

## Newborn Beef Calves Benefit from Supplementation with Vitamins D and E

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### Introduction

- Vitamins A, D, and E are critical for growth and health of newborn calves but supplies of each in beef calves often receive little attention.
- Recent work indicated a high prevalence of vitamin D deficiency in newborn beef calves (Nelson 2016).
- Low concentrations of 25-hydroxyvitamin D [25(OH)D] impair innate activation of nitric oxide and  $\beta$ -defensin responses in cultured monocytes of calves (Merriman 2015).

#### Hypothesis

Supplementation of newborn beef calves with vitamins A, D, and E will achieve vitamin D sufficiency and benefit supplies of vitamins A and E.

### Methods

Calves were randomly assigned to receive no treatment (CON) or subcutaneous injection of VITAL-E® Newborn (ADE, Stuart Products, Inc.; 50,000 IU retinyl-palmitate, 50,000 IU vitamin D<sub>3</sub>, and 500 IU RRR- $\alpha$ -tocopherol/mL).

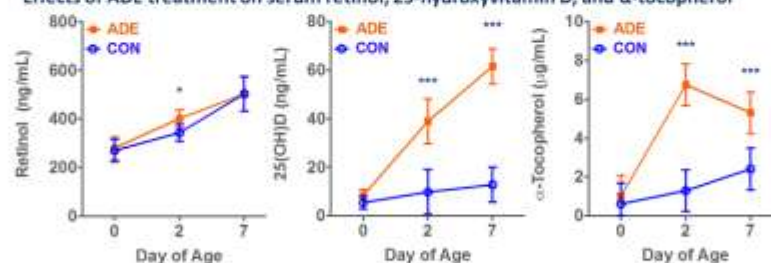
- Minnesota calves received either no treatment (n = 8) or 5 mL of VITAL E-Newborn (n = 8) within 24 hours of birth and serum samples were collected at 0, 2, 7, 50 and 210 days of age.
- Florida calves received either no treatment (n = 7) or 4 mL of VITAL E-Newborn (n = 9) within 24 h of birth and serum samples were collected at 0, 25, 50 and 180 days of age.

### Abstract

**Objective and approach:** The objective of this study was to determine the effects of injectable vitamins A, D, and E on fat-soluble vitamin status of beef calves. Calves were randomly assigned to receive no treatment (CON) or subcutaneous injection of VITAL-E® Newborn (ADE, Stuart Products, Inc.; 50,000 IU retinyl-palmitate, 50,000 IU vitamin D<sub>3</sub>, and 500 IU RRR- $\alpha$ -tocopherol/mL). Minnesota calves received either no treatment (n = 8) or 5 mL of VITAL E-Newborn (n = 8) within 24 hours of birth and serum samples were collected at 0, 2, 7, 50 and 210 days of age. Florida calves received either no treatment (n = 7) or 4 mL of VITAL E-Newborn (n = 9) within 24 h of birth and serum samples were collected at 0, 25, 50 and 180 days of age.

**Results:** Data shown for 0, 2, and 7 d of age from calves in the Minnesota herd. Click on links for further content.

Effects of ADE treatment on serum retinol, 25-hydroxyvitamin D, and  $\alpha$ -tocopherol



Vitamin A Results

Vitamin D Results

Vitamin E Results

**Conclusion:** Newborn beef calves are often deficient in vitamins D and E with concentrations of 25(OH)D and  $\alpha$ -tocopherol below 20 ng/mL and 2  $\mu$ g/mL of serum. Supplementation of newborn beef calves with VITAL-E Newborn increased serum 25(OH)D and  $\alpha$ -tocopherol concentrations, which may serve to improve health of the young calf.

### Results

**Vitamin A:** Overall, retinol concentrations in serum increased similarly in both groups going from 280  $\pm$  16 ng/mL at birth to 503  $\pm$  24 ng/mL at 7 d of age in Minnesota calves and 167  $\pm$  21 to 210  $\pm$  21 from birth to 7 d of age in Florida calves.

**Vitamin D:** Serum 25(OH)D concentrations of the ADE calves were greater than CON calves at 2, 7, 30, and 50 d of age ( $P < 0.01$ ). The difference was greatest at 7 d of age where 25(OH)D of ADE calves was 61.7  $\pm$  3.6 ng/mL compared to 12.9  $\pm$  3.6 in CON calves,  $P < 0.001$ .

**Vitamin E:** Serum  $\alpha$ -tocopherol of the ADE calves was greater than CON calves at 2 d and 7 d of age (6.8  $\pm$  0.5 and 5.3  $\pm$  0.5  $\mu$ g/mL vs. 1.3  $\pm$  0.5 and 2.4  $\pm$  0.5  $\mu$ g/mL,  $P < 0.001$ ). Average serum  $\alpha$ -tocopherol of all calves was near 2.5  $\mu$ g/mL at 50 days of age.

### Acknowledgements

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### References

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- Nelson et al. 2016. Assessment of serum 25-hydroxyvitamin D concentrations of beef cows and calves across seasons and geographical locations. *J. Anim. Sci.* in press.