

RESEARCH ARTICLE

Effect of Different Factors in Mortality of Lambs and Kids in High Hill of Nepal

Hem Raj Dhakal

Sheep and Goat Research Program, Nepal Agricultural Research Council, Nepal

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ABSTRACT

The objective of the study was to study the major causes of lambs and kids mortality in high hill of Nepal. Data pertaining to various factors supposed to be concerned with mortality among lambs and kids were obtained from the record of the Sheep and Goat Research Program (SGRP), Jumla, Nepal, for the period from 2014 to 2019 (6 years). Lambs of different breeds (Romney marsh, Coopworth, Romney*Baruwal, Polworth*Baruwal, Coopworth*Baruwal) and kids of Sinhal, Chyangra, Sinhal*Chyangra, Chyangra*Sinhal were used for the investigation. The overall average lamb and kid mortality among different breeds were 24.54% and 28.02% respectively, 3.48% higher in kids than in lambs. In the case of lambs, higher mortality was observed in pure exotic breeds (Romney marsh and Coopworth) and cross exotic breeds (Romney*Baruwal, Coopworth*Baruwal, Polworth*Baruwal) than the indigenous breed (Baruwal). In the case of kids, the Sinhal breed was found the minimum susceptible breed with the least mortality (14.41%). The highest mortality (33.05%) was observed in Chyangra, followed by Chyangra*Sinhal and Sinhal*Chyangra with mortality percentages of 27.12% and 25.42%, respectively. In both lambs and kids, male mortality was found higher than female mortality. Among lambs, male mortality and female mortality were 56.15% and 43.85%, respectively. Similarly, among kids, male mortality and female mortality were 55.93% and 44.07%, respectively. Almost 60% of lamb mortality and 55% of kid mortality were observed in the summer monsoon and early autumn (from 16 June to 15 October). The least kids and lambs losses were found in late autumn with values of 5.35% and 5.93%, respectively. Pneumonia and parasites were found the major causes of loss in lambs and kids.

Key words: Lambs mortality, Kid mortality, Season, Pneumonia

INTRODUCTION

The success of sheep/goat farming is measured in terms of the number of lambs/kids successfully reared in a given season since lamb/kid mortality is one of the major problems that may adversely affect the success of any sheep/goat enterprise. The important causes of lamb mortality include pneumonia, pneumo-entritis, endo-parasites, septicaemia, toxemia, and diarrhea.^[1] The non-infectious causes 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.^[2] Season has a significant influence on prenatal lamb mortality.^[1,3] Predation is the major cause of mortality in free-ranging lambs.^[4] Low birth weight is also a major cause of pre-weaning mortality of kid.^[5] Higher birth weight of lamb/kid increases the chances of early survival.^[6] Lamb mortalities can be high during the prenatal period.^[4] Mortality caused by disease and external factors (injury and weather related) was less heritable than deaths due to dam, pneumonia, and other causes.^[1,7]

Address for correspondence:

Hem Raj Dhakal

E-mail: dhakalhemraj44@gmail.com

The information on causes of mortality among lambs/kids in high hill of Nepal is quite meager. Besides diseases, there are a number of other factors which may contribute to the mortality of lambs/kids. In this study, various factors that might contribute to the lamb/kid mortality were examined with a view to evolve improved management practices for securing better survival percentage among which is considered an important prerequisite for successful sheep and goat farming.

MATERIALS AND METHODS

The study area is located at an altitude of 2700 m (8858.27 feet) from sea level with the GPS coordinates of 29°15' N and 82°2' E and barometric pressure of 74 KPa.^[8]

In the study area, in a year, the temperature typically varies from 26°C to -16°C, and frequent snowfall from December to March. In addition to that, average rainfall of 1064–1300 mm (June–September-85%), and average relative humidity of 65%.

Data pertaining to various factors supposed to be concerned with mortality among lambs and kids were obtained from the record of the Sheep and Goat Research Program (SGRP), Jumla, Nepal, for the period from 2014 to 2019 (6 years). The record of the following breeds of sheep and goats was used to determine the possible causes associated with mortality among lambs and kids from birth to weaning age (120 days).

1. Breeds of sheep
Baruwal, Polworth*Baruwal, Romney Marsh, Coopworth, Romney*Baruwal, Coopworth*Baruwal
2. Breeds of goat
Sinhala, Chyangra, Sinhala*Chyangra, Chyangra* Sinhala

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 and deworming, effect of vaccination, breeding system (controlled breeding and 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.

RESULTS AND DISCUSSION

Year-wise Mortality

The mortality percentages of both lambs and kids were found in increasing trend up to 5 years of the experiment and then decreased in the 6th year [Tables 1 and 2]. In the case of lambs, the mortality percentage was recorded as 19.32% in the 1st year and increased to 22.11%, 22.88%, 26.28%, and 28.48% in the 2nd, 3rd, 4th, and 5th years whereas the value decreased to 24.70% in the 6th year. The average mortality percentage of lambs was calculated as 24.54% in the whole experimental period.

Furthermore, mortality of kid in the 1st year found 21.95% which increased to 31.25% in the 6th year. The average mortality percentage was found as 28.02% in the whole experimental period.

Pre-weaning mortality rate appeared to be varying from year to year.^[9] Year of birth of lamb had significantly affected the lamb mortality.^[4,10] These differences in mortality might be the result of less care given to lambs during a practically unattended lambing and severe drought and cold conditions leading to fodder shortage.

Table 1: Year-wise production and death of lambs

Year	Birth	Mortality	
		Number	Percentage
2014 (1 st year)	88	17	19.32
2015 (2 nd year)	95	21	22.11
2016 (3 rd year)	118	27	22.88
2017 (4 th year)	137	36	26.28
2018 (5 th year)	158	45	28.48
2019 (6 th year)	166	41	24.70
Total	762	187	24.54

Table 2: Year-wise production and death of kids

Year	Birth	Mortality	
		Number	Percentage
2014 (1 st year)	41	9	21.95
2015 (2 nd year)	59	13	22.03
2016 (3 rd year)	61	15	24.59
2017 (4 th year)	79	24	30.38
2018 (5 th year)	85	27	31.76
2019 (6 th year)	96	30	31.25
Total	421	118	28.02

Breed-wise Mortality

In both cases, male mortality was found higher than female mortality. Out of the total 187 deaths of lambs, 56.15% (105 numbers) and 43.85% (82 numbers) were of male and female lambs, respectively [Table 3]. Similarly, out of the total 118 deaths of kids, 53.93% (66 numbers) and 44.07% (52 numbers) were of male mortality and female mortality, respectively [Table 4]. In the case of lambs, higher mortality was observed in pure exotic breeds (Romney marsh and Coopworth) and cross exotic breeds (Romney*Baruwal, Coopworth*Baruwal, Polworth*Baruwal) than the indigenous breed (Baruwal). The highest mortality was observed in Romney marsh (21.93%), followed by Coopworth (20.32%), Coopworth*Baruwal (18.18%), Romney*Baruwal (17.11%), and Polworth*Baruwal (12.83%), and the lowest mortality was observed in Baruwal (9.63%).

In the case of kids, in high hill, the Sinhal breed was found the minimum susceptible breed with the least mortality (14.41%). The highest mortality (33.05%) was observed in Chyangra, followed by Chyangra*Sinhal and SinhalChyangra with mortality percentages of 27.12% and 25.42%, respectively [Table 4].

The difference in sex-wise mortality might be due to better care and protective measures provided to female sucklers than to the male animals at the farm.^[5,11] Mustafa^[1] observed more mortality in male lambs than in female. Breeds had significant ($P > 0.05$) effect on lamb mortality. That study showed the lamb mortality rate was 7.3%, 11.9%, and 14.2% in Pak-Karakul, Thalli, and Kacchi, respectively, from birth to weaning. The same study also clarified that the mortality rate in purebred (Kacchi and Thalli) was highest than in crossbred (PakKarakul). These results, however, did not agree with the results of Steinheim *et al.*^[10] who reported that lamb mortality was not affected by breed. The results published by Sarkar *et al.*^[12] also supported this study, who found that sex had significant effect on lamb losses.

Season-wise Mortality

The results revealed that the mortality of lambs and kids was the highest in the summer monsoon, followed by early autumn. Almost 60% of lamb mortality and 55% of kid mortality were observed in these 4 months (from June 16 to October 15) [Tables 5 and 6]. Lamb mortality and kid mortality

Table 3: Sex-wise mortality of lambs

Breed	Sex				Overall mortality	
	Male		Female		Number	Percent
	Number died	Percent	Number died	Percent		
Romney marsh	27	14.44	14	7.49	41	21.93
Coopworth	21	11.23	17	9.09	38	20.32
Baruwal	9	4.81	9	4.81	18	9.63
Romney*Baruwal	18	9.63	14	7.49	32	17.11
Polworth*Baruwal	11	5.88	13	6.95	24	12.83
Coopworth*Baruwal	19	10.16	15	8.02	34	18.18
Total	105	56.15	82	43.85	187	100.00

Table 4: Sex-wise mortality of kids

Breed	Sex				Overall mortality	
	Male		Female		Number	Percent
	Number died	Percent	Number died	Percent		
Sinhal	9	7.63	8	6.78	17	14.41
Chyangra	23	19.49	16	13.56	39	33.05
Sinhal*Chyangra	19	16.10	11	9.32	30	25.42
Chyangra*Sinhal	15	12.71	17	14.41	32	27.12
Total	66	55.93	52	44.07	118	100

Table 5: Season-wise mortality of lambs

Season	Birth		Death		Overall mortality (%)
	Number	Percentage	Number	Percentage	
Winter (December 16–February 15)	48	6.3	36	19.25	4.72
Spring (February 16–April 15)	245	32.15	11	5.88	1.44
Early Summer (April 16–June 15)	62	8.14	19	10.16	2.49
Summer Monsoon (June 16–August 15)	105	13.78	59	31.55	7.74
Early Autumn (August 16–October 15)	263	34.51	52	27.81	6.82
Late Autumn (October 16–December 15)	39	5.12	10	5.35	1.31
Overall	762	100	187	100	24.54

Table 6: Season-wise mortality of kids

Season	Birth		Death		Overall mortality(%)
	Number	Percent	Number	Percent	
Winter (December 16–February 15)	28	6.65	17	14.41	4.04
Spring (February 16–April 15)	156	37.05	11	9.32	2.61
Early Summer (April 16–June 15)	21	4.99	19	16.1	4.51
Summer Monsoon (June 16–August 15)	66	15.68	38	32.2	9.03
Early Autumn (August 16–October 15)	111	26.37	26	22.03	6.18
Late Autumn (October 16–December 15)	39	9.26	7	5.93	1.66
Overall	421	100	118	100	28.03

in winter months were found as 19.25% and 14.41%, respectively. The least kids and lambs losses were found in late autumn with values of 5.35% and 5.93%, respectively.

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.^[1] In general, it is considered that autumn is ideal season for lambing as compared to winter and summer.^[12] The result for higher mortality in summer and winter season is due to high summer temperature and high winter temperature which tended to be stressful for the lambs and scarcity of fodder during this season made the condition rather adverse for the lambs. Season of birth was one of the significant factors affecting the survivability of lambs.^[13] A significant mortality in different season is also because of less care, improper nourishment, and less milk feeding given to lambs during a practically unattended lambing.^[2,3]

Mortality due to Different Factors

The findings depicted that the major factors of lamb's and kid's mortality were pneumonia and parasites. Mortality of lambs and mortality of kids due to pneumonia plus parasites were calculated as

82.36% and 77.12%, respectively [Tables 7 and 8]. Lamb's mortality percentages due to pneumonia, parasites, natural enemies, and other factors were observed as 43.32%, 39.04%, 7.49%, and 10.15%, respectively. Due to pneumonia, higher death was observed in pure exotic (Romney marsh and Coopworth) and exotic cross (Romney*Baruwal, Coopworth*Baruwal) lambs than the pure local breed. However, deaths due to parasites in all cases were found almost similar. Moreover, kid mortality due to pneumonia, parasites, natural enemies, and other factors was found as 33.05%, 44.07%, 8.47%, and 14.41%, respectively. The findings also clarified that Sinhal and Sinhal*Chyangra were less susceptible to pneumonia than Chyangra and Chyangra*Sinhal.

Pneumonia and gastro enteritis as the major diseases which caused the highest mortality in lambs.^[1] Necropsy revealed pneumonia to be the most widespread cause of mortality, accounting for the highest proportion of all deaths. Khan *et al.*^[14] found the highest percentage of deaths among the lambs was due to pneumonia (39.42%), followed by enteritis (21.07%) and other diseases. Khan *et al.*^[14]; Chawla *et al.*^[15] Koul *et al.*^[16] also found that pneumonia was the major cause of kid mortality followed by enteritis and other diseases.

Table 7: Lambs mortality in different breeds due to different factors

Breed	Pneumonia	Parasites (Internal and external)	Natural Enemies (Wolf, Bear, Jackal etc.)	Others	Total
Romney marsh	17	19	2	3	41
Coopworth	24	11	-	3	38
Baruwal	6	11	1	-	18
Romney*Baruwal	13	12	3	4	32
Polworth*Baruwal	8	11	2	3	24
Coopworth*Baruwal	13	9	6	6	34
Total	81 (43.32%)	73 (39.04%)	14 (7.49%)	19 (10.15%)	187

Table 8: Kid mortality in different breeds due to different factors

Breed	Pneumonia	Parasites (Internal and external)	Natural enemies (Wolf, Bear, Jackal etc)	Others	Total
Sinhal	4	10	2	1	17
Chyangra	17	13	2	7	39
Sinhal*Chyangra	6	17	3	4	30
Chyangra*Sinhal	12	12	3	5	32
Total	39 (33.05%)	52 (44.07%)	10 (8.47%)	17 (14.41%)	118

CONCLUSION

Higher lamb mortality was observed in pure exotic breeds (Romney marsh, Coopworth, Romney*Baruwal, Coopworth*Baruwal, Polworth*Baruwal) than in indigenous breed (Baruwal). Pneumonia and parasitic infection were the major causes of death in lambs and kids. Higher mortality was observed in lambs and kids born in summer monsoon, early autumn, and winter season. Proper feeding of the pregnant ewes minimizes the chance of lambs and kids mortality. Controlled breeding and better management before parturition, care of young ones from birth to 4 months of age can play an important role in reducing the mortality. The shaded paddocks should be provided to pregnant animals to avoid heat stress in summer. Proper heating system should be arranged in winter season. Proper housing of the lambs and kids increases the chance of survivability. Proper preventive measures such as vaccination, dipping, and deworming against various diseases should be adopted.

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