

## SUBCUTANEOUS VERSUS INTRAMUSCULAR ADMINISTRATION OF VITAMIN E IN FEEDLOT CALVES

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**ABSTRACT:** Fifty Holstein steer calves (121 kg) were used in a completely random design experiment to evaluate the influence of subcutaneous (**SQ**) versus intramuscular (**IM**) injection of vitamin E on plasma tocopherol concentrations during the initial 16 d following their arrival into the feedlot. Ten steers served as controls, receiving no vitamin E injections. The remaining 40 steers (20 steers/treatment) were injected either IM or SQ with 1,500 IU of vitamin E (5 mL of Vital E™, Schering Plough, Kenilworth, NJ). Vitamin E treatments were administered on d 1 and 8. Blood samples were obtained via jugular puncture on d 1 (before application of vitamin E treatments), 4, 8 (before application of vitamin E treatments), 12, and 16. Steers were fed a 72% concentrate steam-flaked corn-based receiving diet containing 18% alfalfa hay. Plasma tocopherol concentrations of control steers remained low throughout the 16-d period, averaging .06, .06, .06, .11, and .10 mg/dL for d 1, 4, 8, 12, and 16, respectively. Vitamin E injection increased ( $P < .01$ ) plasma tocopherol concentrations. However, plasma tocopherol concentrations were not different ( $P > .20$ ) for IM and SQ routes of administration, averaging .08, .41, .28, .56, and .37 mg/dL for d 1, 4, 8, 12, and 16, respectively. Injection site inflammation was noted in 15% of steers receiving IM injections and 20% of steers receiving SQ injections. Nonetheless, plasma tocopherol concentrations were not affected ( $P > .20$ ) by the presence or absence of injection site inflammation, averaging .38 and .41 mg/dL, respectively. We conclude that SQ administration is a practical alternative to the traditional IM route of administration of injectable vitamin E for feedlot cattle.

Key Words: Tocopherol, Cattle, Plasma

### Introduction

Traditionally, vitamin E is administered via intramuscular (**IM**) injection. It has been maintained that subcutaneous (**SQ**) administration of vitamin E result in too slow of uptake to appreciably increase plasma and tissue tocopherol concentrations (Judson et al., 1991). However, direct comparisons between IM and SQ routes of administration have not been conducted. Thus, there is no conclusive experimental basis for this recommendation. With increased interest in reduction of injection-site belmishes, the current trend is apply as many of the injection treatments as possible SQ. The objective of this trial was to compare IM vs SQ routes of vitamin E administration on plasma tocopherol concentrations.

### Material and Methods

Fifty Holstein steer calves (121 kg) were used to evaluate the influence of SQ versus IM injection of vitamin E on plasma tocopherol concentrations during the initial 16 d following their arrival into the feedlot. Calves were purchased as steers (previously castrated via elastration). They originated from Chino, California and were shipped to the University of California Desert Research Center on November 7, 1990. Processing of calves upon arrival was as given in Zinn et al (1996). Ten steers served as controls, receiving no vitamin E injections. The remaining 40 steers (20 steers/treatment) were injected either IM or SQ with 1,500 IU of vitamin E (5 mL of Vital E™, Schering Plough, Kenilworth, NJ). Vitamin E treatments were administered on d 1 and 8. Blood samples were obtained via jugular puncture on d 1 (before application of vitamin E treatments), 4, 8 (before application of vitamin E treatments), 12, and 16. Steers were fed a 72% concentrate steam-flaked corn-based receiving diet containing 22 mg/kg vitamin E (Zinn et al., 1996). This trial was analyzed as a completely random experiment (Hicks, 1973).

### Results and Discussion

Plasma tocopherol concentrations of control steers remained low throughout the 16-d period, averaging .06, .06, .06, .11, and .10 mg/dL for d 1, 4, 8, 12, and 16, respectively (Table 1). As expected (Batra et al., 1995) Vitamin E injection increased ( $P < .01$ ) plasma tocopherol concentrations. Although, plasma tocopherol concentrations were not different ( $P > .20$ ) for IM and SQ routes of administration,

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averaging .08, .41, .28, .56, and .37 mg/dL for d 1, 4, 8, 12, and 16, respectively. The similarities in plasma tocopherol between IM and SQ suggest that the rates of uptake or mobilization are similar. This contrasts with Judson et al. (1991) who did observe significant increases in plasma tocopherol following SQ administration.

Route of administration did not influence ( $P > .20$ ) the percentage of injection site inflammations, averaging 17.5%. Furthermore, plasma tocopherol concentrations were not affected ( $P > .20$ ) by the presence or absence of injection site inflammation, averaging .38 and .41 mg/dL, respectively.

### Implications

Subcutaneous administration is a practical alternative to the traditional intramuscular of administration of injectable vitamin E for feedlot cattle.

### Literature Cited

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Item	Treatment <sup>a</sup>			SD
	Control	SQ	IM	
d 1	.062	.082	.072	.030
d 4 <sup>b</sup>	.063	.401	.421	.262
d 8 <sup>b</sup>	.062	.275	.273	.108
d 12 <sup>b</sup>	.107	.523	.614	.291
d 16 <sup>b</sup>	.105	.376	.360	.127

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Table 1. Influence of subcutaneous versus intramuscular administration of vitamin E on plasma tocopherol concentrations (mg/dL) in feedlot calves.

<sup>a</sup>SQ = subcutaneous injection; IM = Intramuscular injection.

<sup>b</sup>Treatment effect,  $P < .01$ .

