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Incidence and effects of diseases in sheep in Uttar Pradesh

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Abstract

The present study was undertaken to analyze the incidence and effects of diseases in Sheep. The prevalence of specific diseases (42.0%) (FMD 11.7% and HS 30.30%) were more prominent followed by parasitic diseases (18%) digestive diseases (18%) and respiratory diseases (18.0%). while reproductive and other diseases (enterotoxaemia, skin infections) were also prevalent at lower morbidity rate (2.0%) in the study area. Lambs were highly affected by parasitic diseases (41.67%). In young stocks the highest proportional morbidity rate was observed due to digestive diseases (26.32%) while in adults other diseases (4.0%) had high morbidity. Males were affected more by specific diseases (48.72%) followed by parasitic diseases (23.08%). But in females, highest proportional morbidity rate was observed due to respiratory diseases (22.95%). The highest mortality was due to specific diseases (41.86%) followed by parasitic diseases (20.93%) and digestive diseases (20.93%). The analysis of the data on the effect of disease on wool yield in sheep did not reveal any significant difference in wool reduction due to pasturellosis and circling diseases. Overall wool reduction due to both diseases was (44.88%) but pasturellosis had higher effect (44.94%) than circling disease (44.76%) on wool production in sheep.

Keywords: Wool, pasturellosis, circling disease, ANOVA

Sheep has got special importance among all other livestock species due to their multifaceted utility. In India.Sheep can be affected by a variety of infectious and noninfectious diseases. Among the important sheep diseases FMD and H.S. infections result in significant losses. Certain diseases prevent the import and export of livestock. The livestock production depends on the health of the livestock and any compromise on health ground will shatter the hope of livestock sector. Infectious and parasitic diseases of livestock can be manifest in many ways like increased morbidity and mortality and decrease in rates of weight gain, reduced yield and quality of products such as wool. Sheep is one of the earliest animals to be domesticated for agricultural purposes. Since the end of World War II, the sheep production was focussed on wool production protected by the anti-importing wool production (Niznikowski *et al.* 2006). Sheep supply meat, wool (hair), skin and generate cash income to farmers. (Gryseels *et al*, 1989). Economic returns from sheep are various producers still sheep rearing is taken up mainly for wool production. The sheep wool is the most widely used animal fiber. In India estimated wool production in 2011-12 was 44.4 million kg. India having 74 million sheep stock contributes 6.8% in world's sheep population and is at rank second. In Uttar Pradesh sheep population is 1.437 millions and estimated wool production is 8.45 million kg (BAHS, 2012). Most of the sheep in Uttar Pradesh are owned by small land holders and are an integral part of the livestock sector of the economy. Infectious and parasitic diseases remained important constraints to more profitable wool production and reduced yield and quality of wool. Many helminthes infections adversely affect the quantity and quality of wool. Edwards *et al.* (1976) estimated that a harvest of helminthes parasitism (circling disease) has direct correlation with both quantitative and qualitative reduction in wool production. Losses due to

Table 1: Surveyed Sheep population in Sampled Households

Category	Male	Female	Total
Lamb	32	34	66
Young	103	124	227
Adult	86	236	322
Grand Total			615

mortality often have severe and easily quantifiable economic impact, but losses in production due to morbidity are commonly underestimated because they are difficult to estimate. This paper provides a background about the incidence of diseases and their effect on wool yield.

Material and Methods

The present study was conducted in Agra division of Uttar Pradesh in India. The sampling design adopted in this study was stratified multistage sampling. The Agra Division consists of four districts Agra, Mathura, Mainpuri and Firozabad. And each district was taken as stratum for study. From each stratum, blocks were selected by proportional allocation (5 blocks from Agra and 3 blocks from each Mathura, Mainpuri and Firozabad district). From each selected block, three villages were selected and this constitutes fourteen blocks and forty two villages for the study. From each selected village 12 livestock owners were selected. Ultimately a total of 504 livestock owners were selected to study the effects of livestock disease in the study area. The data on flock size (number of animals reared) of sheep with respect to age, sex and wool production were collected from a field survey of 504 respondents by interviewing, using pre tested questionnaires specifically prepared for the study area and reference period was from 1st January 2011 to 31st December 2011. The diseases observed during the study period in Agra division were classified by using Prasad *et al*. (2004) classification procedure, as given below

1. **Digestive Diseases**: Diarrhea, tympani / blot.
2. **Respiratory Diseases**: Cold and Pneumonia and its various types.
3. **Reproductive Diseases**: Dystocia and abortion.
4. **Parasitic Diseases**: Trypanosomiasis and endoparasitic infections.
5. **Specific Diseases**: FMD and HS
6. **Other Diseases**: Diseases which did not come under category mentioned above are taken into this category, skin infections tetanus, rabies and enterotoxaemia.

The collected data were compiled and analyzed to study the incidence and effects of diseases in sheep.

Proportional morbidity and mortality rates

Among various diseases the proportional morbidity/ mortality (PMR) due to each disease was calculated by the formula:

$$\text{Morbidity Rate (P)} = \frac{\text{Number of animals affected by the specific disease}}{\text{Total number of animals affected by all the diseases}} \times 100$$

$$\text{Mortility Rate (P)} = \frac{\text{Number of animals died due to the specific disease}}{\text{Total number of animals died due to all the diseases}} \times 100$$

Chi-square test was used to test the significance of incidence of diseases in cattle by using following statistic

$$\chi^2 = \sum_{i=1}^{k} \frac{(O_i - E_i)^2}{E_i}$$

O = Observed frequency, E = Expected frequency

The collected data were compiled and analyzed to study the effects of diseases on wool yield by using one-way analysis of variance. One-way analysis of variance is a technique used to compare means of more than two samples. The mathematical model for One Way ANOVA is given by

$$y_{ij} = \mu + T_i + e_{ij}$$

Where y_{ij} is the observed value of ith treatment , μ = General mean effect , T_i = ith treatment effect , e_{ij} is the error term

In one way ANOVA we test the null hypothesis of equality of treatment means against the alternate hypothesis that at least two treatment means differ significantly. For testing the null hypothesis two different estimates of the variance are used. One estimate (called the Mean Square Error) is based on the variances within the samples. Second estimate of variance (Mean Square Between) is based on the variance of the sample means. If the null hypothesis

Table 2. Age wise morbidity pattern

Disease	Lamb		Young		Adult		Total	
	No	%	No	%	No	%	No	%
Specific Disease	5	41.67	9	23.68	28	56	42	42
Digestive Disease	0	0.00	10	26.32	8	16	18	18
Reproductive Disease	0	0.00	0	0.00	2	4	2	2
Respiratory Disease	2	16.67	7	18.42	9	18	18	18
Parasitic Disease	5	41.67	12	31.58	1	2	18	18
Others Disease	0	0.00	0	0.00	2	4	2	2
Total	12	100	38	100	50	100	100	100
χ^2	27.85**							

Table 3: Gender wise morbidity pattern

Disease	Male		Female		Total	
	No	%	No	%	No	%
Specific Disease	19	48.72	23	37.70	42	42
Digestive Disease	7	17.95	11	18.03	18	18
Reproductive Disease	0	0.00	2	3.28	2	2
Respiratory Disease	4	10.26	14	22.95	18	18
Parasitic Disease	9	23.08	9	14.75	18	18
Others Disease	0	0.00	2	3.28	2	2
Total	39	100	61	100	100	100
χ^2	6.29					

Table 4: Age wise mortality pattern

Disease	Lamb		Young		Adult		Total	
	No	%	No	%	No	%	No	%
Specific Disease	3	33.33	6	31.58	9	60	18	41.86
Digestive Disease	0	0.00	6	31.58	3	20	9	20.93
Respiratory Disease	2	22.22	2	10.53	0	0	6	13.95
Parasitic Disease	4	44.44	5	26.32	2	13.33	9	20.93
Others Disease	0	0.00	0	0.00	1	6.67	1	2.33
Total	9	100	19	100	15	100	43	100
χ^2	12.9							

Table 5: Gender wise mortality pattern

Disease	Male		Female		Total	
	No	%	No	%	No	%
Specific Disease	9	47.37	9	37.5	18	41.86
Digestive Disease	3	15.79	6	25	9	20.93
Respiratory Disease	1	5.26	5	20.83	6	13.95
Parasitic Disease	6	31.58	3	12.5	9	20.93
Others Disease	0	0.00	1	4.17	1	2.33
Total	19	100	24	100	43	100
χ^2	5.15					

Table 6: Effect of disease on wool yield (%) in sheep

Disease	Mean ± S.E.
Pasturellosis	44.94±1.82
Circling disease	44.76±12.94
Total	44.88±10.75

Table 7: ANOVA Wool Reduction in Sheep

SOV	DF	Sum of Squares	Mean Square	F	Sig.
Diseases	1	1466.58	1466.583	2.753	0.105
Error	41	21840.39	532.693		
Total	42	23306.97			

is true, then MSE and MSB should be the same. However, if H_0 is false then MSB will be greater than MSE.

Results and Discussion

The analysis of the data is based on data collected on 613 sheep in Agra division (Table 1).The morbidity of specific diseases (42.0%) (FMD 11.7% and HS 30.30%) were more prominent followed by parasitic (18.0%), digestive (18.0%) and respiratory diseases (18.0%) while reproductive (2.0%) and other diseases (2.0%) were also prevalent in the study area. The highest mortality was due to specific diseases (41.86%) while parasitic (20.93%) and digestive diseases (20.93%). Deaths due to respiratory diseases were 13.95% and lowest due to other diseases (2.33%).

Morbidity Pattern

The data from all the three age groups show that there was significant difference ($p \leq 0.01$) in pattern of morbidity in different age groups**.** (Table 2).Lambs were highly affected by parasitic diseases (41.67%) followed by specific diseases (41.67%). In young stocks the highest PMR was observed due to parasitic diseases (31.58%). followed by digestive diseases (18.42%), specific diseases (56.0%), reproductive (2.0%) Kaur (2008) reported occurrence of mixed infection to the extent of 85.71% in sheep from Punjab while in adult other diseases (4.0%) had high morbidity The chi-square analysis showed that the morbidity pattern differ significantly ($p<0.01$) between male and female animals. (Table 3).Males were affected more by specific diseases (48.72%) and parasitic diseases (23.08%). Swarnkar *et al.*(2010) reported majority (55.1%) to harbour mixed infection But in female, highest PMR was observed due to specific diseases (37.70%) followed by respiratory diseases (22.95%) digestive diseases (18.03%).

Mortality pattern

The chi-square analysis showed that there was significant difference ($p<0.01$) between different age groups. (Table No. 4) In lambs mortality due to parasitic diseases (44.44%) was higher than other age groups. Young stocks showed relatively high mortality due to specific and digestive diseases (31.58% of each), while in adults major causes of mortality were specific diseases (60.0%) followed by digestive diseases (20.0%). This was similar to the report of Sharma *et al.* (1999). The chi-square analysis showed that the mortality pattern differ significantly ($p<0.01$) between male and female animals. (Table No. 5). These findings were not contemporary with the findings of Sudan *et al.* (1990). Major cause of mortality in males were specific diseases (47.37%) followed by parasitic diseases (31.58%) and digestive diseases (15.79%). In females highest mortality was due to specific diseases (37.50%) followed by digestive (25.0%), respiratory (20.83%) and parasitic diseases (12.50%).

Wool yield in Sheep

The analysis of the data on wool reduction (ANOVA) in sheep has not revealed the significant difference in wool reduction due to pasturellosis and circling disease (Table 7) .Over all wool reduction due to both diseases was (44.88%) but pasturellosis has higher effect (44.94%) than effect due to circling disease (44.76%) on wool production in sheep (Table 6). Morris *et al.*(1977), Steel *et al.* (1980). Wamae *et al.* (1995) reported that acute fascioliasis causes a substantial economic loss. This finding has close conformity with the findings of Barger and Southcott (1975), Johnstone (1978). Waller *et al.* (1987) also observed about 40% loss in wool production on grazing in highly infected pasture for four months period. The major endoparasitic diseases of importance include fascioliasis, gastrointestinal nematodiasis, cestodiasis and lung worm (Graber, 1975; Scott and Goll, 1977; Bekele Mamo *et al*, 1981; Lemma *et al*, 1985). Their effects range from a reduced performance to mortality (Sykes, 1978; Armour and Gettinby, 1983).

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