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Assistance at parturition of primiparous, two-year-old, Angus heifers and the effect of liveweight gain of heifers in early pregnancy on birth weight of the calf

A thesis presented in partial fulfilment of the requirements for the degree of

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A simulation showed that calving heifers for the first time at two compared with three years of age increased profitability of a beef breeding herd; however, profitability of calving two-year-old heifers was dependent on the incidence of assistance at parturition. The predominant cause of dystocia (and hence assistance at parturition) in beef breeding heifers is feto-maternal disproportion. This condition could be alleviated by reducing birth weight of calves relative to live weight of heifers. In a survey of farmers, 20% of those currently calving heifers at three years of age indicated that if the need for assistance at parturition was eliminated, they would calve their heifers at two years of age. In two surveys conducted of the same farmers in consecutive years, mean incidence of assistance at parturition in primiparous, two-year-old heifers was 7.0% and 9.5%, and reached 100% in some herds. Mortality rate by four weeks postpartum was 30% for assisted calves and 11% for assisted heifers. Methods of reducing the need for assistance at parturition in primiparous, two-year-old, beef breeding heifers would be of value to the beef cattle industry in New Zealand.

The objective of this research was to identify whether manipulation of liveweight gain of primiparous, two-year-old, Angus heifers in the first trimester of pregnancy could be used to regulate birth weight of calves, and to identify factors contributing to the need for assistance at parturition. Three experiments were conducted in which heifers were fed for various rates of liveweight gain: 1. moderate versus low for the first trimester of pregnancy; 2. a 2 x 2 factorial experiment in which liveweight gain was 1220 high versus moderate for ten days prior to insemination, and moderate versus a loss for the first trimester of pregnancy; 3. high and moderate, moderate and a loss, or moderate and moderate for days 0–42 and 42–90 of pregnancy, respectively.

Birth weight of calves was not affected by treatment in experiments 1 and 3. In experiment 2, birth weight of the calf relative to live weight of the heifer was least in the high-then-low treatment, but subsequent live weight of those calves was also less,
partially negating any potential benefits to production. An additional experiment revealed similar fetal weight at the end of the first trimester for heifers that had moderate or low liveweight gain from 21 days prior to conception.

Probability of assistance at parturition increased with birth weight of the calf and decreased with increased live weight of the heifer. Body dimensions of calves did not affect the likelihood of assistance. Assistance had no effect on subsequent performance of surviving animals.

Manipulation of liveweight gain of heifers in the first trimester of pregnancy did not offer a means of reliably regulating birth weight of calves; however, the impact of assistance at calving did not justify delaying first calving until three years of age. Birth weight and assistance at calving can currently be best managed through selection of appropriate service sires for primiparous heifers.
ACKNOWLEDGEMENTS

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LIST OF ABBREVIATIONS AND NOTATION

Abbreviations

EBV  Estimated breeding value  
DM   Dry matter  
LSM  Least squares mean  
CI   Confidence interval  
s.e. Standard error of the mean

Notation

Dn  The \( n \)th day of the experiment, with D0 being the first day of insemination for heifers in the experiment. Negative values of \( n \) refer to days prior to the day of insemination.  
Ln  The \( n \)th day of lactation, with L0 being the mean day of parturition for the heifers considered.  
HM  Heifers fed for high liveweight gain for 10 days prior to insemination and for moderate liveweight gain for the first 93 days of pregnancy (chapter 6)  
HL  Heifers fed for high liveweight gain for 10 days prior to insemination and for liveweight loss for the first 93 days of pregnancy (chapter 6)  
MM  Heifers fed for moderate liveweight gain for 10 days prior to insemination and for moderate liveweight gain for the first 93 days of pregnancy (chapter 6)  
ML  Heifers fed for moderate liveweight gain for 10 days prior to insemination and for liveweight loss for the first 93 days of pregnancy (chapter 6)