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Economic losses due to morbidity (Weight losses) in different age group of Marwari sheep

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Abstract
"Evaluation of economic losses due to morbidity in Marwari sheep in arid zone" have been studied using data (for Marwari, 3164) collected from CSWRI, ARC, Bikaner spread over eight years (2005-06 to 2013-14). The traits investigated were morbidity due to different diseases. The different age groups were birth to three (suckling), three to six (weaning), six to twelve (hogget) and above twelve months (adult). The diseases recorded from the farm are classified here on the basis of body systems. Significance of different classes was tested with chi-square.

Keywords: Morbidity, economic, weaning

Introduction
In this paper, Study of Morbidity in sheep are due to multifarious causes such as infectious diseases, parasitic infestations, nutritional disorders, adverse climatic conditions and management fluctuations were made. Systematic studies of non-genetic factors influencing morbidity rate in sheep.

Sheep pox, foot and mouth disease and rinder pest are the important viral diseases of sheep for which vaccines are available in India to protect the animals. Blue tongue and PPR are two other viral diseases, which cause considerable economic losses in sheep production. Enterotoxaemia, Johne's disease, parasitic infestation besides nutritional deficiency diseases are other common problems responsible for production losses. Production losses due to parasitic infestation and nutritional deficiencies arise from morbidity as well as reduced productivity of survivors. Animal productivity is reduced by insidious effect on feed intake and the utilization, which in term affects live weight gain and reproductive efficiency.

There is no doubt that the presence of uncontrolled infections with virulent foot rot reduces the wool production of sheep. It is likely that the estimate of 8% loss of annual wool weight by Marshall *et al.* (1991) [4] was the best available estimate of the effect of virulent foot rot on average annual wool production in an infected flock.

Materials and Methods
Source of data
The data for the present investigation were obtained from health records of Sheep Research Project entitled "Improvement of Marwari `sheep for carpet wool production through selection" located at the Arid Region campus of the Central Sheep and Wool research institute, Bikaner.

Description of data
The present investigation includes the data of Marwari sheep from 2005 to 2014 (year of birth) on the morbidity percentage and economic losses at different age group of lambs. The different age groups were birth to three (suckling), three to six (weaning), six to twelve (hogget) and above twelve months (adult) of age.

Morbidity rate
The numbers of sick animals for the particular disease in different age groups i.e. 0-3, 3-6, 6-12 and above 12 months of age were recorded.

Body weight
The birth weight of diseased and healthy lambs was recorded within twenty-four hours of

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lambing. The lambs were weighed at three months of age (weaning) and thereafter at six, nine and twelve months of age in the morning before they had any access of to feed or water, on the dial platform balance of 50 kg capacity to the accuracy of 0.05 kg up to weaning and on 100 kg capacity to the accuracy of 0.10 kg after weaning.

Classification of data
The data on morbidity rate were classified according to sex, year of disease and season of birth. The data on weather condition, feeding, housing, differential management for male and female were not included in the analysis because these data were not recorded at the farm.

Sex of lamb
Morbidity rates for males and female lambs were calculated separately in 0-3, 3-6, 6-12 and above twelve months of age groups for all the diseases under investigation.

Season of birth
In order to study the effect of climatic changes i.e. temperature, humidity, rainfall etc. on the incidences of morbidity, the year was divided into two seasons depending upon the month of lambing.

The Specific seasons

S/N	Season	Months of year
1.	First	January to June
2.	Second	July to December

Year of morbidity
This study included the data of lambs that born during year from 2005 to 2014. The morbidity was divided into nine years from 2005-06 to 2013-14. Each year show the total number of sheep, which were available in particular year and of particular age group. Morbidity rates were calculated separately in 0-3, 3-6, 6-12 and above twelve months of age.

Economic losses due to morbidity (Weight Losses)
Body weights losses during 0-3, 3-6, 6-12 and above twelve months of age due to morbidity from various causes were calculated using the following formula:
ELBD= EVB [(BH-DH)*ND]

Here,
ELBD= Economic losses in rupees due to reduced body weight.
EVB= Economic value of 1 kg body weight expressed as market price of one kg live weight.
BH= Average body weight of healthy lambs.
DH= Average body weight of diseased lambs.
ND= Number of diseased lambs.

Results
The present investigation was carried out to evaluate growth losses caused by morbidity in Marwari sheep due to various types of diseases. The results of different analyses are presented and discussed under the following headings.

Economic losses due to morbidity
In the present investigation, economic losses due to body weight cost in 0-3, 3-6, 6-12 and above 12 months age groups were calculated on the current CSWRI price (₹ 130/-Kg live body weight, ₹ 80/- Kg of wool).

Losses due to body weight
Economic losses due to decline in body weight on account of morbidity were calculated on basis of sex, Season of birth and year of disease. The CSWRI price for per kg live weight was ₹.130/- for whole period of studies.

Table 1: Economic losses due to morbidity in suckling group

Effect	Healthy		Sick					
	Avg. body wt. of lambs (kg.)	THA	Avg. body wt. (kg.)	Av. Bwt loss (kg.)	TSA	Total Bwt Loss (kg.)	Economic Loss Rs	
Overall	3.13+0.013	2396	3+0.022	0.13	768	101.56	13203.42	
Sex								
Male	3.22+0.0185	1187	3.08+0.032	0.14	407	56.90	7397.43	
Female	3.04+0.018	1209	2.92+0.03	0.12	361	44.66	5805.98	
Season								
Major	3.02+0.017	1522	2.92+0.023	0.11	650	68.64	8923.35	
Minor	3.28+0.019	874	3+0.057	0.28	118	32.92	4280.07	
Year								
2005-06	3.02+0.059	270	3.01+0.1	0.03	37	0.95	123.82	
2006-07	3.23+0.071	211	3.04+0.066	0.20	89	17.38	2259.55	
2007-08	3.08+0.03	195	2.96+0.06	0.12	114	13.93	1810.73	
2008-09	2.86+0.045	277	2.82+0.062	0.05	77	3.86	502.04	
2009-10	3.05+0.035	156	2.86+0.039	0.19	220	42.06	5467.26	
2010-11	3.12+0.027	393	3.02+0.118	0.10	22	2.22	288.07	
2011-12	3.4+0.031	335	3.17+0.076	0.24	65	15.41	2003.44	
2012-13	3.1+0.036	339	3.05+0.111	0.05	37	1.85	240.50	
2013-14	3.15+0.036	220	3.12+0.059	0.04	107	3.91	508.01	

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

Table 2: Economic losses due to morbidity in weaner group

| Effect | Healthy | | Sick | | | | |
	Avg. body wt. of lambs (kg.)	THA	Avg. body wt. (kg.)	Av. Bwt loss (kg)	TSA	Total Bwt Loss (kg.)	Economic Loss Rs
Overall	15.980.067	2565	15.590.17	0.40	393	155.235	20180.55
Sex							
Niale	16.790.097	1254	16.420.239	0.37	222	82.14	10678.2
Female	15.170.082	1311	14.740.202	0.43	171	73.022029	9492.8638
Season							
Major	15.240.085	1662	14.950.175	0.29	354	102.66	13345.8
Mecor	16.930.095	903	15.560.621	1.37	39	53.43	6945.9
Year							
2005-06	15.650.233	295	15.45±1.076	0.20	8	1.632	212.16
2006-07	17.490.462	257	16.550.434	0.94	41	38.413	4993.69
2007-08	16.010.181	61	15.90.179	0.11	228	24.396	3171.48
2008-09	14.470.185	329	14.240.723	0.23	7	1.638	212.94
2009-10	13.610.199	284	13.20.508	0.41	33	13.365	1737.45
2010-11	17.220.127	368	16.410.458	0.81	15	12.165	1581.45
2011-12	15.780.153	360	13.780.729	2.00	12	24.048	3126.24
2012-13	16.530.159	330	15.670.731	0.85	33	28.169533	3662.0393
2013-14	16.260.204	281	15.460.832	0.80	16	12.804333	1664.5633

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

Table 3: Economic losses due to morbidity in hoggot group

| Effect | Healthy | | Sick | | | | |
	Avg. body mt. (kg.)	THA	Avg. body mt. (kg.)	Av. Bmt loss (kg.)	TSA	Total MA Loss (kg.) Economic Loss	Rs
Overall	22.99±0.101	2543	20.95±0.17	2.04	187	381.29	49568.09
Sex							
Male	24.74±0.155	1225	21.89±0.239	2.85	119	338.67	44027.62
Female	21.27±0.097	1318	20.73±0.202	0.54	68	36.45	4738.24
Season							
Major	22.74±0.123	1749	21.08±0.175	1.66	165	274.40	35671.35
Minor	23.32±0.169	794	18.46±0.621	4.86	22	106.90	13896.74
Year							
2005-06	21.89±0.295	291	14.04±1.077	7.85	4	31.42	4084.57
2006-07	26.03±0.573	269	25.03±0.434	1.00	15	14.99	1948.05
2007-08	24.45±0.271	211	23.39±0.179	1.06	72	76.18	9902.88
2008-09	20.91±0.241	319	13.05±0.723	7.85	4	31.42	4084.57
2009-10	19.96±0.162	292	12.11±0.508	7.85	8	62.84	8169.14
2010-11	24.31±0.21	315	23.41±0.458	0.90	24	21.58	2804.88
2011-12	21.46±0.248	311	20.78±0.729	0.68	2	1.36	177.32
2012-13	24.07±0.291	298	16.21±0.731	7.85	16	125.68	16338.27
2013-14	24.13±0.298	237	23.76±0.832	0.38	42	15.83	2058.42

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

Table 4: Economic losses due to morbidity in adult group

| Effect | Healthy | | Sick | | | | |
	Avg. body wt. of lambs (kg.)	THA	A.vg. body wt. (kg.)	Av. Bwt loss (kg.)	TSA	Total Bwt Loss (kg•)	Economic Loss Rs
Overall	29.860.154	882	28.570.18	1.29	718	925.50	120315.26
Sex							
Male	33.250.217	489	31.590.383	1.66	192	318.53	41408.64
Female	27.250.125	393	26.10.181	1.15	526	604.90	78637.00
Season							
Major	31.020.22	372	29.760.178	1.26	673	849.33	110412.38
Minor	28.730.203	510	27.050.107	1.68	45	75.65	9833.85
Year							
2005-06	32.790.529	408	31.35±1.071	1.44	37	53.21	6916.78
2006-07	31.15±1.105	319	30.060.828	1.09	48	52.51	6826.56
2007-08	31.60.511	122	30.120.206	1.48	355	525.40	68302.00
2008-09	28.860.446	444	27.790.491	1.07	21	22.55	2932.02
2009-10	28.880.463	509	28.120.569	0.76	34	25.74	3345.94
2010-11	29.280.279	524	28.10.405	1.18	84	99.12	12885.60
2011-12	27.630.359	471	26.60.597	1.03	45	46.12	5996.25

| 2012-13 | 30.810.391 | 439 | 29.850.839 | 0.95 | 25 | 23.63 | 3071.25 |
| 2013-14 | 31.90.427 | 406 | 30.790.688 | 1.11 | 69 | 76.80 | 9983.61 |

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

Conclusions

1. The sex of lamb highly significantly affect the morbidity rate in the adult group, indicates that male are sturdy and resistant of diseases than females.
2. The effect of season of birth on morbidity rates was highly significant and shows higher morbidity in lambs born in major season. It may be due to cold stress and abrupt change in the temperature during months of January-February.
3. The effect of year of diseases on morbidity rates was significant. It may be due to environmental condition, availability of feed and fodder in pasture and outbreak of diseases in different years. Therefore, to reduce the morbidity, animals should be protected from extremes of weather. Further, supplementary feeding of concentrates and dry fodder during lean period and prophylactic treatments may reduce the morbidity.

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