

INSIDE**Ewe nutrition and progeny fleece production - NSW paddock - scale findings****Production implications of managing ewes to fat score targets****What to do with crossbred lambs in 2008?***Ashley White, NSW DPI Livestock Officer (Sheep & Wool) Cowra & Bruce Watt, CTRLPB District Veterinarian Bathurst*

In 2007 roughage was expensive and in short supply but high protein, high energy grain was available for about \$300/tonne. In that context early weaning made sense but feeding lambs was at best a break-even prospect. The most common strategy was to hedge your bets by finishing the heavy lambs on grain, selling medium weight lambs as stores and running the light unsaleable lambs on a ration just above maintenance while waiting for a price rise and a break in the season.

2008 is quite different. Roughage as pasture, stubble or hay is plentiful. However, grain is still very expensive. So what are the options?

It is clearly uneconomical to feed lambs a grain based ration at current lamb and grain prices. It will cost about \$2.50 per kg of lamb liveweight which is worth just \$1.60/kg.

Since spring 2007 a lot of hay has been made, much of it high quality. Cereal hay for example is averaging 13.6 % protein (ranging from 5.0 to 17.9 %) with metabolisable energy levels between 9 and 12 MJ/kg.

Unfortunately the economics of feeding good quality hay to finish lambs is equally depressing. We would need to feed out lambs about 1.5 kg of high quality hay per day to get them to grow at 150 g/day. If hay is worth \$250/tonne we will need 10 kg of hay worth \$2.50 to put on 1 kg liveweight gain worth just \$1.60. Even though hay is cheaper, it has a lower energy content than grain so the economics are about the same. This figure becomes even more frightening when we consider average hay wastage rates of at least 10 - 20 %.

Silage is an option for some this year. At NSW DPI Cowra we showed that lambs grew at 140 g/hd/day on good quality lucerne silage but this improved to 200 g/hd/day with the addition of 40 % grain to the diet.

We also found that while lambs only maintained weight on lesser quality cereal silage they grew at 130 g/hd/day when we added 40 % grain to the ration. The lambs ate more

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silage and grew 20 g/hd/day faster when silage was fed chopped rather than "long" straight out of the bale. Other studies have also shown that feed intake can be improved by chopping roughage to 2.0 cm lengths. Producers who plan to use silage as a part of their normal feed management program may find it worthwhile to purchase chopping feed out machinery.

But unfortunately the economics of feeding silage for weight gain is similar to grain and hay. Feeding out silage can also be tricky and you need to have a feed out system that can handle the high quantities of feed, the higher moisture content and minimise wastage. Feed out losses can be significant. Research at Cowra has shown it to be 50% when bales of roughage are left whole on the ground for the sheep to climb on.

Roughage needs to be spread out to ensure good access by all sheep to minimise, behavioural shy feeders and diseases such as coccidiosis. You cannot afford to waste half the feed you put out. Roughage feeders will minimise trampling and faecal contamination but are often too expensive to provide sufficient access to all the sheep. About 25 % of sheep should be able to get access to the feeder at any one time. When feeders are expensive, this cost is difficult to justify. Talk to your livestock advisor or vet about lower cost feeding systems for roughage such as mesh cages or sheep panels around bales of roughage.

It is important to "imprint" the lambs prior to weaning onto the silage, hay or grain they will be fed after weaning. Consider cross weaning or leaving some ewes from a different mob with the lambs to lead the weaned lambs to feed and water in the early stages post weaning. These ewes can be the lowest fat score ewes that will require some higher quality nutrition to regain fat score for joining next year.

So what should we do this year? It is stating the obvious but there is no substitute for high quality green pasture to make finishing lambs pay this year. The summer rain has been critical. Producers with either lucerne or perennial grass

pastures now have the option of finishing lambs the most economical way possible – in the paddock.

If you have a few paddocks of high quality feed, ensure they are a low grass seed risk to the lambs and consider early weaning onto these paddocks. Ewes without lambs can then be run on poorer quality pastures, stubbles or locked in the drought lot and fed for maintenance without the lambs.

On the other hand, if you missed the rain and have lower quality feed such as stubbles or even cereal hay you may be better to leave lambs on the ewes and sell the lambs at weaning as stores or to slaughter depending on rain and price. The lighter the lamb then the higher the protein content required in the diet but typically lambs need at least a 13 % protein diet for growth. If no green feed is available and the protein content of the supplement is less than 13 % then weaning could be delayed for a few weeks provided the ewes carry sufficient fat score. Lambs will obtain some protein from the milk and continue to gain weight. The downside of this strategy is that ewes will have less time to recover pre-joining and this may reduce next years potential lambing percentage. High protein supplements such as lupins or protein meals are a consideration to boost lambs dietary protein levels post weaning but used very sparingly given the economics discussed above. Protein levels do not need to be as high as we are used to with grain rations to keep energy and protein in balance (see Table 1).

Whatever we feed to cross bred lambs, it will cost more than we make. Growth rates will be frustratingly slow on roughage based diets but there are limited options this year. Given the large variation in quality, it is **critical** when roughage is the base feed of the diet to get a feed test to determine its quality and disease risk (nitrate). Feed test kits are available from rural retailers, RLPB and DPI offices. Given the high value of grain, the greatest benefit comes from using this scarce resource to “top off” heavier lambs that are close to market specifications and prop up any protein or quality deficiency in the diet.

Table 1. Crude protein requirements of balanced rations for lambs*

Ration energy M/D	Lamb Liveweight			
	20kg	30kg	40kg	50kg
	Crude Protein			
	%	%	%	%
13	18.2	17.5	16.8	15.5
12	16.5	15.8	13.8	12.6
11	14.5	13.5	11.0	10.0
10	12.8	11.8	9.2	8.6

Source: Grazfeed®*Predictions assume ration protein degradability in the rumen of 80% at maintenance.
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Ewe nutrition and progeny fleece production - NSW paddock-scale findings

Dr Sue Hatcher, NSW DPI Senior Research Scientist

As well as influencing the growth of the foetus, fat score of the ewe during pregnancy can modify the development of secondary follicles in the foetus. This has a direct effect on the density and fineness of her lamb's fleece. One of the goals of the Lifetime Wool project was to quantify this impact both at the small-plot experimental sites as well as in the commercial paddock-scale comparisons.

In 2007 the final progeny shearing at our three NSW paddock-scale sites was completed. Across our three sites, Carwoola (Southern Tablelands), Oak Hills (Central West Slopes & Plains) and Kialami (Northern Tablelands) for the three years of the comparison we found significant differences between the high and low maternal nutrition treatments in wool production (both greasy and clean fleece weight) and fibre diameter. Remember that the high nutrition treatment ewes were managed to maintain fat score 3 during pregnancy and up to weaning while the low ewes were held between 0.5 and 1 fat score lower (see Vol 1 Iss 1 January 2005 of this newsletter for more detail of the experimental design at these sites).

Progeny from the better fed ewes grew 96 g more greasy fleece (3.14 versus 3.04 kg), 70 g more clean fleece (2.22 versus 2.15 kg) that was 0.09 µm broader. No differences were found in any of the other wool quality traits (CV, SD, fibre curvature, yield, staple length or strength). These results compare favourably with those from the intensive small plot experiments.

Maternal nutrition versus birth type

The impact of maternal nutrition on wool production was similar to that of birth type. Single born progeny grew 70 g more greasy wool (3.12 versus 3.05 kg/hd) and 50 g more clean wool (2.21 versus 2.16 kg/hd). It is not surprising that these impacts are similar to those of maternal nutrition during pregnancy, as the twin born progeny would have essentially been competing for nutrition with their litter mate since conception and would effectively have been on a lower plane of nutrition from day 1. In this instance though the single born progeny were 0.16 µm finer as expected. The singletons surprisingly had shorter staple lengths (79.9 versus 86.5 mm) - presumably their increased fleece production was therefore due to a denser fleece. Their greater access to nutrition during pregnancy would have had a positive impact on secondary follicle development.

Other effects

Not surprisingly there were significant differences between years in progeny production. Across the three sites, for each of the wool production and quality traits each year was significantly different to the others. Fleeces from the first shearing were lighter, finer, more variable in diameter, had lower curvature, higher yields, shorter staple length and were stronger than later shearings. These are fairly typical differences between a hogget fleece and subsequent wool production as the animal and fleece 'matures' with increasing age.

Similarly there were significant differences between the three experimental flocks in all of the wool production and quality traits - these simply represent bloodline differences between the three properties.

What is the value of these differences?

The value of the improved maternal nutrition on progeny fleece value to a particular flock will differ depending on the average fibre diameter of the wool clip, micron premiums at the time of sale and the length of time progeny are kept in the flock. Obviously the financial benefits will be greater for a finer flock due to the higher micron premiums for the finer wool.

Results from the small plot experimentation indicate that the differences in progeny production persist for the lifetime of the animals. So if ewe hoggets are kept in the flock for 5 years they will effectively grow an additional ¼ kg

of fleece over their lifetime than those whose dams were less well fed during pregnancy.

Production implications of managing ewes to fat score targets

Dr Sue Hatcher, NSW DPI Senior Research Scientist

We know that the breeding ewe plays a pivotal role in the wool production system. Actively managing ewe fat score during pregnancy can have significant impacts not only on the ewe herself but also on the lifetime performance of her progeny. The Lifetime Wool project has developed mathematical equations relating ewe fat score during pregnancy to ewe wool production and quality, reproduction and mortality as well as progeny wool production, wool quality and survival. For the first time, we can now predict the production consequences of managing ewes to different fat scores during pregnancy.

Maintaining ewes at fat score 3 versus 2.5 during pregnancy

The impact of ewe nutrition profiles during pregnancy on ewe and progeny performance are summarised in Table 2. The ewe and progeny performance for ewes maintained at fat score 3 for the duration of pregnancy are highlighted in **bold** in the table. These production outcomes are for a standard reference weight of 45 kg or a fine bloodline (a Standard Reference Weight or SRW is approximately the liveweight that would be achieved when skeletal development is complete and the animal is at score 3).

For example, a ewe maintained at fat score 3 for the duration of pregnancy would be expected to cut 4.1 kg clean wool with a diameter of 20.5 µm. These ewes would have a reproduction rate of 119.9 % and a mortality rate of 1.1%. Their progeny would cut 3.2 kg of clean wool with an average fibre diameter of 17.8 µm. The survival rates of single and twin born progeny from ewes maintained at fat score 3 would be 91 and 71 % respectively.

In comparison, a ewe maintained at fat score 2.5 for the duration of pregnancy would cut 3.8 clean kg (-0.3 kg) of 20.3 µm (-0.2 µm) wool, have a lower reproduction rate of 109.1 % (-10 %) but a similar mortality rate. While her progeny would cut a fleece similar in weight and fibre diameter for the fat score 3 ewe, their survival rates would be lower, 86.3 % for singles (-5 %) and 59.6 % for twins (-11.7 %).

You can use the same process to track ewe and progeny performance from a joining fat score of 2.5, 3 or 3.5 and then losing or maintain condition to day 90 of pregnancy and losing, maintaining or gaining condition between day 90 and lambing. This is possible as the effects of ewe fat score on ewe and progeny production are additive. This means, the impacts of nutrition in early to mid pregnancy can be added to the impacts of nutrition in late pregnancy. Losing fat score during early to mid pregnancy and then regaining that lost condition by lambing gives the same net result as maintaining the ewe’s nutrition over the whole of the pregnancy.

Reproduction rate & survival are key drivers!

The biggest impact of nutrition during pregnancy is on ewe reproduction rate and progeny survival, particularly that of twins. The condition of your ewes at joining ultimately sets the potential number of lambs to be born into your flock from that joining - ewes in better condition at joining conceive more lambs. While how you manage your breeding flock during pregnancy will effectively determine

how many of those ‘potential lambs’ are born and survive to weaning and beyond where they will generate a financial return for your enterprise.

Table 2. Summary of production effects for different ewe fat score profiles during pregnancy*

Joining Fat Score	2.5		3		3.5		4
	Day 90	Lambing	Day 90	Lambing	Day 90	Lambing	
Ewe production							
CFW	3.5	3.8	3.5	3.8	4.2	4.7	4.7
FD	19.8	20.2	19.9	20.3	20.7	21.3	21.3
Reproduction rate	109.1	109.1	109.1	109.1	119.9	131.1	131.1
Mortality	4.4	1.0	4.4	1.0	0.9	0.9	0.9
Progeny production							
CFW/hog	3.1	3.2	3.1	3.2	3.3	3.2	3.3
FD/hog	18.0	17.7	17.9	17.7	17.5	18.0	17.6
Survival singles	78.2	88.7	74.6	86.3	93.8	94.9	98.5
Survival twins	42.8	65.0	36.1	59.6	78.1	81.3	94.6

*For a SRW of 45 kg

Predicting ewe and progeny performance.

The ewe and progeny performance information at each of the fat score profiles in Table 2 is a valuable tool to assist you with nutritional decisions regarding your breeding ewes at critical stages of the reproduction cycle.

The relative performance of ewes joined at either fat score 2.5, 3 or 3.5 is clear - ewes in better condition at joining cut more wool, have higher reproduction rates and lower mortality. Using current grain prices (remember to make an

allowance for purchase, cartage and feeding out) you can calculate the cost: benefit of feeding ewes post weaning to increase condition at joining. The responsiveness of reproduction rate in your flock to a change in fat score will be a major input into your decision. While it may pay to feed a highly responsive flock (ie +12 - 15 additional lambs per 1 fat score increase) the benefit to a low or non-responsive flock (ie +3 or lower additional lambs) would be questionable. The NSW Lifetime Wool team has developed a Reproduction Rate Calculator to assist you in determining the responsiveness of your flock to fat score at joining. See see Vol 3 Iss 1 January 2007 of this newsletter for details of how the calculator works and directions for downloading it from the NSW DPI website.

Fat scoring a random sample of your ewes when they are yarded for pregnancy scanning at about day 90 will allow you to track their progress against the target fat scores. If your ewes have dropped condition you can either decide to maintain them at that lower condition or improve their available nutrition by either moving them to a better paddock or offering some form of supplementation. Again you can use the information in Table 2 to determine the production consequences of either option and calculate the cost: benefit of providing supplementation. Remember that adequate nutrition for twin bearing ewes is vital during the last stage of pregnancy - survival rates of twin born progeny from ewes that lose condition during the latter stages of pregnancy can fall to below 50 %. It is worth considering offering additional feed (pasture or supplements) to lightweight twin bearing ewes following scanning to allow them to build condition as they approach lambing. You can use the same decision process when separating your ewes into mobs for lambing. Fat score a sample of the flock when drafting and use this information, along with their pregnancy status to allocate ewes to lambing paddocks and decide whether the available pasture is

sufficient to meet their needs or if supplementation is warranted.

Again your focus should be on twin-bearing ewes - they must have sufficient available pasture or body reserves to support the relatively greater lactation demand of suckling two lambs.

Management of breeding ewes is about paying attention to detail at all stages of the breeding cycle. Regular monitoring of ewe fat score at critical stages allows you to track ewe progress against targets and make informed decisions regarding their nutritional status (requirements versus feed availability). Active management of breeding ewes to fat score targets during pregnancy is the key to success!

Lifetime Wool - where to from here?

The Lifetime Wool project will officially draw to a close on 30th June 2008. Your NSW Lifetime Wool team is preparing to hold a concluding seminar - located in the Southern Tablelands, Central West Slopes & Plains and the Northern Tablelands. Key findings from the project will be presented at these events as well as case studies from producers who have participated in the project. A feature will be the economic analysis of managing ewes to Lifetime Wool guidelines. Once details are finalised, an invitation will be sent to all readers on our mailing list.

The April edition of this newsletter (Vol 4 Iss 2) will be the final for the project. It will wrap up the key findings of the project with particular emphasis on the economic analyses. Keep an eye out for it in your mailbox in early May.

The Lifetime Wool website (www.lifetimewool.com.au) contains the most up to date information regarding the project. You can click on the interactive map to select your specific geographical location and source project outcomes and recommendations tailored for your region. If you haven't already done so, please visit the site and check it out.

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