The Effects of Growth Rate on Beef Heifer Development

ANIMAL SCIENCE
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Introduction

- Nutrition is one of the most important factors to consider when developing beef heifers[1]
- The goal is to provide a diet that stimulates weight gain to ensure developmental thresholds are reached [2,3]
  - Puberty: 60-65% Mature body weight
  - First calving: Around 2 years of age
- Meeting these goals increases the longevity of reproductive function and overall productivity of that female[2,3]
- Controlling growth rates during heifer development programs may allow producers to[4]:
  - Lower nutritional production costs
  - Maintaining high levels of reproductive success
  - Include concentrates to be more efficient in feedstuff degradation

Hypothesis

Manipulating growth rate in developing beef heifers may stimulate an immune response thus limiting nutritional gains and reproductive performance

Methodology

<u>Experimental Design</u>

- Commercial crossbred heifers (n =48)
- Heifers were blocked by body weight and randomly assigned to one of three growth rate treatments.
  1. Control [CON] fed to gain 0.68 kgs/day for 120 d
  2. Fast to slow [F/S] fed to achieve 1.25 kgs/day for 57d, then 0.11 kgs/day for 63 d
  3. Slow to fast [S/F] fed to achieve 0.11 kgs/day for 57 d, then 1.25 kgs/day for 63 d
- Supplement (25% corn and 75% DDG) was given 4 times per week to meet growth rate goals

<u>Sample Collection</u>

- Body weight and BCS taken every 2 weeks
- G:F calculated by dividing body weight gains by feed intake including supplement and ad libitum hay (hay intakes estimated at 2% of BW)
- Statistical analysis conducted using GLIMMIX procedure in SAS 9.4

Results

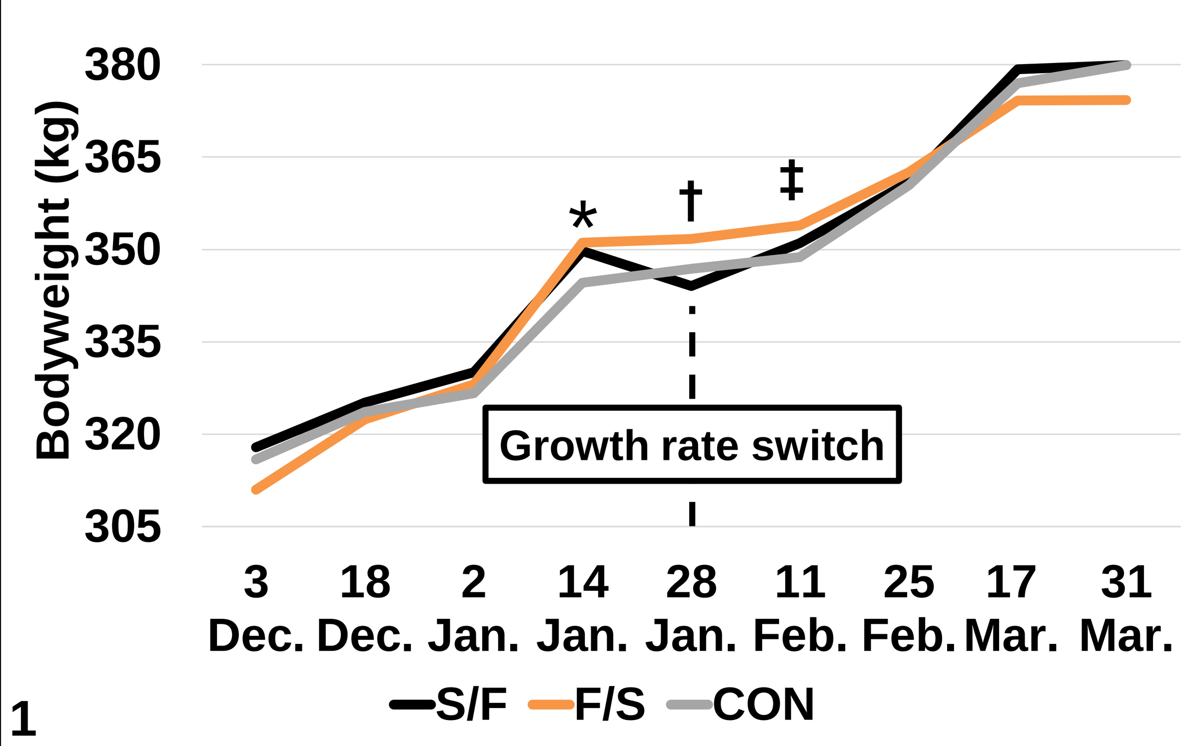

Figure 1. Mean body weights by treatment across all collection dates during heifer development.

- On Jan. 14, F/S were larger than CON, however, S/F remained similar to F/S (*P* = 0.04, Fig. 1).
- On Jan. 28 (*P* = 0.01) and Feb 11 (*P* = 0.05), BW for F/S was greater than both CON and S/F (Fig. 1).
- S/F were losing weight and thus G:F was decreased compared with CON and F/S which (P < 0.01, Fig. 3).
- After growth rate switch, all treatments experienced a increase in G:F (Fig. 3)
- There was a tendency towards an interaction between treatment and date (P = 0.07, Fig. 3)

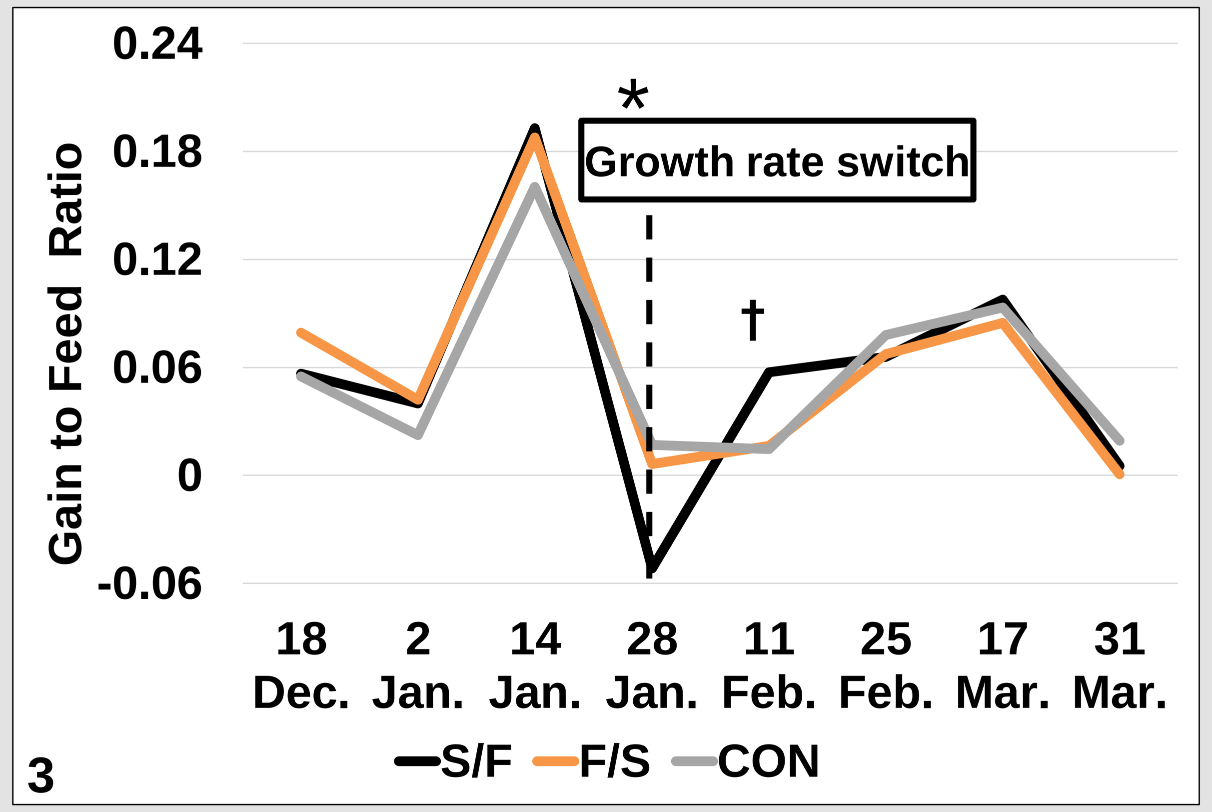

Figure 3. Gain to feed by treatment across all dates. Pre- and post-switch G:F statistics run separately.

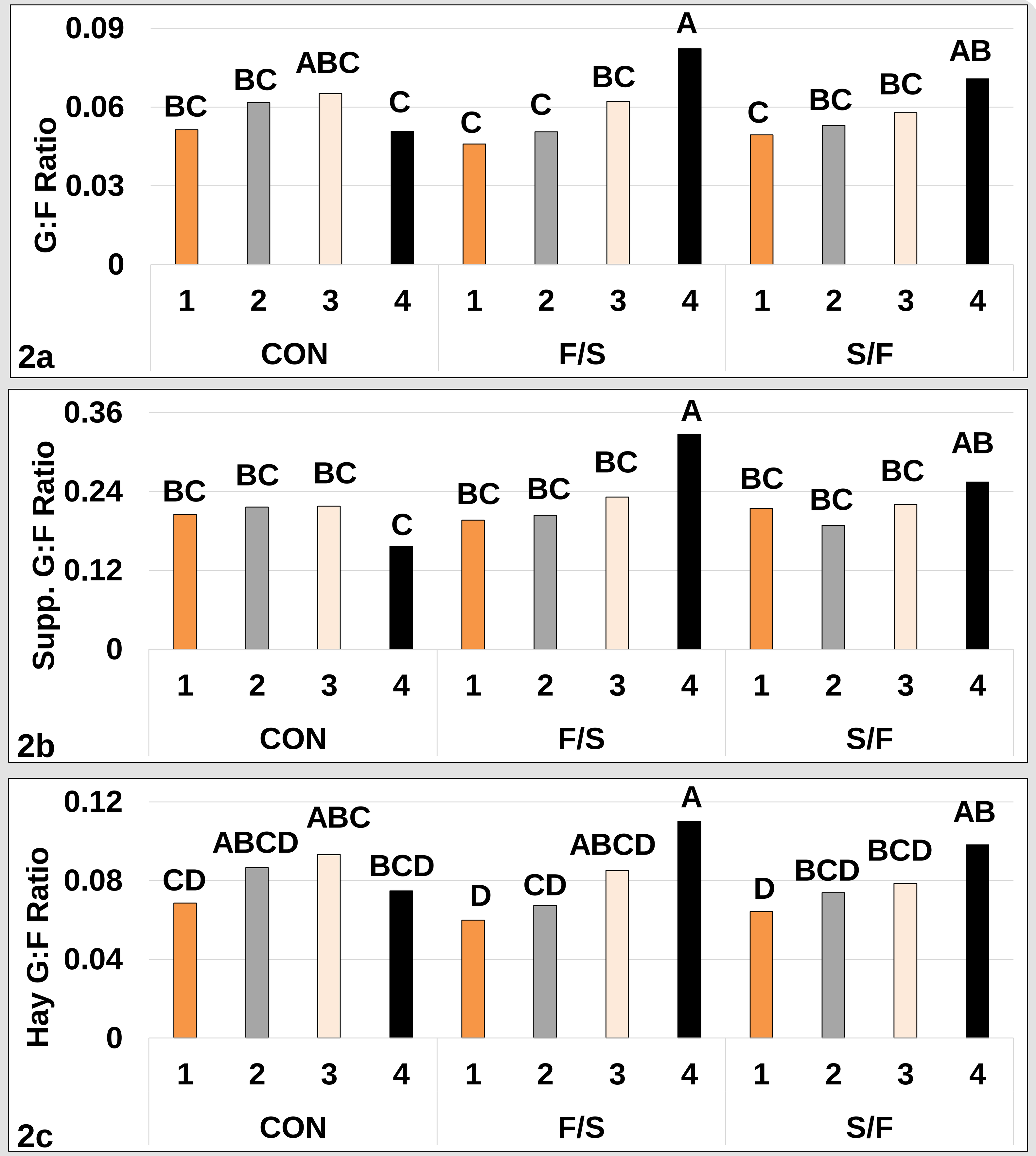

Figure 2. Calculated gain to feed ratios for total G:F (a), supplemental G:F (b), and hay G:F (c).

- Lighter heifers had higher total G:F than heavier heifers (*P*=0.01, Fig. 2a)
- Weight class tended to interact with treatments (*P*=0.08, Fig. 2a).
- Smaller heifers were impacted supplemental treatments in a more extreme manner than other weight classes. The lightest F/S heifers had the highest supplemental G:F (*P* = 0.04, Fig. 2b).
- Heifers in the heaviest weight class held the lowest hay G:F for all treatments (*P* = 0.002, Fig. 2c).

Conclusions

- Before the switch, S/F remained similar to F/S. This may indicate that heifers on low nutritional planes can find adequate nutrition from hay only early after weaning.
- Growth rate change impacted feed efficiency and weight gain in smaller heifers more than larger heifers.
- Feeding heifers a high plane of nutrition and then switching to a low plane of nutrition may provide opportunity for lower feed costs while still maintaining consistently high levels of gain

Future Research

Uterine and vaginal cytokine and systemic endocrine profiles will be identified and reported at a later date. These data will further elucidate the relationship between nutrition, reproduction and inflammation during heifer development.

Acknowledgments

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