

LAMB MORTALITY AND CAUSES

A nine year summary at the Spooner Agricultural Research Station

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INTRODUCTION

The number of lambs born per ewe is certainly an economically important trait in a commercial sheep enterprise. However, profitability is largely determined by the number of lambs sold per ewe. Therefore, a great deal of effort should be put toward the care of pregnant ewes and their lambs before, during, and after birth. A knowledge of when and how lamb mortality occurs could be helpful to keep the mortality rate to a minimum.

A summary of nine years of lambings at the Spooner Agricultural Research Station, UW-Madison is presented here. We tried to see whether there were differences in mortality due to sex of lamb, breed of ewe, year, age of ewe, type of birth, season of birth, breed of sire, and weight of lamb at birth. Moreover, determination of age of lamb at death and the principal causes of death may help develop management strategies to keep mortality as low as possible.

Lambing procedures

During the nine years, lambing occurred mostly in January, February, March, and early April with a few lambs born in May and in the Fall. In winter, ewes were brought in the barn 2 to 3 days before lambing. Fall lambing occurred on pasture or in outside lots with little supervision.

Winter lambing of 300 ewes is supervised by two people in shifts, and the work routine is as follows:

First shift: 4 a.m. - Noon

- Take care of lambs born prior to 4 a.m.
- Dismantle and clean up all material used in the artificial rearing operation
- Feed bottle lambs
- Weigh, ear-tag and record all lambs born in the previous 24 hours
- Feed and check all other animals.

Second shift: 9 a.m. - Midnight

- Work with first shift for tail docking, vaccination, weaning, clean up jugs, etc.
- Feed bottle lambs at 12 a.m., 4 p.m., 8 p.m. and 12 p.m. Train lambs on lamb bar.
- Make rounds every two hours and take care of lambs born until end of shift at midnight

Ewe management

Ewes are vaccinated only for *Clostridium Perfringens* one month before lambing. Ewe lambs are vaccinated twice: six weeks before lambing and with a booster vaccination three weeks before lambing. No other vaccinations are performed.

Winter feeding of ewes consists of haylage or corn silage up to four weeks before lambing. They are then switched to grass-alfalfa hay with one pound of shelled corn. The corn ration is

increased to 2 pounds at lambing and for the first four weeks of lactation. In 1996 and 1997, ewes to be machine-milked received two pounds of a dairy ration (18%CP) while suckling their lambs and three pounds of the same ration as soon as they started milking.

In general, ewes are not shorn before lambing. However, crutching of half the belly and the rear end is practiced. Ewes lambing in late April-May are shorn. Ewes lambing in the fall have a 4 to 6 month fleece.

Lamb management

At the winter and early spring lambings, ewes lamb in the barn. As soon as lambs are born, they are placed in 4' x 5' jugs for 48 hours. All jugs are cleaned, and barn lime spread before being reused again. Until 1995 umbilical cords were only clipped and dipped in iodine as soon as possible after birth. Starting in 1995, umbilical cords were also tied with synthetic suture #2.

Soon after birth, the shepherd decides whether or not the ewe can raise all her lambs. If not, the lamb(s) is grafted to another ewe (when possible) or transferred to the "orphan" pen where it will receive two feedings of thawed cow colostrum and thereafter a high quality lamb milk replacer. Over nine years, 13% of all lambs born were raised on milk replacer. Orphan lambs are weaned as early as possible at an average of 25 days of age. All lambs suckling their dams are weaned at 60 days. Lambs born from machine-milked ewes in 1996 and 1997 were weaned at 30-34 days of age.

Lambs are given one cc of Bo-Se soon after birth. Lambs are vaccinated for Clostridium Perfringens at 30 days of age or on weaning day for orphan lambs. All lambs have access to a creep ration (20% CP) from a few days after birth. The creep ration contains a coccidiostat.

After release from the jugs, lambs and ewes are placed in mixing pens of 25 to 30 ewes. Before the next group of ewes come in the barn for lambing, all lambs and ewes of the previous group are put in outside lots where lambs only have access to a three-sided shelter.

RESULTS

A total of 5,425 lambs were born (alive or dead) during the last 9 years (1989 through 1997). Five hundred-thirty-six lambs (9.9%) were born dead or died before weaning. This overall mortality rate is too high and certainly reduces the profitability of any sheep enterprise considerably. At a price of 80 cents per pound of live lambs, and a cost of production of 30 cents, this lamb mortality represents a lack of income of close to \$32,160 over 9 years or \$3570 per year. All aspects of management should, therefore, be sharply scrutinized to detect where improvements can be made.

Effects of sex

	<u>Males</u>	<u>Females</u>
Total born	2654	2771
Total dead	280	256
% mortality	10.5%	9.5%

Male lambs have a slightly higher mortality rate than females. However, there is very little the shepherd can do about this.

Effect of breed of ewe

	<u>Targhee</u>	<u>Commercial</u>	<u>Romanov x Targhee</u>	<u>Finn x Targhee</u>	<u>East Friesian Crossbreds</u>
Total born	690	1580	1664	906	585
Total dead	70	119	191	117	39
% mortality	10.1%	7.5%	11.4%	12.9%	6.6%
Avg. litter size	1.94	2.02	2.52	2.18	1.82

The two breeds with the highest mortality rate are, of course, the breeds with the largest litter size. This was to be expected. The Targhee breed, however, with a more modest litter size, has a higher than acceptable mortality rate. Commercial ewes (mostly of Dorset breeding with 1/4 Romanov or 1/4 Finn) and East Friesian crossbred ewes are faring fairly well. Although the mortality rate of lambs from prolific breeds is higher than in the other breeds, the number of lambs alive at weaning per ewe lambing or exposed is still far superior.

Effect of year of lambing

	<u>1989</u>	<u>1990</u>	<u>1991</u>	<u>1992</u>	<u>1993</u>	<u>1994</u>	<u>1995</u>	<u>1996</u>	<u>1997</u>
Total born	409	497	603	642	736	753	611	586	588
Total dead	56	55	48	60	64	81	49	90	33
% mortality	13.7%	11%	8%	9.3%	8.7%	10.7%	8%	15%	5.6%
Avg. Litter size	1.96	2.09	2.23	2.10	2.36	2.34	2.12	2.07	1.96

There are large variations between years that are difficult to explain. The mortality does not seem to be dependent on the total of lambs born (relationship between number of lambs and available labor) or on the number of lambs born per ewe.

The high mortality rate of 1989 can be explained as follows:

1. As we have seen previously, the Targhee breed, although having a relatively lower litter size, has a high mortality. In 1989, Targhee ewes composed more than half of the Spooner flock.
2. Romanov x Targhee and Finn x Targhee ewe lambs born in 1988 were bred at the age of seven months with a terminal sire breed (Hampshire). The result was many lambing problems because of large lambs born from immature ewes. Our recommendation would be to not breed ewe lambs with a breed of ram of large mature size.

The high mortality rate of 1996 is due to a confirmed case of toxoplasmosis. Toxoplasmosis is a disease transmitted primarily by cats causing abortion, dead lambs at birth, or weak lambs at birth according to the stage of pregnancy at the moment of infection. The disease is transmitted through cat feces contaminating the feed. Eliminating all cats or periodic testing of cats for the disease will eliminate the problem and one cause of lamb mortality.

Effect of age of ewe

	<u>Adults (2 year+)</u>	<u>Ewe lambs</u>
Total born	4080	1345
Total dead	374	162
% mortality	9.2%	12%
Avg. litter size	2.30	1.86

Although the average litter size of ewe lambs is much lower than of adult ewes, the mortality rate of their lambs is greater. Ewe lambs generally have a poorer maternal instinct and do not always take care of their lambs immediately, leading to hypothermia. However, the main cause of mortality of lambs born from ewe lambs in our flock was due to the use of a large terminal sire breed. In 1989, the mortality rate of lambs born from ewe lambs reached 19% and practically all dead lambs were the result of difficult birth.

Effect of type of birth

	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
Total born	491	2626	1842	412	35	12	7
Total dead	25	191	253	57	5	5	0
% mortality	5%	7.2%	13.7%	13.8%	14.3%	41.6%	0%

The mortality rate increases as the number of lambs in the litter increases. Lambs born single or twins have little reason to die as long as reasonable care is provided. The mortality rate increases in lambs born as triplets or greater. However, there is no big difference between triplets, quadruplets, and quintuplets. This can be explained by the fact that the Spooner management includes the systematic raising of surplus lambs on milk replacer. In a well organized and clean system, the artificial raising of surplus lambs can be very satisfying and economically worthwhile (see Proceedings of Spooner Sheep Day, 1993).

Effect of season of birth

	<u>Winter</u>	<u>Spring</u>	<u>Fall</u>
Total born	3912	1142	371
Total dead	383	111	42
% mortality	9.8%	9.7%	11.3%

Although the weather is generally ideal for lambing in September-October, the mortality rate is higher because of less care given to lambs during a practically unattended lambing. Ewes lambing in the fall were of Romanov x Targhee breeding with a substantially lower litter size than in the spring.

Effect of breed of sire

	<u>Targhee</u>	<u>Dorset</u>	<u>Hamp</u>	<u>EF Crosses</u>	<u>Romanov</u>	<u>Finn</u>	<u>Texel</u>	<u>Polypay</u>
Total born	164	1550	1705	969	375	241	363	58
Total dead	22	115	224	102	38	16	17	2
% Mortality	13.4%	7.4%	13.1%	10.5%	10.1%	6.6%	4.7%	3.4%

It is, of course, difficult to disassociate the sire effect from the breed of dam effect. However, some trends can be pointed out.

1. Targhee rams were used to breed exclusively Targhee ewes. The livability of Targhee lambs is not particularly good.
2. Dorset rams were used to breed mostly Romanov x Targhee or Finn x Targhee ewes with high prolificacy, as well as East Friesian crossbreds and Dorset crossbreds - both with moderate prolificacy. The mortality of lambs is acceptable, making the Dorset one of the top choices as a ram breed.
3. Hampshire rams were used to breed Romanov x Targhee and Finn x Targhee ewes. The mortality of lambs is high when compared to Dorset rams.
4. East Friesian crossbred rams bred RT and FT ewes as well as East Friesian crossbred ewes. Mortality of lambs is barely acceptable.
5. Romanov and Finn rams were used to breed Targhee ewes. Romanov rams were also used for upgrading to pure Romanov, therefore increasing the litter size of the ewes to a high level. Lambs born from Romanov or Finn rams are very vigorous at birth.
6. Texel and Polypay rams were used to breed RT, FT, and Dorset cross ewes. Their lambs were vigorous and had a low mortality rate. Texel rams as terminal sires would be a top choice in terms of lamb livability.

Effect of birth weight (lb.) of lamb

	<u>2-5</u>	<u>5.1-7</u>	<u>7.1-9</u>	<u>9.1-11</u>	<u>11.1-13</u>	<u>13+</u>
Total born	104	608	1484	1781	977	310
Total dead	40	91	137	125	48	20
% mortality	38.4%	15%	9.2%	7%	4.9%	6.4%

The weight of lamb at birth has a tremendous impact on the ability of the lamb to survive. The mortality of lambs weighing less than five pounds at birth is extremely high, but improves steadily for each two pounds more at birth. Lambs weighing between nine and 13 pounds have a low mortality rate. The rate tends to increase with lambs weighing more than 13 pounds.

Nutrition of the ewe at the end of gestation and number of lambs per ewe are the two main factors affecting the weight of the lambs. Undernourished ewes will give birth to smaller lambs prone to an early death, whereas the single lamb of an overnourished ewe may be too big for a chance of survival.

Age of lambs at death

Total lambs dead:		536	
Died at:	0 day:	356	66.4%
	1 day:	14	2.6%
	2 days:	26	4.9%
	3 days:	15	2.8%
	4 days:	10	1.9%
	5 days:	17	3.2%
	6 days:	6	1.1%
	7 days:	6	1.1%
	8-15 days:	39	7.3%
	16-30 days:	47	8.8%

The table shows that more than 66% of all dead lambs died either before, during, or shortly after birth. Another 18% died during the first eight days of life. Therefore, the large majority of deaths occur prior to or during lambing. The attention of the shepherd should then focus on this period.

Causes of death at 0 days

Total dead at 0 days:		356 (out of 536)	
born dead	:	69	} 44.4%
born dead toxoplasmosis	:	29	
born dead deformed	:	36	
born dead due to ewe sickness	:	24	
died at birth dystocia	:	32	
died at birth no rupture of amniotic envelope	:	21	
died at birth weak	:	15	
died at birth exposure to cold	:	30	
died at birth reason unknown	:	100	

Up to 44% of lambs dead at 0 days (30% of all dead lambs) were stillborn for one reason or another. Most of these stillbirths are clearly due to faulty management such as toxoplasmosis (not getting rid of contaminated cats) and sickness of ewes which is mostly ketosis, a typical malnutrition of highly prolific ewes at the end of gestation. Two simple management decisions could reduce the number of stillbirths by a third.

With highly prolific ewes, some stillbirths or some very small lambs born weak are unavoidable no matter how good the management. The reason is that, in the uterus, the number of cotyledons providing the blood supply to the embryos is determined soon after implantation. The number of cotyledons is distributed randomly to each embryo present in the uterus. It may happen that some embryos do not receive enough cotyledons resulting in a low blood supply. Some embryos would die at an early stage (this mortality will not be perceived by the producer), at a later stage near birth or the lamb will be born very small and weak.

Six percent of all dead lambs died at birth because of a difficult parturition. Mal-presentation in a large litter accounted for half of them, the other half being due to lambs too big to pass easily through the birth canal. The use of large framed, muscular terminal sires on immature ewes is not recommended.

Two other causes of mortality could be easily avoided with more supervision at lambing time. The Spooner management includes the sorting of pregnant ewes by udder palpation. Ewes close to lambing are put in the barn, the others are kept outside until the next sorting. Some mistakes are made during sorting. Lambs born outside in the middle of Wisconsin winters have little chance of surviving. Also, quite a few lambs were born without rupture of the amniotic envelopes leading to a quick death of the lambs by drowning. Closer supervision would allow the shepherd to quickly rupture the bag and save the lambs.

Another 100 lambs died at birth without apparent reason. They were generally of a good size and alive at birth. Although some of those death could be attributed to poor mothering ability of some ewes, most of them are certainly due to management such as overcrowding in the lambing area.

By applying better management techniques, better nutrition to ewes carrying three or more lambs, and respecting simple hygiene principles (no infected cats allowed in barn), more than 2/3 of all stillbirths could be avoided, lowering the overall mortality from 10% to 7%.

Causes of death from 1 to 7 days of age

Total dead from 1 through 7 days: 94 out of 536

Unknown	:	3
Ewe laying on lambs	:	24
Lambs destroyed for malformation	:	8
Starvation	:	5
Pneumonia	:	8
Cold-exposure	:	7
Weak from birth	:	3
Overeating	:	1
Accident	:	5

Small lambing jugs and overcrowded mixing pens can lead to high mortality of lambs due to the ewes laying on their lambs. Starvation, exposure (often associated with a lack of milk), and accidents (feeders falling on lambs, trampled, etc.) are also another managerial source of deaths. Although the cause of death of 30% of the lambs could not be diagnosed, it is safe to assume that half of them were due to faulty management. Therefore, lamb mortality between one and seven days of age could be greatly reduced by slight modifications of lambing management: i.e. slightly bigger lambing jugs, less ewes and lambs in mixing pens, closer supervision of poor-doing lambs.

Causes of death from 8 days to weaning

Total dead between 8 days and weaning: 86 out of 536

Unknown	:	45
Killed by ewe	:	6
Euthanized crippled	:	12
Starvation	:	2
Pneumonia	:	12
Overeating	:	9
Accident	:	2

Only 16% of all death occurs between 8 days of age and weaning. The causes of death are more difficult to diagnose without a full necropsy of the lambs. Therefore the number of

pneumonia and overeating problems may be underestimated. Crippled lambs were saved in the hope that their crippled condition would improve. When it did not, those lambs were euthanised since their market value would have been close to nil. In this age group, metabolic disorders and diseases are certainly the prevalent causes of death.

Conclusion

After careful examination of the various tables presented here, it appears that almost all lambs of any sex, any breed, and born any time of the year should be born healthy and vigorous. The exception may be some lambs born from very large litters. More than 3/4 of all mortality had its cause in faulty or inadequate management of either ewes, lambs, or facilities. Simple improvements or modifications in the overall management of the flock **before, during and after lambing** will greatly reduce the number of deaths. Improvements and modifications would include:

- Improving facilities to avoid overcrowding and accidents and to provide a healthier environment.
- Adopting new and proven techniques such as artificial rearing of some lambs and selection of ewes for ease of lambing and good milk supply.
- Following a good nutrition plan.
- Respecting the fundamentals of hygiene.
- Deciding on a health plan with a veterinarian and following it scrupulously.

There is no miracle drug for a dead lamb, practically none for a weak lamb, and if the lamb is healthy, it does not need any drug. Reducing lamb mortality to an acceptable 4 to 5% should be the number one priority of any sheep producer.