lifetimewool
more lambs, better wool, healthy ewes

Implications of Lifetimewool for On-farm Management in the Cereal-Sheep zone

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Executive Summary

The Lifetimewool project (EC298) is a flagship project for AWI and aims to determine the optimal allocation of feed resources and then develop profitable ewe management guidelines for woolgrowers across Australia. The project has included a phase of plot scale research with progeny being born in 2001, 2002 and 2003. This was followed by a paddock scale phase which tested the robustness of the findings from the plot scale trials.

These trials have shown that managing ewes condition score through the reproductive cycle results in;

a. Increased lamb survival and weaning percentages
b. Increased progeny fleece weight (CFW) and decreased fibre diameter (FD).
c. Improved ewe health and survival
d. Increased ewe wool production and tensile strength
e. Improved ewe reproduction

The role of the farm modelling component in this project was to:

a. Quantify the value to producers of the information generated in this project.
b. Identify optimum condition score (CS) targets for producers in five regions in Australia.

Altering the target CS profile of ewe's impacts on wholefarm profitability through a combination of four mechanisms:

a. Impacts on the future production of the surviving progeny.
b. Variation in the survival rate of the lambs born.
c. Varying production achieved from the ewes including CFW, FD and number of lambs conceived.
d. Varying energy demands of ewes which results in changes in stocking rate and grain feeding.

The statistical analysis carried out on the results from the small plot trials has quantified the relationship between the ewe condition at different times in the reproductive cycle and the first 3 of these mechanisms. These biological relationships have been used to quantify the effects of a range of different CS targets on flock productivity. Quantitative feed budgeting with MIDAS has been used to examine the impacts on stocking rate and supplementary feeding. Combining the flock productivity and the feed budgeting allows the impacts on wholefarm profit to be examined.

This report describes the analysis carried out addressing the above goals and reports on optimum CS targets for producers in the wheatbelt of WA.

The Central Wheatbelt version of MIDAS was selected as the modelling tool for this economic component of the project because it represents the whole flock and it includes a powerful feed budgeting module that optimises animal and pasture management across the whole farm. MIDAS is a computer model used to assess the impact of change in a farming system. It describes the biological relationships of a representative farm and calculates the profitability of the whole flock based on the productivity of each class of stock and commodity prices and the farm carrying capacity calculated in the detailed feed budget. Being an optimizing model it calculates the optimum stocking rate and optimum rate of grain feeding that will maximize profitability while achieving the targets specified for the ewes. The model also accounts for changes in flock structure and the change in ewe energy requirements that result from increasing lambing percentage and the number of ewes pregnant or lactating with singles or twins when ewe nutrition is altered.

Including the biology that has been quantified as part of the Lifetimewool project in economic analyses, alters the outcome about the most profitable nutrition strategy for ewes. The optimum profile identified when including the progeny effects is between $2 180 and $5 750 more profitable than the profile that was thought to be optimal without Lifetimewool. This range in value for the Lifetimewool information is related to the range of values examined for the increase in survival of progeny achieved from ewes that follow an improved nutrition profile. The optimum profile is robust and the only impact of altering prices or production was on the joining target, the pattern of condition change during pregnancy wasn't affected.

The benefits from the improved ewe nutrition profiles identified in this analysis are small relative to wholefarm profit because the majority of income from farms in this region is from cropping. This means that the incentive for producers in this region to adopt the Lifetimewool findings is small.

The optimum profile for the wheatbelt in WA is:

a. To maintain condition from joining to lambing.
b. Aim for CS2.7 or above at joining.

To achieve these targets it will be necessary for producers to increase their rate of supplementary feeding by about 5% and to alter the allocation of high quality stubbles in summer and autumn. Also, the benefits from the improved ewe nutrition profiles identified in this analysis are small compared to the level of wholefarm profit. This along with the extra work associated with feeding the extra grain and rationing the stubbles will be a disincentive to adoption of the Lifetimewool findings and indicates that producers in the wheatbelt have less incentive to adopt than producers in the high rainfall zones.

1. Introduction

This report describes the MIDAS analysis carried out, extrapolating the small plot experimental work to the wheatbelt region of WA. This analysis is similar to analyses carried out for the Great Southern region of WA and for the South West of Victoria. The reports for these regions include more detail on the methodology and the background of the project; (see Young 2007) for this extra detail.

2. Methods

2.1 MIDAS

The Central Wheatbelt version of MIDAS (Byrne & Young 2007 in press) has been used to calculate the profitability for a range of nutrition profiles for reproducing ewes in the wheatbelt region of WA.

2.2 The model farm

The following section outlines the main assumptions underpinning this analysis and the management of the property for the 'standard' ewe nutrition strategy. Further detail is presented in Appendix 1.

2.2.1 Land management units

The model represents a 'typical' farm in the region east of Northam in the wheatbelt of WA. The total area of the farm is 2000ha and is comprised of 8 land management units (LMUs) (table 2.1). The pasture and crop production varies on each LMU.

Table 2.1: Description and area of each LMU on the model farm

Land Management Unit	Area (ha)	Description
S1-Poor sand	140	Deep pale sands. Loose white and pale yellow sands, commonly over 2m deep. Poor moisture and nutrient availability of these soils result in very poor crop and pasture growth.
S2-Average Sandplain	210	Deep yellow sands. Yellow sandy soils that are commonly over 2m deep. Cereal yiekds are limited by poor moisture and nutrient availability.
S3-Good sandplain	350	Yellow gradational loamy sands. Often contains large percentages of ironstone gravel. Produces high to very high yields in most years. Doesn't waterlog even in wet years.
S4-Shallow duplex soil	210	Sandy loam over clay. Hardsetting, heavier, grey to brownish soils that occur on the upper and mid slopes. Topsoil is about 10cm deep and the clay subsoil occurs at 30cm.
S5-Medium heavy	200	Rocky red brown loamy sands and brownish grey granitic loamy sands. Above average quality soil.
S6-Heavy Valley floors	200	Red brown sandy loam over clay, red clay valley floor and grey clay valley floor. Can produce good cereal, field pea and medic. Production may be limited by soil structural decline.
S7-Sandy surfaced valleys	300	Deep or shallow sandy surfaced valley soil. Top soil varies from 10cm to over 100cm.
S8-Deep duplex soil	390	Loamy sand over clay. A productive soil with good moisture and nutrient availability.

2.2.2 Animal production system

The analysis is based on a self replacing merino wool producing flock utilising a genotype with medium FD, lambing in May and shearing in September. Surplus young ewes and all wethers are sold as hoggets off shears in September. A summary of the flock productivity is presented in Table 2.2, for other details see Appendix 1.

Table 2.2: Summary of production assumptions for the sheep flock with a typical nutrition profile. The values represent the ewe flock averages (2, 3, 4 and 5 year old).

Standard reference liveweight (kg)	55
Fleece weight (clean kg/hd)	3.2
Mean fibre diameter (μm)	21.1
Weaning rate (%)	85

2.2.3 Pasture production

The pasture production is based on a pasture consisting of sub-clover or medic, annual grasses and herbs which is typical for farms in the region. Medic is grown on the heavy soil (S6) and sub clover is grown on the remainder. More details on the pasture productivity assumptions are presented in Appendix 1.

2.2.4 Farm management

Table 2.3: Production and management parameters for the 'standard' ewe nutrition profile (Join in CS3 and maintain to lambing) and assumes the rate of lamb survival observed in the paddock scale experiments (see Table 2.5).

Profit ($/ha)	70
% of farm cropped	63
Number of ewes	2710
Stocking rate[1] (DSE/WG ha)	8.0
Supplementary feeding (kg/DSE)	43
(t)	254
Flock structure	
% ewes	65
Sale age of CFA ewes	5.5
Sale age of surplus young ewes	hoggets
Sale age of wethers (yrs)	hoggets
Lambing (%)	89
Pasture growth (t/ha)	3.1
Pasture utilization (%)	44
Wool income ($/ha)	178
Sale sheep income ($/ha)	104

[1] Stocking rate calculated using 1.5 DSE/ewe & 1DSE/hd for hoggets

2.3 Lifetimewool assumptions about progeny production

For this analysis the production of the progeny was adjusted based on the CS profile of the ewes (nutritional strategy). See Young (2007) for further details on the methodology and justification for this component of the analysis. Table 2.5 details the changes in production for the progeny, calculated based on the ewe nutrition profiles.

As described in Young (2007) two levels of progeny survival have been examined in this analysis, they are referred to as 'Australian Paddock' and 'Plot Scale' (see Table 2.5 for the difference in survival for each scenario). The 'Australian Paddock' is considered the best bet estimate of the result that most farmers will achieve in their paddocks. The paddock scale results are considered to be better than the plot scale results because of the larger numbers of animals involved and because the response in survival in the small plot trials was reduced due to the frequent experimental interventions.

2.4 The condition score profiles

Fifteen different CS profiles have been evaluated in this analysis. The profiles examined vary in the average condition of the ewes at joining and the average amount of condition lost to the minimum and then the amount of condition regained from the minimum to lambing (Figure 2.1). There are 3 alternative CS at joining (2.7, 3.0 and 3.3), 3 rates of loss of condition to day 90 (no loss, lose 0.2CS and lose 0.4CS) and 4 rates of condition change after day 90 (gain 0.4CS, no change, lose 0.2CS and lose 0.4CS).

The standard nutrition strategy is the pattern with ewes being mated at CS 3 and maintaining condition through to lambing. The selection of this pattern as the standard doesn't alter the results of the analysis; it simply becomes the pattern that is not altered during the sensitivity analysis on the magnitude of the Lifetimewool impacts.

The selection of the 15 patterns allows comparison of the effects on profitability of varying condition at joining, varying rate of loss of condition after joining through day 90 to lambing and whether it is profitable to feed supplement to gain condition prior to lambing.

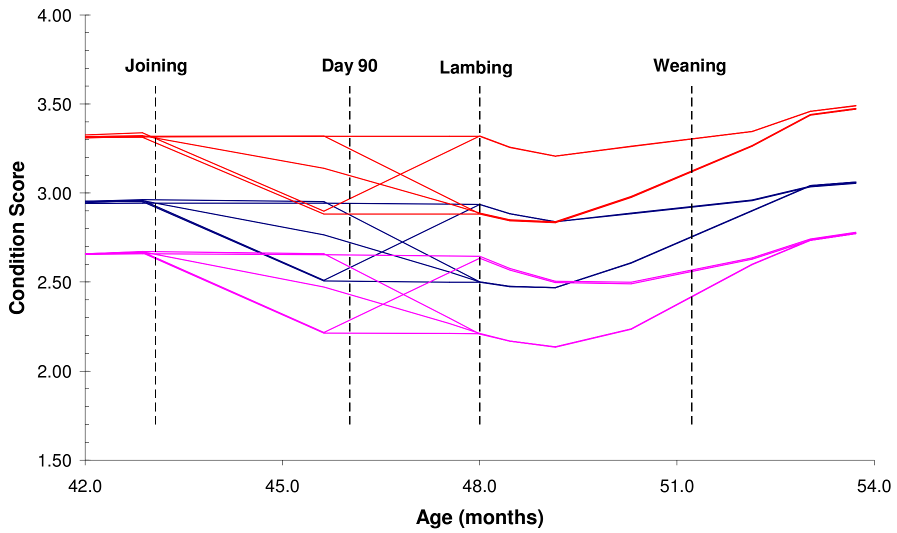

Figure 2.1: The 15 nutrition profiles examined in MIDAS.

For each CS profile the energy demands and the resulting production of the ewes was simulated using the MIDAS simulation spreadsheet. The production levels of the progeny were adjusted as described in Young (2007), section 2.3. Table 2.5 outlines the calculated energy demand of the ewes for the different periods and the estimated change in ewe and progeny production for each of the different profiles.

Table 2.5: ME required by single bearing ewes through the reproductive cycle to follow each of the 15 different profiles and production of ewes and progeny relative to ewes joined at CS 3 and maintaining condition to lambing.

Joining Condition Score		2.7					3.0					3.3				
Loss to day 90		0		0.2	0.4		0		0.2	0.4		0		0.2	0.4	
Change to Lambing		0	-0.4	-0.2	0	+0.4	0	-0.4	-0.2	0	+0.4	0	-0.4	-0.2	0	+0.4
ME intake																
Joining to D90	MJ/d	9.24	9.20	8.87	8.35	8.41	9.49	9.44	9.12	8.63	8.70	9.88	9.84	9.51	9.04	9.11
Day 90 to Lamb	MJ/d	12.56	11.39	11.73	12.21	14.30	12.94	11.77	12.11	12.58	14.72	13.31	12.15	12.49	12.95	15.05
Lamb to Wean	MJ/d	14.72	15.47	15.47	15.48	14.72	15.77	16.40	16.41	16.41	15.75	16.29	16.90	16.90	16.90	16.29
Wean to Join	MJ/d	9.83	10.84	10.84	10.84	9.83	9.83	10.95	10.95	10.96	9.82	10.58	11.64	11.64	11.64	10.58
Ewe Production																
CFW	kg	-0.08	-0.03	-0.04	-0.06	-0.03	0.00	0.05	0.05	0.03	0.05	0.16	0.20	0.19	0.18	0.21
FD	µ	-0.15	-0.04	-0.06	-0.10	-0.05	0.00	0.12	0.1	0.07	0.11	0.30	0.41	0.39	0.36	0.41
SS	N/kT	-1.0	-3.0	-2.3	-1.7	-1.9	0.0	-3.1	-1.6	-0.9	-0.7	-0.7	-3.3	-2.4	-1.5	-1.5
Mortality	%	0.5	2.1	2.1	2.2	0.4	0.0	1.0	0.9	1.0	-0.1	-0.1	0.3	0.3	0.3	-0.1
Rep. Rate	%	-5.7	-5.5	-5.8	-6.3	-6.2	0.0	0.3	0.0	-0.5	-0.4	7.5	7.6	7.4	6.8	7.4
Progeny Prod'n																
CFW	kg	-0.03	-0.11	-0.11	-0.11	-0.02	0.00	-0.08	-0.08	-0.08	0.02	0.04	-0.04	-0.04	-0.04	0.06
FD	µ	-0.01	0.15	0.14	0.12	-0.05	0.00	0.16	0.14	0.13	-0.05	-0.01	0.14	0.12	0.11	-0.06
Survival																
Aust. Pad scale																
Singles	%	-1.9	-7.9	-7.2	-6.2	-0.9	0.0	-5.0	-4.4	-3.6	0.9	1.9	-1.9	-1.4	-0.8	2.5
Twins	%	-4.8	-17.2	-15.8	-14.1	1.2	0.0	-11.3	-10.1	-8.5	5.6	5.6	-4.4	-3.3	-2.0	10.4
Plot Scale																
Singles	%	-0.2	-0.9	-0.8	-0.7	-0.1	0.0	-0.6	-0.5	-0.4	0.1	0.2	-0.2	-0.2	-0.1	0.3
Twins	%	-2.4	-8.6	-7.9	-7.0	0.6	0.0	-5.7	-5.0	-4.3	2.8	2.8	-2.2	-1.7	-1.0	5.2

2.5 Standard Prices, Production and Sensitivity Analysis

A range of scenarios have been examined in this analysis in order to test the robustness of the optimal ewe CS targets (Table 2.6). Future prices are uncertain and therefore decisions made about CS targets for ewes will be made allowing for the range of prices that may be received. The results of the Lifetimewool project will be easier to extend and implement if the optimum CS profile is not affected by market changes. A sensitivity to flock structure was also carried out to examine whether the optimum ewe CS targets are altered by flock structure.

Table 2.6: Standard price and production levels assumed in this analysis and the range examined in the sensitivity analysis.

	Standard	Sensitivity Levels
Prices		
Wool Price (c/kg sweep the board)		
18µ	1044c/kg	+33%, -33%
19µ	942c/kg	
20µ	850c/kg	
21µ	796c/kg	
FD premium	As above	+50%, -40%
Meat Price ($/hd net)		
Ewe Hgt	$34/hd	+25%, -25%
CFA Ewe	$32/hd	
Wether	$46/hd	
Grain Price ($/t fed out)		
Oats	$163/t	+100%, +25%, -25%
Lupins	$222/t	
Flock Structure		
Sale Age of Wethers	17 months	5mo, 29mo, 41mo
% ewes	66%	79%, 56%, 48%

Note: Sale sheep price is an average price including sheep of no commercial value.

3. *Results and Discussion*

3.1 The implications of Lifetimewool and Optimum targets

To examine the implications of the biology that has been quantified in the Lifetimewool project an analysis was carried out including and excluding the effects of ewe nutrition on progeny fleece value and progeny survival. The comparison of these 2 sets of results provides the potential value of the project.

The most profitable CS profile for ewes if Lifetimewool effects are ignored is to join ewes in CS2.7, maintain condition to day 90 then allow the ewes to lose 0.4 of a CS to lambing and regain the condition after lambing. The other CS profiles that lose condition at different rates or timing have a slightly lower profitability. However, these profiles all have a low energy requirement and this reduction in energy requirements outweighs the reduction in fleece value of ewes and the reduction in ewe reproductive rate and survival. On paper, following this profile appeared to be $4 050/farm (or $1.40/ewe) more profitable than maintaining ewes from joining through to lambing (Table 3.1).

The advantage of allowing the ewes to lose condition is similar over a range of stocking rates (Figure 3.1).

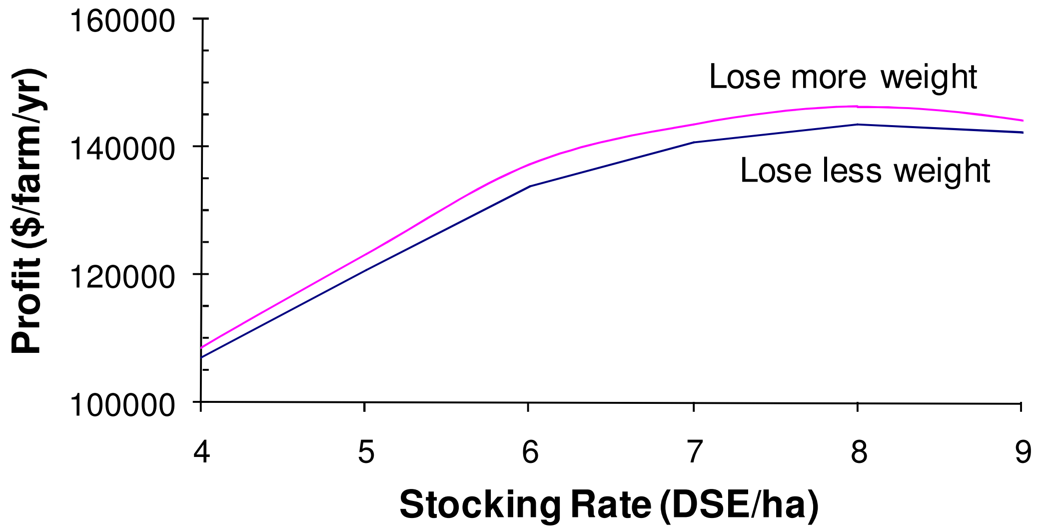

Figure 3.1: The effect of altering stocking rate on farm profit for a farm that aims to maintain ewes (at CS=2.7) and a farm that allows ewes to lose condition (from 2.7 at joining and day 90 to 2.3 at lambing) when the Lifetimewool effects of ewe condition on progeny fleece production and survival are ignored. Note: Landuse is constrained to the optimum for the 'lose less weight' farm plan.

When the Lifetimewool relationships are included, the optimum ewe nutrition profile changes. It is more profitable to maintain ewes from joining through to lambing. Improving the calculations by including the Lifetimewool impacts indicates that allowing the ewes to lose condition is actually less profitable by between $2 150 and $4 900/farm (5% of profit or $1.40/ewe) depending on the magnitude of the impact of ewe nutrition on progeny survival (Table 3.1). See Appendix 2 for further details.

Table 3.1: Differences in profitability ($/yr) for the 2000ha MIDAS farm when Lifetimewool effects are excluded or included with higher 'paddock' or lower 'plot' scale effects on lamb survival.

Pattern	Excluding	Including	
		Australian Paddock	Plot
Join CS2.7, maintain to day 90 & lose 0.4 to lambing.	+3 880	0	0
Maintain joining to Lambing .	0	+5 745	+2 180
Response (% of profit) ($/ewe)	4% $1.30	6% $1.90	2% $0.70

Maintaining ewes requires more energy, but results in higher progeny fleece values and higher progeny survival. In this case the reduction in progeny production for the thinner ewes results in a benefit from meeting the target condition scores regardless of the stocking rate (Figure 3.2) and there is little difference in the optimum stocking rate for thinner or fatter ewes.

Figure 3.2 also puts the magnitude of the benefits from Lifetimewool into context. For producers in the wheatbelt the majority of their income is derived from cropping and altering the management of their sheep enterprise only has a small impact on farm profit even though it is having a moderate impact on the profitability of the sheep enterprise. The majority of producers in this region will probably not be motivated to implement the findings from Lifetimewool.

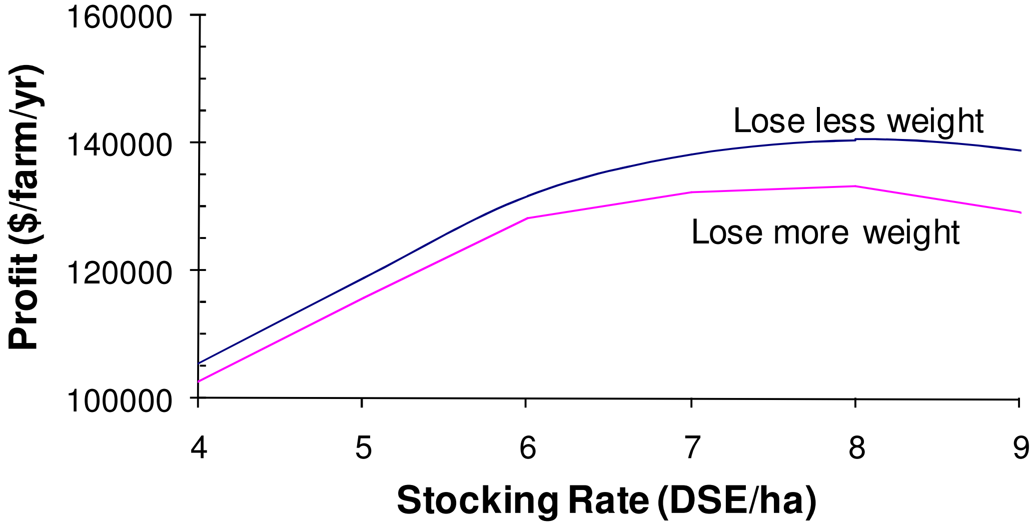

Figure 3.2: The effect of altering stocking rate on farm profit for a farm that aims to maintain ewes (at CS=2.7) and a farm that allows ewes to lose condition (from CS2.7 at joining and day 90 to 2.3 at lambing) when the Lifetimewool effects of ewe condition on progeny fleece production and survival are included. Note: Landuse is constrained to the optimum for the 'lose less weight' farm plan.

The effect of including or excluding the Lifetimewool impacts on farm profit are a combination of the impact of ewe nutrition on progeny fleece value and the impact on progeny survival. The proportion of the effect due to the 2 factors varies with the assumptions about the level of progeny survival (Table 3.2). The stronger influence of ewe nutrition on progeny survival evident in the paddock scale trial results in survival having a similar contribution to fleece value, whereas if the impact on survival is based on the small plot trials then profit is driven by the fleece value.

Table 3.2: The proportion of the difference in profitability due to changes in progeny fleece values and changes in progeny survival in the paddock and plot scale experiments after the Lifetimewool relationships are included.

	Australian Paddock	Plot
Fleece Value	48	89
Survival	52	11

When the ewe nutrition targets are changed the optimum stocking rate and the optimum level of grain feeding both change. However, the change in grain feeding has four times of the impact on profit as the change in stocking rate. So, a simple rule of thumb for producers aiming to achieve the Lifetimewool nutrition targets is to maintain their current stocking rates and feed more grain. For an autumn lambing system the majority of the grain will be fed prior to lambing, and changes to the allocation of the high quality stubbles may also be required. Because the ewes are in better condition after weaning there is less requirement to gain weight immediately after harvest and so a proportion of the high quality stubbles can be retained through till mid pregnancy. This alteration of the timing of utilisation of stubbles reduces the total amount of supplementary grain required.

The actual increase in the amount of supplement that is required to achieve maintenance will depend on the current management of the ewes. If producers are currently following the nutrition profile that is identified as the optimum when Lifetimewool is ignored, then it is estimated they will only need to increase their supplementary feeding by 5%. This is not a great increase in supplement but there is also a requirement to vary the utilization of stubbles and the extra work associated with rationing the stubbles in early summer may act as a disincentive for wheatbelt producers to adopt the Lifetimewool message.

3.2 Cost of missing condition score targets

The optimum ewe CS profile, with standard prices and production, is joining in CS 2.7 and maintain to lambing. If this CS profile is not achieved then profit is reduced (see Appendix 2 for details of profitability of each pattern). Figures 3.3, 3.4 & 3.5 show the reduction in profit and the change in the value of production if the ewe condition targets are not achieved because condition is lost at different times. These values are calculated for flocks of the same size (fixed number of DSE) so that changes in value of production are not the result of changing flock size, however, there are some unavoidable errors associated with the calculations because the flock composition changes when lambing percentage varies and landuse changes when flock profitability changes.

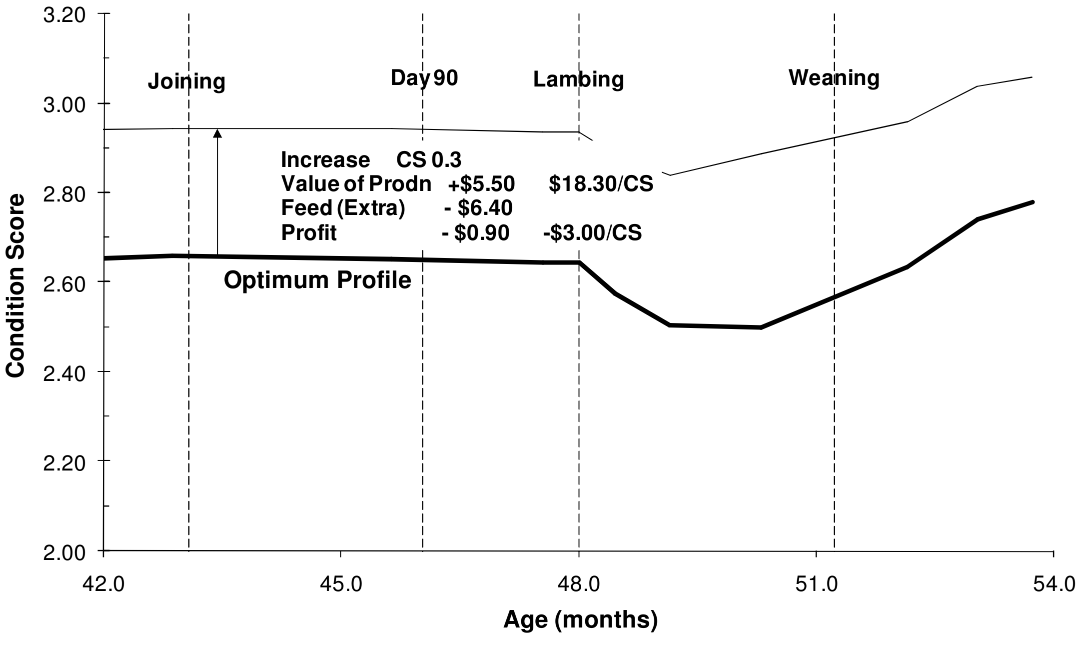

Figure 3.3: Change in value of production, profit and cost of feeding if a sub-optimal profile is followed that maintains ewes in higher condition all year.

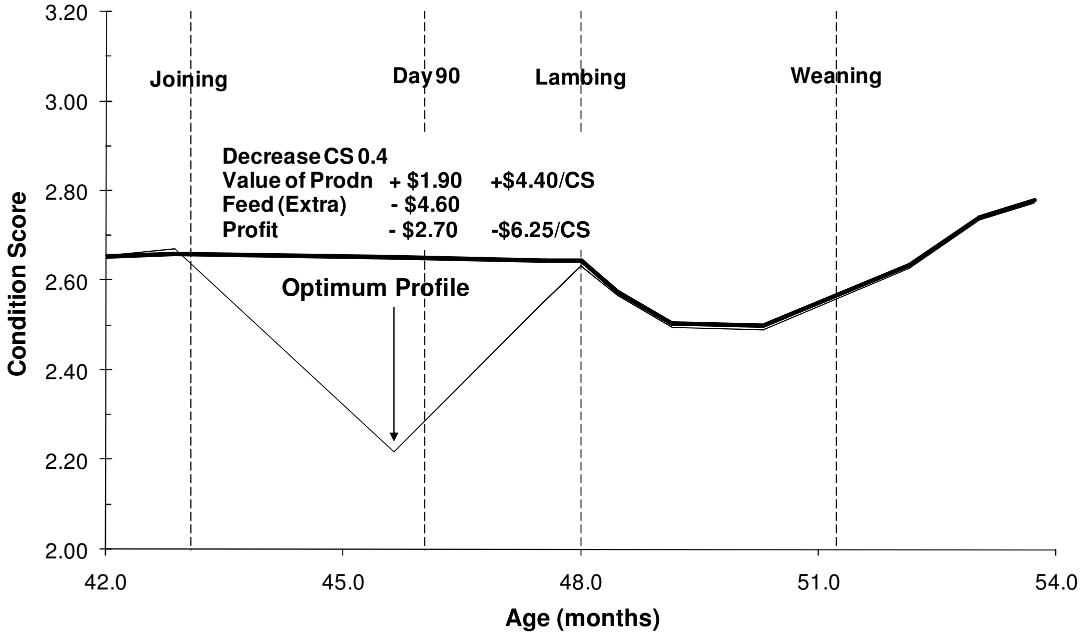

Figure 3.4: Change in value of production, profit and cost of feeding if a sub-optimal profile is followed that looses condition prior to lambing and regain of the lost condition is achieved using grain prior to lambing.

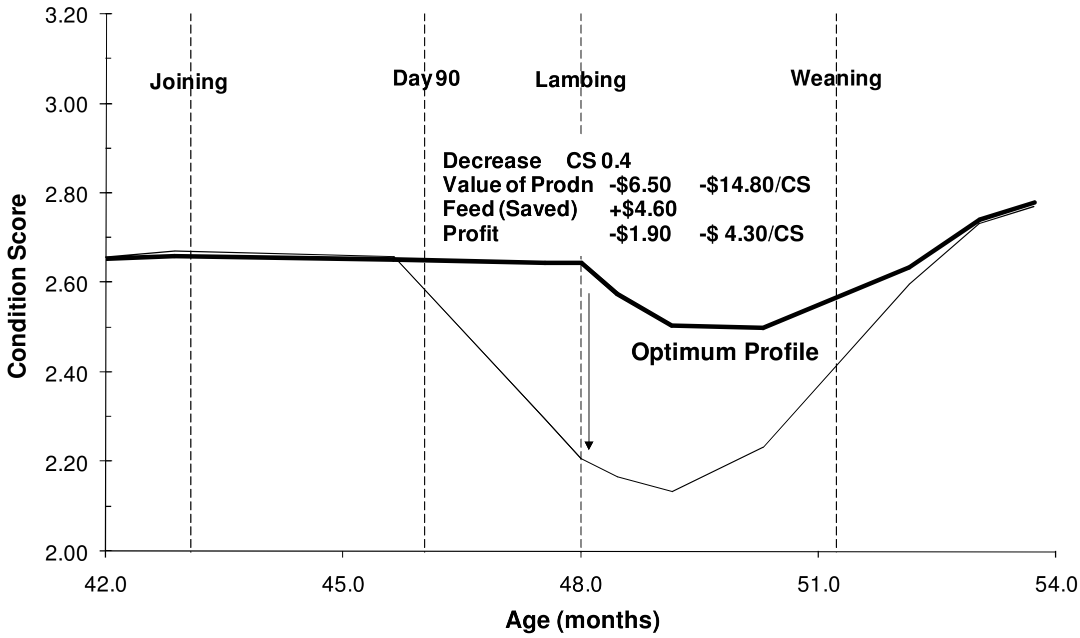

Figure 3.5: Change in value of production, profit and cost of feeding if a sub-optimal profile is followed that produces leaner ewes at lambing.

These values provide insight into the importance of achieving the different CS targets. The value of production is the amount that could be spent to increase ewe condition (or reduce loss of condition) at the different times. The profit values include the cost of providing feed to meet the condition targets in an average year. If the season is not average then the change in value of production and an estimate of cost of feeding could be used to decide if it will be profitable to alter the feeding of the ewes. For example, if the loss of 0.4CS prior to lambing can be prevented for less than \$6.50/ewe then farm profit can be increased. As a rule of thumb, gaining condition using grain will not be profitable, whereas it can be profitable to reduce or stop loss of condition prior to lambing using grain.

3.3 Sensitivity Analysis

The profitability of the 15 different patterns was examined for the range of scenarios outlined in Table 3.4. The scenarios included varying wool prices in a range +/- 33%, meat price +/- 25%, grain price +100%/-25% and changing flock structure. The difference in profit per hectare compared to the optimum CS profile (2.7 at joining and maintained through to lambing) at standard MIDAS values for the 15 different CS profiles for the range of prices productivity and management examined is presented in Table 3.4. In the table the most profitable CS profile is highlighted in bold for each scenario.

Increasing meat price, reducing grain prices or increasing the proportion of wethers in the flock increases the optimum target for the ewes at joining but doesn't alter the target of maintenance to lambing. The change in profit associated with making this adjustment is less than \$2/ha and is therefore very minor.

Reducing the wool price, reducing the meat price or increasing grain price reduces the penalty associated with losing condition during gestation (Table 3.4). However, within the range of prices examined the finding that the most profitable nutrition strategy includes maintaining condition from joining to lambing did not change.

It appears that the optimum CS profiles for ewes are robust and the profile that gave the maximum profit for each scenario is affected little by changing prices, productivity or management. Details of farm profit and production and the impacts of the different scenarios examined are presented in Appendix 3.

Table 3.4: Difference in profit per hectare compared to the optimum CS profile (2.7 at joining and maintained at 2.7 through to lambing) for the 15 different CS profiles for the range of prices productivity and management examined. The most profitable CS profile is highlighted in bold for each scenario.

Joining Condition Score	2.7					3.0					3.3				
Loss to day 90	0		0.2	0.4		0		0.2	0.4		0		0.2	0.4	
Change to Lambing	0	-0.4	-0.2	0	+0.4	0	-0.4	-0.2	0	+0.4	0	-0.4	-0.2	0	+0.4
Standard senario	**0**	-4	-4	-5	-4	-2	-5	-5	-5	-4	-1	-3	-3	-3	-3
Prices															
Wool +25%	**0**	-6	-6	-6	-1	-1	-6	-6	-6	-3	0	-4	-4	-4	-1
-25%	**0**	-1	-2	-3	-3	-1	-2	-2	-2	-2	0	-1	-1	-1	-1
FD premium +25%	**0**	-5	-4	-6	-4	-2	-6	-5	-5	-4	0	-4	-4	-3	-3
-25%	**0**	-3	-4	-5	-4	-1	-4	-3	-4	-4	-1	-2	-2	-2	-2
Meat +25%	0	-5	-4	-3	0	0	-4	-4	-3	-1	**2**	-1	-1	-1	1
-25%	**0**	-2	-3	-3	-3	-1	-3	-3	-3	-3	-1	-2	-2	-2	-2
Grain +100%	**0**	0	-1	-2	-6	-2	-2	-1	-2	-6	-3	-2	-1	-1	-6
+25%	**0**	-2	-3	-4	-4	-2	-3	-3	-3	-4	-1	-2	-2	-2	-3
-25%	0	-7	-6	-5	-1	-1	-5	-5	-5	-1	**1**	-3	-3	-3	0
Flock Structure															
Sell Wethers 5mo	0	-4	-4	-5	-1	0	-4	-4	-4	-1	**1**	-2	-1	-1	-1
29mo	0	-4	-4	-3	0	0	-3	-3	-3	-1	**1**	-2	-1	-1	1
41mo	**0**	-5	-6	-8	-7	-3	-6	-6	-7	-7	-2	-5	-4	-5	-5

4. Conclusions

Including the biology that has been quantified as part of the Lifetimewool project in economic analyses alters the outcome about the most profitable nutrition strategy for ewes. The optimum profile identified when the progeny effects are included is between $2 180 and $5 745 more profitable than the profile that was thought to be optimal without Lifetimewool. The range in value of the Lifetimewool information is related to the increase in survival of progeny that will be achieved from ewes that follow an improved nutrition profile. The optimum profile is robust and the impact of altering prices or production was very minor.

The benefits from the improved ewe nutrition profiles identified in this analysis are small compared to the level of wholefarm profit. This indicates that wheatbelt producers have less incentive to adopt the Lifetimewool findings than producers in the high rainfall zones.

The optimum profile for the wheatbelt in WA is:

a. Maintain condition from joining through to lambing.
b. Aim for CS2.7 or above at joining.

To achieve these CS targets it will be necessary for producers to increase their rate of supplementary feeding (but only by about 5%) and to alter the allocation of high quality stubbles in summer and autumn. The extra work associated with rationing the stubbles could be a disincentive to adoption of the findings of Lifetimewool in this region.

5. References

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Appendix 1: Standard Farm Production

Table A1.1: Sheep management program.

	'Wool'
Lambing time	May
Weaning age	12 weeks
Shearing time	Sept
Stock turn off	
- ewe hoggets	Sept
- CFA ewes	Sept
- wether hoggets	Sept

Other management comments:

- Animal husbandry
  - Drenching (1 summer drenches)
  - Jetting (1 annual jetting of young sheep)
- Crutching (contract)
- Shearing (contract)

Pasture productivity assumptions

Table A1.2: Growth & Digestibility of pasture on Medium Heavy soils in each of the feed periods.

			Sub Clover	
Period of Year	Start of period	End of period	Growth (kg/d)	DMD (%)
1	10-May	23-May	28	81
2	24-May	13-Jun	8	81
3	14-Jun	18-Jul	8	81
4	19-Jul	12-Sep	21	81
5	13-Sep	10-Oct	41	78
6	11-Oct	31-Oct		72
7	1-Nov	5-Dec		64
8	6-Dec	28-Feb		55
9	1-Mar	25-Apr		52
10	26-Apr	9-May		48

Table A1.3: Growth & Digestibility of pasture on each soil relative to the Medium Heavy soil.

S1	S2	S3	S4	S5	S6	S7	S8
60%	85%	100%	90%	100%	100%	90%	90%

Table A1.4: Maximum crop yields on each soil (this is yield of the crop in the highest yielding rotation). Note: the actual rotation selected may yield less than this.

	S1	S2	S3	S4	S5	S6	S7	S8
Wheat	991	1786	2481	2134	2101	2380	2200	2210
Barley	0	1854	2423	2188	2465	2500	2313	2445
Lupins	700	1430	1540	990	1210	0	0	1359
Canola	0	800	1200	945	1050	1000	900	1050

Appendix 2: Profit & production summary for the 15 patterns

Table A2.1: Profit, value of production, stocking rate and supplementary feeding for flocks with ewes with different target condition scores. The most profitable target is highlighted for each survival scenario.

Joining Condition Score		2.7					3.0					3.3				
Loss to day 90		0		0.2	0.4		0		0.2	0.4		0		0.2	0.4	
Change to Lambing		0	-0.4	-0.2	0	+0.4	0	-0.4	-0.2	0	+0.4	0	-0.4	-0.2	0	+0.4
Survival: Aust. Pad. Scale																
Profit	$/ha	**71**	68	68	67	67	70	68	68	68	67	70	69	69	69	69
	Δ$/ewe[2]	**0.0**	-1.9	-2.2	-2.9	-2.7	-0.9	-2.4	-2.3	-2.4	-2.5	-0.6	-1.6	-1.4	-1.3	-1.8
Value of Prodn*	$/ewe	**72.2**	65.7	66.2	66.7	74.1	77.7	71.5	71.9	72.2	79.6	83.3	77.4	78.0	78.2	85.3
Stocking Rate[1]	DSE/ha	**8.5**	7.9	7.9	7.9	8.3	8.0	7.6	7.6	7.6	7.9	7.8	7.4	7.5	7.5	7.7
Supplement	kg/DSE	**39.3**	31.8	32.9	34.9	46.0	42.8	36.4	36.1	36.6	48.0	45.3	39.4	39.6	39.0	49.1
	t	**248**	187	194	206	284	254	205	203	206	284	262	218	221	217	281
Plot Scale																
Profit	$/ha	**72**	71	70	69	67	70	69	69	69	67	70	69	70	70	67
	Δ$/ewe[2]	**0.0**	-0.7	-1.1	-2.0	-3.1	-1.4	-1.8	-1.8	-2.1	-3.4	-1.5	-1.6	-1.6	-1.6	-3.0
Value of Prodn*	$/ewe	**-2.4**	-4.6	-4.7	-4.7	-1.6	0.0	-2.1	-2.1	-2.3	0.7	2.4	0.5	0.5	0.3	3.1
Stocking Rate[1]	DSE/ha	**8.5**	8.1	8.4	8.0	8.3	8.0	7.8	7.8	7.7	7.8	7.7	7.5	7.5	7.5	7.7
Supplement	kg/DSE	**39.0**	32.2	35.7	34.0	45.9	42.8	37.2	37.0	37.4	47.6	45.7	39.6	39.4	38.8	49.9
	t	**247**	194	224	203	283	254	215	214	216	278	264	221	220	216	285

[1] Stocking rate calculated using 1.5 DSE/ewe & 1DSE/hd for hoggets

[2] Change in profit divided by number of ewes.

Appendix 3 – Detailed Sensitivity Analysis results

Table A3.1: Profit and production summary for the optimum CS profile for each of the scenarios examined in the sensitivity analysis.

		Profit	SR	Supplement	
		$/ha	DSE/ha	kg/DSE	Tonnes
Optimum CS profile		71	8.5	39.3	248
Prices					
Wool +33%		100	9.3	59.0	408
-33%		46	6.3	20.8	97
FD premium +50%		75	8.5	39.4	248
-40%		68	8.4	38.3	238
Meat +25%		84	8.9	55.2	365
-25%		59	7.2	29.0	156
Feed Grain +100%		79	6.2	16.4	76
+25%		70	7.2	29.0	156
-25%		76	9.3	56.9	393
Flock Structure					
Sell Wethers 17mo		75	9.4	49.2	347
41mo		73	8.0	30.5	181
53mo		77	7.8	36.1	209