Artificial rearing of lambs – avoiding abomasal bloat.

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ABSTRACT

Triplets occur when lambing percentages exceed 130%. When triplets are left with their dam, survival is often less than 75%. Artificial rearing of one lamb from each set of triplets offers the chance to increase survival rates. But experience to date has frequently resulted in death rates of 10% to 30% of lambs. On the author's farm about 100 sets of triplets are born each year. In 2002 an artificial rearing system was put in place based on the Poukawa system. The smallest triplet from each set was removed for artificial rearing. In 2002 and 2003, when lambs were 3 to 5 weeks old, up to 25% died. A worldwide information search suggested that the disorder was possibly abomasal bloat. A Norwegian method of preparing "soured" milk replacer that had been demonstrated to limit abomasal bloat was adapted for New Zealand conditions. Lambs are fed cow colostrum for two days, followed by *ad lib*. cold "soured" whole milk replacer and *ad lib*. meal. In 2004 and 2005, there have been no deaths due to abomasal bloat. Total deaths from 199 lambs have been 9. Live weight gains of the lambs have been 220-250 grams per day till 8 weeks.

Keywords: Artificial rearing; lambs; abomasal bloat; soured milk

INTRODUCTION

High fecundity ewe breeds and the use of Androvax have lead to many flocks giving birth to significant numbers of triplet lambs. Lamb survival decreases from singles to twins and to triplets. Various studies report survival rates for triplets ranging between 57% lambs weaned per lamb detected at ultrasound pregnancy scanning (Nicoll *et al*., 1999) to 76% live lambs at 12 weeks of age per lamb born (Thomson, 2005). Many of the losses are from lambs dying at birth. But, of all the live triplet lambs born in these two studies 25% and 14% died before weaning or 12 weeks of age respectively. As high lambing flocks become more common, this source of wastage is of greater importance.

A philosophy that is widely held believes that if one wishes to engender high lambing percentages, then there is a duty of care as well as the potential financial advantages to keep as many of the lambs alive as possible. Numerous systems have been developed to artificially rear lambs. Schouten (2004), reports death rates in an artificial rearing system of 29 and 33% on each of two South Canterbury farms. Thirty percent of the deaths were diagnosed as abomasal bloat. A FITT trial, Anon., (1997) used cow's milk to which lamb milk powder, yoghurt and colostrum keeper had been added. A death rate of 10% was reported, but none of these deaths were due to abomasal bloat.

Abomasal bloat occurs most commonly in hand reared lambs when they are 2 to 4 weeks old and on once-daily or *ad lib* warm milk feeding. Typically, within 30 minutes of feeding warm milk replacer, the abdomen becomes bloated, there is acute depression, pain and colic and lambs quickly die if left untreated. On examination the abdomen is grossly distended and may have ruptured. The rupture may occur prior to, or after death. There are reddish areas in the wall, the rupture often occurs at these sites. Under microscope small packets of cocci bacteria can be identified. These packets of *Sarcina* species bacteria are a common finding in cases of abomasal bloat, but rarely seen otherwise. The main cause appears to be sudden gorging and uneven intakes. The bacterium *Clostridium sordelli* has also been implicated.

On the author's farm, just over 100 triplet lambs are hand reared each year. They are Coopworth, Coopworth-Romney cross and Suffolk cross. When confronted with losses of up to 25% of artificially-reared lambs, we had three post mortem examinations performed. These did not yield a satisfactory diagnosis or effective treatment, and so we began a search to find accurate diagnosis. Eventually, we found help from Dr Synnove Vatn (1999) of the Norwegian School of Veterinary Science and Ingebreth Sandhu, a Norwegian farmer. As a result, we have developed a system of feeding milk replacer to lambs that has eliminated losses from what we believe to be abomasal bloat.

THE SYSTEM

One of each set of triplets born alive is removed as soon after birth as it is observed under twice-a-day shepherding. It is usually the smallest

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lamb and it is unknown whether an individual lamb has received sheep colostrum. On entering the feeding shed, all lambs are routinely treated with iodine to limit naval ill and injected with vitamin B12 and iron. No more than 10% of lambs will receive an antibiotic injection to treat such problems as pneumonia or arthritis.

The feeders have 12 teats with 20-24 lambs per pen. They are cleaned once every four days. A deep layer (approximately 10cm) of untreated wood shavings is topped up regularly. Moozlee is fed in plastic roof guttering. Pens are disinfected with Virkon once a week.

Table 1 shows that lambs are fed warm day one cow's colostrum that is free of antibiotics on days one and two. Each lamb is fed colostrum 5 times a day and receives a total of 15% of its live weight per day. The colostrum may be fresh or may have been frozen for storage. Warm calf milk replacer (CMR) is fed on days 3 and 4.. Soured cold CMR is gradually introduced on day 4. From day 5 till day 28, *ad lib.* cold soured CMR is available *ad lib* for 24 hours a day. From day 5, *ad lib*. Moozlee, chaffhage, pasture hay and reticulated water are on offer in the shed. On day 28, provided lambs have reached 12 kg live weight, the soured CMR is withdrawn. Lighter lambs continue to have access until they reach 12 kg. The Moozlee feeding plus access to ryegrass/white clover pasture continues till day 42 or longer until lambs achieve 20 kg live weight.

Table 1 describes the average intakes. However, there always seems to be a small number (up to 15) that do not thrive as well as the majority for unknown reasons. These lambs are fed Moozlee beyond day 42 and so total quantities of feeds used are slightly in excess of what can be derived from table 1. (See Table 3)

The CMR used is standard whole milk powder, widely used for calf rearing, mixed at 125gm/litre. It contains 27% crude protein and 41% lactose. Moozlee is a steam-flaked meal containing 18% crude protein with a metabolisable energy content of 12.5 megajoules/kg. Lambs find it highly palatable and their intake has to be restricted after day 28. The chaffhage was made from lucerne hay.

Each lamb consumed a total of 10.5kg CMR powder, 17kg Moozlee and 208gm chaffhage.

The soured CMR was prepared as follows:

Starter

- Add 200mls acidophilus yoghurt to 5 litres CMR at 40^0C and keep it warm for 24 hours.

Sour milk

- Put 30 litres of warm (40^0C) water in a 75 litre container. Add 10kg of CMR and 2 litres of starter. Mix until smooth, cover and keep warm till set (24hrs) and leave for a further 24 hours.
- Remove 2 litres of top crust to use as the starter for the next batch and store it in a refrigerator or cool place.
- Thoroughly mix the remaining sour milk and sieve to remove lumps.
- Add water to make 80 litres.

Soured milk will last up to 5 days in a cool place.

The feeder consisted of a 75 litre rubbish bin with lid. Twelve holes of sufficient diameter to accommodate the teats were evenly spaced around the container, 350mm from the ground. A plastic tube ran from each teat to the bottom of the feeder and was fitted with a non-return foot valve. The teats were regularly checked to ensure the soured milk flowed properly. The feeder was in the pens continuously. It was shaken from time to time to disperse any sediment

TABLE 1: Feeding system until lambs are 6 weeks old and at least 20kg live weight.

Lamb Age	Feeding System	Quantities Consumed/lamb
Days 1-2	5 times/day, warm cow's colostrum, 15% of live weight.	800ml/day for 5kg lamb 600ml/day for 4kg lamb
Days 3-4	4 times/day, warm calf milk replacer (CMR), 15% of live weight. Soured milk added to CMR on day 4.	As above
Days 5-21	*Ad lib* cold, soured CMR, fed once per day, plus *ad lib* Moozlee and chaffhage.	Approx. 325g/day CMR (2.6 litres/day), 365g/day Moozlee, 12g/day chaffhage.
Days 22-28	As for days 5-21 plus access to ryegrass/white clover pasture.	Approx. 650g/day CMR, 600g/day Moozlee
Day 28 or 12kg LW till day 42 or 20kg LW	Pasture plus restricted Moozlee morning and evening.	Approx. 250g/day Moozlee

RESULTS

A total of 112 lambs began on the system and 106 lambs survived to weaning. The 6 deaths were due to a neo-natal anaemia of which the cause is as yet unknown.

There were no cases of scours. There were no cases of abomasal bloat.

A sample of lambs was weighed when they first arrived at the feeding shed to determine early feeding levels. They averaged 4kg and ranged from 2.2 to 6.3kg. One group of 50 lambs was weighed at 8 weeks of age and a different group of 38 on 28 November. The age of the 28 November group was not accurately known, but is estimated to be 10 weeks. Table 2 shows the average live weights of both groups and estimated daily live weight gains of the 8 week group.

Table 3 shows costs of rearing each weaned lamb.

TABLE 2: Live weights and estimated daily live weight gains.

	8 week		28 November	
	Coop & Rom-Coop	Suffolk cross	Coop & Rom-Coop	Suffolk cross
Average live weight (kg)	16.4	17.8	19.9	21.4
SEM	0.44	0.42	0.64	0.74
Live weight gain (g/d)	222	247	227	249

TABLE 3: Quantities and costs of feeds used to rear 106 lambs.

	Total quantity (kg or l)	Total cost ($)	Cost per lamb
Colostrum	100 l.	100.00	0.94
Calf milk replacer	1113	3803.01	35.88
Moozlee	1800	1497.36	14.13
Chaffhage	22	16.88	0.16
Total		5417.25	51.11

DISCUSSION

Adapting the milk feeding system to using soured milk eliminated lamb losses from abomasal bloat. It has been a more successful system for this aspect compared to that of Schouten (2004) where affected lambs were treated with baking soda or the bloat was deflated with a needle. The overall death rate was 31% and abomasal bloat accounted for 30% of all deaths. No deaths from abomasal bloat were reported in the FITT trial, but the overall death rate was 10%, mainly scours, pneumonia and scabby mouth.

Live weight gains of 220 – 249g/day compare favourably with those achieved by Schouten (193g/day to 10 weeks, and 210g/day to 14 weeks on the second property), and Muir (175g/day to 8 weeks).

The cost of rearing each lamb to a minimum live weight of 20kg was $51.11. This cost could have been reduced if a set of scales was more readily available. Lambs could be regularly weighed and those reaching 20kg could have been weaned from Moozlee earlier. In the 28 November group, 58% of lambs weighed more than 20kg before being weaned. It is estimated that these lambs, on average, had been fed Moozlee for 11.5 days after they had reached 20kg. This represents $2.42 per lamb. However, economics are not the only consideration in this system. The primary driver for artificially rearing triplet lambs on this farm comes from the duty of care that arises with high reproduction rates. If one assumes that one third of all triplet lambs would die if left on their mothers, and that the death rate of the "twins" which are left on their mothers is 15%, then this technology has reduced the deaths of all triplet lambs from 33% to 12%. Six of the artificially-reared lambs died, and it is assumed that 34 of the "twin" lambs die. Hence, it is estimated that the technology has reduced deaths by 72 lambs. At a total cost of $5417 plus labour, each lamb saved has cost $75. The technology is clearly not economic when viewed in isolation. However, as part of the whole farm system to achieve high lambing percentages in an ethically-acceptable manner, it is felt that the artificial rearing costs can be regarded as just one component of the whole lamb production system.

The main aim of adopting soured CMR was to eliminate abomasal bloat. The system achieved that. The very limited use of antibiotics in the system suggests that it may be appropriate technology for farmers who follow organic production practices, provided they can source organically acceptable CMR and meal.

From an economic point of view, the system can be improved. From here onwards, there will be more concentration on routine monitoring of milk intakes and using scales to determine when to stop feeding individual lambs CMR and Moozlee. Secondly, since a newborn lamb weighing 5kg begins growing rapidly much more readily than a lamb weighing only 3kg, consideration will be given to whether to take the heaviest of a set of triplets instead of the lightest. The viability of this option will depend on the survival and growth rates of the smaller triplets when left on their mothers.

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