The Identification of Single and Multiple Bearing Ewes by Ultrasonic Imaging

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A swift and accurate field technique that enables the differentiation of single and multiple bearing ewes could make a major contribution to productivity in the sheep and wool industry. Perinatal wastage could be reduced, genetic selection programmes aimed at increased fecundity could be implemented in commercial flocks and nutritional management, particularly during drought, could be improved. Recent developments in the technology of ultrasound (Ligtvoet et al. 1978) now enable imaging of internal anatomy that is both instantaneous and continuous (real time) with small portable scanners. Our aim is to determine the practical use of ultrasonic imaging in differentiating single from multiple bearing ewes prior to parturition.

Six different scanners have been used so far to examine ewes at various stages of pregnancy. Ewes were restrained in dorsal recumbency while scanned in the abdominal region anterior to the udder. Transducers of varying acoustic resolution and scanners using linear array and sector-scanning systems have been studied. The acceptability of the image produced by the various scanners and the suitability of each with respect to the general requirements of sheep handling in the field have been assessed. Following each scanning exercise, ewes were slaughtered and reproductive tracts were collected and examined to determine the accuracy of the diagnoses made.

There was marked variation between scanners in both the characteristics of the image produced and in suitability with regard to the general requirements of sheep handling in the field. The removal of belly wool with a standard shearing handpiece and the use of ultrasonic contact gel was found necessary with all scanners to achieve a good acoustic coupling. Close clipping of the shorn ewe and fasting of ewes prior to scanning led to marginal increases in image clarity. Pregnancy was often determined instantaneously and always within 15 seconds of the start of scanning. Furthermore, we were able to identify twin bearing ewes by the simultaneous imaging of two foetuses. Operator experience is limited at this stage but we have begun to develop a scanning technique and we would expect to decrease scanning time and improve accuracy as the system is developed. There have been 6 errors in a total of 169 scans conducted to date. Our efforts so far indicate that the 3.5 MHz transducer and the linear-array scanning system are the most suitable for sheep. The optimum stage of pregnancy for scanning appears to be between 40 and 90 days post-conception.

Our results so far show that ultrasonic images of a suitable quality to diagnose pregnancy and to enable the differentiation of single and multiple bearing ewes can be obtained with the machines examined. Linear-array scanning enabled a greater overall scan width and as such was a more desirable scanning system than was sector scanning. Mid-pregnancy appears to be the optimum time for scanning because at this time the foetus is small with respect to the scan width of the linear array scan. Beyond 98 days of pregnancy the diagnosis of twins was made difficult by the large size of the foetuses. Foetal size before 40 days of pregnancy may also cause inaccuracies. Work is in progress to determine if the accuracy of diagnosis and rates of throughput possible with real time scanning are acceptable for practical application.