

New Zealand Society of Animal Production online archive

This paper is from the New Zealand Society for Animal Production online archive. NZSAP holds a regular annual conference in June or July each year for the presentation of technical and applied topics in animal production. NZSAP plays an important role as a forum fostering research in all areas of animal production including production systems, nutrition, meat science, animal welfare, wool science, animal breeding and genetics.

An invitation is extended to all those involved in the field of animal production to apply for membership of the New Zealand Society of Animal Production at our website www.nzsap.org.nz

[View All Proceedings](#)

[Next Conference](#)

[Join NZSAP](#)

The New Zealand Society of Animal Production in publishing the conference proceedings is engaged in disseminating information, not rendering professional advice or services. The views expressed herein do not necessarily represent the views of the New Zealand Society of Animal Production and the New Zealand Society of Animal Production expressly disclaims any form of liability with respect to anything done or omitted to be done in reliance upon the contents of these proceedings.

This work is licensed under a [Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License](#).



You are free to:

Share— copy and redistribute the material in any medium or format

Under the following terms:

Attribution — You must give [appropriate credit](#), provide a link to the license, and [indicate if changes were made](#). You may do so in any reasonable manner, but not in any way that suggests the licensor endorses you or your use.

NonCommercial — You may not use the material for [commercial purposes](#).

NoDerivatives — If you [remix, transform, or build upon](#) the material, you may not distribute the modified material.

<http://creativecommons.org.nz/licences/licences-explained/>

Pregnancy diagnosis of twinning beef cows

M.G. LAMBERT, N.R. PERKINS¹, B.P. DEVANTIER, T.W. KNIGHT AND K. BETTERIDGE

AgResearch, Grasslands Research Centre, PB 11008, Palmerston North, New Zealand.

ABSTRACT

Technology now exists to make beef cows twin-pregnant. Accurate detection of pregnancy status is a prerequisite for differential management of twin and single-bearing cows. Calving outcome for about 50 beef cows was compared with predicted outcome by foetal counting using transrectal ultrasonography at day 50-70 of pregnancy, and veterinary palpation to confirm pregnancy at day 111-156. The trial ran for 4 annual calvings, and different combinations of scanning operator and equipment were used in each year. Overall accuracy of prediction of calving outcome ranged from 74-94%, and did not differ for cows carrying singles or twins. Prediction accuracy was highest in the 2 years where scanning equipment provided a high degree of visual detail, and the operator was experienced in distinguishing foetal abnormalities. It was concluded that the combination of early foetal counting using ultrasound, and later determination of wet/dry status by palpation, could lead to levels of accuracy close to those being achieved by competent commercial scanning operators for sheep.

Keywords: beef cows; twinning; pregnancy detection; ultrasonography; scanning.

INTRODUCTION

Twinning beef cows through embryo transfer has the potential to increase biological efficiency and profitability of cow/calf systems, and enhance access to superior genetics. Twin-pregnant cows have greater energy requirements for pregnancy, a shorter gestation period, and a probable requirement for intensive management at calving, compared to cows carrying single calves (Koong *et al.*, 1982; McLeod *et al.*, 1992; Lambert *et al.*, 1996). Hence high accuracy in detection of pregnancy status will be desirable for twinning cow systems.

Ultrasound scanning of ewes to determine pregnancy status is now routine practice on many New Zealand sheep farms, and it is generally accepted that accuracy of detection of multiples should be at least 95% (Cook 1997). Because twin calves occur naturally with a low frequency (1-3%), cows are normally only diagnosed as pregnant or non-pregnant, usually by manual examination. Ultrasound scanning using a rectal probe has been used in research herds with high incidences of twinning. Dobson *et al.*, (1993) predicted twins with a high degree of success, however McMillan *et al.*, (1994) concluded that scanning was not accurate.

This paper reports on the accuracy of ultrasound scanning in predicting pregnancy status of cows which had received two embryos, over four calving seasons.

MATERIALS AND METHODS

In December of each year (1993-96), Friesian x Hereford and Friesian x Angus cows at AgResearch's Ballantrae Research Station near Woodyville had two *in vitro* produced (IVP) embryos transferred 7 days after synchronised oestrus, as part of a larger trial examining aspects of twinning

cow management. Cows were examined at 50 to 70 days after oestrus (Table 1) for pregnancy determination and foetal counting using transrectal ultrasonography.

TABLE 1: Dates for embryo transfer (ET), and timing of scanning and veterinary palpation.

Year	ET date	Oestrus to scanning (days)	Oestrus to palpation (days)
1	16/12/93	70	111
2	20/12/94	50	135
3	13/12/95	50	156
4	11/12/96	58	148

Different operators carried out ultrasound examinations across years. Two operators were involved in year 1 (operators 1 & 2), and operator 2 again in year 2. Operator 2 was also involved in year 3 (but not year 4) in conjunction with operator 3 who was experienced in use of ultrasonography for detection of pathological symptoms in foetuses. Scanning equipment also differed across years. In years 1 & 2, a 7.5 Mhz linear array transducer (Aloka 210) was used, and in subsequent years a combined 5/7.5 Mhz linear array transducer (Pie Medical Scanner 200) was used.

Cows determined as pregnant at scanning were subsequently diagnosed as pregnant/non-pregnant by veterinary palpation, 111 to 156 days after oestrus (Table 1). Because animals which returned to oestrus were re-mated in years 1 & 4, reliable information on loss of pregnancy between scanning and veterinary palpation was not available. However in years 2 & 3 non-pregnant cows were not re-mated between scanning and veterinary palpation and the relevant information was collected. Most of the twin-pregnant, and some of the single-pregnant animals at veterinary palpation

¹ IVABS, Massey University, Palmerston North, New Zealand

were allocated to treatment groups within the larger trial mentioned above, and calving outcome (single or twins) was recorded for those which reached full term.

Chi square analysis was used to compare predicted number of foetuses in pregnant cows with number of calves at calving. Results are expressed as accuracy values for prediction of singles and twins. Accuracy was calculated as the percentage of individual cows predicted to be carrying either a single or twins and still pregnant at veterinary palpation, which produced the predicted result at calving. Year effects were also investigated.

RESULTS & DISCUSSION

Accuracy of predicting pregnancy status over the 4 years was 79-96% for singles, and 54-100% for twins (Table 2), and on average was not significantly different ($P>0.05$) for predicting singles (89%) vs predicting twins (85%).

TABLE 2: Scanning results for four years.

	Year 1	Year 2	Year 3	Year 4
Number of cows calving	50	51	50	45
Predicted number of singles	24	28	36	31
Actual number of singles	35	24	33	29
Predicted number of twins	26	23	14	14
Actual number of twins	15	27	17	16
Singles diagnosed correctly (% accuracy)	23 (96)	22 (79)	33 (92)	28 (90)
Twins diagnosed correctly (% accuracy)	14 (54)	21 (91)	14 (100)	13 (93)
Cows diagnosed correctly (% accuracy)	37 (74)	43 (84)	47 (94)	41 (91)

Overall accuracy of predicting calving outcome ranged from 74-94%, and differed across years ($P<0.01$), with a tendency for predictions for years 1 & 2 to have lower accuracy than for years 3 & 4 (Table 2). The scanning equipment used in years 3 & 4 provided greater image detail for the operator, because of advances in image processing and display capabilities. This superior visual detail, coupled with the experience of operator 3 in distinguishing foetal pathological details, is likely to have contributed to the observed difference in accuracy of prediction of pregnancy status. The level of accuracy achieved in years 3 & 4 was only slightly less than that acceptable for commercial pregnancy scanners in the sheep industry.

From a farm-management point of view, it would be desirable to identify those twinbearing animals not diagnosed by ultrasound, and graze them with the diagnosed twiners in late pregnancy. Inclusion of a small proportion of actual single-bearing cows in that group would not be a major problem. In the first year of the trial, we found that twinbearing cows had higher blood serum β -hydroxybutyrate (β OH) levels than single-bearing cows in late pregnancy (Lambert et al., 1996), as did Morris et al., (1992) and Clark et al., (1994). Body shape of twin bearing cows can also assist in identification of potential twiners (twinning

cows are often more ‘bell-shaped’ when viewed from behind). We used these two criteria as supplementary diagnostic tools in the subsequent 3 years to enhance accuracy of detection of twins, the aim being to minimise the occurrence of twiners in the group predicted to have single calves. Of 6 twinbearing cows allocated to the single-bearing group by ultrasound scanning in 1995, three were identified using β OH and shape criteria. In 1996 one of 3 was detected, and in 1997 three of 3.

In years 2 & 3, about 15% of cows noted as pregnant at scanning were diagnosed as dry at veterinary palpation 85-106 days later (Table 3).

TABLE 3: Loss of pregnancy between scanning and veterinary palpation in years 2 and 3 (results for years 1 and 4 were not available).

	Year 2	Year 3	Years 2 & 3
Number of predicted singles at scanning	42	33	75
% singles dry at veterinary palpation	7.1	15.2	10.7
Number of predicted twiners at scanning	22	24	49
% twiners dry at veterinary palpation	31.8	11.1	20.4
Overall % dry at veterinary palpation	15.6	13.3	14.5

Relatively higher levels of foetal loss between scanning and calving have been associated with use of IVP as opposed to *in vivo* embryos (Sinclair et al., 1995). Differentiation of twin and single pregnancies by ultrasonography is most effective between 35 and 60 days of pregnancy. In our work, substantial foetal loss occurred after this time, and this suggests that pregnancy status determination in cows twinbearing as a consequence of transfer of IVP embryos should be a two-step process involving scanning at about 50 days, followed by a further examination at a later date to confirm pregnancy.

CONCLUSIONS

Calving outcomes for twin and single-bearing beef cows can be predicted with 90-95% accuracy by a combination of ultrasound scanning to count foetuses at about 50 days, using high-quality equipment and an experienced operator; and a determination of wet/dry status at about 130 days to detect non-pregnant animals. Some of the unidentified twiners amongst cows predicted to have 1 calf can be detected using body shape and serum β OH concentration in late pregnancy as indicators.

ACKNOWLEDGMENTS

The AgResearch Ruakura Embryology Laboratory provided high quality IVP embryos for the trial, and John Napier and the Ballantrae Farm Staff provided valued field assistance.

REFERENCES

- Clark, A.J.; Middleton, N.C.; McLeod, I.K.; Cummins, L.J.; Wilkins, J.F.; Hennessey, D.W.; Andrews, C.M.; Williamson, P.J.; Makings, B.J. 1994. Calving management for a twinbearing herd. *Proceedings of the Australian Society of Animal Production* **20**: 30-31.

- Cook, T. 1997. Scanning time, accuracy and animal health implications. *Proceedings of the Southern North Island Sheep & Beef Farmers' Conference* **6**: 39-42.
- Dobson, H.; Rowan, T.G.; Kippax, I.S.; Humblot, P. 1993. Assessment of foetal number, and foetal placental viability throughout pregnancy in cattle. *Theriogenology* **40**: 411-425.
- Koong, L.J.; Anderson, G.B.; Garrett, W.N. 1982. Maternal energy status of beef cattle during single and twin pregnancy. *Journal of Animal Science* **54**: 480-484.
- Lambert, M.G.; Devantier, B.P.; Betteridge, K.; McMillan, W.H.; Pugh. 1996. Winter feeding of twinning beef cows. *Proceedings of the New Zealand Society of Animal Production* **56**: 382-385.
- McLeod, I.K.; Clark, A.J.; Cummins, L.J.; Wilkins, J.F.; Hennessey, D.W.; Andrews, C.M.; Williamson, P.J. 1992. Calving performance in twinning herds. *Proceedings of the Australian Society of Animal Production* **19**: 441-442.
- McMillan, W.H.; Oakley, A.P.; Hall, D.R. 1994. Determining the number of calves in early pregnancy using real-time ultrasound imaging in beef cows induced to twin. *Proceedings of the New Zealand Society of Animal Production* **54**: 353-355.
- Morris, C.M.; Day, A.M.; Jones, K.R. 1992. Blood metabolites near calving in twin-pregnant and single-pregnant cows. *Proceedings of the New Zealand Society of Animal Production* **52**: 21-24.
- Sinclair, K.D.; Broadbent, P.J.; Dolman, D.F.; Watt, R.G.; Mullan, J.S. 1995. Establishing twin pregnancies in cattle by embryo transfer. *Animal Science* **61**: 25-33.