NEW SOUTH WALES
LIFETIMEWOOL
MAXIMISING THE GENETIC POTENTIAL OF YOUR FLOCK
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What sheep enterprise?

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Sheep producers in most production regions are questioning traditional assumptions about the best and most profitable enterprises to run in the future. Factors driving this change include: i) price relativities for wool, lamb and mutton; ii) price volatility and production risk; iii) perceived price outlook and iv) potential productivity gains from different enterprises.

The relative differences between a range of sheep enterprises were examined over 4 market periods (Tables1 & 2):

- low wool & medium meat (October 2005)
- medium wool & medium meat (February 2006)
- medium wool & low meat (10 year average 1995-2005)
- high wool & meat (80 percentile for both)

Table 1 Wool prices used.

	18 µm	19 µm	21 µm	23 µm	28 µm
Low wool (Oct 2005)	992	825	688	665	467
Medium wool (Feb 2006)	1080	965	760	716	483
Medium wool (10 year ave)	1378	1020	746	671	520
High wool (80 percentile)	1502	1175	861	740	551

Table 2. Lamb prices used.

	PL & S	D & MT	MM, M & FM
Medium meat (Oct 2005)	3.20	3.07	2.94
Medium meat (Feb 2006)	3.40	3.27	3.14
Low meat (10 Year ave)	2.68	2.55	2.42
High meat (80 percentile)			

The different lamb prices reflect different carcass weights and premium paid for 2nd cross type lambs. The enterprises examined were:

- Fine Merino (FM)
- Merino (M)
- Merino Ewe / Terminal Sire – sell all progeny (MT)
- Meat Merino – improved carcass and reproduction (MM)
- Dohne (D)
- Samm (S)
- First X Ewe / Terminal Sire (PL)

where the FM, M, MM, D & S are all self-replacing flocks. Replacement merino ewes were purchased at $80/hd for MT and 1st X ewes at $100/hd for the PL enterprises.

CSIRO's GrassGro program was used to generate the results. GrassGro uses soil data, real weather data and plant growth data to 'grow the grass' and generates animal production and subsequent financial results over defined time periods. The program was set up using actual soil parameters from a long term grazing trial and actual temperature and rainfall from 1971 to 2003 to generate pasture production using annual grass and legume species.

Each enterprise was run on the same pasture, soil and weather parameters in a paddock of 100ha. Ewe numbers were adjusted so the overall stocking pressure was similar (approx. 15 DSE/ha). All enterprises lambed in mid August with all surplus ewe and all wether progeny sold off by the 15th June at 46kg. Grain feeding is used, if necessary, to finish the lambs. The grain price used was $200/T for cereal grain. The production results for each of the enterprises are in Table 3

Table 3 Production results for each of the enterprises.

	FM	M	MT	MM	D	S	PL
GFW (kg)	4.7	5.3	5.3	5.3	4.4	3.6	3.7
AFD (µm)	18.3	19.8	19.8	20.2	21.2	23.3	28.4
Lambing (%)	93	93	93	103	109	123	127
No of ewes joined	629	629	666	579	537	488	516
Lambs sold	437	437	437	452	448	477	634
Ewes bought	0	0	141	0	0	0	109
Ave sup. feed[a] (kg.ha)	63	62	62	56	48	39	43
DSE/ha	15	15	15	15	14.8	14.8	14.8
Pasture eaten (%)	48	48	48	49	49	50	49
Ewe BWT[b] (kg)	53	53	53	57	62	70	70

Note: [a] Ave sup. feed is the average amount of supplementary feed required to finish lambs and [b] ewe bodyweight is on an empty and fleece free basis.

The same prices and costs were used for each of the 33 years of weather data. The critical thing to look at is the relative

differences between enterprises In terms of profit/ha (ie the difference in gross margin/ha generated by GrassGro minus $100/ha overhead cost and $40/ha pasture fertiliser costs) the Merino Ewe Terminal Sire enterprise is probably the best performing enterprise (Figure 1). However, as with any modelling work, there is 'noise' in the results due to the relative nature of the inputs used. There would need to be a difference of more than $20/ha before one enterprise could be said to outperform another.

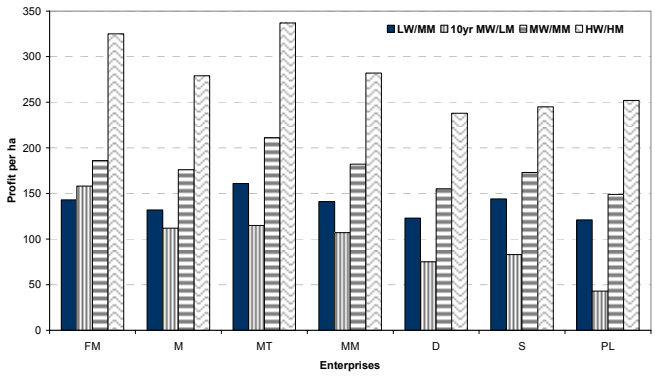

Figure 1: The average profit/ha over 33 years for each of the alternative enterprises for the four market periods.

Importantly the variation in profit between each year was far greater than the variation between each enterprise when the same prices were used across those 33 years. The variation in yearly profits was the greatest for those enterprises oriented towards the sale of lambs (PL & T) and lower for enterprises more reliant on wool income (M).

Important points

- There is no enterprise which is a standout in profit. Enterprises based on Merino ewes are competitive. Decide what you want to do, and do it well.
- Use $/ha for your decisions, and not $/head.
- Current prices are low for wool and high for meat. The 10 year average moves the other way.
- Maintaining your Merino ewe base and joining surplus ewes to terminal sires looks the best each-way bet.

Information in this article was summarised from a paper prepared for the QPLU$ Open Day at NSWDPI'S Trangie ARC 11th May 2006 titled 'Economic and production analysis of different sheep enterprise'. Contact Phil Graham if you would like a copy of the full paper.

Improved nutrition during pregnancy and ewe and progeny performance.

The three NSW Lifetime Wool paddock-scale sites are only a component of the national Lifetime Wool project. Across southern Australia there were a further 15 paddock-scale sites located in the major wool growing regions of WA, SA and Victoria. The national project team has recently analysed the impact of improved ewe nutrition during pregnancy on the performance of the ewes and their progeny using data from these 18 paddock-scale sites.

If you remember back to the experimental design of the paddock-scale sites (see Volume 1, Issue 1 January 2005 of this newsletter) you will recall that the aim was to manage their nutritional intake to achieve a difference in fat score between the high and low nutrition groups during pregnancy. On average across all 18 sites a difference of 0.3 of a fat score was achieved between the high and low nutrition groups (Table 1).

This variation in ewe fat score was enough to generate significant differences in the amount and quality of wool grown by the ewe. Better fed ewes grew 0.4 kg more clean wool that was 0.8µm broader, 4.2 mm longer and 4.3N/ktex stronger than ewes on a lower plane of nutrition during pregnancy (Table 4). The better fed ewes also had higher conception rates at their next joining (+4%).

Table 4. The average performance of ewes managed for low and high nutrition during pregnancy across Lifetime Wool Paddock Scale Sites in Southern Australia

	High nutrition	Low nutrition	Diff.
Average FS (Day 0 to 140)	2.7	2.4	+ 0.3
Average BWT(Day 0 to 140)	51.2	48.4	+ 2.4
Clean fleece weight (kg)	3.3	2.9	+ 0.4
Average fibre diameter (µm)	20.3	19.5	+ 0.8
Staple length (mm)	92.4	88.2	+ 4.2
Staple strength (N/Ktex)	35.1	30.8	+ 4.3
Carryover Reproduction*	129	125	+ 4.0

** Carryover reproduction refers to the ewes' scanning % at their next joining*

The higher ewe liveweight and fat score during pregnancy also had a positive impact on both progeny survival and wool production (Table 5). Progeny of better fed ewes are more likely to survive to weaning and are heavier at both weaning and 12 months of age than progeny of ewes in poorer condition during pregnancy. Progeny of better fed ewes also grow more (+0.07 kg), finer wool (-0.12 µm) than the low ewe nutrition progeny.

Table 5 The average performance of progeny of ewes managed for low and high nutrition during pregnancy across Lifetime Wool Paddock Scale Site in Southern Australia

	High nutrition	Low nutrition	Diff.
Survival to Weaning (%)	78	70	+ 8.0
Liveweight at Weaning (kg)	24.1	22.0	+ 2.1
Liveweight at 12months (kg)	32.4	31.7	+ 0.7
2nd Clean Fleece Weight (kg)	2.91	2.84	+ 0.07
2nd Mean Fibre Diameter (µm)	18.52	18.64	- 0.12

These results are consistent with the phase 1 Lifetime Wool plot-scale observations that showed a strong relationship between ewe live weight profiles and ewe wool production with subsequent effects on the lifetime performance of their progeny.

This article was summarised from a paper prepared by Behrendt et al. prepared for the up-coming 2006 conference of the Australian Society of Animal Production (www.asap.com.au).

Capturing the production potential of twin-bearing Merino ewes and their progeny

Dr Sue Hatcher, NSW DPI Senior Research Scientist

The primary objective of the Lifetime Wool project is to optimise maternal nutrition during the reproductive cycle. One area for potential optimisation is the differential nutritional management of single and twin bearing ewes.

In early pregnancy, up to about day 90, ewes do not require any particular additional nutrients and should be managed to

maintain their joining fat score until pregnancy scanning. Up to day 90 there is little difference between single and twin bearing ewes in their energy requirements (Fig. 2). However from mid-pregnancy to lambing rapid changes begin to occur. The placenta undergoes a period of rapid growth up to day 95 which is followed closely by a phase of rapid foetal development and growth which continues to lambing.

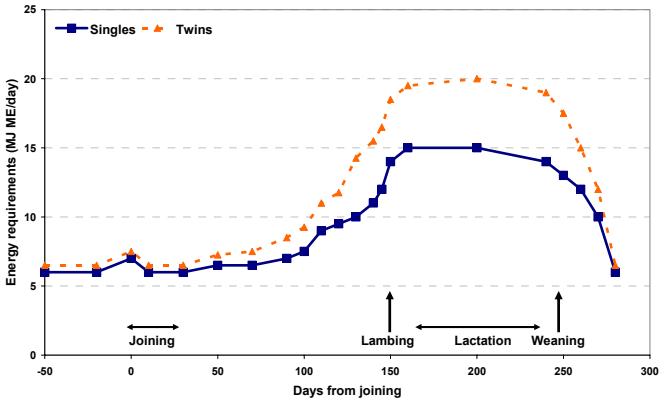

Figure 2: Energy requirements of single and twin bearing ewes (Source: Hall, 1991)

The impact of this period of foetal growth on the condition of the ewe is significant. Ewes carrying a single lamb will require 2 times their maintenance level of nutrition. Ewes carrying multiples have higher nutritional requirements - those bearing twins require 2.5 times and those with triplets 2.8 times their maintenance levels. Clearly from about day 90 of pregnancy the energy requirements of twin bearing ewes increase significantly and remain higher than those of single bearing ewes until weaning (Fig. 2).

The pattern of protein requirements during pregnancy generally runs parallel to that of energy requirements (Fig 3). You should aim for 10g of crude protein/MJ of ME for most of pregnancy, but in late pregnancy or during lactation the needs are greater particularly for twin bearing ewes.

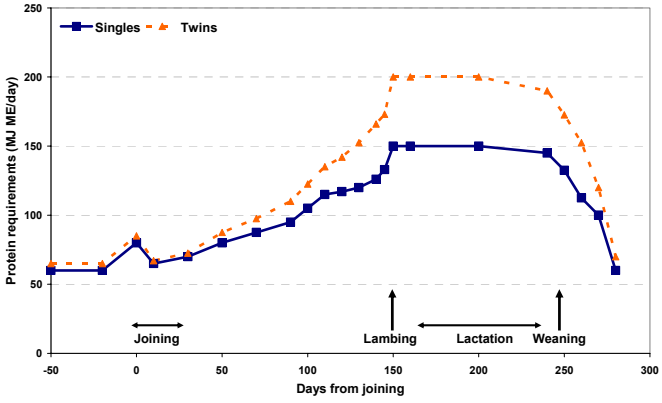

Figure 3 Protein requirements of single and twin bearing ewes (Source: Hall, 1991)

Severe under nutrition, particular in mid to late pregnancy will restrict placental growth and subsequent lamb weights while very high nutrition will result in over-fat ewes which are more susceptible in late pregnancy to pregnancy toxaemia (as they tend to eat less) and dystocia.

If the energy and protein requirements of the ewes, single or twin bearing, are not the met through increased intake the ewe will mobilise body reserves to supply the demands of the foetus/es. This does, however, come at a cost to both the ewe and her progeny. The preceding article outlined the average performance of ewes and their progeny in the high and low ewe nutrition groups. Further data collected from the 18 Lifetime Wool paddock-scale comparisons where single and twin bearing ewes and their progeny were run together, provides us with a good indication of the production 'penalties' incurred by twin bearing ewes and their progeny if their nutritional requirements are not met during mid to late pregnancy.

Despite there being no significant difference in fat score between single and twin bearing ewes, ewes bearing twins grew lighter (-0.2 kg) and finer (-0.1µm) fleeces than single bearing ewes (Table 6). Most significantly for superfine and fine wool flocks in particular is the trend for twin bearing ewes to have lower staple strength than single bearing ewes. When you consider that ewes that bore twins were more likely to have twins in subsequent years, this could have a significant negative impact on wool returns across the whole flock particularly those with high twinning percentages.

Table 6. The average performance of single and twin-bearing ewes across Lifetime Wool paddock scale sites, in Southern Australia

	Single	Twin	Diff.
Average FS (day 0 to 140)	2.6	2.6	0
Average BWT (day 0 to 140kg)	49.0	50.6	- 1.6
Clean fleece weight (kg)	3.2	3.0	+ 0.2
Average fibre diameter (µm)	20.0	19.9	+ 0.10
Staple length (mm)	91.1	89.5	+ 1.6
Staple strength (N/ktex)	34.1	31.8	+ 2.3
Carryover reproduction (scanning %)	120	134	- 14

** Carryover reproduction refers to the ewes' scanning % at their next joining. (Source Behrendt et al. 2006)*

Twin born progeny are more likely to die when compared to single lambs and have lower weaning weights (Table 7). They also produce less wool (-0.17kg) of higher fibre diameter (+0.28µm) than their single born counterparts. Interestingly there is a tendency for ewe progeny of twin bearing ewes to have higher reproductive rates (ie to also have twins).

Table 7. The average performance of single and twin progeny across Lifetime Wool paddock scale sites, in Southern Australia

	Single	Twin	Diff.
Progeny survival to marking (%)	86	62	+ 24
Progeny live weight at weaning (kg)	24.3	21.7	+ 2.6
Progeny live weight at 12months (kg)	32.6	31.5	+ 1.1
Progeny 2nd clean fleece weight (kg)	2.96	2.79	+ 0.17
Progeny 2nd mean fibre diameter (µm)	18.44	18.72	- 0.28
Progeny reproductive rate (scanning %)	96.9	100.8	- 3.9

(Source Behrendt et al. 2006)

Furthermore, if twin-bearing ewes are subject to low nutrition during pregnancy, the negative impacts of bearing twins and inadequate nutrition are additive. In this situation the relative performance of twin bearing ewes would be worse than that indicated in table 7. Conversely better nutrition can improve twin performance and the lack of any significant interaction between nutritional treatments and parity type indicates there is potential to manage twin-bearing ewes and their progeny for improved performance through better nutrition.

Preferential nutritional management of twin bearing ewes during pregnancy has been the subject of a number of on-farm comparisons in NSW over the past 12 months - results of these trials will be presented in future editions of this newsletter.

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Pasture benchmarks for pregnant ewes

The target fat score for pregnant ewes by day 100 of pregnancy is 3. Maintaining the fat score of your ewes at this level of condition during pregnancy will reduce the risk of pregnancy toxaemia, reduce lambing difficulties, save feed increase lamb birth weights and survival and provide you with some flexibility if the season collapses. Ensuring your pasture meets the recommended benchmarks (Table 8) for single and twin bearing ewes at various stages of pregnancy will allow you to maintain your ewes in the required condition. If your available pasture does not meet these benchmarks you will need to consider offering supplements to the ewes.

Table 8. Recommended pasture (kg DM green/ha) for ewes from scanning to lambing.

	Days pregnant	
	100-128	**Last two weeks**
Single bearing	900	1,000
Twin bearing	1,000	1,200

Source: Wean More Lambs (2004)

Ewes that were in poor condition at joining should be allowed to increase their fat score by 0.5 to 0.75 of a score in the first 3 months of pregnancy. However you should take care to avoid gross overfeeding to overcome low weights as this leads to partitioning of nutrients away from the foetus and towards maternal tissue, resulting in small lambs of low viability.

If your ewes are above fat score 4, then mid pregnancy is the best period for them to lose weight. These ewes could safely lose up to 5% of their bodyweight between days 30 to 100 of pregnancy but for the remainder of pregnancy major changes in nutrition should be avoided.

Preparation for mid-pregnancy - things to do now

1. Avoid severe nutritional stress to day 90

2. Pregnancy scan for multiples

- Draft ewes into mobs on scanned information and manage accordingly

3. Fat score ewes

- Aim to achieve a target fat score of 3 by day 100
- Restrict nutrition in mid pregnancy to fat score 4 or 5 ewes

4. Keep an eye on pasture availability

- Be prepared to supplement your ewes, particularly those with twins if pasture availability falls below the recommended benchmarks.

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