LAMB AND WOOL PRODUCTION FROM EWES FED DIFFERENTIALLY DURING PREGNANCY

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SUMMARY

Four groups each of 20 Merino ewes bearing either single or multiple lambs and running on 2 ha plots of dry pasture were fed lupin grain at 300 to 400 g/hd/day from about day 30 of pregnancy to lambing in an attempt to maintain ewe live weight throughout pregnancy. A further four groups each of 20 similar ewes were fed lupin grain ad lib. only from day 110 of pregnancy; this treatment resulted in substantial losses followed by recovery in ewe live weights during pregnancy. For single born lambs, 48% of the 1.9 kg variation in mean birth weight between groups was accounted for by change in mean condition score of the ewes between days 30-100 of pregnancy. For twin born lambs, 53% of the 0.8 kg variation in mean birth weight between groups was associated with mean ewe live weight at day 100 (range 39.6-48.8 kg) and a further 27% with weight change from days 30-100 of pregnancy (range -1.6 to -8.9 kg). Greasy fleece weights of the ewes were also associated with live weight and condition score during pregnancy. These results indicate that nutrition during early-mid pregnancy of Merino ewes joined at about 50 kg can have marked effects on lamb birth weight and ewe wool production.

Keywords: ewes, pregnancy, nutrition

INTRODUCTION

Offering grain at high rates to autumn lambing Merino ewes at pasture has failed to increase the low birth weights and survival rates of twin or triplet born lambs in Western Australia (Beetson 1984). Declining ewe live weights during the first 90-100 days of pregnancy in these ewes reflects the poor pasture conditions typical of many farms in the late summer-autumn period in Western Australia. This loss of live weight may reduce the ability of the pregnant ewe to respond to feeding in late pregnancy. Placental size reaches its maximum at about day 90 of pregnancy (Bell 1984) and as placental weight and lamb birth weights are highly correlated (Mellor 1983) it has been suggested (e.g. Davis et al. 1981) that optimisation of lamb birth weight would be better achieved by attention to factors influencing placental growth rather than manipulation of feed intake in late pregnancy. In this paper we present results of a study to test the effect of differential nutrition during pregnancy on lambing performance and wool production of single and twin bearing Merino ewes. Feeding rates were adjusted in an attempt to either maintain ewe live weight throughout pregnancy, or for ewes to lose up to 20% of starting live weight by about day 100 of pregnancy and then to regain this loss by lambing.

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MATERIALS AND METHODS

Approximately 500 six year old Booroola Merino and Merino ewes had their oestrous cycles synchronised using intravaginal progestagen sponges in December, 1984, and were joined with 20 harnessed entire rams for mating at their second oestrus following withdrawal of sponges.. Ovulation rates of all marked ewes were determined by laparoscopy about 10 days after mating. Twenty days later, 160 ewes with ovulation rates of two or greater that failed to return to service were randomly allocated to one of eight groups of 20 ewes and placed in 2 ha plots.

In an attempt to maintain ewe live weight throughout pregnancy, four groups of ewes (Treatment 1) were offered 300 g/head/day of lupin grain from about day 30-110 of pregnancy, and 400 g/head/day from day 110-lambing. The ration was offered 3 times per week in troughs. Thereafter lupin grain was offered ad libitum for 4 weeks post lambing. The other four groups of ewes (Treatment 2) were not offered any grain until day 110 of pregnancy, to induce substantial weight losses during this period. Thereafter lupin grain was offered ad libitum until 4 weeks post lambing. All ewes were run as one flock from this time until shearing.

Ewes were weighed and condition scored every 2 weeks during pregnancy and at a mean of 3 days after lambing. Lambs were weighed soon after birth. Wool growth was measured by placing dyebands in midside staples (Chapman and Wheeler 1963) of each ewe on days 30 and 110 of pregnancy and 3 days after lambing. Greasy fleece weights were recorded for each ewe at the annual shearing (October) and a midside sample taken for determination of washing yield, fibre diameter and staple strength.

In each of the two treatments nine ewes bearing triplets, detected by ultrasonic scanning on about day 55 after mating, were killed on day 90 after mating and foetal and placental weights recorded. These ewes were replaced with spare ewes in each plot.

Statistical analyses

Changes in ewe live weight and condition score during pregnancy only partly reflected differences in level of grain feeding, due to differences between plots in pasture on offer; Consequently, a stepwise regression analysis, with adjustments for sex of lamb and number of observations contributing to each mean, was used to examine the proportion of the between plot variation in mean lamb birth weight and wool production that could be explained by live weight, condition score and-their changes during pregnancy. The procedure fitted variables starting with the one that explained the most variance and continued until the residual mean square of the model was not reduced by addition of the next selected variable.

Analyses of variance were used to test for treatment effects on placental and foetal weights in the triplet bearing ewes that were killed on day 90.

RESULTS

Feed and animal Performance

At the commencement of grazing, the plots contained between 1.1 and 2.5 tonnes of dry matter/ha, with an average in vitro dry matter digestibility of 28% and crude protein content of 8.1%. The dry matter on offer declined to an average of 0.4 tonnes/ha immediately post lambing, although digestibility and

protein levels increased from about day 100 of pregnancy with the break of the season when green material became available. This change in paddock feed from day 100 meant that the maximum changes in ewe live *weight and condition score for the first two-thirds of pregnancy were achieved by that time, and so this day rather than day 110 has been used as the changeover point for differential feeding. The lupin grain had an in vitro dry matter digestibility of 90% and crude protein content of 31.6%. Average consumption of lupins for the ewes in Treatment 2 over the period from day 110 to immediately after lambing was 1.2 kg/ewe/day.

For ewes bearing single lambs, mean starting live weights and condition scores per plot within sex of lamb born varied from 45.0-53.5 kg and 2.4-3.0 respectively, the number of animals per observation varying from l-6 and averaging 3. Mean weight change from day 30-100 of pregnancy ranged from a gain of 0.5 kg to a loss of 4.3 kg for ewes on Treatment 1, and losses of 7.5-13 kg for ewes on Treatment 2. Mean condition scores changed by 0 to 1.0 (Treatment 1) and 0 to minus 1.2 (Treatment 2). From day 100 to 3 days post lambing all ewes gained weight, the range being from 1.5-18.0 kg. Condition scores were either maintained or increased.

For ewes bearing twins, mean starting live weights and condition scores per plot varied from 46.6-50.2 kg and 2.4-3.0 respectively, the number of ewes varying from 6-13. Live weight and condition score changes in the first period ranged from losses of 1.6 to 8.9 kg and plus 0.7 to minus 0.8 respectively. From day 100 to 3 days post lambing all ewes gained weight (range 2.7-11.7 kg). Condition score changes over this period ranged from a loss of 1.0 to a gain of 0.6. Further data is available from the authors on request.

Lamb birth weights and wool production

For single born lambs, a total of 48% of the between plot variation in mean birth weight (3.3-5.2 kg) was associated with change in mean condition score over days 30-100 of pregnancy. Change in mean condition score between days 30-100 of pregnancy was highly correlated (0.81) with mean ewe live weight on day 100. For twin born lambs, 80% of the between plot variation in mean birth weight (3.2-4.0 kg) was accounted for by live weight of the ewe at day 100 (53%) and weight change from days 30-100 of pregnancy (27%).

Fifty-three per cent of the between plot variation in mean greasy fleece weights of the ewes bearing single lambs (4.0-6.0 kg) was associated with condition score at day 100 (35%) and condition score at day 30 (18%). For ewes bearing twins, 58% of the variation between plots in mean wool weights (4.0-4.9 kg) was associated with live weight 3 days post lambing (45%) and weight change over days 30-100 of pregnancy (13%). There were no significant differences between treatments in mean fibre diameter (22.7 micron) or washing yield (71%). Staple breaking force was greater in Treatment 1 than 2 (39 *v.* 31 Newtons/Ktex, $P < 0.05$).

Foetal and Placental measurements in triplet bearing ewes

There was no significant difference between Treatments 1 and 2 in the total number of cotyledons per ewe, but there were significant differences in total weight of cotyledons per ewe (1159 g *v.* 944 g respectively, $P < 0.05$) and total foetal weights per ewe (1695 g *v.* 1498 g respectively, $P < 0.05$). Hot carcass weights of the ewes were also greater in Treatment 1 than Treatment 2 (18.6 kg *v.* 15.9 kg respectively, $P < 0.05$).

DISCUSSION

Dramatic losses and gains in ewe live weight and condition score during pregnancy are typical of many on-farm situations for ewes lambing in autumn-early winter in Western Australia. The results from this experiment for Merino ewes bearing both single and twin foetuses indicate that for animals mated at about 50 kg and condition scores of 2.5-3.0, live weight and/or condition score changes during the first two-thirds of pregnancy are important factors in determining lamb birth weight as well as wool production from the ewe.

While our results, particularly for ewes bearing singles, have a limited number of observations, they are supported by other studies. Lippert and Milne (1985) reported increases in lamb birth weight due to supplementary feeding between days 30-90 of pregnancy in Scottish Blackface ewes, even when ewes were adequately fed in late pregnancy. Everitt (1966,1967) using lighter but similar condition score Merino ewes to those used in our study, reported that ewes well fed during the first 90 days of pregnancy had heavier foetuses on day 140 of pregnancy than ewes underfed from mating to day 90 and then well fed. The mechanism by which lamb birth weight is affected appears to be associated with placental size, as indicated by the results obtained from the ewes killed on day 90 and from Everitt (1964). These findings are particularly relevant to the successful exploitation of techniques to increase the lambing performance of ewes through increasing their ovulation rate at joining.

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