Feeding Interval Effects on Growth, Puberty, and Pregnancy Rates in Yearling *Bos indicus* and *Bos taurus* Beef Heifers

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Summary
The objective of this study was to examine the effects of daily versus three d/wk supplementation on growth, age at puberty, estrous synchronization response, and pregnancy rates of yearling Brangus and Angus heifers consuming round bale silage (RBS). Sixty heifers (30, Angus; 30, Brangus) were stratified by initial body weight, breed, and age and randomly allocated to 12 pens. Pens were randomly assigned to one of two treatments: 1) distillers grains and soybean meal supplemented daily; or 2) distillers grains and soybean meal supplemented three d/wk. Supplement consumption and RBS offered were similar for both treatments. Heifers supplemented daily had similar ADG as compared to heifers supplemented three d/wk (1.82 vs. 1.79 lb/d). The number of heifers reaching puberty by breeding tended to be greater for daily fed heifers. Synchronized pregnancy rates and total 28 day AI pregnancy rates were also similar for both treatments. In this study, three d/wk supplementation of developing heifers had no effect on heifer growth rates or pregnancy rates as compared to daily supplementation.

Introduction
The development of heifers is one of the major economic considerations in a cow-calf operation. Heifers that calve by two years of age have greater lifetime productivity than heifers that calve at an older age. Heifers must be maintained on a high plane of nutrition to reach puberty and conceive by 14 to 15 mo of age. Most cattle raised in the Southeastern United States have some degree of *Bos indicus* breeding and heifers with *Bos indicus* breeding tend to mature slower and reach puberty at older ages than *Bos taurus* heifers. The influence of *Bos indicus* breeding can negatively affect the rancher’s success of having heifers pregnant to calve at two yr of age. The impact of supplemental nutrition is increasingly important in these situations.

Supplementation of heifers is a very common practice, but producers are often concerned about the labor inputs involved with supplementation. Labor saving methods utilized include: supplement type (liquid and self-limiting), feeding method (hand fed, self fed), and feeding intervals (daily, three times a week, once a week). Little data is available on the effects of supplementing heifers at different intervals on growth and reproductive performance. A better understanding of the biological effects of these labor saving supplementation methods can lead to more efficient development of heifers.

The objective of this study was to examine the effects of daily versus three d/wk supplementation on age at puberty, estrous synchronization response, and pregnancy rates of yearling Brangus and Angus heifers consuming RBS.

Supplementation of developing heifers with distillers grains three days/week has no negative effects on heifer growth or reproductive performance compared to daily supplementation.
Procedure
This study was conducted at the Santa Fe Beef Unit, located near Gainesville in northern Alachua County. Sixty heifers (n=60) were stratified by age, body weight, and sire into 12 pens (6 pens Angus and 6 pens Brangus). Beginning in October 2006, heifers were supplied ad libitum access to bermudagrass round bale silage (RBS; 51% dry matter, 12.9% crude protein, 53.9 % total digestible nutrients) and free choice mineral. Heifers were supplemented with distillers dried grains (DDG) and soybean meal to gain approximately 1.5 lb/d, with half of the pens supplemented daily (CON) and the remaining pens supplemented three d/wk (3X). Soybean meal was fed to help meet degradable intake protein requirements as determined by the NRC computer model. Heifers were weighed and bled weekly to determine average daily gain (ADG) and age at puberty. Body condition scores (BCS) and hip heights (HH) were taken monthly. A shrunk body weight (following a 12-h shrink) was collected at the beginning and the end of the trial.

Heifers were synchronized for artificial insemination on d 145 of the experiment. A CIDR was inserted concurrent with GnRH. Seven d later the CIDR was removed and prostaglandin was administered to synchronize estrus. Estrus was detected for 72 h, using the Heatwatch system, and heifers were inseminated approximately 8-12 h after the onset of estrus by a single AI technician. Heifers not exhibiting estrus by 72 h after prostaglandin received GnRH and fixed-time AI. Detection of estrus and AI were continued for 27 d while heifers remained in their respective pens and continued to receive supplement treatments. Pregnancy was diagnosed by ultrasonography 31 d after prostaglandin at which time heifers were removed from supplementation treatments and pens.

Data for ADG, HH, and BCS were analyzed using the PROC MIXED procedure of SAS. The model statement contained the effects of treatment, breed, and the interaction. Pen within treatment was the random effect. Pregnancy and puberty data were analyzed using PROC GLM. Least square means were determined and differences between means were considered significant is P<0.05.

Results
The ADG of the heifers for the trial was greater than predicted by the model, and ADG were similar between treatments (P=0.83). Heifers averaged 1.84 lb/d for the entire trial for both treatments. Shrunk weight ADG for the trial were also similar (P=0.72) between treatments (CON- 1.82, 3X- 1.79 lb/d). The Angus and Brangus heifers gains were similar (P=0.86) regardless of treatment (Angus 1.91 vs. Brangus 1.77 lb/d). Total RBS offered was similar (P=0.73) between treatments (CON= 17,787 lbs; 3X= 17,556 lbs), and DDG consumption was also similar (P=0.56) between treatments (CON=2,891; 3X=2,970 lbs). Changes in hip height were also similar between treatments (P=0.95; 3.7 in for CON and 3X). Heifer gains were not impaired by supplementing three d/wk compared to daily supplementation. This supports previous research conducted in cows that three d/wk supplementation of protein feed does not significantly affect cow performance and therefore it can be used as means to save labor in a feeding program.

Heifers in the CON treatment tended (P=0.09) to have a greater percentage pubertal (60%) at breeding compared to 3X heifers (40%, Table 1). It is unclear at this point if this difference is due to the feeding regimen used (daily vs. three d/wk) or it is just due to the limited number of heifers in that group. Estrus response tended (P=0.10) to be greater for CON (77%) compared to 3X (57%). The synchronized pregnancy rates were similar (P=0.30) for 3X (57%) compared to CON (43%). Total 28 d AI pregnancy rates were also similar (P=0.59) between treatments (CON=63%; 3X=70%). Synchronized pregnancy rates for the heifers exceeded previous reproductive performance for heifers at the Santa Fe beef unit. It is important to note that even though only 50% of the heifers had reached puberty by the start of the breeding season, the synchronization treatment still resulted in a first service AI pregnancy rate of 50%. This indicates the importance of using a
synchronization treatment that utilizes a progestagen source in inducing puberty in the non-pubertal heifers.

In conclusion, DDG showed no negative effects on the development of yearling Angus and Brangus heifers in combination with RBS. Heifers adapted easily to DDG and RBS, and exceeded the computer modeled performance during the study. Three-time a week feeding of developing heifers offers a management practice that may help significantly reduce labor cost without sacrificing heifer growth rates or pregnancy rates.

### Table 1. Summary of reproductive performance of heifers supplemented Daily or 3X a week

<table>
<thead>
<tr>
<th></th>
<th>Daily</th>
<th>3X</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pubertal at AI (%)</td>
<td>18/30 (60)</td>
<td>12/30 (40)</td>
<td>0.09</td>
</tr>
<tr>
<td>Estrous response (%)&lt;sup&gt;a&lt;/sup&gt;</td>
<td>23/30 (77)</td>
<td>17/30 (57)</td>
<td>0.10</td>
</tr>
<tr>
<td>Synchronized pregnancy rate (%)&lt;sup&gt;b&lt;/sup&gt;</td>
<td>13/30 (43)</td>
<td>17/30 (57)</td>
<td>0.30</td>
</tr>
<tr>
<td>30 d AI pregnancy rate (%)&lt;sup&gt;c&lt;/sup&gt;</td>
<td>19/30 (63)</td>
<td>21/30 (70)</td>
<td>0.59</td>
</tr>
</tbody>
</table>

<sup>a</sup> Percentage of heifers displaying estrus during the 3 d after PGF2 of the total treated.

<sup>b</sup> Percentage of heifers pregnant during the synchronized breeding of the total treated.

<sup>c</sup> Percentage of heifers pregnant to AI during the first 30 d of the breeding season of the total number of heifers.

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