Recent studies on developing replacement beef heifers in South Florida

Philipe Moriel, Assistant Professor – Beef Cattle Nutrition and Management
Range Cattle Research and Education Center, Ona, Florida

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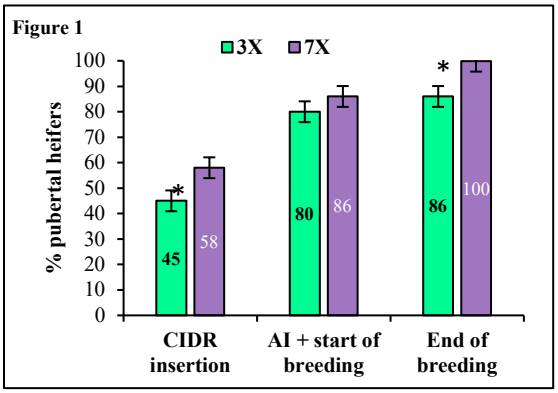
Traditional recommendations suggest that beef heifers should attain 60-65% of their mature body weight at the start of the breeding season. Recent research indicated that developing *Bos taurus* heifers to achieve 50-57% of mature body weight had an economic advantage over developing heifers to 60-65% of mature body weight (Endecott et al., 2013). However, evidence of such success after applying this lower nutritional strategy to *Bos indicus*-influenced heifers is lacking. After 9 research studies evaluating different nutritional management strategies for developing beef heifers at the Range Cattle Research and Education Center (Ona FL), pregnancy rates averaged 60% when animals achieved 55-60% of a mature body weight at the start of breeding season. However, we observed greater pregnancy rates (89 vs. 70%) when heifers achieved 73% instead of 64% of mature body weight at the start of breeding season (Moriel et al., 2014). These results indicate that *Bos indicus*-crossbred heifers may need to be closer to 70% of mature weight at the start of breeding season to obtain acceptable pregnancy rates. Hence, our laboratory is committed to evaluate multiple, economic feasible nutritional strategies to boost the reproductive performance of *Bos indicus*-influenced beef heifers in Florida.

How does the frequency of energy supplementation and supplement amount impact reproductive performance of beef heifers? Three studies previously conducted at the Range Cattle REC demonstrated that puberty attainment and pregnancy rates were decreased when concentrate supplementation was provided 3 times weekly (Monday, Wednesday, and Friday) from weaning until the end of breeding season compared to daily supplementation (**both treatments consumed the same weekly amount of concentrate**). Our most recent study tried to identify management strategies that would allow producers to decrease the frequency of concentrate supplementation (and consequently, save money on labor costs and time) without negatively impacting the reproductive performance of beef heifers. This 2-year study was funded by the Florida Cattle Enhancement Board and evaluated the effects of frequency of concentrate supplementation (offered 3 or 7 times weekly) and supplementation amount (1.25% or 1.75% body weight; dry matter basis) on growth and reproductive performance of Brangus heifers submitted to a puberty induction protocol before the start of the breeding season. Heifers were

offered their respective treatment from September to March.

RESULTS:

Similar to our previous studies, less heifers achieved puberty at the start of the puberty induction protocol (CIDR insertion) if they were offered concentrate 3 times weekly compared to heifers that were supplemented 7 times weekly (Figure 1). **However, after the puberty induction protocol, the percentage of pubertal heifers at the time of AI and start of breeding season did not differ between treatments. Overall final pregnancy rates also did not differ between treatments (72% for 3X heifers** vs. **75% for 7X heifers). Despite the similar pregnancy rates, heifers supplemented 3 times weekly calved later during their first calving season compared to heifers supplemented daily (Figure 2).** For instance, 80% of heifers calved within the first 4 weeks of their first calving season if they received daily supplementation during the developing period, whereas only 40% of heifers calved during the first 4 weeks of their first calving season if they received concentrate supplementation 3 times weekly during the developing period. These data indicate that heifers can be supplemented less frequently without reducing their overall pregnancy rates if a puberty induction protocol is implemented. However, calving will occur later compared to daily supplementation.



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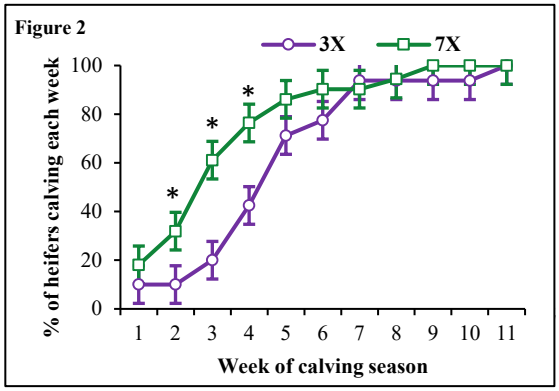

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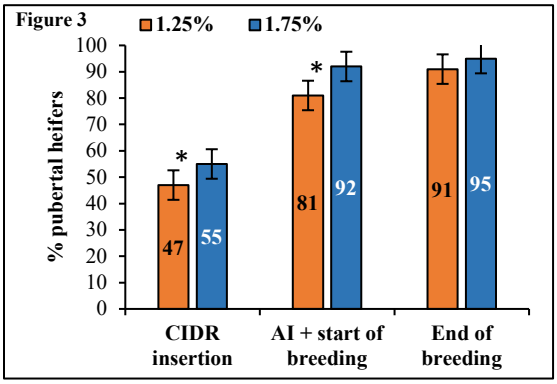
This study also demonstrates that more heifers achieved puberty at the start of breeding season if they received concentrate supplementation at 1.75% of body weight rather than 1.25% of body weight (Figure 3). Despite the greater supplementation cost per heifer ($290 vs. $204), **a greater amount of concentrate supplementation increased the overall final pregnancy rates (83% for heifers supplemented at 1.75% of BW** vs. **64% for heifers supplemented at 1.25% of BW) and net income per heifer ($244 vs. $212). Heifers supplemented at 1.75% of body weight also calved earlier than heifers that received supplementation 3 times weekly (Figure 4).** Hence, our study indicates that the benefits to reproductive performance of heifers were substantially greater than the cost of increasing concentrate supplementation rate from 1.25% to 1.75% of body weight.



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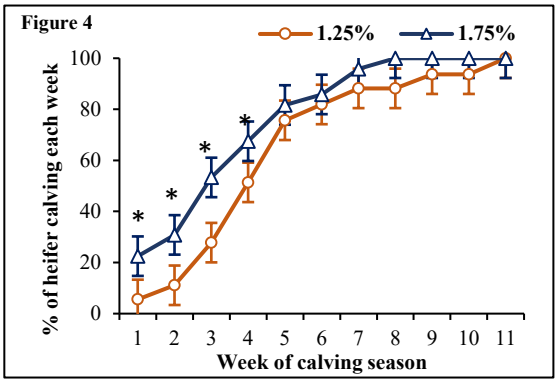

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After completing this study, we decided to further evaluate the impact of puberty status at the start of the breeding season on subsequent pregnancy rates. So, regardless of treatment, we divided the 2-year data into 2 groups. Group 1 represented the heifers that achieved puberty AFTER the start of the breeding season, whereas group 2 included the heifers that achieved puberty BEFORE the breeding season had started (Table 1). On average, heifers that achieved puberty before the start of the breeding season had 2.25 times greater overall pregnancy rates than heifers that achieved puberty after the breeding season had started. These results reinforce the importance of properly developing heifers to induce puberty attainment before the breeding season begins.

Take Home message = Decreasing the frequency of concentrate supplementation did not impact overall pregnancy rates of beef heifers if a puberty induction protocol was also implemented. Also, increasing the supplementation amount from 1.25% to 1.75% of body weight enhanced the reproductive performance of heifers beyond the extra supplementation cost.

Table 1	Puberty status at the start of the breeding season			
Item	GROUP 1 = Heifers that achieved puberty AFTER the breeding season started	GROUP 2 = Heifers that achieved puberty BEFORE the breeding season started	SEM	*P*
Pregnant heifers, % of total				
Year 1	33.9	78.2	12.2	0.001
Year 2	39.4	85.0	6.1	0.005
Average	36.2	81.6	10.3	<0.0001

References: Endecott et al. 2013. J. Anim. Sci. 91:1329–1335; **Moriel et al. 2012**. J. Anim. Sci. 90:2371-2380; **Moriel et al. 2017.** J. Anim. Sci. 95:3523-3531.