VALUING LAMB SIRES - THE EFFECT OF ESTIMATED BREEDING VALUES FOR WEIGHT AND FAT IN A DECLINING LAMB MARKET.

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SUMMARY
Three hundred and twenty lambs, sired by Poll Dorset rams with a range of estimated breeding values (EBVs) for weight and fat, out of Border Leicester x Merino dams, were born in March and April and grown through to mid August, mid September or mid October. Lambs were slaughtered if they were over 48 kg live weight or had GR tissue depths over 15 mm with the balance slaughtered in October. Growth rates from weaning to September and the August live weight were related to EBVs for weight with the August weight (mean 36.8 kg) increasing by 0.242 kg/kg EBV. The regressions between EBVs for fat and fat measurements were positive, although not significantly different from zero. A carcass value was estimated based on average NSW lamb prices in August, September and October with discounts for over fatness and feed costs. This value was significantly related to EBV for fat with the highest value carcasses from the lean, fast growth sires. The value increased by $0.07 for each 1% increase in the lean growth index.
Keywords: Lamb, growth, fat, ebv, prices

INTRODUCTION
There is usually a decline in lamb prices from July through to October (AMLC 1995) and thus lamb producers need to balance the advantages of selling lambs early against sacrificing potential extra weight. However, lambs become fatter as they increase in weight and fast growth rates may also result in increased fat levels (Thatcher and Gaunt 1992) which may attract a price penalty. If fast lamb growth results from choosing fast growth sires, any economic advantage may depend on the leanness of the progeny. Thus, there was a need to assess the growth and fat characteristics of lambs when sold in late winter and spring to determine if the lean growth index within LAMBPLAN (Banks 1990) was useful in predicting carcass value. In this experiment, lambs of varying genetic predisposition for growth and leanness were slaughtered on the basis of live weight or leanness and the carcass given a simulated value based on weight, fatness and month of sale.

MATERIALS AND METHODS
Twenty Poll Dorset rams were selected from a drop of 170 in 1991 using fat and weight EBVs calculated by LAMBPLAN (Banks 1990). The stud had objectively selected for growth and leanness since 1981. The rams were selected to give a spread in genetic potential for weight and fat and EBVs for weight and fat averaged -0.2 kg (range -3.4 to 3.1 kg) and 0.1 mm (range -0.4 to 0.7 mm) respectively and the lean growth index (50:50 growth: lean) averaged 98.6 % (range 85.4 to 116.2 %).

The rams were joined in single sire groups to 425 Border Leicester x Merino ewes from 8 October to 26 November 1992 at the Agricultural Research Station, Cowra. Ewes were randomized to sire on ewe source (there were 4 groups of ewes representing 3 ages), previous location (Cowra or Temora) and live weight. There were data on 12 to 23 lambs per sire reared to slaughter, except for one sire which sired 3 lambs as it died during joining.

Lambs were born on pasture, between 3 March and 27 April 1993 and their birth weight, sex, dam and birth date recorded. Ewes lambed in two flocks based on early or late raddle data at joining. Ewes were fed lucerne silage, then large round lucerne hay bales and finally oats and lupins at about 1 kg per day until a week after lambing ceased. Of the 425 ewes at joining 319 were pregnant and 379 lambs were born of which 332 were available at weaning with complete pedigree and other data.

Lambs were weaned on 7 June and subsequently grazed on ryegrass and lucerne pasture with grain supplements, averaging 330 g oats/d and 60 g lupins/d until 29 July. They then grazed lucerne pastures with over 2000 kg green DM/ha with some supplementation with oat and lupin grain. From August, the lambs grazed pasture consisting of clover, lucerne, phalaris or barley grass with no supplements. From weaning until slaughter 10 lambs died from grain poisoning, accidents or unknown causes.

Lambs were weighed at weaning, and on 17 August, 13 September and 18 October. On 12 August measurements were made of C fat depth (45 mm from the mid-line over the 12th rib) by ultrasound (Delphi Backfat Meter Model 1017a), fat score by manual palpation and GR (total tissue depth 110 mm from the mid-line of the carcass over the 12th rib) by real-time ultrasound (Aloka Echo Camera Model SSD-500).

Lambs were slaughtered in August, September or October. Those ≥ 48.0 kg live weight or with GR ≥ 16 mm on 17 August or 13 September were slaughtered 2 days later and the balance was slaughtered on 20 October. Lambs measured as having GR ≥ 16mm were confirmed by manual fat scoring and discrepancies resolved. Fasted live weights of slaughter lambs were obtained the day after their full weight. Ninety nine, 76 and 147 lambs were slaughtered on 19 August, 16 September and 20 October respectively. After slaughter, GR was measured with a GR knife and C fat depth with a ruler and carcass weight recorded.

To assess the value of the carcass (carcass$) a number of arbitrary assumptions based on historical data were made about prices. Carcass prices used were $1.83, $1.70 and $1.48 per kg for lambs sold in August, September and October, which are the average NSW Meat Industry Authority prices for 18 to 20 kg lambs for these months 1992-95 (A. Bowman pers. comm.). Lambs which had a carcass C fat depth of 5 mm or over were discounted by 10% based on the relationships between C fat depth and GR (Kenney 1996; D.G. Hall unpublished data) and knowledge that Sydney lamb wholesalers would like to discount over fat lambs (Hall *et al.* 1996) with the balance given a 10% premium to maintain the same average price. Thus lambs which had to be sold early because they were considered over fat did not gain an unrealistic price advantage. Lambs sold in September and October were discounted a further $2.46 and $4.56 per head based on suggested feed costs of 6 cents per kg feed consumed in winter and 3 cents in spring in this region (A. White pers. comm.) and predictions from GRAZFEED (Anon 1990) of likely intakes based on their actual growth.

Statistical analysis. The variables live weight at weaning and on 17 August and growth rate from weaning to 17 August, 17 August to 13 September and 13 September to October 18 and carcass$ were analysed by least squares analysis of variance (Gilmour 1988) with the factors ewe source, lamb birth type, date of birth, sex, sire EBV for weight and fat, their interaction and their interaction with sex. A subsequent analysis used lean growth index rather than the EBVs in the model. Fat score, GR and C fat depth on 12 August were similarly analysed with live weight on 17 August as a covariate.

RESULTS AND DISCUSSION

Growth averaged 244 ± 3 g/d from birth to weaning and 184 ± 3 g/d from weaning to 17 August. The mean lamb weights varied among the ewe sources by 1.2 kg at weaning ($P<0.05$) and by 0.7 kg on 17 August ($P>0.05$). Sex significantly affected all weights and growth rates ($P<0.001$), with cryptorchids 4.0 kg heavier than ewes on 17 August. Litter size and day of birth also affected ($P<0.001$) all weights and growth rates.

The sire EBV for weight significantly affected weight gain from weaning to 17 August ($P<0.05$) and from August to September ($P<0.01$) with 3.1 ± 1.3 and 8.4 ± 3.2 extra g/d for each kg EBV respectively. There was no affect in the final period. The regression for weight on August 17 was 0.242 ± 0.143 kg/kg EBV ($P= 0.09$). This value is consistent with expectations as live weight was 36.8 kg and EBVs are estimated for 60 kg. Thus 60/36.8 x 0.242 is 0.39 which would not be significantly different to 0.5, the expected value. The sex x EBV for weight interaction did not significantly affect any variable.

After adjustment for live weight (always $P<0.001$), both sex ($P<0.001$) and litter size ($P<0.01$) significantly affected live fat score, GR and C fat depth on 12 August. After adjustment to the same weight (36.8 kg) ewes and cryptorchids had fat scores of 3.82 ± 0.04 and 3.10 ± 0.04, GR of 15.0 ± 0.2 and 11.9 ± 0.21 mm and C fat depth of 3.63 ± 0.06 and 2.88 ± 0.07 mm respectively. There was no significant affect of ewe source or day of birth on fat measurements.

EBV for fat did not significantly affect any of these fat related variables although the EBV for fat approached significance for C fat depth ($P = 0.10$; 0.202 ± 0.124 mm fat depth C/mm EBV). The regression for GR was 0.270 ± 0.361 mm fat depth C/mm EBV ($P> 0.10$). The lack of significance of fat EBV on the fat measurements may be associated with the errors in measuring live lambs and their relative leanness at this point (Hopkins *et al.* 1993; Kenney 1996) together with the limited number of lambs per sire. However, the relationships between EBV for fat and progeny fatness were positive and larger than predicted for each measure. The sex by EBV for fat did not significantly affect any variable.

The carcass$ is not an actual profit figure, but the relative differences are realistic. Carcass$ at average EBV for weight and fat, litter size and birthday was $29.80 ± 0.44 for ewe lambs and $35.39 ± 0.49 for cryptorchid lambs ($P<0.001$). Carcass$ was also significantly ($P<0.001$) affected by birthday ($0.27 ± 0.03 /d higher each extra day of age) and litter size (single born lambs $4.44 ± 0.67 higher). EBV fat was significant ($P<0.05$) but not EBV weight. When their interaction was included it was significant (P

<0.05) (Figure 1). When the lean growth index replaced the sire EBVs it was also significant (P<0.05) with carcass$ value increasing by $0.07 per 1% increase in the index.

Using the simulated results with 20% price differences per kg between lean and fat lambs and including the costs of feeding, there are advantages in using sires that are leaner and faster growing during late winter and early spring when prices usually decline. However, the differences due to sire EBV for weight were not significant. The largest difference was between progeny from sires with EBVs for weight of 3 kg and fat of -0.4 mm at $33.90 compared to $31.22 for progeny from sires with EBVs for weight of -3 kg and fat at 0.6 mm. This is not a large difference even though lean lambs were given a 20% price advantage, but in the model used the effect of EBV for weight did not significantly affect the carcass$. These differences would vary markedly between years and with the discount used for fat and thus it needs to be recognised that advantages of using large lean sires will not be obvious in many situations.

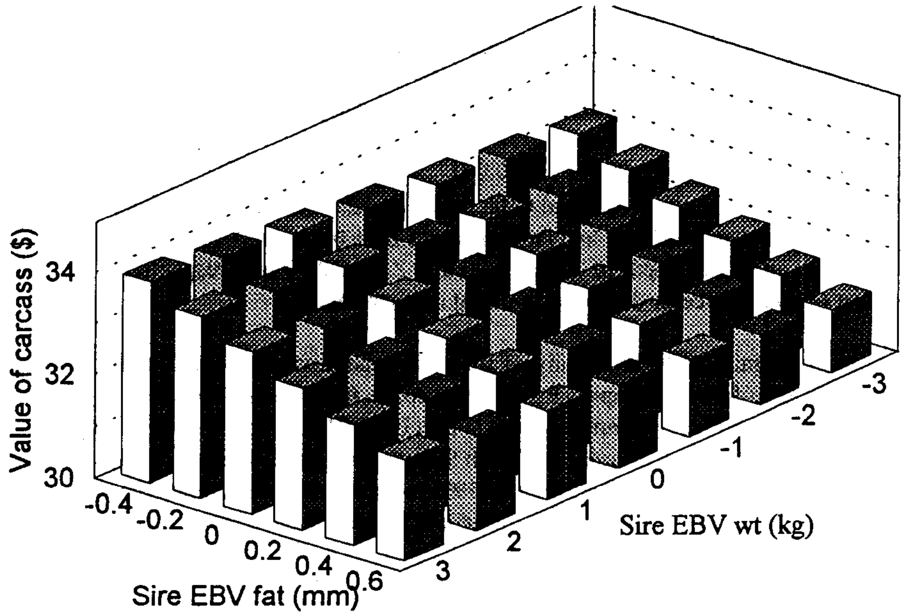

Figure 1. Estimated value ($) of lamb carcasses from sires with different estimated breeding values for weight and fat.

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