BRIEF COMMUNICATION: Days to calving and intercalving interval in beef and dairy-beef crossbred cows

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Introduction

One important attribute of a beef-breeding cow is the ability to wean a calf every year. Furthermore, an earlier-born calf is likely to be heavier at weaning and its dam has more opportunity to conceive again during the following breeding season. In a spring-calving system under the seasonal pastoral-grazing system in New Zealand, a 365-day intercalving interval is desirable. A normal gestation length is 280 days leaving 85 days for a cow to resume oestrous cycles and conceive again to maintain the 365-day calving interval. Literature estimates of the interval between calving and the first oestrous cycle post-calving are 53-82 days for mixed-aged beef-breeding cows and 81-95 days for first-lactation beef-breeding cows (Hickson et al. 2012; Knight & Nicoll 1978; Morris et al. 1978; Smeaton et al. 1986), indicating that a 365-day calving interval is difficult to maintain.

An alternative reproductive performance measure to intercalving interval, and favoured in naturally mated beef-cow herds, is days to calving, that is defined as the number of days from the start of joining to the day of calving. Days to calving has become the standard fertility trait for genetic evaluation (Meyer et al. 1990; 1991; Johnston & Bunter 1996).

A study was conducted to investigate the effects of breed group, year of calving and conception cycle on intercalving intervals and days to calving in straight-bred Angus and Angus-cross-Friesian, Angus-cross-Jersey and Angus-cross-Kiwicross cows from first mating as heifers through to their sixth calving.

Materials and methods

This study was conducted at Massey University's Tuapaka farm 15 km east of Palmerston North, New Zealand (latitude 40°20'S, longitude 175°43'E) with approval from the Massey University Animal Ethics Committee.

Study design

Straightbred Angus and Angus-cross-dairy cows were generated through contract inseminations of Angus, Holstein Friesian, Jersey and Kiwicross cows (Hickson et al. 2012; Law et al. 2013; Hickson et al. 2015). All cows were sired by a team of four Angus bulls. These resulted in: straightbred Angus (AA; n=69), Angus-cross-Friesian (AF; n=43), Angus-cross-Jersey (AJ; n=54) and Angus-cross-Kiwicross (AK; n=31) heifer calves. These heifer calves were monitored from weaning at ~8 months of age until their sixth calving.

Cows were first bred as 16-month-old heifers in 2009 and each subsequent year to their sixth calving. Joining began on the 8th December. For each reproductive period, records were maintained of pregnancy status, calving date, whether a calf was weaned, culling and deaths. Pregnancy diagnosis was conducted in each reproductive period approximately six weeks after the end of the joining period. Cows were observed during each calving period and the date of parturition was recorded. If a cow failed to conceive in any joining period, or did not rear a calf to weaning in any lactation, she was culled from the herd at that time. If a cow did not calve after having been joined with a bull in the preceding mating season (i.e. she was empty or aborted her pregnancy), she was assigned a nominal calving date that was 21 days later than the last calf in the season. These cows and any cow that did not rear a calf were excluded from all subsequent records.

Statistical analyses

Data were analysed using the Statistical Analysis System (SAS version 9.4, SAS Institute Inc., Cary, NC, USA, 2001). Days to calving and intercalving interval were analysed using mixed models that allowed for repeated measures on each cow and included the fixed effects of breed cross and year and the random effect of cow. The interaction of breed cross and year was not significant for either model so was removed. The percentage of cows calving during each 21-day period was analysed using a generalised model based on a logit transformation and a binomial distribution. The effect of calving group on days to calving and intercalving interval was analysed using mixed models that included the fixed effects of calving group, year and breed cross.

Results and discussion

There was no effect ($P>0.05$) of cow breed cross on intercalving interval or days to calving (Table 1). There was also no effect ($P>0.05$) of breed cross on the percentage of cows calving in each 21 days period from start of calving to day 63 from calving (Table 1). All cow breed crosses achieved at least 65% of cows calving in the first 21 days of the calving period, which is considered desirable in a pastoral-based seasonal-calving herd (Morris 2007).

Table 1 The effect of cow breed-cross (straightbred Angus, AA; Angus-cross-Friesian, AF; Angus-cross-Jersey, AJ; Angus-cross-Kiwicross, AK) on the days to calving, intercalving interval and percentage (95% confidence limits) of cows from start of calving to day 21 (1-21) days 22-42 and days 43-63.

	n	Days to Calving	Inter-calving Interval	Percentage of cows calving d1-d21	Percentage of cows calving d22-d42	Percentage of cows calving d43-d63
AA	69	305.4±1.5	369.7±1.9	65(58-72)	27(21-34)	6(3-10)
AF	43	304.5±1.7	370.0±2.1	69(61-76)	23(17-30)	6(4-11)
AJ	54	305.1±1.6	372.8±2.1	72(65-78)	21(16-28)	5(3-10)
AK	31	309.2±2.2	373.8±2.8	71(61-80)	21(14-30)	7(3-13)
P value		0.348	0.503	0.524	0.482	0.968

Table 2 The effect of year on the LSM±SEM for days to calving and intercalving interval and the percentage (95% confidence limit) of cows calving from start of calving (d1) to day 21 (d1-d21), days 22-42 and days 43-63.

	Days to Calving	Inter-calving Interval	Percentage of cows calving d1-d21	Percentage of cows calving d22-d42	Percentage of cows calving d43-d63
Year 1	302.5±1.5^{cd}		79^{b} (72-84)[1]	19^{a} (14-26)	2^{a} (1-6)
Year 2	316.5±2.4^{a}	386.3±2.3^{a}	45^{a} (36-53)	36^{b} (28-45)	20^{c}(14-28)
Year 3	307.4±1.8^{bc}	364.3±2.0^{c}	54^{a} (44-63)	34^{b} (26-43)	12^{bc} (7-20)
Year 4	307.5±2.3^{bc}	367.4±2.5b^{c}	71^{b} (61-79)	25^{ab} (17-34)	4^{a} (2-11)
Year 5	304.1±2.7^{bcd}	373.0±3.0^{b}	77^{b} (67-85)	18^{a} (11-28)	5^{ab} (2-13)
Year 6	297.9±2.1^{d}	367.0±2.5^{bc}	83^{b} (73-90	12^{a} (7-22)	4^{ab} (1-13)
P value	<0.001	<0.001	<0.001	<0.001	<0.001

^{abcd} Values within column for each variable without superscripts in common differ at the P<0.05 level
[1] values in parenthesis indicate the 95% confidence levels

Table 3 The effect calving group from start of calving (d1) to day 21 (d1-d21), day 22-42 and day 43-63 the previous year on days to calving and inter-calving interval.

	Days to Calving	Inter-calving Interval
d1-d21	303.1±1.0^{a}	376.7±1.4^{c}
d22-d42	312.7±2.0^{b}	367.2±2.1^{b}
d43-d63	317.4±3.5^{b}	347.9±3.6^{a}
P value	<0.001	<0.001

Days to calving was influenced (P<0.05) by year of calving and was longer in cows during their second pregnancy than in any other pregnancy, which also coincided with the longest intercalving interval between the first-born and second-born calf (Table 2). Other researchers have also found second calvers have the longest days to calving (Johnston & Bunter 1996; Morris 1984). The longer intercalving interval in these second-calving cows and the reduced number that calved in the first 21 days of calving, suggest that this is a group that should be managed separately to the rest of herd and priority given to feeding and condition score, as reported by Morris et al. (2006). With the exception of year 2 and 3, the percentage of cows calving in first 21 days of calving would be considered acceptable by most New Zealand beef-breeding cows herd owners (Morris 2007).

If a cow calved early the previous year, she had fewer days to calving the next year (P<0.05) compared with cows that calved later the previous season. However, the shorter days to calving did not translate into reduced intercalving intervals, as cows with that calved late the previous year had the shortest (P<0.05) intercalving intervals (Table 3).This is most likely a reflection of late calving cows exhibiting shorter post-partum anoestrous intervals as reported by numerous authors (Knight & Nicoll 1978; Morris et al. 1978; Smeaton et al. 1986; Tervit et al. 1982) and that early-calving cows that had a short return to oestrus were not able to conceive at those early oestrous events because they occurred prior to the start of joining.

Conclusion

The results of this study showed that the reproductive indices, days to calving, intercalving interval, and the percentage of cows calving early in the calving period are not influenced by cow breed cross. However, cows calving for the second and third time represent the most vulnerable in terms of extended calving intervals and a decreased number calving early in the calving period. It is suggested these age groups receive attention in terms of separate feed management, especially over the period from calving to mating.

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