%, MTR-II=7.29%), then blood diseases (MTR-I=0.85%, MTR-II=3.52%), other group diseases (MTR-I=0.41%, MTR-II=1.69%), digestive system diseases (MTR-I=0.85%, MTR-II=3.52%), and tetanus (MTR-I=0.32%, MTR-II=1.30%). Another way to reduce mortality would be to determine the dam's threshold weight at kidding in relation to child mortality. External validation can be carried out on separate datasets of Marwari sheep from different regions to ensure the model's generalizability.

Keywords: Marwari sheep, survival, young stock rearing

Introduction
Dairy farming is intrinsically tied to raising kids, as gestation is required not only to initiate breastfeeding but also to replenish the herd and enhance her pedigree. Since goat and sheep are seasonal breeders, farmers must deal with a brief period of time during which kidding and raising of newly born young stock take centre stage in farm operations. Because it is common in Dutch dairy goat husbandry to strive for longer breastfeeding, only a small portion of the herd typically gives birth, with the majority of babies delivered between January and May (Dijkstra *et al*., 2023) [1].

Rates of death and the variables influencing them the mortality rates resulting from distinct diseases were computed independently. The death rates of Marwari sheep were shown to be influenced by several factors, including sex, the year of the disease, and the season of birth.

The proportion of dead lambs to all lambs available and the percentage of dead lambs for a specific disease to all sick lambs were used to calculate the mortality rate in the current study.

Sharma (2006) [9] found that the total mortality rates for Marwari sheep were 3.58 percent for sucklings, 3.32 percent for weaners, 2.37 percent for hoggets, and 14.37 percent for adults.

Many studies examining the mortality have found that pre-weaning animals typically experience a higher rate of mortality than adults (Chouhan *et al*., 2019; Sharma *et al*., 2007; Kumar *et al*., 2010) [2, 3, 4]. Additionally, mortality during the weaning period may account for as much as 37% of the total mortality (Chouhan *et al*., 2019; Thiruvenkadan and Karunanithi, 2007) [2, 5].

Materials and Methods
Source of data
The Central Sheep and Wool Research Institute's Arid Region campus in Bikaner, together with the project "Improvement of Marwari sheep for carpet wool production through selection" are

the sources of the data used in this study.

Illustration of data
This investigation offers a summary of Marwari sheep statistics on mortality percentage and economic damage at various age groups of lambs from 2005 to 2014 (year of birth). Birth to 03 (suckling), 03 to 06 (weaning) were the various age categories.

Mortality rate
The lambs, both alive and dead, were sorted into age groups: 0-3. The post-mortem results were used to document and validate the potential cause of the lambs' deaths.

Body weight
Within twenty-four hours of lambing, the birth weights of both healthy and sick lambs were noted. Before the lambs had access to food or water, their weight was measured at three months of age (weaning), then again at six, nine, and twelve months of age in the morning. We used a dial platform balance with a 50 kg capacity that was accurate to within 0.05 kg up until weaning, and a 100 kg capacity that was accurate to within 0.10 kg after weaning.

Classification of data
The mortality rate data was categorised by birth season, disease sire year, and sex. The rates of illness and death by sire were also computed. The weather, feeding, housing, and differential management of males and females data were not collected at the farm, so they were excluded from the analysis.

Sex of lamb
For every condition under examination, the mortality rates for male and female lambs in the age categories of 0-3, 3-6, 6-12, and over twelve months were computed independently.

Season of birth
To investigate how variations in temperature, humidity, rainfall, and other meteorological factors affect mortality rates, the year was split into two seasons based on the month that lambs were born.

Table 1: Classification of data

S. No.	Season	Months of year
1.	First	January to June
2.	Second	July to December

Economic losses due to mortality
Economic losses due to mortality were calculated on the basis of live healthy animals as follows
ELBM = EVB [BH*ND]
ELWN = EVW [WH*ND]

Here,
ELBM/ELWM= the economic losses (in rupees) in body weight /'wool weight due to mortality.
BH/WH= the body weight /wool weight of diseased lambs.
ND= number of lambs died.
EVB/EVW= the economic value per kg body /wool weight expressed as market price of 1 kg of live/wool weight.

Results
This group's overall mortality rate was 3.73 percent. The pre-weaning period death rate was found to be greater in Narayan swami and Yadav's 1980 study (54.75%) than it was in Mukasa-Mugerwa *et al*.'s (2000) [7] study. According to Mauna (1994) [6], the average post-weaning mortality was 6% and 10%, respectively, while the pre-weaning mortality was higher in lambs than in goats. According to Segura *et al*. (1996) [8], the blackbelly and Pelibuey sheep breeds have lamb mortality rates till weaning of 23.8 and 15.1%, respectively.
The highest observed mortality rates were attributed to respiratory diseases (MTR-I=1.77%, MTR-II=7.29%), then blood diseases (MTR-I=0.85%, MTR-II=3.52%), other group diseases (MTR-I=0.41%, MTR-II=1.69%), digestive system diseases (MTR-I=0.85%, MTR-II=3.52%), and tetanus (MTR-I=0.32%, MTR-II=1.30%). Total number of sick in term of male and female was significantly different at MTR-1 and MTR-2.
Sheep are susceptible to a variety of illnesses, such as parasite infections, gastrointestinal problems, and respiratory infections. The frequency of these illnesses in a given area, the success of preventative efforts, and the promptness and quality of veterinary care can all have an impact on the death rate.

Table 2: Total number of sick in term of male and female was significantly different at MTR-1 and MTR-2

Classes	No. of animals		Blood			Digestive system			Reptile bite	
	TNA	TSA	ND	MTR-I%	MTR-II%	ND	MTR-I%	MTR-II%	ND	MTR-I%	MTR-II%
Total	3164	768	27	0.85	3.52	12	0.38	1.56	0	0.00	0.00
Sex	$\chi 2$			0.84	0.41		0.00	0.04			
Male	1594	407	16	1.00	3.93	6	0.38	1.47	0	0.00	0.00
Female	1570	361	11	0.70	3.05	6	0.38	1.66	0	0.00	0.00

Classes	No. of Animals		Respiratory System			Tetanus			Others		
	TNA	TSA	ND	MTR-I%	MTR-II%	ND	MTR-I%	MTR-II%	ND	MTR-I%	MTR-II%
Total	3164	768	56	1.77	7.29	10	0.32	1.30	13	0.41	1.69
Sex	$\chi 2$			1.01	0.36		0.37	0.19		6.07**	5.13*
Male	1594	407	32	2.01	7.86	6	0.38	1.47	11	0.69	2.70
Female	1570	361	24	1.53	6.65	4	0.25	1.11	2	0.13	0.55

Note: TNA= Total number of animals, TSA= Total number of sick, ND= Number of died animals, **= Highly Significant, *= Significant

Conclusion
The economic losses resulting from the morbidity and mortality of diseases of the respiratory system (pneumonia), the digestive system (I) (diarrhoea), the eye (conjunctivitis), the digestive system (II), the blood, and pyrexia were greater; therefore, regular deworming and prompt disease treatment were necessary to minimise losses. Conjunctivitis and foot rot were similarly associated with higher morbidity rates in the hogget and adult age groups, thus caution should be used while treating these conditions.

Declarations of Competing Interest: The authors declare that

they have no conflicts of interest associated with this publication.

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