Effects of stair-step vs. constant supplementation amount on growth, reproduction, and intravaginal temperature in *Bos indicus*-influenced beef heifers

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Introduction

- Heifers that calve in the first 21-d of the calving season breed back earlier in the subsequent breeding season and remain in the herd longer[1]
- Increasing pre-breeding BW of *Bos indicus*-influenced heifers can reduce age at puberty and increase the percentage of heifers calving earlier in the calving season[2]
- In *Bos taurus* heifers, increasing BW gain closer to the initiation of the breeding season vs. a constant BW gain decreased DMI of heifers with no negative consequences on BW[3]

Objective

- To evaluate growth and reproductive performance of *Bos indicus*-influenced beef heifers when provided a concentrate supplement at either a constant or stair-step supplementation rate.

Materials and Methods

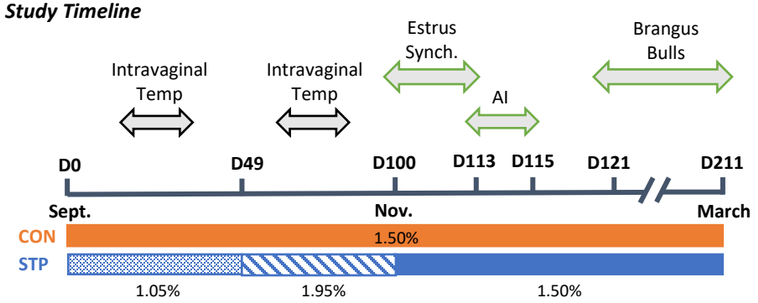
Animals and diet

- September 2019 to March 2020 (Yr 1)
  - 2-yr project – only presenting results from Yr 1
- 64 Brangus heifers/yr
  - Stratified by BW (255 ± 20 kg) and age (270 ± 22 d)
  - Randomly assigned to 1 of 16 bahiagrass pastures (4 heifers/pasture)
- Treatments randomly assigned to pastures (8 pastures/treatment):

Control (CON): concentrate supplementation at **1.50% of BW** from d 0 until start of estrus synchronization (d 100)

Stairstep (STP): concentrate supplementation at **1.05% of BW** from d 0 to 49 and **1.95% of BW** from d 50 to start of estrus synchronization (d 100)

Study Timeline



Data Collected

- Intravaginal temperature collected every 30 min on 16 heifers/treatment
  - D 25 to 31 (Sept.)
  - D 85 to 91 (Nov.)
- Shrunk BW collected every 28 d and amount of feed adjusted accordingly
- Reproductive tract scores (Scale of 1 to 5) reported on d 101

Temperature Data

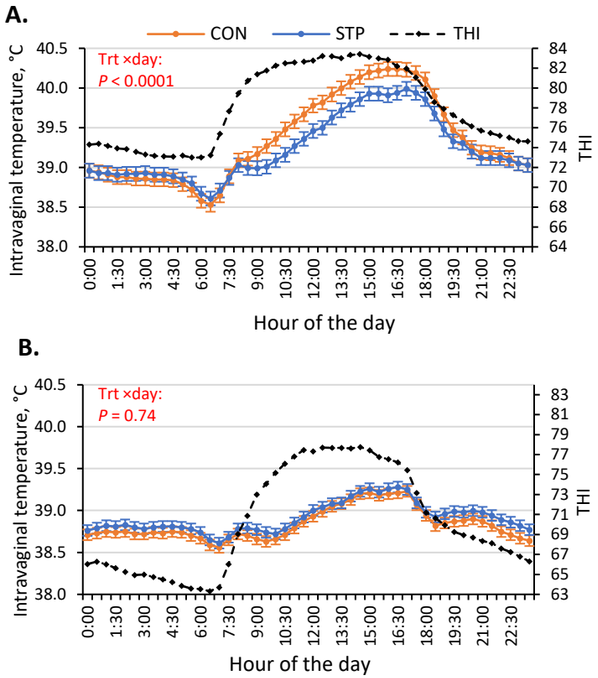


Figure 1. Intravaginal temperatures **A.** collected from d 25-31 when **CON** heifers were supplemented at **1.50% of BW** and **STP** heifers were supplemented at **1.05% of BW**. **B.** collected from d 85-91 when **CON** heifers were supplemented at **1.50% of BW** and **STP** heifers supplemented at **1.95% of BW**.

Conclusions

Stair-step (1.05 to 1.95% of BW) vs. constant (1.50% of BW) concentrate supplementation prior to the start of the breeding season:

1) **Decreased intravaginal temperatures from d 25 to 31**
2) **Improved BW gain at estrus synchronization**
3) **Did not influence overall total supplement DM offered**
4) **Did not impact reproductive performance**

Growth Performance

Table 1. Body weight, average daily gain, and total supplement offered to heifers from d 0 to 100

	Supplementation strategy			*P*-value	
Item	**CON[1]**	**STP[2]**	**SEM**	**Trt**	**Trt × Day**
Body weight, kg					
d 0	242	242	2.14	0.98	0.03
d 49	274	273	2.14	0.90	
d 100	302[b]	311[a]	2.14	<0.01	
ADG, kg/d					
d 0 to 49	0.63	0.62	0.040	0.87	.
d 49 to 100	0.56	0.73	0.044	0.01	
d 0 to 100	0.59	0.68	0.031	0.07	
Total supplement DM offered, kg/heifer					
d 0 to 49	188	132	1.4	<0.01	.
d 49 to 100	217	278	2.3	<0.01	
d 0 to 100	405	410	3.5	0.26	

[1]**CON:** heifers supplemented at **1.50% of BW** from d 0 to 100

[2]**STP:** heifers supplemented at **1.05% of BW** from d 0 to 49 and **1.95% of BW** from d 50 to 100

Reproduction

Table 2. Reproductive parameters of *Bos indicus*-influenced beef heifers provided concentrate supplement at either a constant or a stair-step supplementation rate

	Supplementation strategy			
Item	**CON[1]**	**STP[2]**	**SEM**	***P*-value**
Pubertal heifers, % of total				
d 91	**65.6**	**62.4**	8.23	0.79
d 101	**71.9**	**79.3**	8.23	0.54
Reproductive tract score, d 101	**4.37**	**4.52**	0.173	0.58
Heifers in estrus, % of total				
d 101 to 105	**25.0**	**27.6**	7.99	0.82
d 113 to 115	**59.4**	**49.1**	8.35	0.40

[1]**CON:** heifers supplemented at **1.50% of BW** from d 0 to 100

[2]**STP:** heifers supplemented at **1.05% of BW** from d 0 to 49 and **1.95% of BW** from d 50 to 100

Acknowledgements

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[1]Cushman et al., 2013: J. Anim. Sci. 91:4486–4491

[2]Moriel et al., 2017: J. Anim. Sci. 95:3523–3531

[3]Lynch et al., 1997: J. Anim. Sci. 75:1715–1722

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