



Overcoming the negative impacts of reduced frequency of concentrate supplementation on reproduction of beef heifers in FL

Philippe Moriel, Assistant Professor – Beef Cattle Nutrition and Management
Miguel Fidelis, undergraduate student – São Paulo State University, Botucatu, SP, Brazil
Range Cattle Research and Education Center, Ona, Florida

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Replacement heifers should calve by 24 months of age to achieve maximum lifetime productivity. Recent studies with *Bos taurus* heifers demonstrated that heifers that calved during the first 21 days of the calving season remained longer in those calving groups throughout their productive life and weaned heavier calves in the subsequent 6 parturitions. In fact, early-calving heifers had an increase in weaning weight that amounted to the production of an extra calf during their lifetime compared to late-calving heifers. This represents a substantial financial benefit for cow-calf producers and reinforces the importance of having replacement heifers conceive as early as possible. A major determinant of pregnancy success is the age at puberty attainment. Providing the correct nutrition that will allow the heifer to achieve these goals is crucial.

The typical recommendation is that beef heifers should attain 60-65% of their mature body weight at the onset of the breeding season. Various strategies have been employed to achieve this end point including constant body weight gains from weaning to breeding or nutritional restriction followed by greater nutrient intake and compensatory body weight gain, which indicates that flexibility exists in how this target weight is attained to achieve acceptable pregnancy rates. Recent research has suggested that development of *Bos taurus* heifers to 50-57% of mature body weight may present an economic advantage over developing heifers to 60-65% of mature body weight (Endecott et al., 2013). However, evidence of success after applying this lower nutritional strategy to *Bos indicus*-influenced heifers is lacking. *Bos indicus*-crossbred heifers need to reach a greater proportion of their mature size before becoming pubertal compared to *Bos taurus* heifers. 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 were in average 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.

It is important to mention that all studies mentioned above did not use puberty induction protocols. The use of estrous cycle control protocols consisting of exogenous hormone administrations is another strategy that can initiate estrous cycles in prepubertal heifers (heifers that did not ovulate and attain puberty). The use of puberty induction protocol in our conditions in Florida decreased age at puberty by 24 days, numerically increased overall calving rate (64 vs. 57%), and percentage of heifers that calved during the first 8 weeks of the calving season (98 vs. 82%) compared to not using a puberty induction (Moriel et al., 2017). Thus, the use of a puberty induction protocol was an effective strategy to significantly increase reproductive success of *Bos indicus*-influenced heifers.

Ongoing research at the Range Cattle REC

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 concentrate supplementation (both treatments consumed the same weekly amount of concentrate).

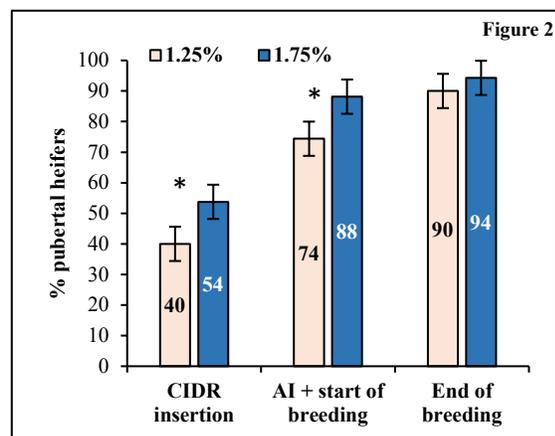
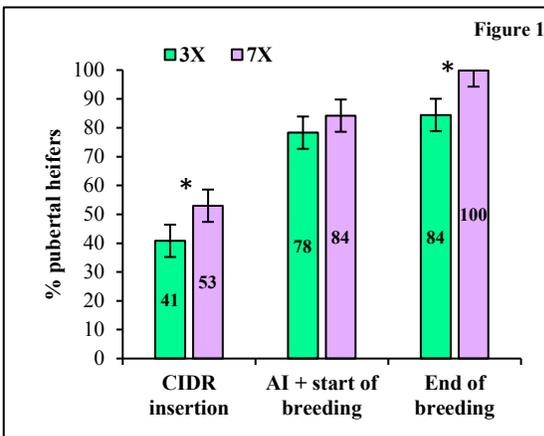
Our group is committed to identify management strategies that will allow producers to decrease the frequency of concentrate supplementation (and consequently, save money on labor costs and time) without observing the negative impacts on reproductive performance of beef heifers described by our previous studies.

Our ongoing study is evaluating the effects of frequency of supplementation (offered 3 or 7 times weekly) and supplementation rate (offered at 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 for 177 days (September 2017 to March 2018).

PRELIMINARY 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 heifers supplemented 3 and 7 times weekly, which also explains the similar overall final pregnancy rates between these treatments (69% for 3X heifers vs. 69% for 7X heifers).** These data indicate that if a puberty induction protocol is implemented, heifers can be supplemented less frequently without negative impacts on reproductive performance.

Year 1 of this study also demonstrated that more heifers achieved puberty at the time of AI and start of breeding season if they received concentrate supplementation at 1.75% of body weight rather than 1.25% of body weight (Figure 2). In addition, **a greater amount of concentrate supplementation increased the overall final pregnancy rates of heifers (80% for heifers supplemented at 1.75% of BW vs. 58% for heifers supplemented at 1.25% of BW).** Hence, our study indicated that the increment on overall final pregnancy rates was greater than the cost of increasing concentrate supplementation rate from 1.25% to 1.75% of body weight. The study needs to be replicated for a second year in order to confirm our preliminary results and increase the strength of the data. A proposal to the Beef Enhancement Funds board was recently submitted by Dr. Moriel to secure funds for the second and final year of this study. The overall results from year 1 demonstrated the positive impact of our study to the beef industry in Florida.

* $P < 0.05$



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.