

Effects of feeding *Brassica carinata* meal on beef cattle performance



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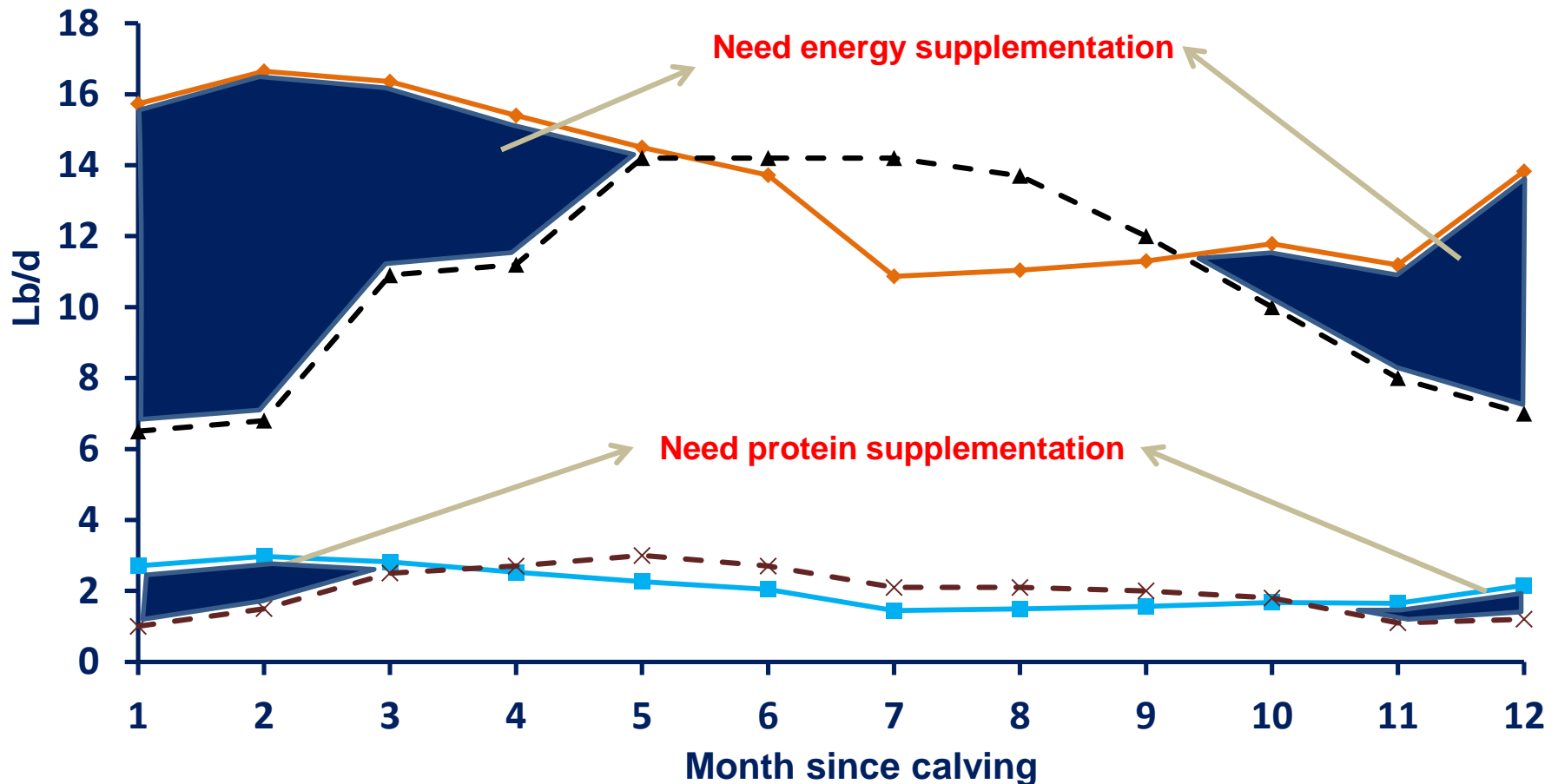


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Why carinata meal in FL?

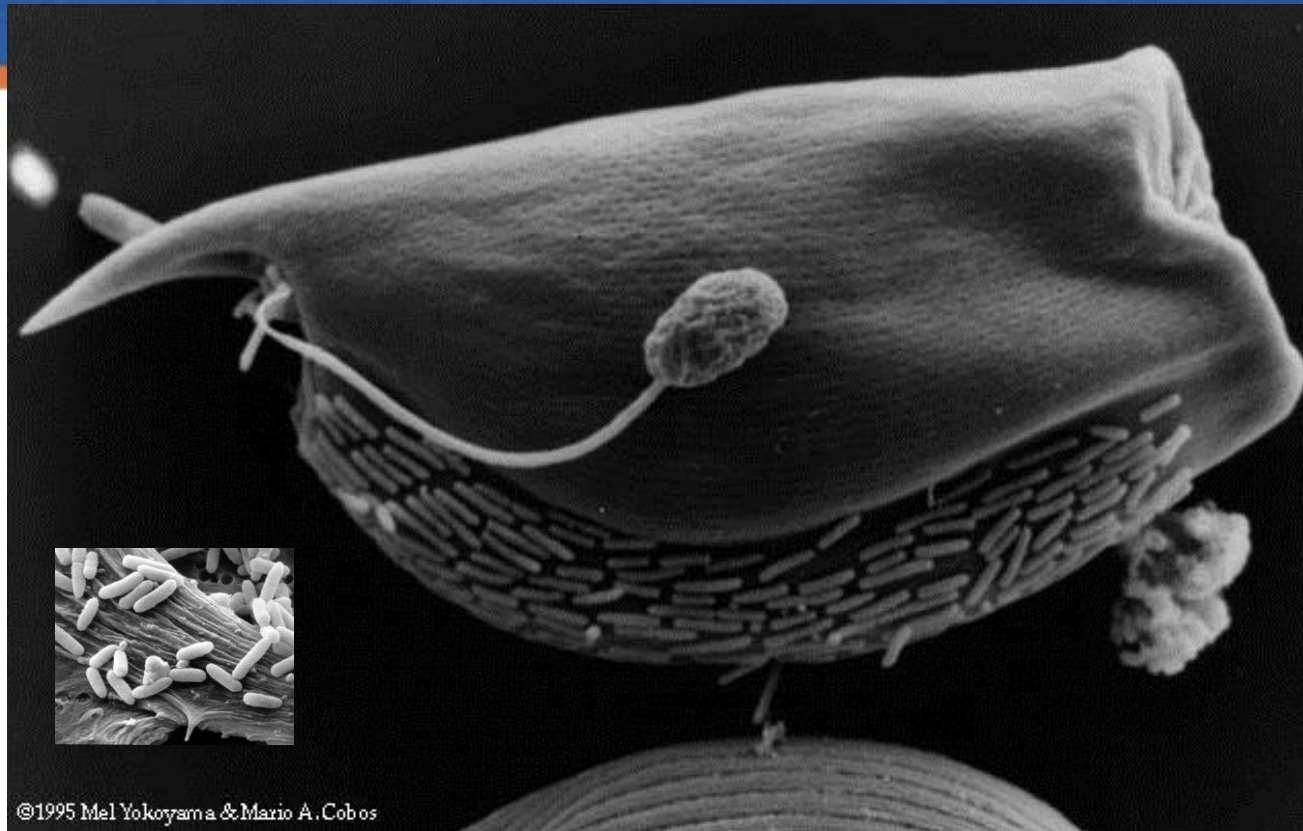
1200 lb cow lactating, 20 lb at peak milk prod.

—◆— Lb/d of TDN required —■— Lb/d of CP required
-▲- Pasture Production TDN -×- Pasture Production CP

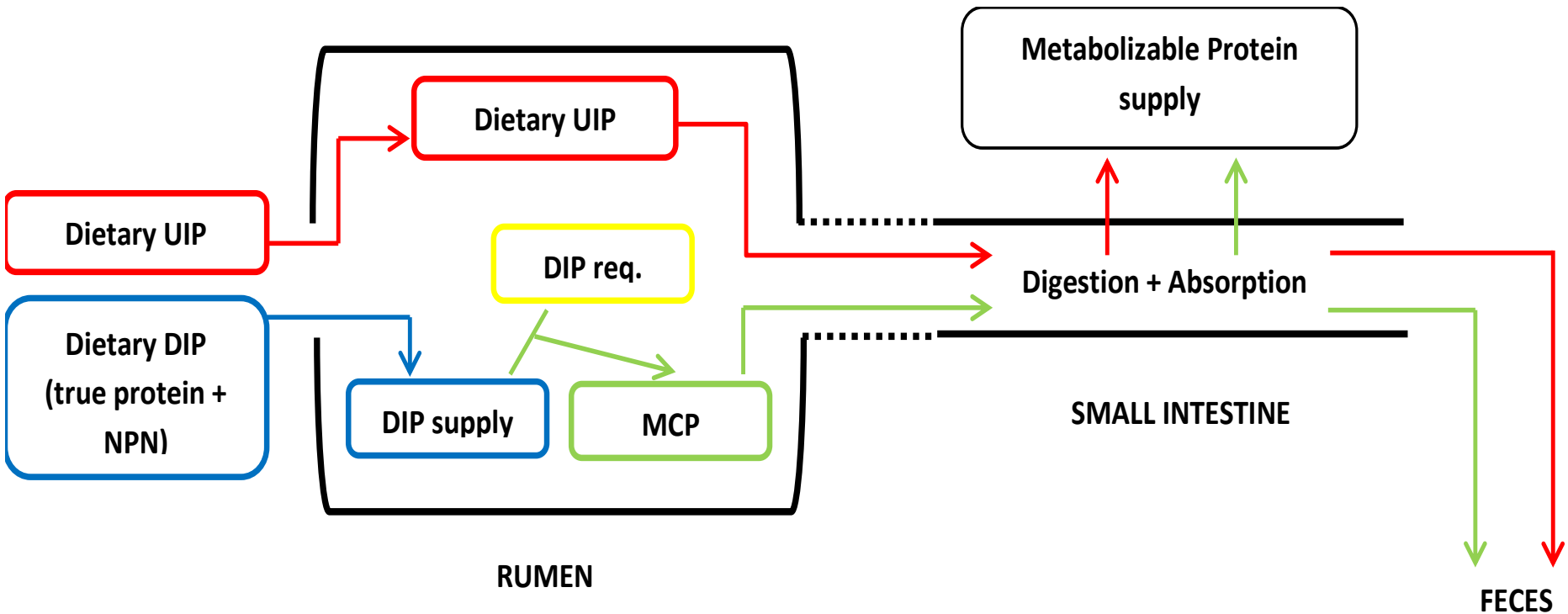




Ruminant GI tract



Understanding N metabolism in ruminants



NFREC Feed Efficiency Facility



Economics of cattle supplementation in FL

- FL cow herd = 1,062,275 (cows and heifers that had calved)
- 30% replaced annually = 318,683 heifers to develop/year
 - ✓ **Heifer development: \$402-463 million per year market**
 - ✓ Need high protein supplements
- Typical FL pastures produce abundant quantity but low quality (Crude protein ~ 5-9%)
 - ✓ Supplementation is needed in winter
 - ✓ Typically used sources: DDGS, CSM, urea

Experiment 1

Objective: to determine the effects of feeding *B. carinata* meal on ruminal metabolism

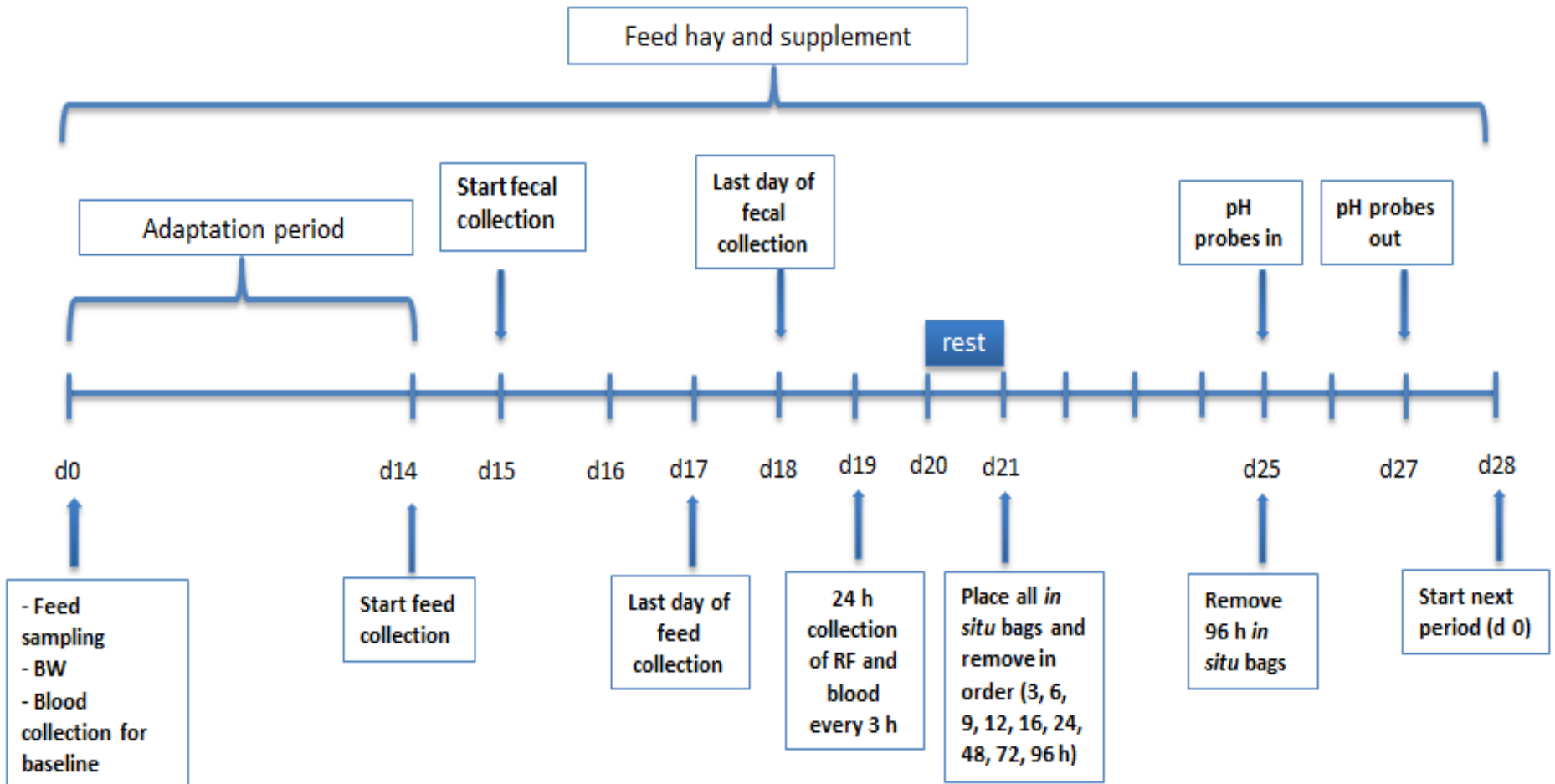
- 8 cannulated steers housed in the NFREC-FEF
- Ad libitum bahiagrass hay – intake recorded by GrowSafe
- Four treatments on an isonitrogenous basis:
 - *Brassica carinata* meal: 2.8 lb DM/steer/d (0.3% of BW)
 - Soybean meal (SBM)
 - Dry distillers grains plus solubles (DDGS)
 - Cottonseed meal (CSM)
- Supplemental amounts based on total N provided by 2.8 lb DM/hd/day of *B. carinata* meal

Cattle and facilities



Experiment 1

Objective: to determine the effects of feeding *B. carinata* meal on ruminal metabolism



Diet

Nutrient profile

	B. carinata meal	Bahiagrass hay
DM, %	89.8	94.0
CP, % DM	43.3	7.2
ADF, % DM	12.8	41.8
NDF, % DM	23.5	71.4
TDN, % DM	80.0	56.0
S, %	1.75	0.35

Experiment 1

Ruminal metabolism and fermentation



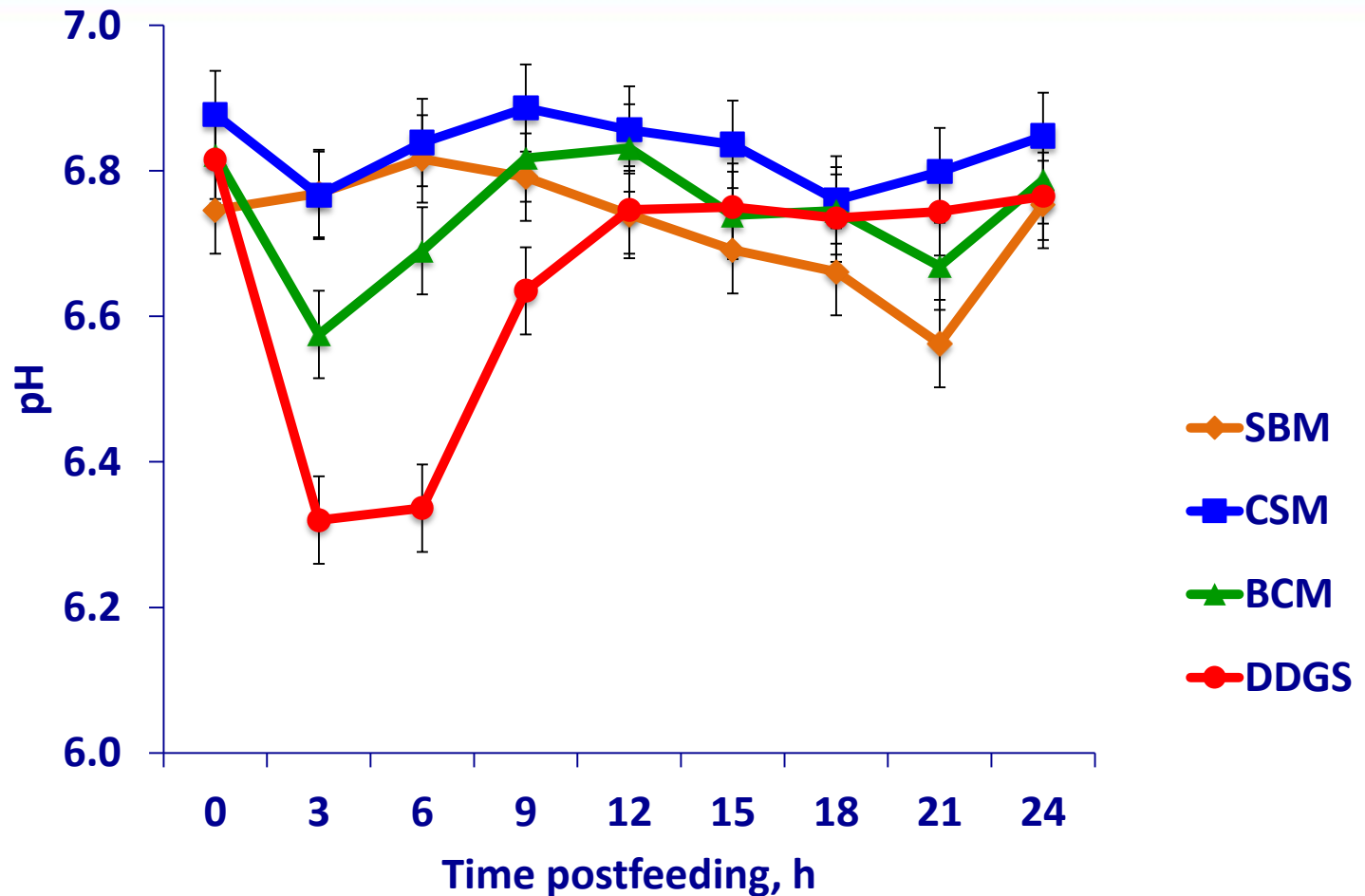
Experiment 1

Ruminal metabolism and fermentation



Exp. 1 Results

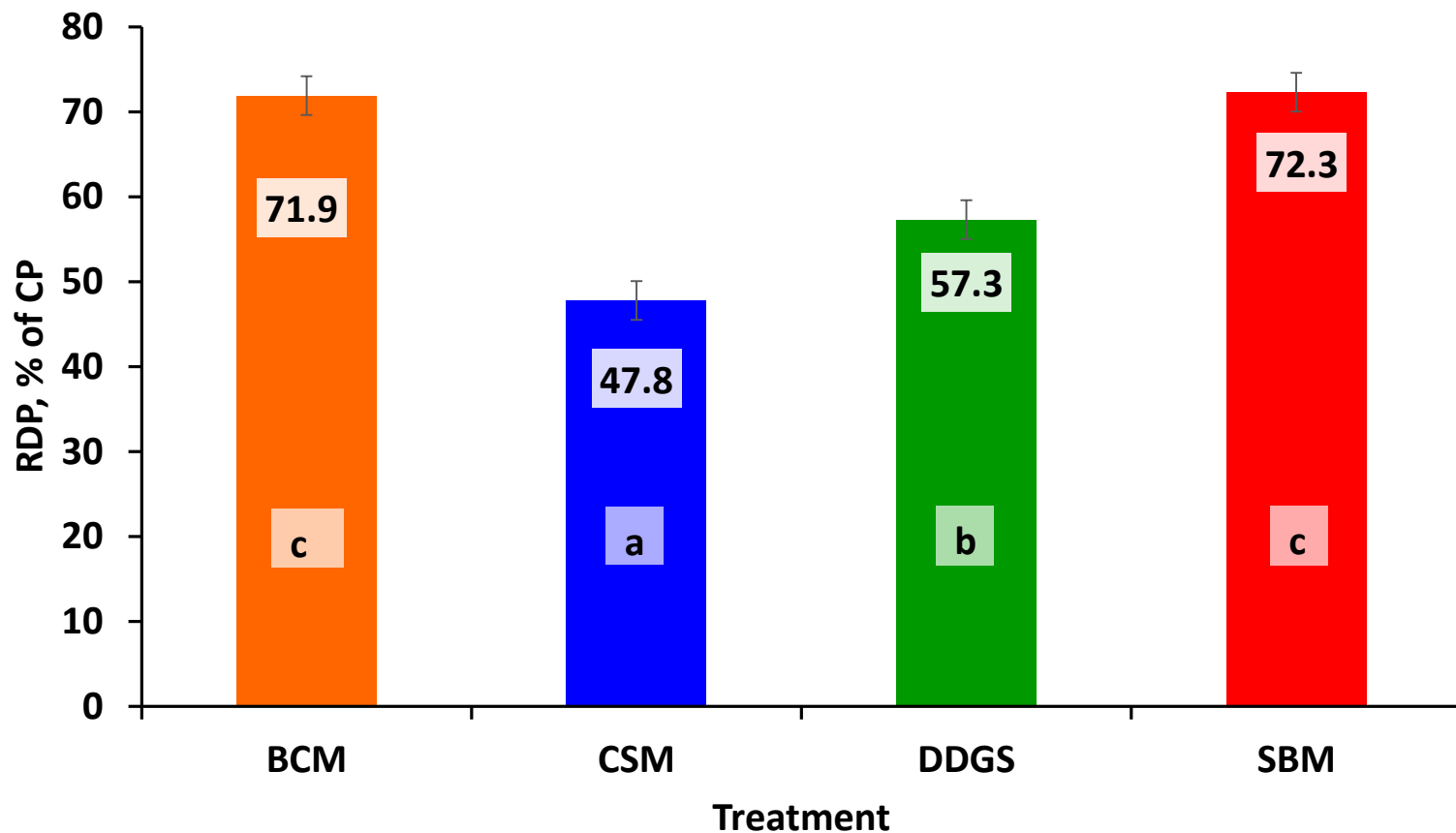
Ruminal pH



Treatment x time interaction, $P = 0.001$

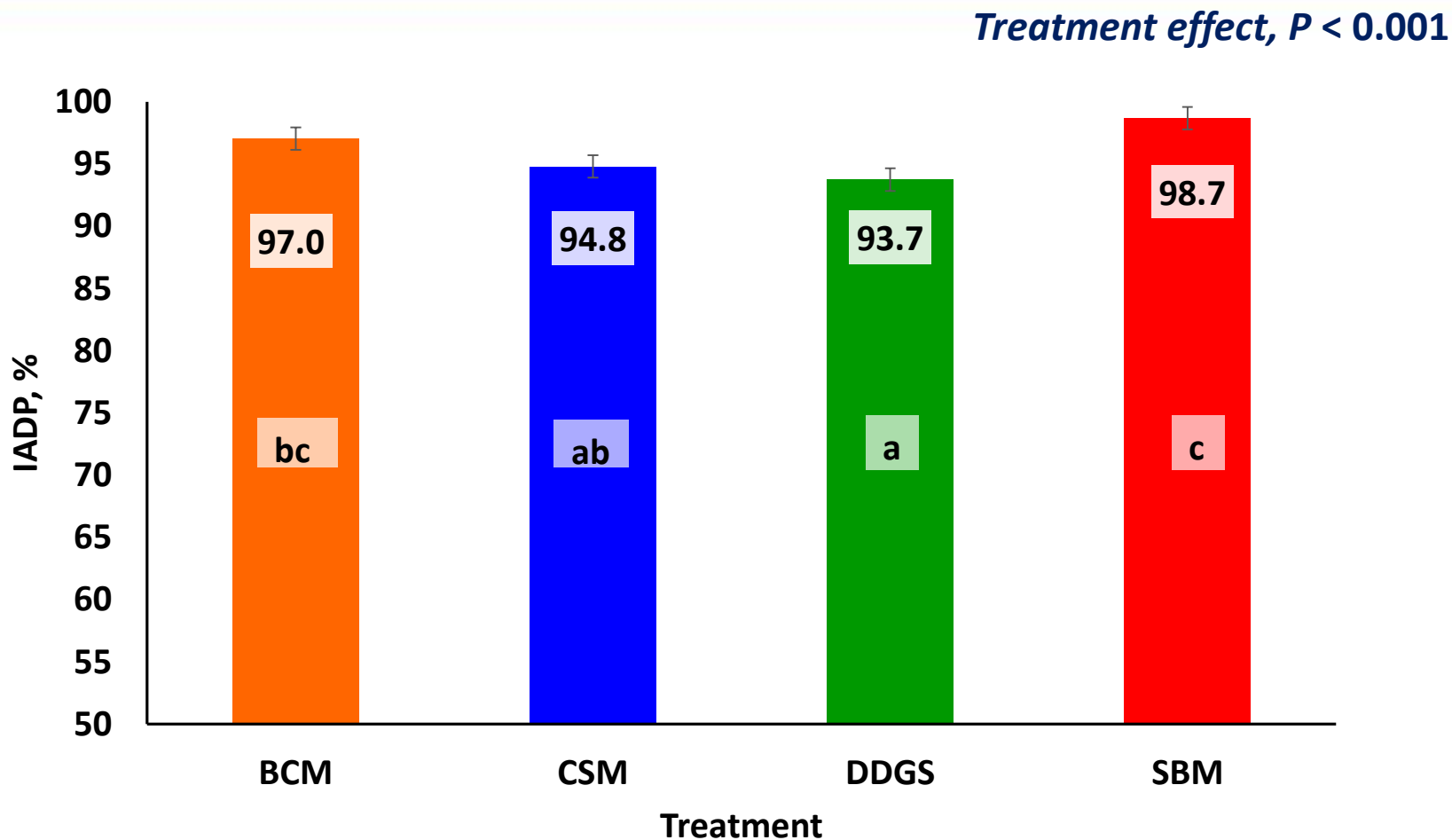
Exp. 1 Results: Rumen degradable protein (RDP)

Treatment effect, $P < 0.001$



a,b,c Means with different letters differ, $P < 0.05$

Exp. 1 Results: Intestinally Absorbable Dietary Protein (IADP)



a,b,c Means with different letters differ, $P < 0.05$

Experiment 2

Objective: to determine the effects of *B. carinata* meal on beef cattle performance

- 30 growing heifers in 10 pens of 3 heifers each, (n=5/treatment) in 2 consecutive years (~ 600 lb)
- Fed ad libitum amounts of bermudagrass hay
- Supplemented daily with *Brassica carinata* meal at:
 - 0.0% of their body weight (BW) (hay only)
 - 0.30% of their BW
- Body weight and blood samples collected weekly for 70 d – ADG using weights from 2 consecutive days
- Assessment of animal performance, attainment of puberty, and blood profile (ceruloplasmin, haptoglobin, blood urea nitrogen, T3 and T4)

***B. carinata* meal (BCM)**

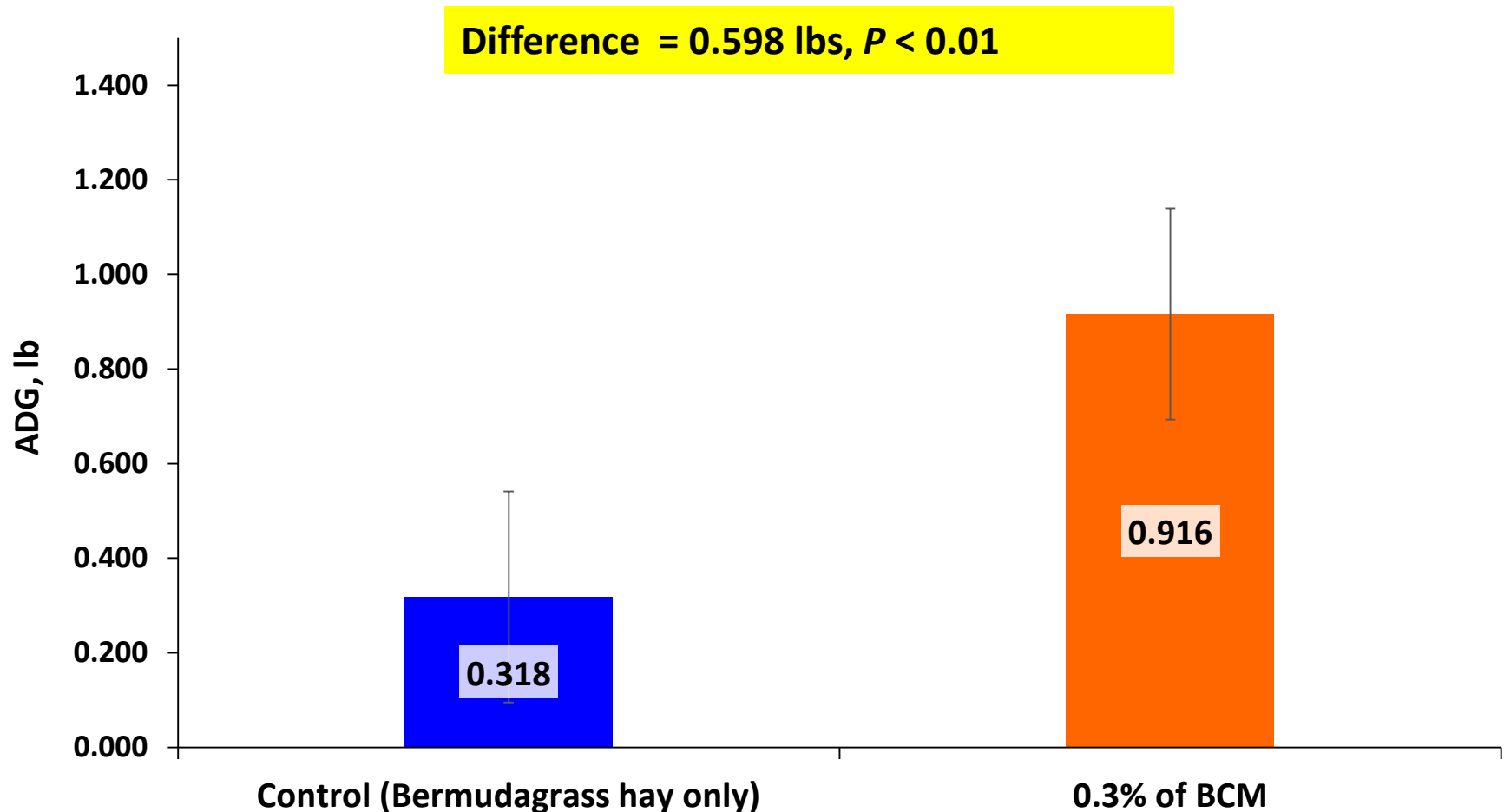
Nutrient profile (DM basis)

	BCM ¹	Bermudagrass hay ¹
DM, %	89.1	92.7
Glucosinolates ($\mu\text{mol g}^{-1}$)	28.65	-
Crude protein, %	43.6	13.3
Ash, %	7.0	NR
NDF, %	23.6	71.2
ADF, %	13.2	38.0
Ether extract, %	2.5	NR
S, %	1.73	NR
TDN, %	76	55
RFV	-	79

¹Average values over the 2 years of study

Bermudagrass hay with *B. carinata* meal

2-year study, 64 hd total (18 pens) 70 d each yr



Bermudagrass hay with *B. carinata* meal

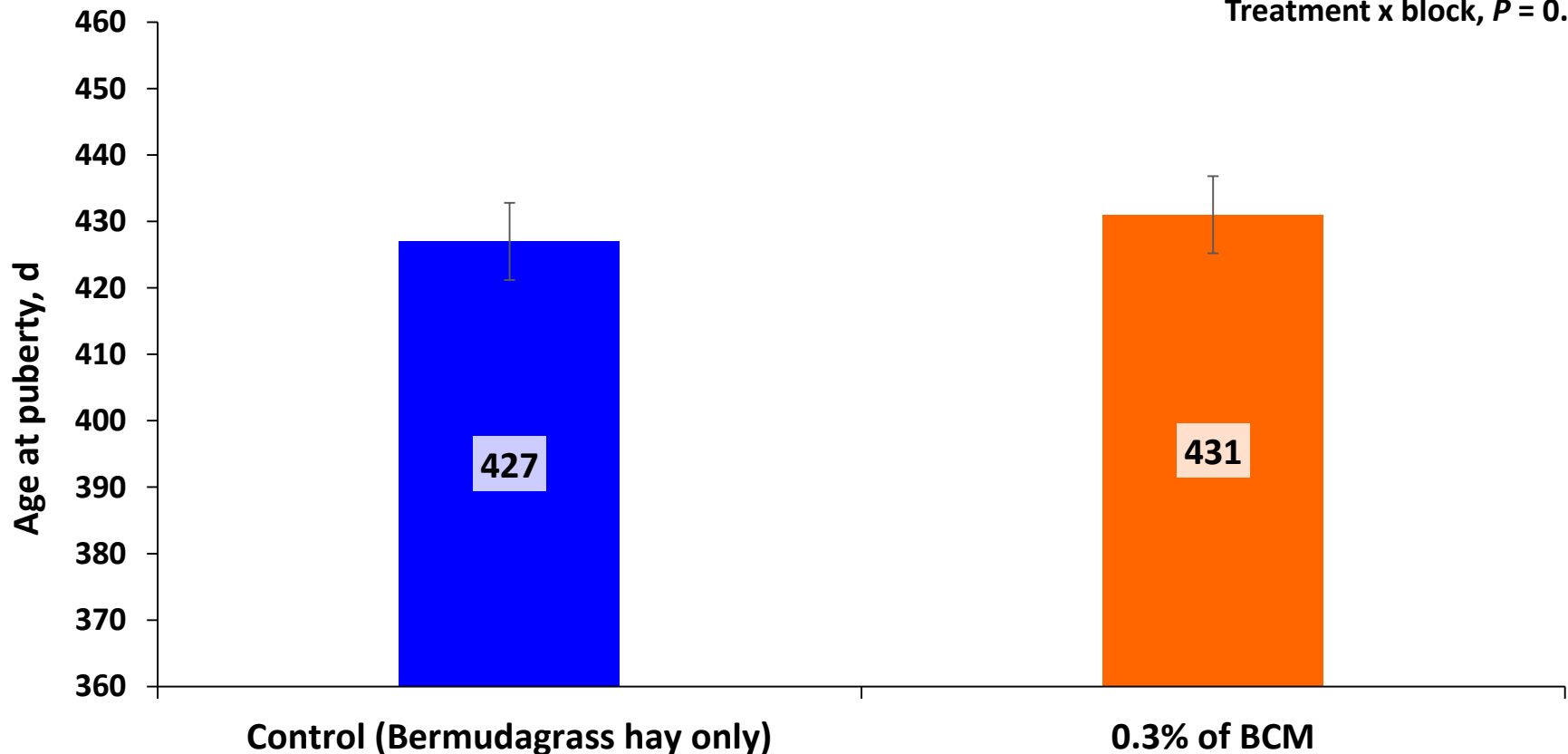
2-year study, 64 hd total (18 pens) 70 d each yr

Treatment effect

Treatment, $P = 0.68$

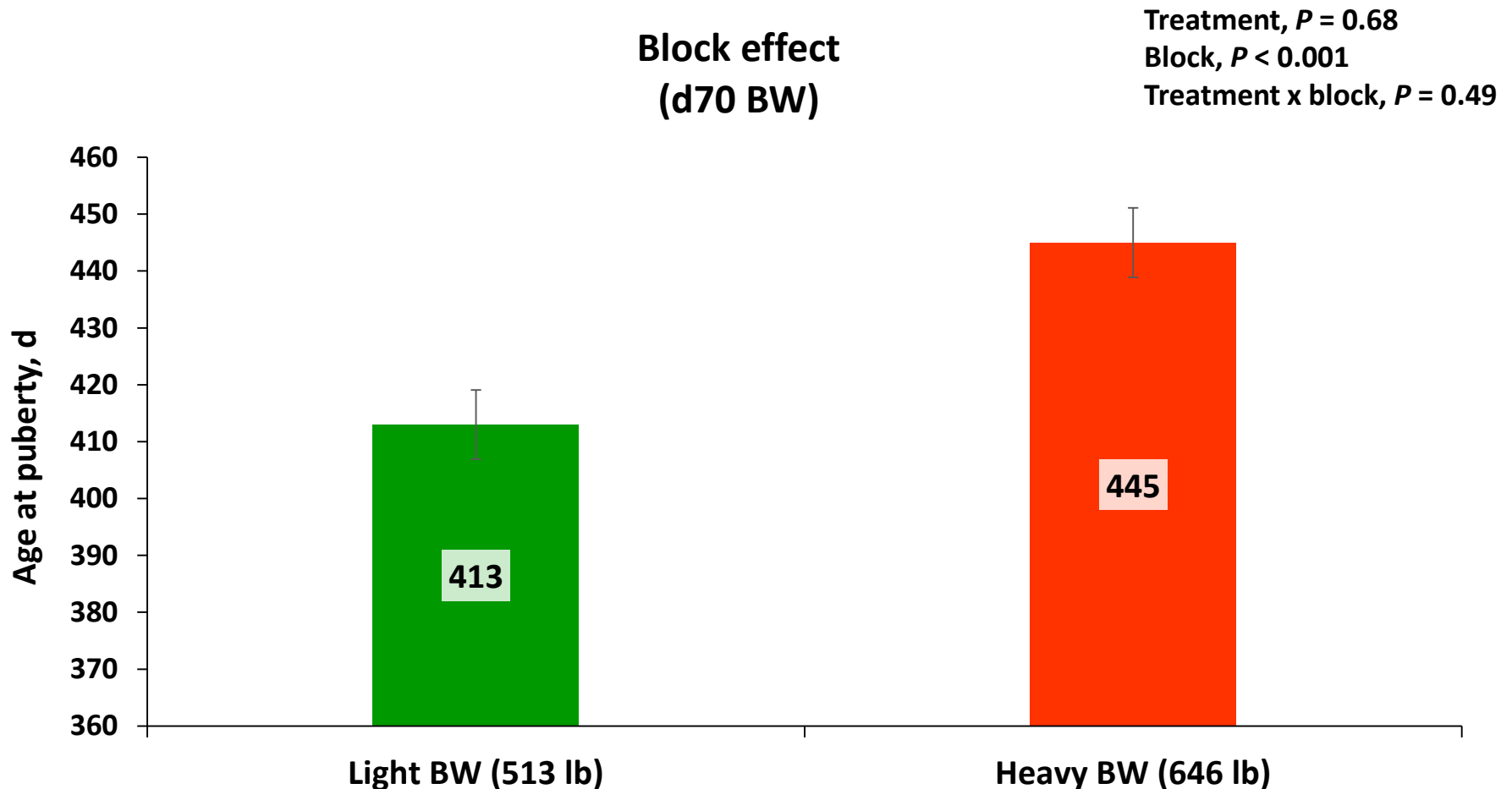
Block, $P < 0.001$

Treatment x block, $P = 0.49$



Bermudagrass hay with *B. carinata* meal

2-year study, 64 hd total (18 pens) 70 d each yr



What does this mean in \$ terms?

- A difference of 0.598 lbs over 70 d means:
 - 42 extra lb of beef to sell
 - Today beef prices = \$1.20/lb
 - Thus, an extra \$50.4 for only 70-d feeding
- $1.8 \text{ lb/d} \times 70 \text{ d} = 126 \text{ lbs of BCM}$
- Assuming a \$280/ton (canola meal pelleted 38% CP)
 - $\$0.14/\text{lb} \times 126 = \17.6 in feed costs
 - Net return = \$32.8/head over 70 days feeding



Can we afford to feed BCM?

Economic impact of *B. carinata* meal supplementation in FL

1,062 million head × 4 lb of BCM/d × 90 d/yr = 191,160 tons/yr
👉 \$53.5 million/yr



Conclusion

- Animal performance was improved when BCM was supplemented at 0.3% of BW daily to heifers consuming bermudagrass hay
- At the supplemental level tested, no detrimental effects were observed on thyroid hormones metabolism or attainment of puberty
- *B. carinata* meal can be high-quality protein supplement in beef cattle systems