

THE ACCURACY OF ULTRASONIC IMAGING WITH REAL TIME SCANNERS IN DETERMINING LITTER NUMBER IN PREGNANT EWES

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A swift and accurate field technique that enabled the determination of litter number in pregnant ewes has been the subject of a concerted research effort during the last decade. Audio ultrasonics, X-rays, endocrine and rectal-abdominal palpation techniques have been tried but were either unsatisfactory or inaccurate. Our aim was to determine whether ultrasonic imaging with real time scanners could enable the determination of litter number in pregnant ewes.

Approximately two thousand pregnant ewes (Border Leicester x Merino, Dorset x Merino and Merino) were used in our studies. The ewes were 40-47, 56-68, or 83-96 days pregnant on the day of scanning in 1980 and 54-70 days pregnant on day of scanning in 1981. Ewes were scanned by three operators in 1980 and two operators in 1981. Operators were required to classify each scan according to number of foetus, image characteristics and resolution. Actual number of foetus was determined by direct observation of the reproductive tract at slaughter.

Accuracy of diagnosis in 1980 was independent of breed and operator but significant effects of number of foetus ($P < 0.001$) and stage of gestation ($P < 0.005$) were found. A significant interaction of breed x number of foetus ($P < 0.005$) is as yet unexplained. In 1981 the largest effect was number of foetus ($P < 0.005$), but there were also significant effects of breed ($P < 0.01$) and operator ($P < 0.01$). Breed effects are probably related to conformation or anatomical differences but require further study. Differences in accuracy between operators were small (0.97, 0.97, 0.96 in 1980; 0.98, 0.97 in 1981). Pertinent results are shown in the table.

TABLE 1 Accuracy of scan diagnosis as influenced by stage of gestation, number of foetus and year of study.

Number of foetus	Stage of gestation (days)			1981
	1980			
	40 - 47	56 - 68	83 - 96	54 - 70
0	0/38 (1.0) ⁺	0/102 (1.0)	0/48 (1.0)	0/268 (1.0)
1	24/490 (0.95)	9/924 (0.99)	3/519 (0.99)	11/1276 (0.99)
2	14/42 (0.67)	15/96 (0.84)	12/66 (0.82)	35/1115 (0.97)
3 & 4				25/48 (0.48)
Overall	38/570 (0.93)	24/1122 (0.98)	15/633 (0.98)	71/2707 (0.97)

⁺incorrect scans/total (accuracy:- correct scans/total)

The low accuracy at 40-47 days was due to errors with twins which was also evident at the later stages examined in 1980. In 1981 there were many more twins present and accuracy was greatly improved. We believe this was due to experience of the operators and improved scanning technique. Accuracy of exact allocation to higher order litter sizes (3 or 4) in 1981 was low (0.48), but correct diagnosis of multiple pregnancy remained high (0.98).

Ultrasonic imaging is capable of accurate determination of litter number in pregnant ewes where stage of gestation on day of scanning has been controlled. Procedures for accurate diagnosis in naturally mated flocks are being investigated (Wilkins and Fowler, 1982) as part of the development of an economically viable field technique.

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