CSIRO PUBLISHING

Animal Production Science, 2016, **56**, iii–iv
http://dx.doi.org/10.1071/ANv56n4_FO

Foreword

This second special edition on sheep reproduction is a sequel to a special edition published in *Animal Production Science* in May 2014.

About one half of the papers in this special edition represent work of the Cooperative Research Centre for Sheep Industry Innovation (Sheep CRC), with the balance being contributions that also fit the general theme of sheep reproduction.

The first paper, by David Masters and Andrew Thompson is a review of the utility of grazing young crops for improving reproductive performance in sheep. Utilising young crops can often fill winter feed-gaps that would otherwise exist in many parts of temperate Australia and coincides with ewes in mid to late pregnancy or in lactation, periods of high nutrient demand. Whilst the benefits of grazing young crops for sheep nutrition are clear, it also heightens the risks of metabolic disturbances and nutritional imbalances, although this can be minimised by regular monitoring of livestock and crop biomass and the provision of mineral supplements.

Two papers follow on the usefulness of pregnancy scanning technology. A paper by John Young and colleagues concludes that pregnancy scanning of ewes is profitable under high rainfall conditions in southern Australia, particularly for allowing ewes bearing twin or single lambs or that are dry to be assigned optimum nutritional profiles based on their litter size. These profiles consist of all ewes losing 4 kg in early pregnancy, single-bearing ewes regaining the 4 kg to lamb at their standard reference weight, twin-bearing ewes gaining 8 kg for lambing and dry ewes losing a further 4 kg to be 8 kg lighter than their standard reference weight at lambing time. The second paper, by Kim Bunter and colleagues, compared the benefits of pregnancy scanning to mothering up at lambing time for deriving reproductive traits to use in genetic evaluation and for estimating genetic parameters. Although pregnancy scan data can be directly substituted for reproductive traits traditionally based on lambing data, some attention to accuracy of scanning is required, and scanning alone provides no information on lamb-survival outcomes. Hence lamb survival should be recorded to ensure litter size increases are accompanied by improvements in the number of lambs weaned.

Three papers then follow on the importance of fat and muscling to reproductive performance in sheep. The first, by Daniel Brown and Andrew Swan, considers the inclusion of records of eye muscle and fat depth in Merino breeding programs, which were predicted to increase selection response from 3% to 21% across three Merino indexes. However, the responses were much larger when direct reproduction traits were included in genetic evaluation, with additional gains from 17% to 45% predicted for the same Merino indexes, indicating that direct selection for reproduction traits is more efficient than indirect selection based on eye muscle and fat depth data. Two papers by Sam Walkom and colleagues, which report studies on maternal sheep breeds, conclude that the genetic relationship between fat depth and reproduction traits is weak and that changes in ewe weight and fat over time are more related to season and reproductive status than genetic factors. However, selection for increased fat depth in a breeding flock could provide an economic advantage with ewes able to remain above target condition scores for longer during periods of feed shortage, thus delaying the need for supplementation. On a related theme, a paper by David Kleemann and colleagues conclude that reproductive performance of South Australian Merino ewes lambing annually in autumn was higher when they had beared and reared lambs in the prior year, noting that their mating weights had recovered to be similar to ewes that previously did not rear lambs.

Four papers specifically on lamb survival are also included in this special edition. A paper by Gordon Refshauge and colleagues reports on factors associated with lamb deaths in the Sheep CRC's Information Nucleus. Forty-eight percent of losses were found to be associated with the birth process, including from being still born, dying from birth injury or from classic dystocia, with a further one-quarter of deaths being caused by starvation/mismothering. Deaths *in utero*/prematurity, or losses from predation and exposure accounted for most of the remaining one-quarter of lamb deaths. The authors conclude that for improvements to occur in the rates of lamb survival, the Australian sheep industry needs to focus on minimising losses related to the birth process and from starvation.

A review paper by Kate Plush and colleagues hypothesises that whilst genetic and phenotypic factors help explain variation in resistance to cooling, the physiological maturity of lambs immediately following birth is a likely determinant of cold resistance and recommend further work to elucidate this link. In a research paper by the same authors, glucose metabolism is reported to be, in addition to birthweight, a potential explanation as to why some lambs are better able to resist hypothermia than others. Such knowledge may lead to targeted options, such as nutritional manipulation of gluco:regulatory pathways, to increase lamb survival. A paper follows by Amy Lockwood and colleagues on whether supplementation of Merino ewes with cholecalciferol during late pregnancy increases the levels of Vitamin D in the ewe and lamb at birth and whether such supplementation is correlated with an increase in innate phagocytic and adaptive antibody immune responses in the lamb. Although increases in the levels of Vitamin D were observed in both ewes and lambs at birth following supplementation, there was no correlated increase in immune responses in the lamb.

The genetic relationships estimated between maternal behaviour, temperament and production and reproduction traits in three Australian sheep data sets is reported in a paper by Daniel Brown and colleagues. There were small favourable genetic correlations between maternal behaviour score and various bodyweights and the reproduction trait – number of lambs weaned. However, there were no significant genetic relationships between the two temperament traits of flight time and agitation score and production traits. Maternal behaviour score, but not flight time and agitation score, could therefore be a useful additional trait in breeding programs for improved reproduction.

In the last two papers included in this special edition, Sarah Blumer and colleagues firstly address whether large variation in liveweight change in the ewe flock during periods of poor

nutrition, shown to adversely affect farm profitability, can be reduced by selection. Whilst management had the greatest effect on liveweight change, the authors suggest that there may be scope to select sheep that will lose less weight during periods of poor nutrition in some environments. In their second paper, the authors report that ewes with high concentrations of leptin, indicative of high levels of whole body fat, had lower daily intake when fed a poor quality diet and lost less weight than ewes with low levels of leptin. They conclude that maximising fat tissue accretion via genetics and/or nutritional management could improve adult ewe efficiency during periods of poor nutrition.

Finally, a related paper by Sabine Schmoelzl and Frances Cowley, which reviews the evidence for selenium and iodine supplementation of ewes for improving lamb survival, will be published later in *Animal Production Science*, as will a number of other papers on sheep reproduction that had not been finalised in time for this special edition.

Forbes Brien
Associate Professor
University of Adelaide