

Lifetime Wool – Carryover Effects on Subsequent Reproduction of the Ewe Flock

Chris Oldham ^A Andrew Thompson ^B

^A Department of Agriculture Western Australia, South Perth WA 6151, ^B Primary Industries Research Victoria (PIRVic), Dept of Primary Industries, Hamilton, Vic 3300

ABSTRACT

The 'Lifetime Wool' project imposed a range of nutritional treatments on ewes during pregnancy and lactation that resulted in 'carryover' effects on their liveweight and condition score at their next joining. The liveweight at artificial insemination in February/March 2001 of groups of single bearing ewes at sites in WA and VIC was 46 kg. After weaning in November at both sites, all ewes were grazed together at the standard commercial stocking rate, on pasture or a combination of stubble and pasture, until joining the following February/March 2002. Initially, the pattern was for the heavier flocks to lose liveweight/condition score while the lighter flocks gained liveweight/condition score until mid January. Thereafter, all flocks tended to lose liveweight/condition score at a similar rate resulting in a range of mean liveweight for treatment groups at their next joining (41 to 51 kg in WA and 44 to 48 kg in VIC). Overall, the mean liveweight was similar 46.3 v 46.7 kg, as was the fertility 86% v 89% and prolificacy 111% v 112% in WA and VIC respectively. However, the fecundity of the single bearing ewes decreased at about 3 fetuses/100 ewes joined in WA and 5 fetuses/100 ewes joined in VIC for each kg decrease in fleece free liveweight at joining in 2002. The relationship at both sites was higher than previous published estimates of around 2 lambs born /100 ewes joined. More of the variance in fecundity was explained by the mean condition score than by fleece free liveweight. The reduction in fecundity had a large effect on the outcome from whole-farm modeling of the economic consequences of the various feeding systems.

AIMS

The importance of the liveweight (LW) at joining to the reproductive performance of flocks of adult Merino ewes is well recognised; fecundity (lambs scanned *in utero* per ewe joined) is the combination of fertility (ewes pregnant/ewe joined) and the prolificacy or twinning rate of ewes pregnant. Fecundity has been shown to increase by at least 2 lambs per kg increase in the average liveweight of the flock at joining (Kelly and Croker 1990). The 'Lifetime Wool' project (Thompson and Oldham 2004) imposed a range of nutritional treatments on ewes during pregnancy and lactation that resulted in carryover effects (Ferguson *et al.* 2004) on their LW and condition score (CS; Russel *et al.* 1969) at their next joining. At day 90, following the introduction of rams in 2002, the ewes were scanned for litter size using real-time ultrasound to test the hypothesis that lower LW/CS at their next joining due to the 'Lifetime Wool' treatment group would reduce their fecundity.

METHOD

At two sites (VIC and WA) ewes with a mean LW of 46 kg and mean CS of 2.5 at artificial insemination were differentially fed to achieve a CS of either 2.0 or 3.0 by Day 90 of pregnancy. At Day 90, sheep within each CS flock were allocated to plots maintained at five different levels of feed on offer (FOO; Hyder *et al.* 2004) until lambs were weaned (design = 2 CS x 5 FOO = 10 plots). There were 2 or 3 replicates of 20 or 30 pregnant ewes in WA and VIC respectively. After weaning at both sites, all ewes were grazed together, on pasture or a combination of stubble and pasture, until joining the following February/March 2002. At day 90, following the introduction of rams in 2002, the ewes were scanned for litter size using real-time ultrasound.

RESULTS

The experiments were successful in generating a large range of LW/CS profiles for the ewes during pregnancy and lactation at both sites (Ferguson *et al.* 2004). However, common grazing after weaning resulted in the mean liveweight of treatment groups ranging from 41 to 51 kg in WA and 44 to 48 kg in VIC at their next joining in 2002. Overall, the liveweight was similar (46.3 v 46.7 kg), as was the fertility (86% v 89%) and prolificacy (111% v 112%) in WA and VIC respectively. However, the fecundity of the single bearing ewes at each site varied with their LW/CS at joining in 2002. The decrease in fecundity, for each kg decrease in fleece free liveweight at joining in 2002, was greater in VIC than WA (2.6 v 4.6; $P < .001$) and higher than Kelly and Croker 1990 reported in their extensive review (2 lambs/100 ewes joined).

More of the variance in fecundity was explained by the mean condition score of the flocks than by their fleece free liveweight (figure 1b).

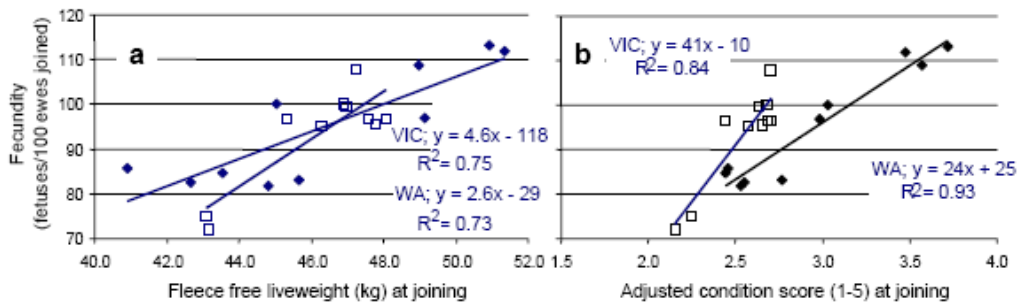


Figure 1. The influence of a) mean fleece free liveweight and b) condition score, on the fecundity (fetuses scanned at day 90 of pregnancy) of the ewes in the plot scale experiments conducted by Lifetime Wool in 2001 (WA & VIC) at their next joining in 2002.

CONCLUSION

The relationship between the mean LW/CS of flocks of Merino ewes at joining and their fecundity may be greater than was previously thought. In the plot scale experiments conducted by Lifetime Wool during 2001, effects on the LW/CS of different grazing pressures, while reduced by common grazing over summer were still significant at their next joining. The resulting reduction in fecundity had a large effect on the outcome from whole-farm modeling of the economic consequences of the various feeding systems (Young *et al.* 2004).

KEY WORDS

Ewes, Fecundity, Liveweight, Condition score and Carryover effects

ACKNOWLEDGMENTS

The Lifetime Wool project was initiated as a cooperative project between the Department of Primary Industries, Victoria and the Department of Agriculture of Western Australia. Since, 2001 it has become a National project funded by Australian Wool Innovation Limited with on-farm experimental sites in all the main wool producing states.

Paper reviewed by: Andrew Peterson and Mike Hyder

REFERENCES

- Ferguson, M., Kearney, G and Paganoni, B. 2004. Proc.Aus.Soc.Anim. Prod. 25, (In press).
 Hyder, M.W., Gordon, D.J., and Tanaka, K (2004). Proc. Aust. Soc. Anim. Prod., 25, (In press)
 Kelly, R.W. and Croker, K.P. 1990. In "Reproductive Physiology of Merino Sheep – Concepts and Consequences", Ch. 1, eds C.M.Oldham, G.B.Martin & I.W.Purvis, School of Agriculture, UWA,Perth
 Russel, A.J.F., Doney, J.M. and Gunn, R.G. 1969. J. Agric. Sci. Camb. 72, 451-454.
 Thompson, A.N. and Oldham, C.M. 2004. Proc.Aus.Soc.Anim. Prod. 25, (In press).
 Young, J.M., Thompson, A.N. and Oldham, C.M. 2004. Proc.Aus.Soc.Anim. Prod. 25, (In press).