EFFECT OF LAIDLOMYCIN PROPIONATE ON THE FATTY ACID COMPOSITION OF BEEF RIBEYE STEAKS

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Story in Brief

Differences in the fatty acid composition of beef ribeye steaks were assessed as a function of ionophore incorporation into a high concentrate diet. Ribeye steaks were obtained from crossbred steers that had been fed a high concentrate diet for 111 d with or without the addition of the ionophore, laidlomycin propionate. Laidlomycin propionate addition decreased saturated fatty acid concentration in the intramuscular lipid thereby lowering the hypercholesterolemic to hypocholesterolemic fatty acid ratio. These results indicate that the addition of laidlomycin propionate to a high concentrate diet may allow cattle producers the opportunity to provide consumers with a beef product lower in saturated fat.

(Key Words: Beef, Ionophore, Fatty acids)

Introduction

Ionophores are routinely incorporated into high concentrate feedlot diets where they enhance feed efficiency; even though, no information is available as to how ionophores may alter nutrient composition in feedlot cattle. Previous studies (Marmer et al., 1985; Gilka et al., 1989) indicate that ionophores reduce the saturated fatty acid and increase the odd chain fatty acid content of intramuscular fat of both steers and lambs when supplemented to forage-type diets. Since ruminal bacterial populations vary depending on type of diet (i.e. high concentrate vs. forage), this study was designed to evaluate the effects of an ionophore, laidlomycin propionate, on the fatty acid composition of steers fed a high concentrate diet.

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Materials and Methods

One hundred forty Angus x Hereford steers were fed as described by Van Koevering et al. (1991). Seventy ribeye steaks were selected from the control (basal diet) and laidlomycin propionate (10g/ton) treatments after aging for 10 d at 33°F. Laidlomycin propionate is still under investigation by the FDA and thus is not yet available for the commercial producer. After trimming of all exterior fat and epimysial connective tissue, the longissimus muscle was pulverized in liquid nitrogen and stored at -4°F until subsequent analyses. After solvent extraction, fatty acid methyl esters were separated by gas-liquid chromatography (Duckett et al., 1993). Total lipid and cholesterol content have been previously reported (Duckett et al., 1992). Data were analyzed using the GLM procedure of SAS with the error term being treatment by replication.

Results

Overall, laidlomycin propionate incorporation to a high concentrate diet did not markedly alter ($P > .05$) the fatty acid composition (Table 1) of ribeye steaks. However, several tendencies ($P < .10$) existed for minor differences in fatty acid content of these rib steaks. The polyunsaturated fatty acids, mead (C20:3) and clupanodonic (C22:5) acids, were increased in concentration due to laidlomycin propionate addition. Also, laidlomycin propionate reduced the concentration of the myristic (C14:0) acid and the total saturated fatty acid content. Together these changes resulted in a 3% reduction in the hypercholesterolemic (plasma cholesterol elevating) to hypocholesterolemic (plasma cholesterol lowering) fatty acid ratio.

These changes in fatty acid composition are consistent with laidlomycin propionate incorporation into a high concentrate diet suppressing ruminal biohydrogenation and allowing for the passage of more unsaturated fatty acids to the small intestine; similar to the findings of Marmer et al. (1985) and Gilka et al. (1989). In contrast, laidlomyin propionate did not affect the odd chain (C15:0, C17:0) fatty acid concentrations. Marmer et al. (1985) and Gilka et al. (1988) both reported increased concentrations of the odd chain fatty acids due to monensin supplementation. This discrepancy is presumably due to either the differences in the type of diets to which the ionophores were added or differences in the action of each individual ionophore. Gaylean et al. (1992) reported that laidlomycin propionate addition to a high concentrate diet does not increase ruminal propionic acid production, and thus, odd chain fatty acid synthesis should not be affected.

Combining the fatty acid composition data with the total lipid content reported previously (Duckett et al., 1992) revealed a .3 g reduction (2.66 vs 2.36g; $P = .12$) in the saturated fat content per 3 oz serving due to laidlomycin

Table 1. Percent of each fatty acid in the total lipid.

Fatty acid, %	Control	Laidlomycin Propionate	SEM
C14:0	3.14[a]	2.98[b]	.06
C14:1	.65	.64	.04
C15:0	.55	.52	.01
C16:0	26.19	25.81	.19
C16:1	3.75	3.54	.10
C17:0	1.63	1.56	.04
C17:1	1.21	1.18	.05
C18:0	13.34	13.26	.11
C18:1	42.59	42.98	.29
C18:2	4.47	4.89	.40
C18:3	.13	.11	.01
C20:3	.35[b]	.40[a]	.01
C20:4	1.29	1.46	.07
C22:5	.13[b]	.16[a]	.01
C22:6	.18	.20	.01
U	.35	.23	.06
Saturated fatty acids	44.85[a]	44.13[b]	.24
Monounsaturated fatty acids	48.20	48.34	.41
Polyunsaturated fatty acids	6.58	7.24	.46
Ratio[c]	.544[a]	.527[b]	.006

[ab] Means with uncommon superscripts in the same row differ (P<.10).
[c] Ratio of hypercholesterolemic to hypocholesterolemic fatty acids=(C14:0+C16:0)/(Monounsaturated + Polyunsaturated fatty acids).

propionate addition. Thus, the addition of laidlomycin propionate to a feedlot diet may allow cattle producers the opportunity to provide consumers with a beef product lower in saturated fat.

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