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Response of newborn calves to injectable vitamins A, D and E

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Introduction

- Calves are born deficient in fat soluble vitamins and depend upon colostrum and milk to provide adequate vitamins E and A. Sun exposure is required for adequate systemic vitamin D production since vitamin D content of colostrum and milk is typically very low.
- In early spring, gestating beef cows consuming stored roughages that contain low levels of fat-soluble vitamins, typically supply lower levels of fat-soluble vitamins E and A in colostrum and milk compared to gestating cows grazing lush pasture (Hidiroglou et al., 1973). While mineral/vitamin supplements may contain vitamin A and vitamin D, levels of vitamin E are typically very low (0 to 220 I.U. vitamin E per kg mineral)
- Gestating dairy cows are typically supplemented with higher levels of fat-soluble vitamins pre-partum compared to beef cows, especially vitamin E.
- Newborn calves deficient in fat-soluble vitamins can exhibit weak-calf syndrome, muscle weakness and diarrhea after birth (Waldner, 2007; Radostits, 1991).
- Injecting fat-soluble vitamins at birth is a means to enhance fat-soluble vitamin status during the first few weeks after birth (Krueger, et al. 2014).
- Two experiments were conducted to measure effectiveness of **VITAL E®-Newborn** (Stuart Products, Inc.) on fat-soluble vitamin status in newborn beef and dairy calves.

One mL of **VITAL E-Newborn** contains 500 I.U vitamin E (d-*alpha*-tocopherol), 50,000 I.U. vitamin A (retinyl-palmitate), and 50,000 I.U. vitamin D (cholecalciferol).

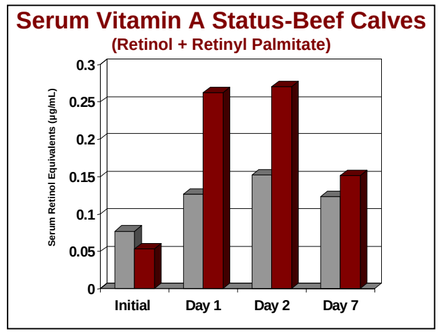
Methods

In experiment 1, randomly selected newborn Angus beef calves (n= 4) were not injected and others (n= 4) were injected S.Q. with 5 mL **VITAL E-Newborn**. Serum samples were obtained initially and days 1, 2, and 7 post-injection and analyzed for α-tocopherol, total vitamin A (retinol plus retinyl-palmitate), and 25-OH-D_3.

In experiment 2, newborn Holstein dairy calves (n= 4) were not injected and others (n=7) were injected S.Q. with 5 mL **VITAL E-Newborn**.Serum samples were taken 62 h post-injection and analyzed for α-tocopherol, retinol and 25-OH-D_3.

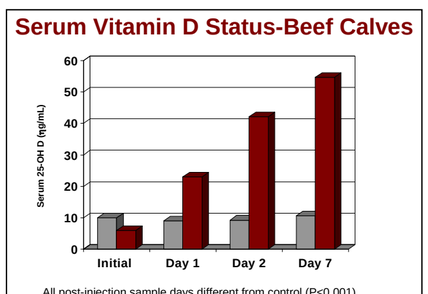
Serum was analyzed for Vitamin E and vitamin A by Veterinary Diagnostic Laboratory, Iowa State University, Ames, and for 25-OH-D y Heartland Assays, Ames, Iowa. Paired t-test was used to determine differences between treatments.

Results-Beef Calves

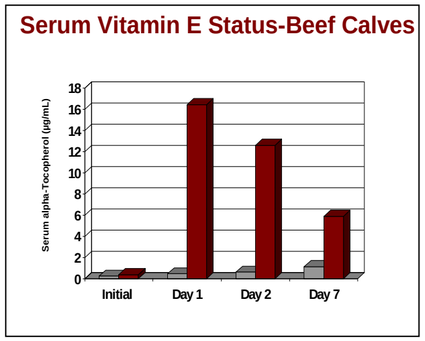


All post-injection sample days different from control (P<0.01)

All treated calves were injected S.Q. with **5 mL VITAL E-Newborn** to supply each calf:
2,500 I.U. vitamin E
(d-α-tocopherol)
250,000 I.U. vitamin A
(retinyl palmitate)
250,000 I.U. vitamin D
(cholecalciferol)

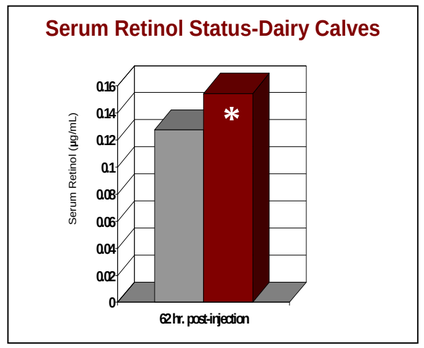


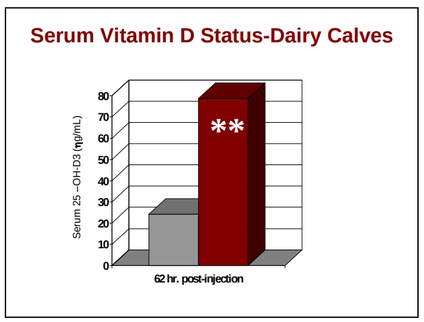
All post-injection sample days different from control (P<0.001)

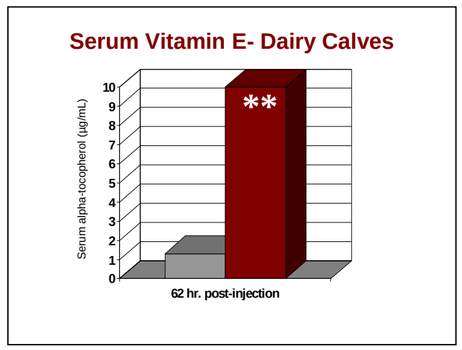


All post-injection sample days different from control (P<0.001)

Results-Dairy Calves







Discussion

- **Beef and dairy calves responded similarly to the injection.**
- **Increase in vitamin A status was mainly due to increase in retinyl palmitate levels. Retinol did not increase significantly.**
- **Vitamin D status continued to increase 7-days post injection in beef calves.**
- **Vitamin E status was highest 24 hours post-injection in beef calves.**

Conclusion

- **Injecting newborn calves with a bioavailable source of fat-soluble vitamins is an excellent method to assure that newborn beef and dairy calves have adequate levels of these critically important vitamins after birth.**

Literature Cited

Hidiroglou, M. et al. 1973. Changes in plasma and milk tocopherol levels in beef cattle turned out to pasture. Anim. Production 16: 179-183

Krueger, L. et al. 2014. Effects of d-alpha-tocopherol and energy on growth and health of preruminant dairy calves. J. Dairy Sci. 97:3715-3727.

Radostits, O. et. al. 1991. Fatal Non-Responsive Diarrhea in Beef Calves 6 to 8 Weeks of Age. Proc. Am. Assoc. Bovine. Prac. p 101-109.

Waldner, C. 2007. Weak calf syndrome. Alberta Beef Producers. 07-034.