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RESEARCH ARTICLE

Factors Influencing Lamb Mortality from Birth to Weaning in Pakistan

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ABSTRACT

The objective of the study was to investigate the association of different factors with lamb mortality. For this purpose data of 6084 lambs (1998 to 2007) was used from Province of Punjab maintained at Livestock Experiment Station, (LES) RakhKhair-e-Wala, District Layyah, of the Pak-Karakul, Thalli and Kacchi sheep breeds. The results, year of birth and season of birth had a significant (P<0.01) effect on lamb mortality rate at all ages while sex and type of birth showed non-significant effect. The maximum lamb mortality rate was 17.2%, observed in year 2001 followed by 16.6 %and 5.8% in 2002 and 2004, respectively. The overall mortality rate (10.2%) was noticed in female lambs and male lamb (8.8%). The lambs during early ages showed higher mortality, when compared with those of old ages. The lambs born in triplet or twins showed high mortality than the single born. The highest mortality rate (12.2%) was estimated during spring season following (5.5%) in summer season. The overall mortality rate (43.7%) due to pneumonia was recorded followed by gastro-enteritis (19.2%) and heat stroke (10.7%). The ewe of 3 year age showed the highest overall lamb mortality rate (44.1%) than 4 year old dam (25.7 %), rate was reduced as the dam become older. It is concluded that all these factors related to disease and management, which can be minimized by proper preventive medication and better management.

INTRODUCTION

In Pakistan livestock accounts for 55.91% of the agricultural value added and 11.9% to the GDP. Out of total livestock population of 150.5 million, there was 28.8 million heads of sheep in the year 2013-14 that produced 43.6 thousand tons of wool. Sheep contribute to over 20 % of the total mutton and 6.85 % of the total meat supplied in the country. In addition, sheep are also providing 0.035 million tons of milk which amounts to be 0.08 percent of the total national milk production (GOP, 2013-14). They provide important protein sources in the diets of the poor and help to provide extra income and support for survival of many farmers in the tropics and sub-tropics of Pakistan.

Lamb mortality is the major quandary that makes this goal difficult. Reduction in lamb mortality can be achieved only by identifying and targeting its specific causes. The important causes of lamb mortality include pneumonia, pneumo-entritis, endo-parasites, septicaemia, toxaemia and diarrhoea. The non-infectious conditions that can affect lamb mortality include starvation/chilling exposure complex, stillbirths/ dystocia, mis-mothering, low birth weight, breed, age of ewe, immunity acquired by the neonate through colostrum, parity of the dam and sex of the lamb, injury, and poisoning (Khan et al., 2006). Pre-natal lamb mortality is defined as losses occurring shortly before, during or within a week of birth (Haughey, 1991). Season has a significant influence on prenatal lamb mortality (Susic et al., 2005).

Causes of lamb mortality are largely unknown but recent studies indicated that predation can be an important source of mortality for lambs. Predators, when present, are the major cause of mortality in free-ranging lambs. Low birth weight leads to increased pre-weaning mortality risk (Dwyer and Lawrence, 2005). Heavier lambs have increased chances of early survival (Morel et al., 2008). Lamb mortalities can be high during the prenatal period (Mandal et al., 2005). Mortality caused by disease and external factors (injury and weather related) were less heritable than deaths due to dam, pneumonia, and other causes.

The study was planned with the objectives to identify the factors which contribute to lamb mortality from birth to weaning and identified factors for the development of extension messages to be used by farmers.

MATERIALS AND METHODS

Data of 6084 lambs pertaining to various factors contributing to lamb mortality (1998 to 2007) was obtained from Livestock Experiment Station, Rakh Khair-e-Wala, District Layyah. The records (birth to weaning) of the Pak-Karakul, Kacchi and Thalli sheep breeds were analyzed to determine the possible causes associated with lamb mortality. The data on age of dam at lambing, sex of lamb, age of lamb at death, birth weight, types of birth (single, twin, triplet and quadruplet), season of birth, fodder / feed availability, feeding of dam during pregnancy, type of housing, flock size, effect of dipping & deworming, effect of vaccination, breeding system (controlled breeding, stray breeding/mating), predators (wolf, dogs, snake etc.) and diseases (Infectious or Non-infectious) were recorded from the history sheet, feeding, medication and mortality registers.

The climate of study area is extremely hot in summer and cold in winter. There are five seasons of the study area i.e. winter (December to February), spring (February to April), summer dry hot (May to June), summer humid hot (June to September) and autumn (September to November). June is the hottest month with the mean maximum temperature of 51 °C. December is the coldest month of winter with mean minimum temperature of 2 °C. The maximum average annual rainfall of the area is 21 mm and average relative humidity ranges from 33.4 per cent to 66.6 per cent. The mortality rates due to different factors in lambs were calculated by using the following formulae:

Mortality rate = $d_i / b – (d_i – 1)$

Where;

d_i is the number of lambs died in the ith age group,

b is the total number of lambs born, and

(d_i-1) is the number of deaths up to previous age group.

Overall mortality = Total number died (1998-2007) / Total number born (1998-2007) X 100

Mortality percentage in a year = Number died in a year / Number exposed to risk in a year X 100

The different factors of mortality rates, overall mortality and mortality percentage in a year were calculated. Association among different factors contributing to the mortality in lambs of different breeds were statistically analyzed through Chi-square (X^2) test (Steel et al., 1997).

RESULTS AND DISCUSSION

The data analysis revealed that breeds had significant ($P<0.01$) effect on lamb mortality. The lamb mortality rate was 7.3%, 11.9% and 14.2% in Pak-Karakul, Thalli and Kacchi, respectively from birth to weaning. Year of the lamb birth had a significant ($P<0.01$) effect on lamb mortality rate at all the ages. The results showed that maximum mortality was observed in 2001 while minimum in 2000 in Pak-Karakul, the mortality rate of the lambs surviving substantially, decreased after 2002, in Thalli maximum mortality was observed in 1999 while minimum in 2005. The mortality rate of the lambs surviving substantially, decreased after 2002. However in Kacchi sheep maximum mortality was observed in 2007 while minimum in 2006 (Figure 1).The mortality rate was higher because of less care given to lambs during a practically unattended lambing. The results were in close proximity with the finding of Khan et al. (2006) who reported that the lamb mortality rate was 12 per cent in Thalli and 9 per cent in Pak-Karakul breed. There was significant difference in mortality rate among different breeds of sheep (Roy et al., 2008). The Kacchi breed is not native to the area where it is kept while Thalli breed is native to the area that might be the reason of high mortality in Kacchi breed compared with Thalli breed. The lowest mortality rate in Pak-Karakul among all breeds may be due to better feeding and management provided to the animals of this breed as observed at Livestock Experiment Station, RakhKhair-e-Wala, District Layyah. The present study showed that the mortality rate in purebred (Kacchi & Thalli) was highest than in crossbred (Pak-Karakul). These results, however, did not agree with the results of Steinheim et al. (2008) who reported that lamb mortality was not affected by breed.

There was significant variation in lamb losses between years, which were observed for the 10 years of study. Year of the lamb birth had a significant ($P<0.01$) effect on lamb mortality rate at all the ages. The effect of the year of birth on the mortality at different ages was omitted from the results which showed that maximum mortality (14.9 per cent) was observed in 2001 while minimum (3.5 per cent) in 2000. The mortality rate of the lambs surviving substantially, decreased after 2002

Table 1: Mortality % of different sheep breed lambs at different birth weight

Breeds	Weight of lamb at birth (Kg)			P value
	1.00-1.50	1.51-3.00	Above 3	
Pak-Karakul	0.5 (437)	9.8 (1815)	7.0 (1018)	<0.01
Thalli	0.0 (7)	17.6 (1480)	2.2 (866)	< 0.01
Kacchi	20 (15)	17.1 (263)	1.6 (62)	<0.01

In Parenthesis is the number of lambs born

Table 2: Type of birth and lamb mortality % in different sheep breeds

Breeds	Type of birth (mortality & No of births)			Total	P value
	Single	Twin	Triplet		
Pak-karakul	7.2 (3320)	13.8(65)	-	7.3	>0.05
Thalli	10.5 (2269)	17.3 (52)	-	10.7	>0.05
Kacchi	13.9 (332)	21.4 (14)	-	14.2	>0.05

In Parenthesis is the number of lambs born

(Figure 1). The mortality rate was higher because of less care given to lambs during a practically unattended lambing. The results of present study were supported by the results of Peeler and Wanyangus (1997) who reported that pre-weaning mortality rate appeared to be varying from year to year. These results also agreed with the findings Mandal et al. (2005) and Steinheim et al. (2008) who reported that year of birth of lamb had significantly affected the lamb mortality. These differences in mortality might be the result of severe drought conditions leading to fodder shortage (Figure 6).

A non-significant (P>0.05) difference was observed in the death of lambs as male or female births at all ages. Female lambs were found to have a higher death rate than males with mortality rate of 7.6 per cent & 7.0 per cent respectively, in Thalli death rate than males with mortality rate of 12.9 per cent & 10.8 per cent respectively, where as in Kacchi female lambs were found to have a higher death rate than males from 3 months of age with mortality rate of 16.2 per cent &11.8 per cent respectively (Figure 2).These results, however, did not agree with the findings of Steinheim et al. (2008) who found that male lambs had greater risk of death compared to their female counterpart.

These differences in mortality might be due to better care and protective measures such as protection from severe weather and proper feeding provided to male sucklers than female animals at the farm. In general, female lambs have low birth weight than male sucklers.

Sex was statistically non-significant in explaining mortality among lambs (Figure 2). This result agreed with the finding of Khan et al. (2006) who found that sex did not affect the lamb mortality. The results published by Sarkar et al. (2008) was not supported this study, who found that sex had significant effect on lamb losses.

Birth weight was observed significant (P<0.01) effect on lamb mortality. The weight of lamb at birth has a tremendous impact on the ability of the lambs to survive. The mortality of lambs weighing between 1.51-3.00 kg at birth was 9.8%, 17.6% and 20.0% in Pak-Karakul, Thali and Kacchi, respectively, but improved steadily as lamb gained weight (Table 1).

Low mortality in lambs born with birth weight (up to about 1-1.50 kg) did not actually reflect reduced death loss rather it was due to small number of lambs involved. Moreover, such lambs were given more attention and care that enhanced their survival rate. On the other hand, higher percentage of mortality in birth weight group of 1.51-3.00 kg is due to large number of animal involved. In addition stress due to overcrowding may also lead to enhanced mortality, resulting probably from improper colostrums feeding and more chances of spread of infection.

Mortality increased with increased in birth weight. These results were not supported by the findings of Morel et al. (2008). They found that pre-weaning higher lamb mortality was mainly due to low birth weight of lamb compared to heavier lamb

The mortality rate in lambs increased as the survivor lambs grew older. With respect to age of lamb i.e. 1, 2, 3 and 4th months was 3.6%, 7.7%, 31.5% and 41.5% respectively in Pak-Karakul lambs, while 15.7 per cent died above 121 days of age. The mortality rate of the lambs surviving substantially, decreased after 3 months of age. With respect to age of Thalli lambs, 31.1% at 4th months, in Kacchi same rate of mortality was found (Figure 3).There were shortages of feeding which attributed to the lamb mortality rates. These results were also in close proximity with the findings of Mandal et al. (2005). Type of birth was found not important factors in all breeds; however, the death rate was higher in twins as compared to single birth (Table 2).

Season of birth of the lambs had highly significant (P<0.01) effect on the mortality rate of lambs in all age groups in all breeds. Generally, it is considered that autumn is ideal season for lambing as compared to winter and summer. The result for mortality in different

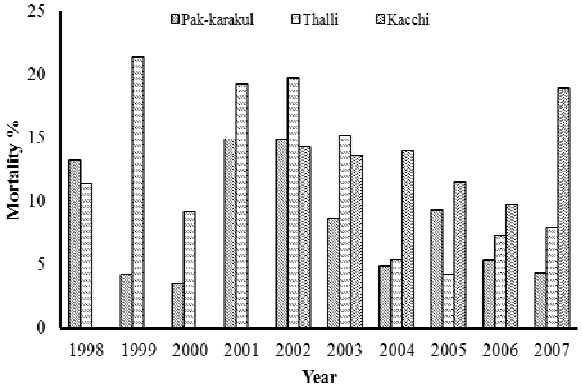

Fig. 1: Year-wise lamb mortality in different breeds

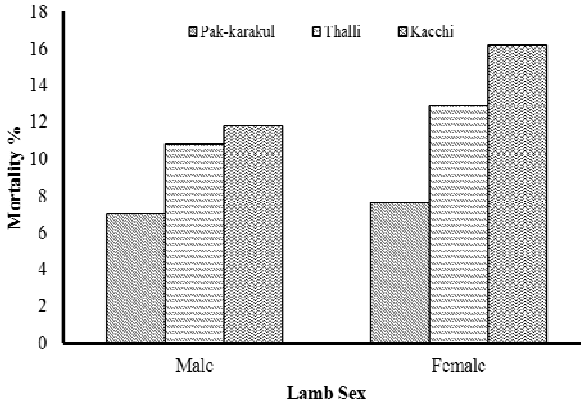

Fig. 2: Lamb mortality of different breeds of sheep in male and female lambs

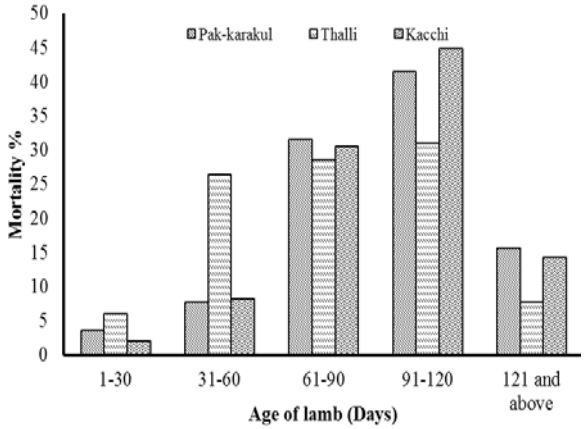

Fig. 3: Lamb mortality of different breeds of sheep in at different age groups

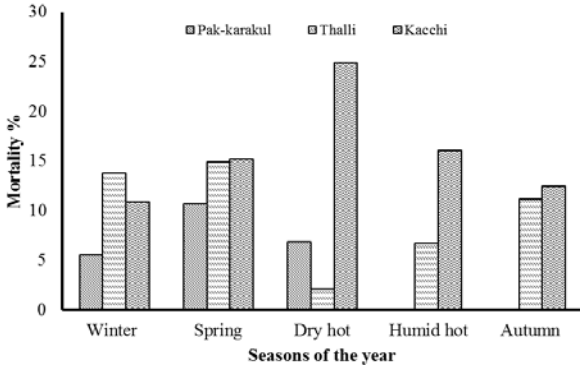

Fig. 4: Lamb mortality of different breeds of sheep in different Seasons of the year

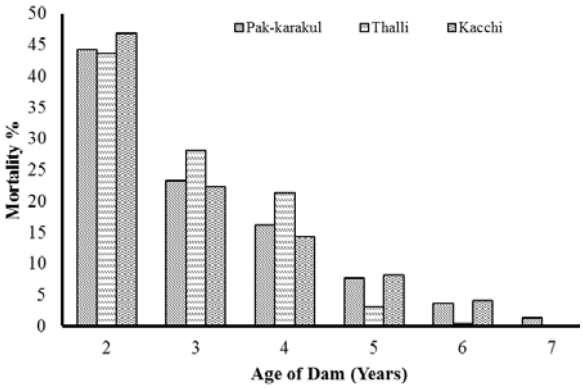

Fig. 5: Lamb mortality of different breeds of sheep in different ages of dams

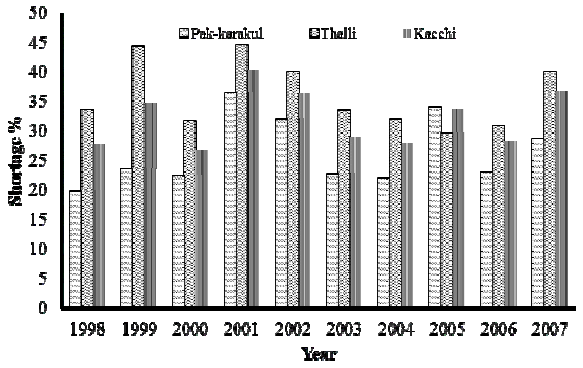

Fig. 6: Feeding shortage % to Pak-karakul, Thalli and Kacchi sheep during different years

season represented in Figure 4.The mortality rate was higher because of less care, improper nourishment, less milk feeding given to lambs during a practically unattended lambing. Effect of cause of diseases had non-significant effect on lamb mortality. Post-mortem findings revealed the total lamb losses to be ascribed to pneumonia, gastroenteritis, heat stroke, enteritis, toxaemia, pleurisy, worm infection, white scour, tympany. Necropsy revealed pneumonia to be the most widespread cause of mortality, accounting for the highest proportion of all deaths. Snake was the only predator which contributed to 0.8%, 1.2% and 2.1 of lamb mortality of Pak-Karakul, Thalli and Kacchi, respectively. The next important ailment was linked to age of dam. Age of dam had significant ($P<0.01$) on

lamb mortality. Dead lambs record showed that a high proportion of deaths were attributed to the dam having 3 years of age (adult), while lower to 8 years of age (older) as shown in Figure 5. Adult ewes generally do not always take care of their lambs immediately, leading to mortality. These results coincided with the findings of Mandal et al. (2005); who reported that the major cause associated with lamb losses was pneumonia.

The highest lamb mortality was observed in Kacchi followed by Thalli breed. Pneumonia and gastro enteritis were the major diseases which caused the highest mortality in lambs. Mortality in multiple births was more than in single births. Highest mortality was observed in age at (91-120) days. Proper feeding of the pregnant ewes minimizes the chance of lamb mortality. Controlled breeding and better management before lambing and care of lambs from birth to 4 months of age can play an important role in reducing the mortality. The shaded paddocks should be provided to pregnant ewes to avoid heat stress in summer. Disinfect the naval cord of the lambs after birth to prevent the chance of infection. Proper housing of the lambs increases the chance of survivability. Proper preventive measures such as vaccination, dipping and deworming against various diseases should be adopted. More attention should be given to the feeding of twin lambs.

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