STUDY OF MORBIDITY AND MORTALITY IN DIFFERENT AGE GROUPS OF MARWARI SHEEP AT CSWRI, BIKANER[#]

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ABSTRACT

The mortality and morbidity in 3164 Marwari sheep in arid zone have been studied using data, collected from CSWRI, ARC, Bikaner spread over eight years (2005-06 to 2013-14). The traits investigated were morbidity and mortality due to different diseases. The different age groups were suckling (birth to three months), weaning (three to six months), hogget (six to twelve months) and adult (above twelve months months). Significance of different classes was tested with chi-square. The overall morbidity was 24.27, 13.29, 6.85 and 44.88 per cent of suckling, weaning, hogget and adult groups, respectively. The overall mortality was 3.73, 0.91, 0.66 and 3.94 per cent of suckling, weaner, hogget and adult groups, respectively.

***Key words*:** Marwari sheep, morbidity, mortality

Introduction

The sheep farming is most suitable to draught prone areas of country. The sheep contribute significantly to the Indian economy by providing sustenance and supplementing the income of landless farmers and rural poor. The high incidence of diseases and parasitic infestation in sheep is one of the major constraints in the development of this enterprise and has been reported to cause huge losses to the poor sheep owners and consequently to the Indian economy. It is well known for its high disease resistance, draught tolerance, faster growth rate and capacity to travel longer distances in search of forage.

In India, small ruminant systems are complex, diverse and prone to many risks. Even at the organized farms, the diagnosis of different diseases is mainly based on clinical symptoms and diagnostic investigations are not very appropriate and most of the recording of incidence of different diseases is based on post-mortem lesions. Sheep as they seems to respond less to treatment when sick than other livestock. Sheep is a peculiar species, in spite of serious illness it may not show apparently distinct symptoms, and therefore disease prevention depends on talent of a veterinarian. Mortality and Morbidity in sheep are due to multifarious causes such as infection diseases, parasitic infestations nutritional disorders, adverse climatic conditions and managemental fluctuations. The high incidence of diseases and parasitic infestation in sheep has been reported to cause huge losses. Present investigation was undertaken to evaluate mortality and morbidity in Marwari sheep in hot and arid agro climatic conditions. The proposed investigation has been undertaken with the objectives to study the mortality and morbidity percentage in different age group of Marwari sheep and to study the effect of non-genetic and genetic factors influencing mortality and morbidity percentage in different age groups.

Materials and Methods

Source of data

The data for the present investigations 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 data of Marwari sheep from 2005 to 2014 (year of birth) on the mortality and morbidity percentage 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).

Classification of data

The data on morbidity and mortality rate were classified according to sex, year of disease, season of birth and sire wise. 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 and mortality 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 and mortality, the year was divided in to two seasons depending upon the month of lambing.

The Specific seasons

This study includes the data of lambs that born during

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

years from 2005 to 2014. The morbidity and mortality 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 and mortality rates were calculated separately in 0-3, 3-6, 6-12 and above twelve months of age.

Effect of sire: Random effect.

Statistical technique

Lamb morbidity percentage

MBR = (NS/TNA) x 100

Lamb mortality percentage

MTR= (ND/TNA) x 100

Here**,** MTR= Mortality percentage on basis of total lamb

ND= total number of died lambs

MBR= Morbidity per cent on the basis of total lamb

NS= total number of sick lambs

TNA= total number of lambs available.

Statistical Analysis

Mathematical model: The effects of non-genetic and genetic factors on morbidity and mortality rate were analyzed with the following mathematical model.

$Y_{ijklm}= \mu+a_i+B_j+C_k+D_l+e_{ijklm}$

Here,

Yijklm= Observation on i^{th} effect of sire, j^{th} sex of lamb, k^{th} year of disease and l^{th} season of birth

μ= Overall mean

ai= effect of sire

Bj = Effect of sex of lamb

Ck = effect of year of disease

Dl = effect of season of birth

eijkim = random error

Test of significance: Mortality and Morbidity are threshold characters; therefore, significance among the different classes was tested with chi-squares test (Snedecor and Cochran, 1994).

$$\Sigma = \frac{(O-E)^2}{E}$$

Where,

O= Observed number of diseased/died lamb in each animals group

E= expected number of diseased/died lamb (frequency) in each animals group

Results and Discussion

The present investigation was carried out to evaluate morbidity and mortality in Marwari sheep. Morbidity and mortality in sheep are due to multifarious causes such as infectious diseases, parasitic infestations, nutritional disorders, adverse climatic conditions and managemental fluctuations**.** Thereare number of factors which affected the morbidity rates of Marwari sheep, some of them are sex, year of disease, season of birth and individual sire.

The year of disease occurrence was thought to be a major source of variation in morbidity rates across different age groups. The possible reason for yearly variation in morbidity and mortality rates of lambs could be variation in season (rainfall, temperature, humidity and climatic variations), feed or managemental practices may lead for such variation. The difference in morbidity rates during years may be on account of the availability of nutrients to the dam through pasture, management conditions at the farm and other non-specific environmental conditions. Season of birth may directly influence the incidence of diseases. Weaning age group is the critical period for health of lambs especially in the arid region as the animal is still in a very active stage of growth and has to depend on his ability to manage nutrition from ground as it has been weaned and separated from their mothers recently.

The effect of sex may influence growth rate of the lamb. In general, males were heavier and more tolerant to environmental and pastoral conditions than the females. Hence, they might suffer less in comparison to females. Some of the differences might have come up due to differences in preferential managemental practices. Bobde and Barbind (2002) reported that significant effect of sex on the incidences of disease in kids (Beetal X Osmanabadi) were higher in females than the male kids.

In adult group higher morbidity rate was observed due to age factor. As the age increases, the resistance power against the disease was also reduced. This resulted to higher incidence of disease in adult group. As the animal matured; the mortality rate due to different diseases was comparatively reduced because the lambs got adopted with the prevailing pasture management and environmental conditions. Hence, the mortality rate, which was 3.73 per cent in pre-weaning period, reduced to 0.66 per cent during this period due to all diseases. Rana *et al.* (2002) observed that the effect of age on mortality was higher after the age of 6 months and above in Beetal goats.

The mortality due to all diseases, which was reduced from pre-weaning to hogget group, showed the increased rate (3.94%) in adult group. The higher rate of mortality in adult group seems to be due to old age. As the age advanced, the resistance power or immunity against diseases decreased. Hence, the mortality rate was the highest in this group. Hughes *et al*. (1971) also reported that in adult sheep the mortality showed a declining trend up to four years of age and subsequently it increased to a maximum of 33.97 per cent for the age group of six years and above. Kanaujia *et al.* (1985) reported lower survivability rate (71.69) in Beetal and its crosses (females >12 months age) which indicated high mortality rate (28.31%) in adult females.

The nutritional availability for grazing suffers great changes during the years. If nutritious availability pasture, management and prophylactic treatment were balanced, most of diseases would be controlled.

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Table 1: Overall morbidity rates in different age groups of Marwari sheep

CAUSES	No. of animals	Age Groups of lambs											
		Suckling group			Weaner group			Hoggot group			Adult group		
			NS	MBR%		NS	MBR%		NS	MBR%		NS	MBR%
		3164	768	24.27	2958	393	13.29	2730	187	6.85	1600	718	44.88
Sex	χ2	1.6917			6.0272**			14.527**			52.84**		
Male	TNA	1594	407	25.53	1476	222	15.04	1344	119	8.85	681	192	28.19
Female	TNA	1570	361	22.99	1482	171	11.54	1386	68	4.91	919	526	57.24
Season	χ2	77.9698**			80.522**			28.081**			208.6577**		
Major	TNA	2172	650	29.93	2016	354	17.56	1914	165	8.62	1045	673	64.40
Minor	TNA	992	118	11.90	942	39	4.14	816	22	2.70	555	45	8.11
Year	χ2	253.94**			650.91**			192.47**			700.89**		
2005-06	TNA	307	37	12.05	303	8	2.64	295	4	1.36	445	37	8.31
2006-07	TNA	300	89	29.67	298	41	13.76	284	15	5.28	367	48	13.08
2007-08	TNA	309	114	36.89	289	228	78.89	283	72	25.44	477	355	74.42
2008-09	TNA	354	77	21.75	336	7	2.08	323	4	1.24	465	21	4.52
2009-10	TNA	376	220	58.51	317	33	10.41	300	8	2.67	543	34	6.26
2010-11	TNA	415	22	5.30	383	15	3.92	339	24	7.08	608	84	13.82
2011-12	TNA	400	65	16.25	372	12	3.23	313	2	0.64	516	45	8.72
2012-13	TNA	376	37	9.84	363	33	9.09	314	16	5.10	464	25	5.39
2013-14	TNA	327	107	32.72	297	16	5.39	279	42	15.05	475	69	14.53
SIRE	χ2	248.021**			603.302**			284.316**			939.465**		

Note:- TNA= Total number of animals, NS= Number of sick animals, **= Highly Significant, *= Significant

Table 2: Overall mortality rates in different age groups of Marwari sheep

Causes	No. of animals	Age Groups of lambs											
		Suckling group			Weaner group			Hoggot group			Adult group		
			ND	MTR%		ND	MTR%		ND	MTR%		ND	MTR%
		3164	118	3.73	2958	27	0.91	2730	18	0.66	1600	63	3.94
Sex	χ2	4.36*			0.342			1.00			17.77**		
Male	TNA	1594	71	4.45	1476	15	1.02	1344	11	0.82	681	10	1.47
Female	TNA	1570	47	2.99	1482	12	0.81	1386	7	0.51	919	53	5.77
Season	χ2	3.81*			0.060			0.101			21.81**		
Ist	TNA	2172	91	4.19	2016	19	0.94	1914	12	0.63	1045	59	5.65
IInd	TNA	992	27	2.72	942	8	0.85	816	6	0.74	555	4	0.72
Year	χ2	92.14**			5.79			14.9			23.62**		
2005-06	TNA	307	1	0.33	303	3	0.99	295	1	0.34	445	0	0.00
2006-07	TNA	300	1	0.33	298	4	1.34	284	2	0.70	367	3	0.82
2007-08	TNA	309	16	5.18	289	1	0.35	283	1	0.35	477	8	1.68
2008-09	TNA	354	8	2.26	336	2	0.60	323	0	0.00	465	3	0.65
2009-10	TNA	376	44	11.70	317	4	1.26	300	2	0.67	543	5	0.92
2010-11	TNA	415	3	0.72	383	2	0.52	339	2	0.59	608	11	1.81
2011-12	TNA	400	18	4.50	372	2	0.54	313	0	0.00	516	7	1.36
2012-13	TNA	376	11	2.93	363	6	1.65	314	6	1.91	464	15	3.23
2013-14	TNA	327	16	4.89	297	3	1.01	279	4	1.43	475	11	2.32
Sire		171.817**			334.849**			272.640**			506.262**		

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

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