NEW SOUTH WALES
LIFETIME WOOL
MAXIMISING THE GENETIC POTENTIAL OF YOUR FLOCK

VOLUME 1, ISSUE 2 • APRIL 2005 • ISSN 1832-3790

INSIDE

HIGHLIGHTS

Does ewe nutrition during pregnancy affect progeny body composition and immune response?

Conception rate increases with increasing fat score.

It is well known that heavier ewes or those in better condition at joining have more lambs. This is due to the relationships that exist between fat score, bodyweight and ovulation rate. Ovulation rate largely depends on the body condition (or fat score) of the ewe, with a higher fat score generally resulting in higher ovulation rates, although there is an additional impact of nutrition level at the time of joining. At the same fat score, ewes that are gaining weight are more likely to have a higher proportion of twins than ewes of the same fat score that are either maintaining or losing weight.

However considerable variation exists in the responsiveness in reproductive rate of various flocks (Table 1). Data from 6 Lifetime Wool flocks across Australia indicate that while more foetuses were scanned in those ewes with higher fat scores the magnitude of the increase varied from 7 to 36%.

Table 1 Conception rates (foetuses scanned/100 ewes) are variable between flocks.

Farm	FS 2 to 2.5	Fs 3 to 3.5	change
'Billandri', Kendenup, WA	100	136	+36
'Austral Park', Coleraine, VIC	90	118	+28
'Cressy', Launceston, TAS	100	128	+28
'Thornton Park', Brookton, WA	101	121	+21
'Edale', Moora, WA	117	127	+10
'Kayanaba', Dandaragan, WA	117	124	+7

The conception rates at the three NSW paddock-scale sites also varied (Figure 1). Overall, the conception rate at Oak Hills (Central NSW) was greater than that at both Carwoola (Southern Tablelands) and Kialami (Northern Tablelands). The greatest response in conception rate to increasing fat score occurred at Carwoola and the flattest at Kialami.

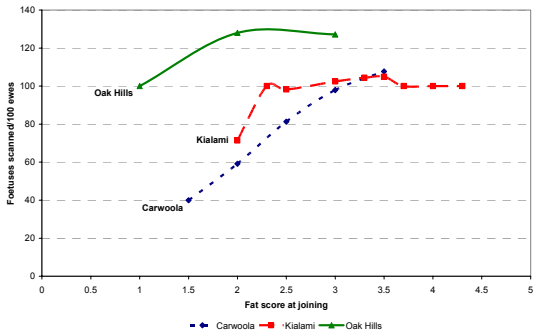

Figure 1 Ewe conception rate (foetuses scanned/100 ewes) and fat score for the three NSW Lifetime Wool sites.

Obviously genetic, environmental and management differences between properties will impact on the conception rate response to fat score in individual flocks. It is important to know the genetic potential of your flock to achieve high conception rates. Scanning ewes at 90 days for twin or single foetuses and comparing this with the fat score of the ewes at joining will enable assessment of the genetic potential of your sheep to increase conception rates.

In addition to the benefits of increased ovulation rate the length of joining can be reduced if the breeding ewes have reached the target fat score of 3, particularly in the autumn breeding season. More than 70 % of ewes which have reached fat score 3 or higher in the breeding season can be expected to conceive within the first cycle of joining. This has benefits later on in the breeding cycle, in terms of a reduced lambing period and a more even drop of weaners and perhaps earlier weaning. An earlier weaning (at say 12 weeks) will give the ewes a greater opportunity to reach the target fat score of 3 prior to their next joining.

Some of the information in this article was taken from both the Prograze ™ and Wean More Lambs extension packages. For more information on becoming involved in either a Prograze ™ or Wean More Lambs group, please contact your local NSW DPI Livestock Officer (Sheep & Wool).

australian wool
another innovation
limited

NSW paddock-scale comparison update

Lifetime wool has now been operating in NSW for 12 months. During 2004, the liveweight and fat score of the breeding ewes at each of the three paddock-scale sites were monitored monthly during pregnancy and lactation. Paddock rotation and/or supplementary feed rations were managed in order to achieve a target difference of 1 fat score between the high and low nutrition ewes from about day 90 of pregnancy to weaning.

At each of the three NSW sites a difference in fat score was achieved although there was variation between sites in the timing and magnitude of the difference as well as the length of time it was able to be maintained (Figure 2). This variation is due a number of factors, the most influential being the prevailing environment. Drought conditions prevailed at Carwoola (Southern Tablelands) until about day 200 and at Oak Hills (Central) until day 150. This required full ration feeding of the ewes at these two sites until sufficient pasture became available. At Kialami (Northern Tablelands) episodic rainfall was received during 2004 which resulted in atypical pasture growth patterns for the year.

The three fat score profiles are drawn from the monitoring data of those ewes which were pregnant with and successfully reared a single born lamb. At Carwoola a significant difference in fat score between the high and low groups occurred between day 70 to just prior to lambing. The maximum fat score difference achieved at this site was 0.5. At Kialami a significant fat score difference between the two groups was achieved from day 55 and maintained to weaning. The greatest difference in fat score at Kialami was 0.6. At Oak Hills a significant difference in fat score was achieved at day 109 with the differences persisting, although at a smaller magnitude until their second joining in mid-March 2005. The greatest fat score difference achieved at Oak Hills was 0.8.

These results highlight that managing ewe fat score targets can be challenging however the benefits of doing so can be substantial. These benefits include:

- increased conception rate (see page 1)
- increased lamb and weaner survival
- better quality wool from the ewe, and
- more and better quality wool from the progeny

Monitoring the fat score of breeding ewes at critical times of the breeding cycle (pre-joining, mid-pregnancy, late-pregnancy and weaning) will enable timely and effective management decisions to be made that maximise wool production profitability. Identifying target fat scores and working towards them with careful feed budgeting and ewe monitoring will increase both the number of lambs produced from a flock and the lifetime productivity of those lambs.

Further information on each of these areas will be published in future editions of New South Wales Lifetime Wool.

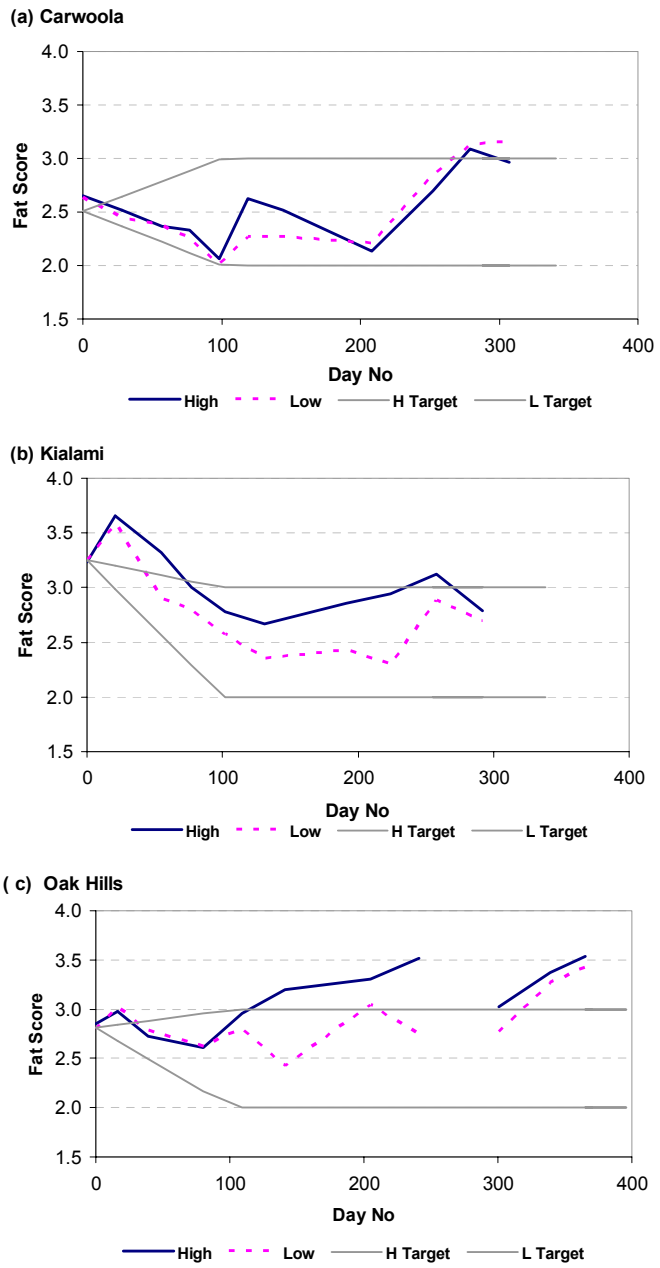

Figure 2: Fat score profiles from joining for the three NSW Lifetime Wool sites a) Carwoola, b) Kialami and c) Oak Hills.

Experiences from the Carwoola site

The drought conditions during all of pregnancy at Carwoola provided some challenges. These ewes had experienced a tough season during 2003 as well and both groups were being fully fed. The high group peaked at 1kg/hd/day of wheat, while the low group were around 600g/hd/day, but they were lifted in late pregnancy to counter pregnancy toxaemia.

The average fat score of the high groups did increase a bit (Figure 2a), but not as much as we wanted. Why? As the amount of grain/hd/day increased, the variation in the mob increased. By lambing time the high group had ewes ranging in fat score from 1.5 to 4.0 with a coefficient of variation in fat score of 25 % (Figure 3).

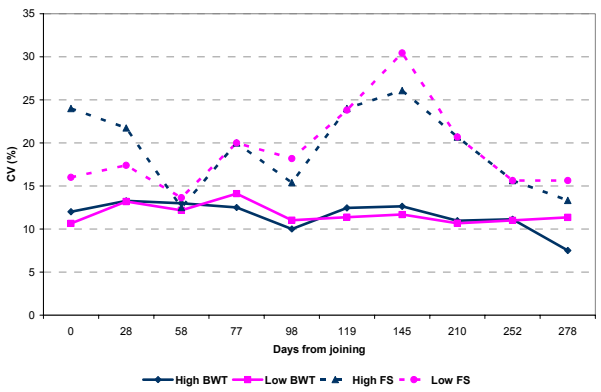

Figure 3: The variability of fat score at Carwoola increased significantly with ration feeding.

It was impossible to get the high ewes to eat 1kg/hd/day. Wastage increased with each increase in feeding rate. What needed to be done was to draft on fat score and feed accordingly, however this was not possible within the Lifetime Wool experimental protocol.

A similar pattern was evident with the low ewes at Carwoola. The fat score of these ewes also ranged from 1.5 to 4.0 at lambing; however their CV of fat score was approximately 5 % higher at this time than the ewes in the high group.

The season did break during lactation and the ewes have made an excellent recovery with an average fat score of just over 3.0 by this February for both mobs (Figure 2a). There has been some green feed in the pastures since October, since then the fat score variability of both the high and low ewes has decreased significantly.

Lessons from Kialami

The performance of the ewes at the Kialami site has shown that it can be difficult to achieve and maintain a target fat score of 3 following a pre-lamb shearing in mid-winter (Figure 2b). The increase in nutritional demand off-shears is considerable as bare shorn sheep have a very low resistance to cold temperatures and therefore must either increase their feed intake or lose body condition (ie decrease fat score) just to maintain their temperature and normal bodily functions. From mid to late pregnancy these nutritional demands increase, particularly for those ewes carrying twin lambs.

In the Northern Tablelands environment closely aligning the reproductive cycle of the ewe with pasture production so that the peak feed requirements of lactation coincide with the probable onset of spring pasture growth does not fully solve this problem. Under this scenario, the recommendation of maintaining a fat score of 3 through winter from mid-pregnancy to lambing can generally be achieved through pasture availability alone up to pregnancy scanning at about day 100. However decisions must then be made on how to either maintain fat score or minimise loss of body condition until lambing.

Due to the difficulty of accumulating pasture mass in New England during winter and the typical low clover content of tablelands pastures at this time, supplementary feeding with cereal grain is required for about a month off-shears to maintain a fat score of 3.

Post shearing, the high ewes at Kialami were grazing pastures with herbage mass of about 1,800kg DM/ha dry with 600kg DM/ha green. From about day 88 (ie off-shears) to lambing they were fed 200g/hd/day of oats. Even with this level of feed their fat score was below the recommended target of 3 at lambing (Figure 2b).

Events at Oak Hills

At joining in March 2004, pasture availability was minimal and all ewes were receiving about 1kg/hd/wk of wheat. As the year progressed the season deteriorated and the levels of grain and hay or silage fed to both the high and low groups increased. From early to mid pregnancy the high ewes were being offered about 2.5 kg/hd/wk of wheat with about 2.7kg/hd/wk of a mix of hay and silage. The low ewes received about 68% of the high ewes grain ration and 76% of their hay and silage ration. These feed levels increased slightly in late pregnancy.

While this level of feeding did generate a fat score difference from day 109 onwards (Figure 2c), like the ewes at Carwoola the variation in the mobs at Oak Hills also increased (Figure 4). However at Oak Hills both bodyweight and fat score were variable with the coefficient of variation in both traits not decreasing until weaning despite ration feeding ceasing at day 146.

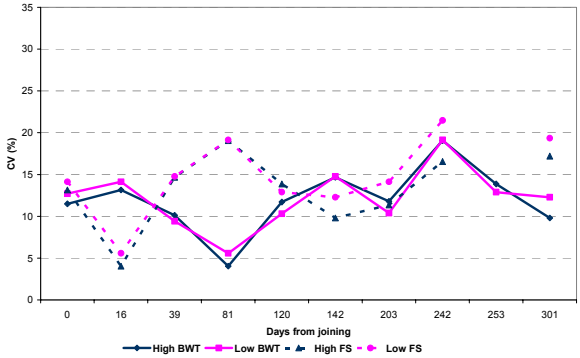

Figure 4 Body weight and fat score variability of breeding ewes at Oak Hills

Under normal commercial management rather than feed two large mobs of 500 breeding ewes as was the case at Oak Hills, feed utilisation would have been improved if the ewes had been drafted into smaller groups based on their reproductive status and/or fat score and fed separately.

Where to now for the NSW paddock-scale sites?

At each of the three NSW sites the progeny have been weaned and the ewes are now being joined for the second time. The purpose of this second joining is to determine whether their nutritional level (ie high vs low) from pregnancy to weaning in 2004 impacts on their ability to conceive during joining in 2005 and their fertility.

During 2005, the focus will now move to the performance of the 2004 drop progeny. Monitoring of liveweights, growth, wool production and quality and in the case of the female progeny reproduction will continue until the progeny reach 2.5 years of age.

During 2005 an extension program is being established for Lifetime Wool in NSW. If you are interested in testing the feasibility of managing breeding ewes to achieve fat score targets that will improve weaning percentages, lifetime wool production and quality performance of the project and farm profit, contact any of your NSW Lifetime Wool team for further information.

Does ewe nutrition during pregnancy affect progeny body composition and immune response?

'Fetal programming' describes the influence of the nutritional level of the ewe during pregnancy on a range of traits expressed by progeny in later life. The impact of maternal nutrition on progeny wool production and quality was outlined in the previous issue of this newsletter. But are other traits expressed by the progeny also affected by maternal nutrition?

Body composition

Nutritional limitations during pregnancy can impact on the composition of muscle types in lambs resulting in lighter, fatter lambs at slaughter. Previous research has found that poor nutrition early in life can increase the amount of carcase fat when animals are compared at the same bodyweight. Low birth weight lambs had a larger percentage of fat at 20 kg liveweight than those with higher birth weights. This lead to the suggestion that the metabolism of a lamb can be 'programmed' by poor nutrition during foetal and infant life so that when nutrition is later improved the animal is less productive.

Progeny born in 2002 from the plot-scale experiments in Phase 1 of Lifetime Wool (see Vol. 1 Iss. 1 of this newsletter) had back fat and eye muscle depth at the C-site measured using an ultra-sound scanned every 8 weeks until 12 months of age.

No significant impact of ewe fat score at *mid-pregnancy* was found on back fat or eye muscle depth of the progeny at neither the WA nor Victorian sites. However at the Victorian site progeny from the lowest nutritional treatment during *late pregnancy* tended to have less eye muscle at the same liveweight as the progeny from the highest nutritional treatment although the difference was only small.

From this it was concluded that in practical terms the impact of ewe nutrition on the body composition of Merino progeny, at least up to about 30kg liveweight are relatively small and will have little economic significance.

Immune response

The provision of additional protein early in life enables animals to resist better the effects of disease and parasitism and contributes to higher production in later life. Evidence also exists that poor nutrition and stress during pregnancy can influence the development of the immune systems in the foetus and that these effects may persist for the lifetime of the animal.

From weaning to 12 months of age, faecal worm egg counts (FWEC) of the progeny from the Phase 1 lifetime wool sites were monitored monthly. Analysis of these results indicated that ewe nutrition to mid-pregnancy did not have any significant effect on progeny FWEC at either of the two sites. It was concluded that the effects of maternal nutrition on resistance/resilience to parasites are only minor, at least in the progeny studied, until the age of 12 months.

This article was summarised from two papers prepared by Paganoni, Banks, Oldham and Thompson which were prepared for the 2004 conference of Australian Society of Animal Production. If you would like a copy of either of these papers or others in the series, please contact Sue Hatcher.

Your NSW Lifetime Wool Team

Dr Sue Hatcher – Team Leader & Site Leader Oak Hills
Orange Phone 02 6391 3861

Phil Graham – Site Leader Carwoola
Yass Phone 02 6226 2199

Michael Lollback – Site Leader Kialami
Tamworth Phone: 02 6763 1257

Bob Marchant – Site Leader Kialami
ArmidalePhone 02 6776 5011

Clare Edwards – Agronomist
Armidale Phone: 02 6776 5000

Peter Johnson – Project Extension
Orange Phone 02 6391 3967

Kevin Thornberry - Technical Support
Orange Phone 02 6391 3862

NSW Lifetime Wool is edited by Sue Hatcher
NSW Department of Primary Industries
Orange Agricultural Institute
Orange, NSW 2800
email: sue.hatcher@agric.nsw.gov.au

NSW DEPARTMENT OF
PRIMARY INDUSTRIES