

“CLEAN, GREEN AND ETHICAL” MANAGEMENT: THE USE OF SOCIO-SEXUAL SIGNALS AND ULTRASOUND TO DETERMINE THE TIME OF LAMBING

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The strategy known as ‘focus feeding’ has been developed to optimize lamb production (Martin *et al.* 2004a), but it can only be fully implemented if there is tight control over the time of ovulation, mating and lambing. Injections of prostaglandin analogues or the insertion and withdrawal of intravaginal devices containing progesterone can be used for this purpose, but exogenous hormones are not compatible with our ‘clean green and ethical’ vision for animal production (Martin and Kadokawa 2006). We therefore need to explore alternative methods for either controlling the timing of lambing or for accurately estimating when ewes will lamb. If these methods are to penetrate farm practice, they need to provide a level of reliability and predictability that is comparable to that offered by exogenous hormone treatments. It seems likely that the answer will be found in the ram effect (‘teasing’) and in the latest developments in ultrasound.

It is well established that exposure of anoestrous ewes to rams causes an almost instantaneous increase in the concentrations of luteinising hormone (LH) that can ‘switch on’ the reproductive system of ewes and allow them to ovulate and conceive outside the natural breeding season (reviews: Martin *et al.* 1986; Walkden-Brown *et al.* 1999). This phenomenon, termed the ‘ram effect’ or ‘teasing’, clearly has great potential as a ‘clean green and ethical’ method for controlling the timing of ovulation (Martin *et al.* 2004b), but it has 4 limitations. First, the proportion of ewes ovulating in response to the teasing stimulus is variable, ranging from 40-100% in Merino ewes (Lindsay and Signoret 1980). Second, in about 50% of the ovulating ewes, the first ovulatory cycle is very short (review: Martin *et al.* 1986) thus reducing the synchronicity and predictability of the timing of mating and lambing in the flock. Third, the ability of rams to induce ovulation in ewes is heavily constrained in very seasonal breeds, thus restricting the use of this technique in ewes of the genotypes that are used for meat production (review: Rosa and Bryant 2002). Finally, the ram effect is only effective for inducing a synchronous ovulation during the non-breeding season so it cannot be used to control the time of lambing in ewes mated after the end of January (i.e. during the breeding season).

Due to the variability in the percentage of ewes ovulating and the occurrence of short cycles, the pregnancies induced by the male effect are not always well synchronized within a flock. This leads to uncertainty in the gestational age of the fetus, restricting the use of nutritional strategies to improve fetal development and lamb survival. A ‘clean green and ethical’ solution to this problem is to use ultrasound scanning between Days 45 and 85 of pregnancy. Skilled operators are able to confirm pregnancy, identify single or multiple fetuses and age the fetus with a high level of accuracy, speed and efficiency (review: Martin *et al.* 2004a). If the mating period is restricted to 35 days or less, farmers would be able to classify pregnant ewes as carrying small (< 60 days) or large fetuses (> 60 days) and manage lambing accordingly. For example, they could provide energy supplements during the last 2 weeks of pregnancy to increase colostrum production and improve lamb survival. Clearly, in ewes mated from February onwards, the ram effect is not yet a viable option so ultrasound is the only “clean, green and ethical” method for ascertaining the timing and distribution of lambing.

Though the ram effect was first reported over 60 years ago (Underwood *et al.* 1944), we have a remarkably limited understanding of the mechanism responsible for the endocrine responses evoked by the socio-sexual signals from rams or teasers. Our group at the University of Western Australia is tackling this by studying the brain pathways that are involved and we are aiming to determine why, for example, the ram effect works so well in Merinos but not in the more seasonal meat breeds (e.g. Suffolk). Research in this area, in association with further developments in on-farm ultrasound testing, will allow us to optimize the efficacy of ‘clean green and ethical’ methods for managing reproductive events in the ewe.

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