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An Analysis of the Profitability of Altering Ewe and Weaner Nutrition To Improve Weaner Survival

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Executive Summary

1.0 Background

The majority of the deaths occur during the first 3 months after weaning (Figure 1). During this 3 months approximately 68% of the total number of weaners that are going to, will have died. Deaths are then evenly spread through to 12 months of age and then decline for the remaining 4 months.

This indicates that nutrition of the weaners during the 3 months immediately after weaning will have the greatest impact on reducing weaner mortality. This coincides with the period leading up to joining and means that improving the nutrition of the weaners is competing for feed with getting the ewes into better condition for joining (Figure 2).

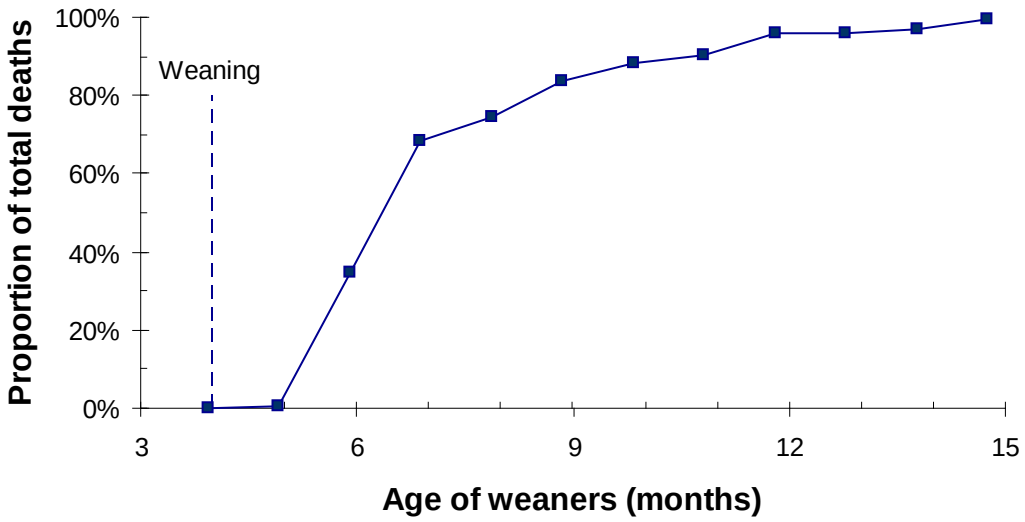

Figure 1.1: Proportion of the total post weaning mortality that has occurred by different ages during summer. Source: Angus Campbell *pers comm*.

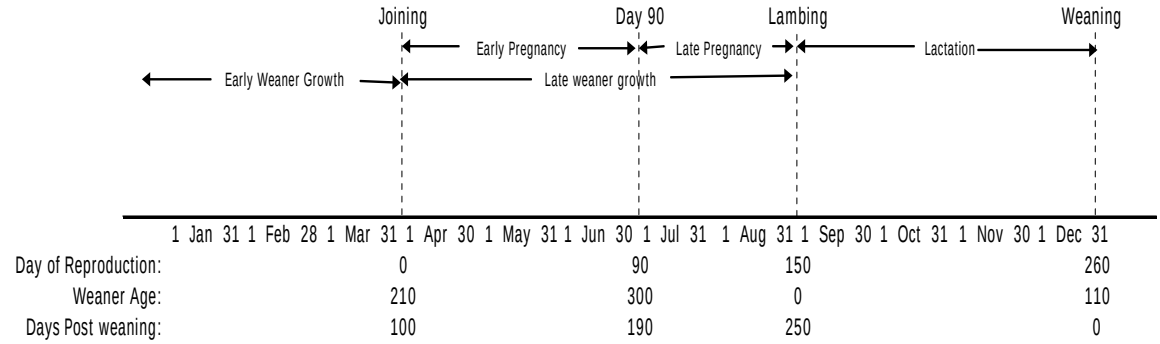

Figure 1.2: Timeline of events in the reproductive calendar, showing nutritioinal demand periods for ewes & weaners.

Both average weaning weight and growth rate of weaners post weaning has an impact on survival (Figure 3). Increasing summer growth rate from 0.25 kg/month (8 g/hd/d) to 0.50

kg/month (17 g/hd/d) reduces mortality significantly (30% if weaning weight is 22kg). An increase of a further 0.5 kg/month leads to a reduction in mortality of less than 5% if the weaning weight is 16kg or greater.

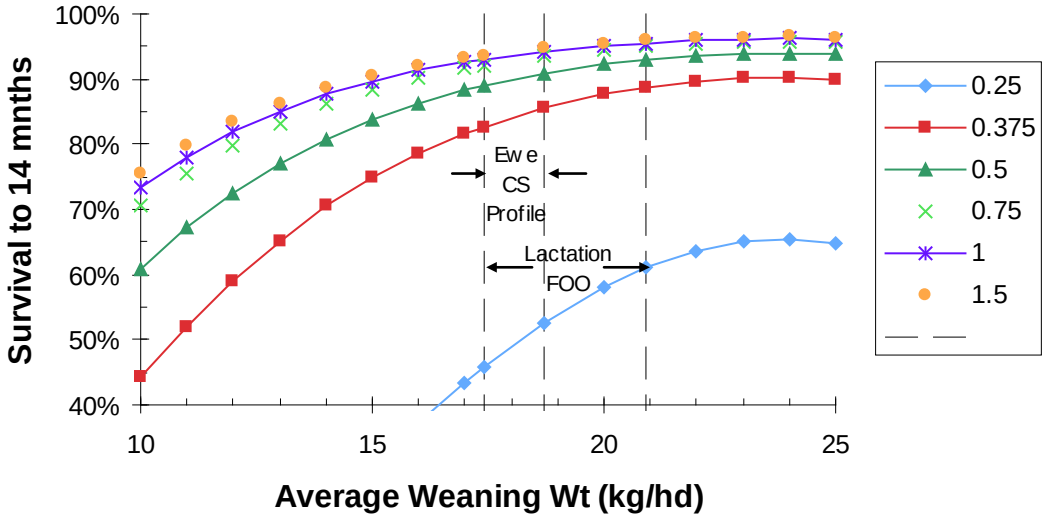

Figure 1.3: Survival of weaners to 14 months of age for different weaning weights and growth rates through summer. Graph shows impact of altering ewe condition score profile and FOO during lactation on expected weaning weights. Source: Angus Campbell *pers comm*.

The impact of altering ewe condition score profile within the range examined in the Lifetimewool analysis resulted in a range of weaning weight from 17.4kg up to 18.7kg. Altering FOO during lactation in the range from 1000kg/ha up to 2700kg/ha increases weaning weight by 3.5 kg/hd (see Figure 1.4). These increases in weaning weight increase weaner survival by as little as 1 or 2% if summer growth rate is greater than 0.5 kg/month or as much as 7% and 15% if summer growth is only 0.25% per month (Table 1).

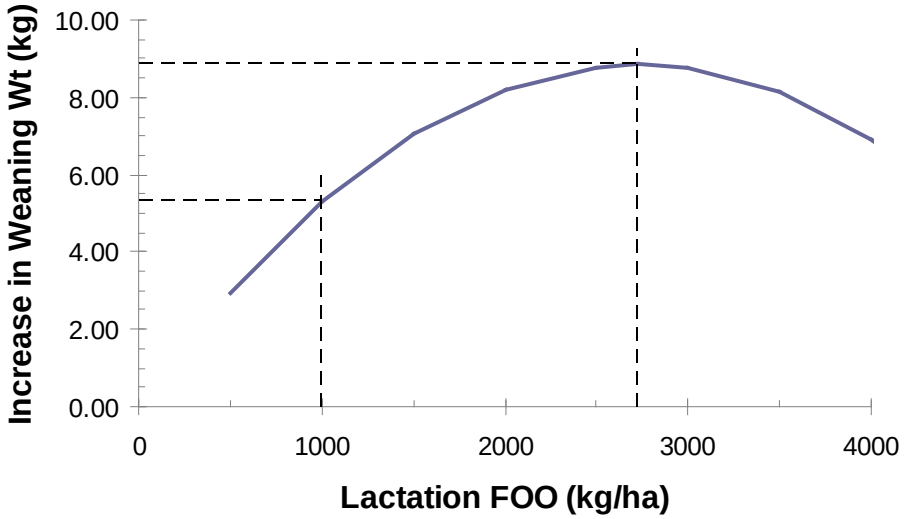

Figure 1.4: Impact of FOO during Lactation on weight of animals at weaning. Maximum weaning weight is achieved at 2700 kg/ha.

Table 1.1: Impact of altering ewe condition score profile and Lactation FOO from low to high values on weaning weight and weaner survival for different levels of weaner growth rate during summer and autumn.

	Wean Wt (kg)	Weaner Survival (%) with different summer growth rate			
		0.25 kg/mth	0.375 kg/mth	0.5 kg/mth	1.0 kg/mth
Low CS, Low FOO	17.4	46	83	89	93
High CS	18.7	53	86	91	94
High FOO	20.9	61	89	93	96

Equation 1.1: Equation fitted to Lifetimewool data to estimate weaning weight from Ewe CS profile during pregnancy.

WeanW = 11.8+ 0.18 LWJ + 0.24 (LW90-LWJ) + 0.19 (LWL-LW90) + 0.08 (LWW-LWL)
– 1.7(Twin reared as single) – 4.8(Twin reared as twin) (r2 = 0.42)

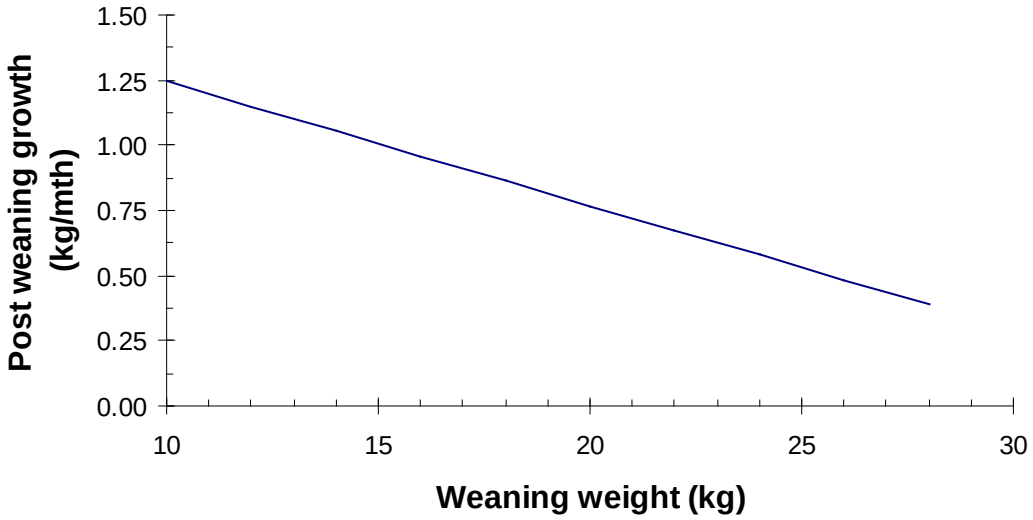

Figure 1.5: Average of the relationships fitted to the Lifetimewool data for weaning weight and post weaning growth.

When offered the same feed smaller weaners grow faster (Figure 1.5). This means that to get large weaners to grow quickly requires more and better quality feed than to get small weaners to grow quickly. If weaners are very large then it may be very difficult to achieve liveweight gain post weaning and the relationships developed by Angus Campbell indicate that even for heavy weaners the weaner losses are very large if growth rates drop below 0.25kg/month.

2.0 Analysis

To calculate the impact of including weaner survival on the profitability of different ewe condition score profiles the average weaning weight was calculated for each of the 27 profiles analysed in the Pregnancy Scanning analysis. The equation (Eqn 1.1) was used for this purpose. Weaner survival levels were then estimated using the spreadsheet tool developed by Angus Campbell assuming a flock with an average weaning weight and a summer growth rate of 0.75kg/month has an average mortality of 9.8%.

Given the small range of weaning weight generated by altering ewe CS profile, for the 2nd component of the analysis a range in weaning weight was arbitrarily generated so that optimum management could be examined for a range of weaning weights. The weaning weights examined were 10, 13, 18 and 25kg/hd. For each weaning weight a range of weaner growth rates were examined. The growth rates selected were based on a feed supply that would generate growth rates of 0.25, 0.375, 0.5 and 1.0 kg/month for 18kg weaners.

The growth rate of the lighter and heavier weaners on each feed supply was estimated using the relationship fitted to the Lifetimewool data that compared growth rate of weaners at varying starting weights (Figure 1.5). The fitted lines were averaged to give a single relationship between weaning weight and summer growth rate. The estimated growth rates are in Table 2.1

Table 2.1: Growth rate during summer for animals weaned at different weights.

Wean wt. (kg)	Feed supplied to achieve the following weaner growth rates (kg/month) From animals weaned at 18kg			
	0.25	.0375	0.50	1.0
10	0.36	0.54	0.72	1.44
13	0.32	0.48	0.64	1.28
18	0.25	0.38	0.50	1.00
25	0.15	0.23	0.31	0.61

Having estimated the growth rates that will be achieved from the animals weaned at different weights, the spreadsheet developed by Angus Campbell could be used to calculate survival levels for each combinatioin of weaning weight and post weaning growth rate (see Table 2.2). An outstanding feature of these results is that the 25kg weaners require a high nutrition level in order to achieve levels of survival greater than 90%, this is because on the same level of feed the 25kg weaners only grow at approximately 60% of the growth rate of an 18kg weaner.

Table 2.2: Survival (%) during summer for animals weaned at different weights with the growth rates calculated in Table 2.1.

Wean wt. (kg)	Feed supplied to achieve the following weaner growth rates (kg/month) From animals weaned at 18kg			
	0.25	.0375	0.50	1.0
10	41	64	70	75
13	52	76	82	86
18	49	84	90	94
25	0	50	84	95

The final step for the analysis was to calculate the hogget weight that will be achieved for each weaning weight and post weaning growth rate combination. This final hogget weight has an impact on the capacity of these maiden ewes to have a successful joining. In doing this calculation it became obvious that the weaners will be growing much quicker than the specified post weaning growth rate during the spring months. To allow for this an extra 15 kg was added to the calculated final hogget weight, this value was derived as 5 months of growth at an average of 100g/hd/d. the range in final hogget weight was 28.6kg up to 46.1kg.

The analysis was done in steps so that the contribution of each of the following could be examined separately:

i. Survival
ii. Future reproduction and
iii. Feed requirement of the weaners

3.0 Results & Discussion

3.1 Impact on Ewe CS Profile

Including the impact of ewe nutrition on weaning weight has little impact on the profitability of the different ewe condition score profiles, this is because the impacts on weaning weight and survival are modest. A regression of farm profitability calculated including and excluding the impact of ewe nutrition on weaning weight showed an r^2 of 0.995 (Figure 3.1)

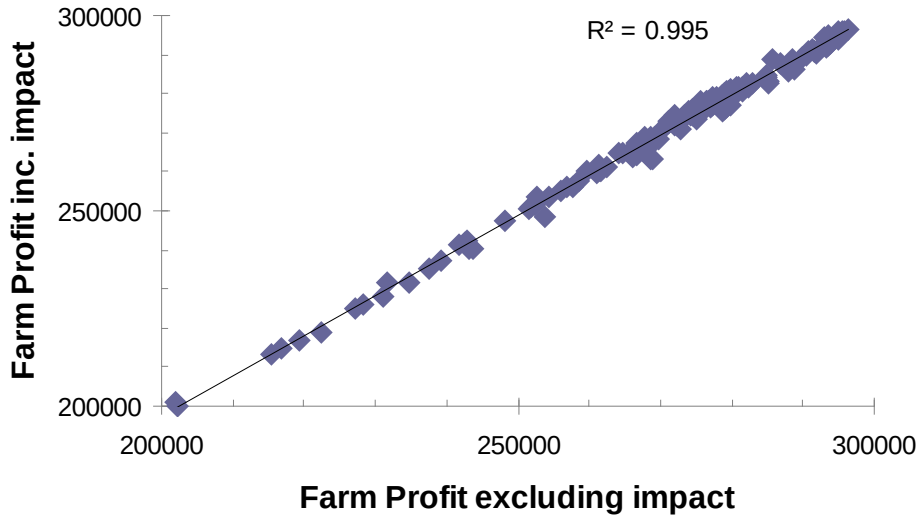

Figure 3.1: Relationship between profitability of the flock calculated including and excluding the impacts of ewe nutrition on weaning weight.

Achieving a change in weaning weight by altering FOO during lactation is likely to have a greater impact on profitability because the impacts on weaning weight and survival are greater. However, it is not possible to evaluate the costs of achieving the increase in FOO facing the ewe portion of the flock using the MIDAS model as it is currently configured.

3.2 Optimum Weaner Management

Achieving a weaner weight of 18kg and then growing at approximately 0.5kg/month gives maximum profitability (Figure 3.2). The reduction in profitability from growing at a different rate is more marked if growth rate is slower compared to if growth rate is quicker. When growth rate is slower the level of weaner mortality increases (see Figure1.3) and the reductionin in income is greater than the saving achieved from reduced feeding. Conversely when growth rate is greater than 0.5kg/month profit is reduced because the extra feed required is not fully compensated by the increase in weaner survival.

Aiming for a weaning weight of 18kg results in a higher profit than weaning either lighter or heavier than this (Figure 3.2). If animals are weaned at 25kg, then the amount and quality of feed required to achieve rates of post weaning liveweight gain that result in survival levels near 90% is much higher than for lighter weaners.

Weaning lighter than 18kg means that survival levels are reduced even if past weaning growth rates are high (Figure 1.3).

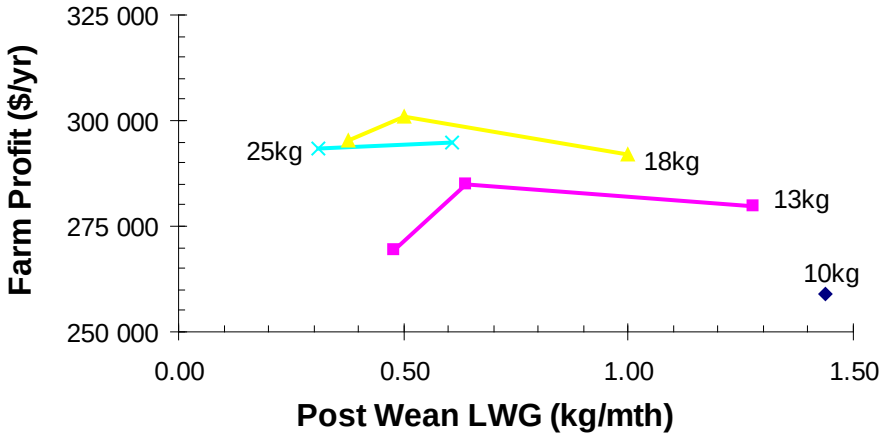

Figure 3.2: Impact of altering post weaning growth rate on farm profitability for a range of weaning weights.

4.0 Conclusions

The optimum weaning weight is 18kg and the optimum post weaning growth rate is 0.5 kg/month. There is less penalty with over achieving both weaning weight and post weaning growth rate than under achieving on these goals. These should therefore be considered minimum targets.

5.0 References