

THE PROFITABILITY OF IMPROVING LAMBING PERCENTAGES

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Increasing ewe lambing percentages has the potential to improve farm profitability. However this depends on the level of fertility already being achieved by the ewes, the level of survival of the lambs as well as the lamb selling strategy that is implemented. Farmers need to carefully consider the implications of whether or not to focus on improving ewe fertility further.

Since the removal of subsidies in 1984 New Zealand farmers have increased productivity in an attempt to maintain or enhance the economic viability of their operations. For example the average number of lambs tailed per ewe mated in New Zealand has increased from 98 per cent in 1984 to 126 per cent in 2006.

COSTS OF EWE FERTILITY

Increasing lambing percentage can come at a cost. Higher ewe fertility in general will increase ewe pregnancy and lactational energy requirements. For example an extra lamb for a ewe requires an extra 20 kilograms of dry matter for pregnancy and an extra 100 kilograms for lactation. This may require a reduction in the number of ewes carried on a farm.

At higher flock lambing percentages, the proportion of triplets and quadruplets increases. The average proportion of singles in a litter can halve from survival to sale lambing percentage of 125 per cent to 150 per cent. This is made up for by an increase in twin and triplet lambs.

Triplets and quadruplets can have over 20 per cent lower survival rates from birth to weaning which contributes to the costs of higher ewe fertility. Many farmers also find the management involved with triplets and quadruplets more difficult. On the positive side, increasing lambing percentages may allow for more of the spring surplus to be consumed by stock allowing for higher pasture quality and reducing the requirement for costly hay or silage making. The question of whether increasing lambing percentages makes economic sense then becomes an issue to consider.

COMPUTER MODELLING

Simply comparing the profitability of farms with various lambing percentages may not lead to an accurate depiction of the relationship between lambing percentages and farm profitability. There are many variables that can differ between farm systems that could make it difficult for a reliable comparison to be made. Climatic variation and differences in management practices between farms are such examples of variability that can render analysis between real farms unreliable.

Computer models can be used to ascertain whether increasing lambing percentages produces greater profits to farmers. A computer model that simulated a typical Canterbury dry land sheep and beef farm was developed as part of a masters degree. The model involved a linear programme which was designed to obtain an optimal solution. In this case the linear

programme changed the number of stock on the farm to maximise farm profits. At several levels of ewe fertility the model was used to calculate the maximum possible net profit the farm could make, taking into account the farm's finite feed availability throughout the year.

There are many different measures of lambing percentage used by farmers, consultants and researchers. For example, researchers often use the term ewe prolificacy or number of lambs born per ewe lambing, but farmers may find this hard to relate to. The number of lambs sold and retained for replacements per ewe mated is a lambing percentage measure that most farmers and consultants are familiar with. This will be the measure that is referred to in this article.

MODEL FARM

A Canterbury/Marlborough dry land sheep and beef farm similar to that described in MAF monitoring reports was used as a basis for the farm model. Farm parameters included –

- 378 hectares of effective area
- Winchmore unirrigated pasture growth
- Average South Island monthly pasture quality
- 10 hectares of swedes and 10 hectares of kale yielding 6,000 kg dry matter per hectare for winter feed
- Cattle numbers set to around seven per cent of the number of ewes
- Ewes producing four kilograms of clean wool a year at four dollars a kilogram
- \$57.33 average lamb price with a 17 kg carcass
- \$40 cull ewes
- One stock unit was equivalent to a 6,000 MJME energy requirement.

The farm net profit was calculated by adding the returns from the lamb, ewe, cattle and wool sales and subtracting from this the sum of variable costs. These costs were based on the number of stock units on the farm, as well as the fixed costs that were in proportion to the total area of the farm. Feeding and genetics of the ewes at mating time in April set the lambing percentages for the model. There is a positive relationship between the weight of ewes at mating time and their subsequent ovulation rates. However this relationship plateaus at approximately 67 kg.

To alter the level of ewe fertility a multiplier was used to increase or decrease the relationship between ewe live weight at mating and their ovulation rates. This multiplier simulated genetic variation in fertility that occurs naturally between flocks. When the fertility was altered, so did their feed requirements.

Lamb live weight gains were differentiated between the single at 156 grams per day, twin at 130 grams a day, triplet at 104 grams a day and quadruplet 83 grams a day. A fixed proportion of the lambs available for sale were sold prime each month from November to June. The proportions sold each month varied from 10 per cent of lambs available in November, to 20 per cent in December, 30 per cent in January, 20 per cent in February with the remainder sold from March to June.

LAMBING PERCENTAGES AND PERFORMANCE ON FARM PROFITS

The base trend line in the graph shows how farm profitability relates to lambing percentage when average levels of lamb survival and live weight gain performance are achieved. It shows an increasing trend in profitability when lambing percentages increase from 100 per cent to approximately 150 per cent.

A greater number of lambs available for sale is a major reason for this increase. As the lambing percentage increases, a smaller proportion of the total lamb drop needs to be retained as replacements. Therefore most farmers in the 100 per cent to 150 per cent range will likely benefit from improving ewe fertility.

Above the 150 per cent mark, farm profitability reduced. A rise in the proportion of triplets and quadruplets was the most significant factor contributing to the negative trend. While ewes are scanned at higher percentages, a higher proportion of lambs did not survive from scanning to sale. All feed that went into the ewe for pregnancy and lactation for lambs that eventually died before slaughter was effectively being wasted.

The ewes still needed to be allocated the extra feed for the higher lambing percentage, which required a reduction in stocking rate as lambing percentage increased. For example from a lambing percentage of 124 per cent to 180 per cent the model estimated a reduction in the total number of sheep by 53 stock units in order to balance the supply and demand of feed. The table indicates the numbers of livestock over a range of lambing percentages. As is shown, more lambs born are produced from fewer ewes at higher lambing percentages.

Stock numbers estimated by the linear programme model over a range of lambing percentages

Parameter	New Zealand average			
Ewe profligacy percentage	152%	190%	252%	280%
Survival to sale percentage	124%	153%	180%	192%
Number of ewes	1789	1661	1478	1410
Number of hoggets	335	311	277	264
Number of lambs born	2720	3154	3731	3955
Lambs born actually sold	81%	80%	71%	68%
Stocking rate stock units per hectare	9.10	9.09	8.96	8.91

However, the table also shows that the average proportion of lambs that survived from birth to weaning dropped from 81 per cent to 71 per cent when lambing percentages increased from the New Zealand average of 124 per cent to 180 per cent. This means that more feed will be wasted on ewe pregnancy and lactational requirements for lambs that do not get to a selling age. Farmers who are close to the 150 per cent mark therefore may need to look closely into alternative ways of improving profitability to see how they compare with further improvements in ewe fertility.

Another way of measuring the level of ewe fertility is by scanning percentages. These percentages give farmers an idea of ewe fertility before lambs have been born. This can help farmers make management decisions to suit the respective level of fertility.

The optimal ewe fertility that the model calculated is equivalent to 200 to 210 per cent at scanning.

LAMB SURVIVAL AND PROFITABILITY

The first graph shows how much of an effect survival of triplet and quadruplet lambs have on profits. If these lambs were able to achieve survival rates equal to twins, the decline in profitability above the 150 per cent optimum would be slowed substantially, but not halted. In practice, achieving triplet survival rates that are the same as twins would be very difficult.

Triplet and quadruplet survival rates defined as the proportion of lambs that survive from birth to weaning would have to increase from 65 per cent and 55 per cent respectively to the 85 per cent survival rate of a twin lamb. A major limitation to improvements in triplet and quadruplet lamb survival is the physiological limitation of the ewe. Lamb survival is often influenced by birth weight, with larger lambs suffering from birthing difficulties, while smaller lambs with their high surface area to volume ratio and lower fat reserves are more vulnerable to climatic challenges. The optimal birth weight is generally regarded as being around 4.5 kg.

Ewe nutrition can be manipulated to increase lamb birth weights. However, ewes with many lambs may not be able to physically consume enough feed, nor have sufficient uterine space to grow the lambs to the desired birth weight.

An alternative way of improving the average survival rates of lambs would be to increase the proportion of twins in ewe litters relative to the level of fertility. As ewe fertility increases so does the proportion of triplets that are present in the ewe litter. This comes at the cost of having fewer single and twin lambs that have higher survival rates. However, the heritability of the trait for ewes that have higher fertility with fewer triplet and more twin lambs is low.

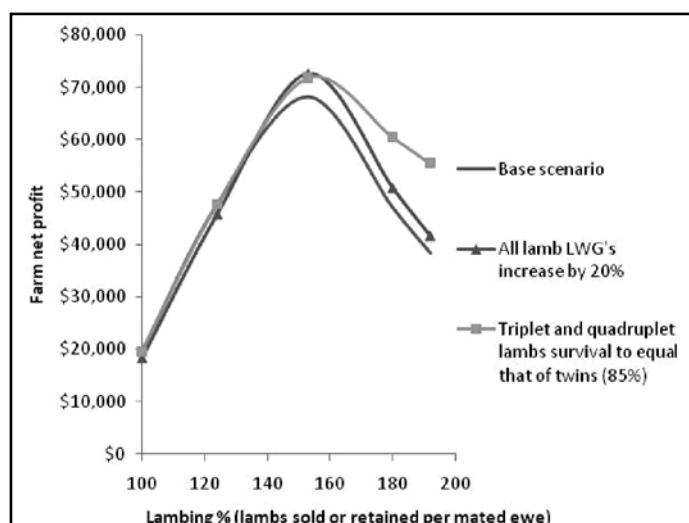
However as a long term breeding programme objective the benefits could accumulate and allow it to be a helpful way of improving the average survival rates of lambs. The fact that improving the triplet survival rates to that of twins did not halt the decline in profitability would suggest that other factors also contributed to the decline in profitability above 150 per cent.

LAMB LIVE WEIGHT GAINS AND PROFITABILITY

The average weight of triplets and quadruplets are lower at any given age owing to lower birth weights and lower live weight gains compared to single and twin lambs. At the optimal lambing percentage of around 150 per cent, increasing lamb live weight gains by 20 per cent produced a similar profit as increasing the survival rates of triplet and quadruplet lambs. Given that it is likely to be easier for a farmer to achieve 20 per cent higher lamb live weight gains compared to 20 per cent increases in lamb survival rates, it may be better for a farmer who is sitting near the optimal lambing percentage to look towards improving lamb growth rates.

Increasing ewe fertility above the optimal made lamb survival more important as a factor for improving profits. This was due to the fact that at higher ewe fertility more triplets and quadruplets were present meaning the increase in lamb survival would affect more lambs. However, at those lambing percentages the farmer may actually be better off reducing ewe fertility to allow for a higher stocking rate rather than trying to improve triplet and quadruplet survival.

Farm profitability in relation to lambing percentage, with variation in lamb live weight gain and survival



LAMBING PERCENTAGES AND SALES STRATEGIES

Triplet and quadruplet lambs will generally have lower carcass weights at any set age compared to their single and twin born counterparts. The model disadvantaged the triplets and quadruplets as it sold a set proportion of the singles, twins, triplets and quadruplets as prime each month. Triplet lambs that were under-weight at sale were doubly disadvantaged in that they were sold at a lower price per kilogram according to the schedule.

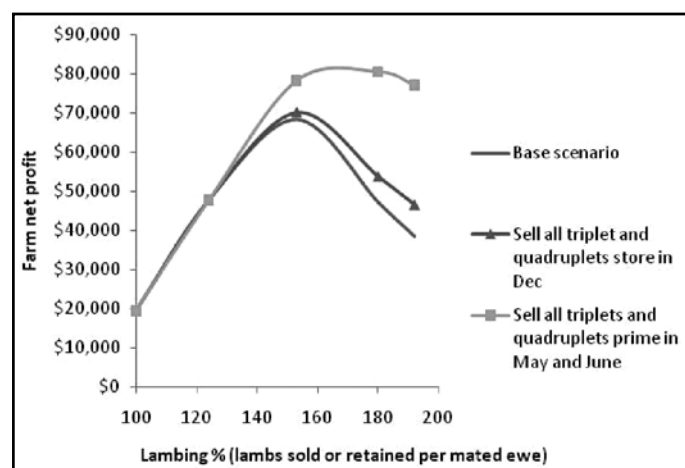
Therefore, a scenario which aimed to counteract the problem of lower prices for triplet and quadruplet lambs was included in the analysis. In particular the sales strategy of keeping the triplet and quadruplet lambs on later was implemented as is shown in the graph. Compared to the base scenario, holding off the sales of triplet and quadruplet lambs until May and June when there is generally a lift in lamb prices allowed farm profits to be maintained even at above optimum lambing percentages.

This indicates that profits when lambing above 150 per cent can potentially be maintained so long as the right sales strategy is put in place. An important word of caution is that while selling the triplet and quadruplet lambs later can help stop the decline in profits, there is risk involved in this strategy which was not accounted for in the model.

A significant risk involved in keeping the multiple lambs on until May and June is drought. This is especially important in a Canterbury dry land situation, but may be of lesser concern in a summer safe areas such as in parts of Southland. Either way there will be a cost involved with keeping on the lambs until later in the season. Even in a summer safe environment there could be a cost in the form of possibly lower ewe performance in the next year. For example using autumn feed for lamb finishing may do so at the expense of ewe nutrition at a pivotal time of the year. This could have a bearing on ewe ovulation rates and subsequent fertility in the next year.

Selling the triplets and quadruplets as stores early on in the season allowed for a slightly higher profitability at and above optimum lambing percentages. However, the risk would reduce significantly when implementing this policy. Selling the lambs as stores still did not halt the decline in profitability brought about by a higher proportion of lighter triplet and quadruplet

Farm profitability in relation to lambing percentage, with variation in lamb sales strategies



lambs with lower survival rates though. The benefits of selling stores or finishing lambs later must be balanced against the risk of drought.

Summary

Issues to consider when considering whether to focus on increasing ewe fertility or not, include –

- Increasing lambing percentages comes at a cost in the form of additional feed requirements as well as a greater proportion of lambs with lower survival rates and live weight gains. There may be a requirement for a reduction in stocking rates.
- When average lamb survival rates, live weight gains and ewe performance measures are being achieved the optimal lambing percentage was calculated as being around 150 per cent lambs sold or retained per mated ewe for a typical Canterbury dry land farm. This is equivalent to a ewe scanning percentage of 200 per cent to 210 per cent.
- The actual optimal lambing percentage will vary between farms according to the proportion of triplets in the ewe litters, and average lamb survival rates.
- Improvements in lamb survival and live weight gains could help increase the optimal lambing percentage. Farms with above average shelter or a breeding/nutrition programme focussed on lamb survival could have a higher optimal lambing percentage than was described.
- Improvements in triplet and quadruplet lamb survival showed the greatest promise of improving profitability at above optimum lambing percentages. However it is likely that it would be relatively easier to increase lamb growth rates, than to increase lamb survival described in this research.
- If a farmer is close to the optimal lambing percentage it may be better to focus instead on lamb growth rates.
- Selling policies can have a big impact on the profitability of farms at high lambing percentages. Selling triplet and quadruplet lambs later on in the season when prices rise may improve profitability. However, these policies can carry additional risks, especially in the event of drought or if they impact on subsequent ewe performance.

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