A comparison of the performance of progeny derived from two- and three-year old heifers and mature cows

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Abstract. *The performance of the progeny of two-year old, three-year old and mature beef cows with equivalent genetic background was examined to evaluate the effects of age of dam at mating/calving on birth, weaning and growth traits. There were clear effects on all traits measured with incremental disadvantage as the age of cow decreased. The large penalties in live-weight, fat-depth and frame-size (seen in the 'yearling mated' heifer progeny in particular), imply that extra inputs to management would be necessary to meet market specifications. The economic and management issues of compensating for the effects due to age of dam need further examination.*

Introduction

Mating heifers as yearlings, as opposed to two-year olds, is often proposed as favourable since it offers the opportunity for an extra calf in a cow's lifetime. Hence, there has been a large focus on the pre- and post-joining management of heifers to maximise initial conception rates and subsequently to improve post-partum performance. However, the first drop of calves from heifers has historically posed a large management issue for producers. These calves are usually smaller and thus lighter than calves from mature cows, making it difficult to manage the live-weight gain of the total calf-drop when targeting a sale end-point. This paper quantifies the effects of mating heifers as yearlings as opposed to two-year olds on their resultant progeny's growth and body composition, in comparison with the performance of progeny of mature cows. Nutritional demands and management to grow these progeny to feedlot-entry weights are also discussed.

Methods

The cattle used in this experiment were all pure-bred Angus born and reared within a research herd at the Glen Innes Agricultural Research and Advisory Station. Thirty six yearling heifers (Y group – aged approximately 15 months), 34 two-year old heifers (T group – aged approximately 30 months) and 136 mature cows (M group – average age 6.5 years, third and fourth generation) were mated to Angus bulls for a nine week joining period. These were randomly spread among six mobs which were rotationally grazed on improved temperate grass pastures from mating through to weaning. Calves were weaned at an average age of 237 days. Weight at birth and weight, hip height and P8 fat (measured using real-time ultrasound) at weaning were recorded for all progeny. Average daily weight-gain (ADG) from birth to weaning was then calculated. These data were used to generate expected post-weaning performance using the MLA/Beef CRC 'Growth and Fat Calculator Tool', which is based on the growth model initially described by Oltjen et al. (1986).

Results and discussion

Progeny of Y heifers were much lighter at birth and weaning than those born to the M group cows (14.5 and 13.8 per cent less, respectively), resulting in considerably lower growth-rate (12.1 per cent less). However, of potentially greater impact, was the effect on P8 fat depth which showed a 30.7 per cent reduction, and which was also accompanied by a 2.6 per cent lower average hip height. This difference in hip height equates to approximately half a frame score (McKiernan 2005). Tables 1 and 2 show that the Y group progeny were penalised in performance compared to the T group for all traits measured, with the latter being intermediate between Y and M progeny.

To assess the impact of lower weaning weights, it was calculated that to reach a feedlot entry weight of 450 kg, given equivalent growth-rate of 1 kg/head/day, it would take the Y progeny an extra 21 days compared to T progeny, or 38 days compared to M progeny. From the perspective of the producer, feed-lotter and processor, it is desirable to have all progeny meet the feed-lot entry weight at the same time, that is, achieve an 'even line' of cattle which can be managed the same and will perform similarly. Assuming the producer's priority is to turn off all progeny at the same time and at the same physiological status (weight and fatness), the extra growth required to achieve the desired outcome is predicted using the 'Growth and Fat Calculator Tool'. This is a more accurate estimate of requirements than extra days as it takes into account the variation in fatness between the different groups of progeny.

Table 1. Birth weights and weaning measurements for progeny derived from Y heifers, T heifers and M cows

Measured traits[A]	Y heifer calves	T heifer calves	M cow calves
BWt (kg)	34.0	37.3	39.8
Difference (%)[B]	-14.5	-6.2	
WWt (kg)	254.9	275.7	293.0
Difference (%)	-13.8	-6.0	
ADG (kg/head/day)	0.94	1.005	1.07
Difference (%)	-12.1	-6.1	
P8 fat (mm)	3.6	4.1	5.2
Difference (%)	-30.7	-20.9	
HHght (cm)	110.4	111.5	113.4
Difference (%)	-2.6	-1.7	

[A]Birth weight (BWt), weaning weight (WWt), average daily gain from birth to weaning (ADG), P8 fat depth at weaning and hip height (HHght) at weaning

[B]The difference in measured traits, for both Y heifer and T heifer progeny, when compared to M cow progeny, expressed as a percentage

Table 2. Comparison of performance of progeny derived from Y heifers, T heifers and M cows from weaning to feedlot entry. Final weight and P8 fatness were calculated by the MLA/Beef CRC 'Growth and Fat Calculator Tool'. The growth-rate required for Y and T groups to match M cow progeny performance at feedlot entry (450 kg liveweight and P8 fat 8.8 mm after 5 months) was also estimated

Age of dam at mating	Weaning weight (kg)	P8 fat (mm)	Post weaning time (months)	Post weaning growth (kg/head/day)	Feedlot entry weight[A] (kg)	Feedlot entry P8 fat[A] (mm)	Required post weaning growth[B] (kg/head/day)	Feedlot entry weight[B] (kg)	Feedlot entry P8 fat[B] (mm)
Y (yearling)	255	3.5	5	1.0	407	6.6	1.3	453	8.9
T (2 years)	276	4.0	5	1.0	428	7.7	1.1	443	8.5
M (mature)	293	5.0	5	1.0	445	8.8		445	8.8

[A]Feedlot entry weight and feedlot entry P8 fatness simulates all progeny being managed as one group from weaning to feedlot entry with a common growth rate of 1 kg/head/day

[B]Feedlot entry weight and feedlot entry P8 fatness simulates separate management of progeny groups from weaning to feedlot entry, and estimates the different growth rates required for a common end point

Predictions reported in Table 2 show that the progeny from Y heifers required a growth-rate of approximately 1.3 kg/day to reach a similar feedlot entry weight and level of fatness (approximately 450 kg, 8.8 mm) as progeny from M cows. That equates to an extra 0.2 kg/head/day when compared to progeny from T heifers. This highlights the need to treat heifer progeny differently to the progeny of mature cows by having access to either better pastures or supplementary feed. These extra management resources question the economics of mating yearling heifers.

Conclusions

Results here support the industry belief that progeny of heifers mated as yearlings are lighter at birth and weaning, leaner, and smaller in frame size than those of heifers mated at two years of age. The performance of the progeny of heifers is heavily influenced by nutritional management. The heifer 'dam/calf unit' requires priority for nutrition in lactation, and particularly for later calvers, if the calves are to perform as well as those from mature cows. Accordingly, the economics and practical implications of mating yearling-heifers are questioned. All factors need to be considered (including economic analysis) to comprehensively assess the impacts (on the beef cattle enterprise and whole farm profitability) of the effects of 'age of mating' (of heifers) on the performance of their progeny in growth to slaughter and carcass attributes.

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