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## Study of lower productivity in the suckling and weaner age group of Marwari sheep due to mortality (Weight losses)

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### Abstract

The assessment of financial damages resulting from disease in Marwari sheep in arid zones had been examined by the utilisation of data (relating to Marwari, 3164) obtained from CSWRI, ARC, Bikaner over a period of eight years (2004). Morbidity from the disorders mentioned was the subject of the study. The age groups under study were birth to three (suckling age) and three to six (weaning age). Here, the diseases listed at the Central Sheep and Wool Research Institute in Bikaner are categorised according to systemic diseases. It's important to note that mortality rates can be influenced by various factors, including nutrition, housing conditions, disease control, and the overall health management of the flock. Therefore, implementing effective management practices and investing in the health and well-being of the animals can help mitigate economic losses.

**Keywords:** Morbidity, economic, weaning

### Introduction

A number of variables, including bacterial infections, worm infestations, malnourishment, adverse the climate, and management practices, have been studied in relation to sheep mortality. thorough investigation on non-genetic variables affecting sheep mortality rates. There are vaccines for the viral infections that affect ovine, such as rinderpest, FMD, and sheep pox, which can shield small ruminants from harm. Two more viral diseases that result in a decrease in sheep production are blue tongue and PPR. In addition to hunger, other common issues that cause output losses include enterotoxemia, Johne's illness, and worm infestation.

Along with decreased output, mortality also results in economic damage from parasite infestation and nutritional inadequacies. The indirect influence on feed intake and efficiency reduces overall production by influencing live weight gain and reproductive efficiency. The yield of wool is decreased by uncontrolled infections with virulent foot rot. It is likely that the estimate of 8% loss of yearly wool weight by Marshall *et al.* (1991) [2] was the greatest available estimate of the effect of foot rot on average annual wool production in an infected flock.

### To estimate economic losses, would typically consider the following factors

**Replacement Cost:** The cost of replacing a lost animal, which includes the purchase or breeding cost of a new animal.

**Productivity Loss:** The potential productivity of the lost animal in terms of wool production, meat yield, or breeding capacity.

**Veterinary Costs:** Costs associated with veterinary care and treatment if the mortality is due to disease or health issues.

**Labor Costs:** Any additional labor required for managing the situation, such as disposal of the deceased animal and associated tasks.

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**Market Prices:** The current market prices for sheep and sheep products, as this can influence the economic impact.

**Preventive Measures Cost:** The cost of implementing preventive measures to reduce mortality rates, such as vaccination programs or improved management practices.

According to Kanaujia *et al.* (1985) <sup>[1]</sup>, Beetal and its crosses (females older than 12 months) had a lower survivorship percentage (71.69%), indicating a higher death rate (28.31%) in adult females.

## 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, 3-6, 6-12, and above twelve months. 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.

### Season of birth

S/N	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

### Economic Losses due to body weight (Mortality)

The economic losses in body weight resulting from mortality were computed for various genders, birth seasons, and sickness years. Over the course of the research, the CSWRI's average cost per kilogramme of live weight was Rs. 130.

The mean weight loss per lamb resulting from the 118 deaths was 3.00±0.022 kg. Rs. 46020.00 was the economic loss as a result of the 354.00 kg body weight drop (Table: 1). The sheep pox outbreak at CSWRI, Avikanagar caused an estimated economic loss of Rs. 29,140 in Avivastra and Rs. 5820 in Chokla, according to Kushwaha *et al.* (1997).

For every age group, birth season, and disease year, the economic losses in body weight resulting from mortality were computed. For the duration of the studies, the CSWRI fee per kilogramme of live weight was Rs. 130/-per kg.

### Suckling group (0-3 months of age)

The mean weight loss per lamb resulting from the 118 deaths was 3.00±0.022 kg. Rs. 46020.00 was the economic loss as a result of the 354.00 kg body weight drop (Table: 2). The sheep pox outbreak at CSWRI, Avikanagar caused an estimated economic loss of Rs. 29,140 in Avivastra and Rs. 5820 in Chokla, according to Kushwaha *et al.* (1997).

The economic losses resulting from the deaths of 71 male and 47 female lambs were 218.68 kg and 137.24 kg, respectively, resulting in losses of 28428.40 and 17841.20 rupees. Within this cohort, males experienced a greater reduction in body weight and economy than females.

The total body weight losses for the 91 lambs born in the major season and the 27 lambs born in the minor season were 265.72 kg and 81.00 kg, respectively. The corresponding monetary losses resulting from mortality were Rs. 10530.00 and Rs. 35543.60. When comparing major to minor birth seasons, the economic loss from mortality was greatest during the main season.

The cumulative body weight losses from 2005–06 to 2013–14 resulting from the deaths of 1, 1, 16, 8, 44, 3, 18, 11 and 16 lambs were 3.01, 3.04, 47.36, 22.56, 125.84, 9.06, 57.06, 33.55 and 49.92 kg, in that order.

The following amounts were the economic losses documented over these years: 391.30, 395.20, 6156.80,

2932.80, 16359.20, 1177.80, 7417.80, 4361.50, and 6489.60, in that order. The total economic loss as a whole due to mortality was Rs. 101343.42.

### Weaning group (3-6 months of age)

For each lamb that died, the least-squares mean was  $15.59 \pm 0.170$  kg. The economic loss resulting from the 27 lambs' 420.82 kg body weight decrease was Rs. 54706.86 (Table: 2).

15 male and 12 female lambs lost a total of 246.30 kg and 176.86 kg of body weight, respectively. As a result, the economic losses incurred were Rs. 32019.00 and 22991.23, respectively. Males lost more members of the weaning group owing to mortality than females did.

The overall body weight losses for the 19 lambs born in the main season were 284.05 kg, whereas the losses for the 8 lambs born in the minor season were 124.48 kg. The corresponding monetary losses resulting from mortality were Rs. 16182.4 and Rs. 36926.5. The economic loss resulting from animal mortality was greater in the major season of birth compared to the minor season because there were more animals in the major season.

Total body weight losses from 2005–06 to 2013–14 were 46.35, 66.19, 15.90, 28.48, 52.80, 32.81, 27.55, 94.05, and 46.39 kg owing to the deaths of 3, 4, 1, 2, 4, 2, 2, 6, and 3 lambs.

During these years, there were the following documented economic losses: 6025.50, 8605.01, 2067.00, 3702.40, 6864.00, 4265.82, 3581.50, 12226.01, and 6030.85, in that

order. The entire amount of money lost as a result of mortality was 74887.41. The period from 2012 to 2013 had the largest drop in body weight.

### Discussion

In Uttar Pradesh, India, a flock of adult sheep and lambs experienced an outbreak of acute respiratory illness due to *Pasteurella* sp., as reported by Kumar *et al.* (2005) [3]. There were 127 sheep at risk of infection in all, resulting in a 47.24% morbidity rate, 18.11% mortality rate, and 38.33% case fatality rate.

According to Biffaa *et al.* (2006) [4], helminthic burden causes 20% of adult mortality and 30% of mortality in lambs.

Sharma (2006) [5] found that the overall morbidity rates in the age groups of hogget, adult, weaner, and suckling Marwari sheep were, respectively, 8.53, 6.21, 15.38, and 34.79 percent.

Barbosa, 2014 [6] According to research, septicemia (19.1%), enterotoxaemia (25.5%), coccidiosis (8.1%), colibacillosis (14.9%), and other diverse causes (31.9%) were the main risk factors linked to poor lamb survival. Lambs aged 0–14 and 31–45 days had greater mortality rates (36% and 55%, respectively), and the majority of them passed away without exhibiting any symptoms. With abortions and lamb deaths included, the average mortality rate was 13.05%, meaning that the 57 sheep farms lost a total of 116.706 euros annually.

**Table 1:** Economic losses due to mortality in suckling group

Effect	Healthy		Died Animal				Total Economics (Rs)
	Avg. body wt. of lambs (kg.)	THA	Body wt. loss (kg.)	ND	Total Bwt Loss (kg.)	Economic Loss Rs	
Overall	3.13±0.013	2396	3±0.022	118	678.00	88140	101343.42
Sex							
Male	3.22±0.0185	1187	3.08±0.032	71	329.57	42844.21558	50241.65
Female	3.04±0.018	1209	2.92±0.03	47	347.48	45172.4	50978.38
Season							
Major	3.02±0.017	1522	2.92±0.023	91	527.77	68610.36789	77533.71
Minor	3.28±0.019	874	3±0.057	27	135.00	17550	21830.07
Year							
2005-06	3.02±0.059	270	3.01±0.1	1	15.00	1950	2073.82
2006-07	3.23±0.071	211	3.04±0.066	1	30.40	3952	6211.55
2007-08	3.08±0.03	195	2.96±0.06	16	76.86	9991.28	11802.01
2008-09	2.86±0.045	277	2.82±0.062	8	36.61	4759.04	5261.08
2009-10	3.05±0.035	156	2.86±0.039	44	157.30	20449	25916.26
2010-11	3.12±0.027	393	3.02±0.118	3	54.36	7066.8	7354.87
2011-12	3.4±0.031	335	3.17±0.076	18	85.52	11118.0405	13121.48
2012-13	3.1±0.036	339	3.05±0.111	11	115.90	15067	15307.50
2013-14	3.15±0.036	220	3.12±0.059	16	105.94	13772.72	14280.73

**Note:** Figures in parenthesis indicate number of animals economic loss was calculated on the basis of CSWRI rates Rs. 130/- per kg live body weight during the study period

**Table 2:** Economic losses due to mortality in weaner group

Effect	Healthy		died Animal				Total Economics (Rs)
	Avg. body wt. of lambs (kg.)	THA	Body wt. loss (kg.)	ND	Total Bwt Loss (kg.)	Economic Loss Rs	
Overall	15.98±0.067	2565	15.59±0.17	27	420.82	54706.86	74887.41
Sex							
Male	16.79±0.097	1254	16.42±0.239	15	246.30	32019.00	42697.20
Female	15.17±0.082	1311	14.74±0.202	12	176.86	22991.23	32484.10
Season							
Major	15.24±0.085	1662	14.95±0.175	19	284.05	36926.5	50272.3
Minor	16.93±0.095	903	15.56±0.621	8	124.48	16182.4	23128.3
Year							
2005-06	15.65±0.233	295	15.45±1.076	3	46.35	6025.50	6237.66
2006-07	17.49±0.462	257	16.55±0.434	4	66.19	8605.01	13598.70
2007-08	16.01±0.181	61	15.9±0.179	1	15.90	2067.00	5238.48
2008-09	14.47±0.185	329	14.24±0.723	2	28.48	3702.40	3915.34
2009-10	13.61±0.199	284	13.2±0.508	4	52.80	6864.00	8601.45
2010-11	17.22±0.127	368	16.41±0.458	2	32.81	4265.82	5847.27
2011-12	15.78±0.153	360	13.78±0.729	2	27.55	3581.50	6707.74
2012-13	16.53±0.159	330	15.67±0.731	6	94.05	12226.01	15888.05
2013-14	16.26±0.204	281	15.46±0.832	3	46.39	6030.85	7695.42

**Note:** Figures in parenthesis indicate number of animals economic loss was calculated on the basis of CSWRI rates Rs. 130/- per kg live body weight during the study period

### Conclusion

The morbidity rate in the adult group is highly significantly influenced by the sex of the lamb, indicating that males are more robust and disease-resistant than females.

### Declarations of Competing Interest

The authors declare that they have no conflicts of interest associated with this publication.

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