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Lipid Sources in Finishing Diets for Yearling Steers

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Introduction

Results of a yearling finishing trial with supplements of soybean oil refining byproduct and pork fat (white grease) were presented in the 1995 Nebraska Beef Report, pp. 22-24. The two sources of lipid were equally effective at improving daily gain and feed efficiency for a corn-based diet with corn silage as the source of roughage. Sources of fat are often added to finishing diets to increase energy density and improve feed efficiency. However, animal fats are difficult to handle, especially during cold weather, and storage tanks, piping and pumps must be heated so the fats can be handled as a liquid. Because of the equipment investment needed to handle animal fats, large quantities need to be fed to justify the cost. As a consequence, most animal fats are fed in large commercial feedlots. Oilseed lipids have an advantage, as they stay in a liquid state during cold weather, blending easier with liquid molasses based protein supplements. This advantage allows cattle feeders to increase energy density of diets by using oilseed lipids more conveniently with less expensive equipment.

A second finishing trial was initiated to study similar additions of Synergy liquid supplement or pork fat and lecithin, a plant phospholipid, to a corn-based diet with alfalfa hay as the source of roughage. The objective was to determine effects of these lipids on daily gain, feed efficiency and carcass characteristics in finishing yearling steers.

Procedure

For this trial, 216 crossbred steers weighing approximately 850 lb were purchased from one source. The steers had been fed together for the previous 120 days and were uniform in condition. The steers were randomly assigned to 18 pens and the pens randomly assigned (blocked within location) to six treatments. The supplemental treatments were additions of lipids to supply 1.12 or 2.24% lipid in diet dry matter as follows:

- 1) Control - dry protein supplement (58% crude protein).
- 2) Combination of control and Synergy supplements to supply 1.12% soy lipid from Synergy.
- 3) Control supplement plus 1.12% pork fat.
- 4) Control supplement and Synergy to supply 1.12% soy lipid

Daily gain may be slightly improved when a corn-based finishing diet is supplemented with 1.12% lipid from Synergy, a processed soybean oil refining byproduct or from pork fat.

Summary

Adding Synergy² to a corn-based finishing diet to provide 1.12% lipid did not significantly increase steer performance in this trial or in pooled results between this trial and one reported in 1995. However, numerical increases were observed in daily gain and feed dry matter intake for Synergy when compared to control values. Pooled results for additions of pork fat (white grease) to provide 1.12 or 2.24% lipid were intermediate to those for the control and Synergy treatments. Any performance benefit attributed to Synergy may be as much from its effect on dry matter intake as it is from nutrient addition.

Table 1. Composition of finishing diets and calculated nutrient contents.

Treatments	Control	Synergy ^a 19/14	Control +1.12% Pork fat	Synergy +1.12% Pork fat	Control +2.24% Pork fat	Control +1.12% Lecithin +1.12% Pork fat
Ingredients, % of DM						
Corn	83.3	78.7	81.9	77.5	80.6	80.7
Alfalfa hay	10.0	10.0	10.0	10.0	10.0	10.0
Beef finisher 58%	6.7	4.2	6.9	4.4	6.7	7.1
Synergy 19/14		5.9		5.9		
Rumensin supplement		1.1		1.1		
Pork fat			1.12	1.12	2.24	1.12
Non-medicated supp 40%					0.5	
Lecithin						1.12
Calculated contents, % of DM						
Dry matter	86.8	84.6	87.0	84.7	87.1	87.2
Crude protein	13	13	13	13	13	13
Fat	3.9	5.0	5.0	6.1	6.0	5.7
Calcium	.83	.74	.85	.74	.87	.86
Phosphorus	.34	.38	.34	.37	.34	.34
Roughage	10	10	10	10	10	10
Rumensin, g/ton	30	30	30	30	30	30

^aSynergy 19/14 is a patented processed product of Cargill, Inc., from soybean oil refining byproduct supplying 19% crude protein and 14% fat.

Table 2. Average chemical analysis of diets from bunk samples.

Treatments	Control	Synergy ^a 19/14	Control +1.12% Pork fat	Synergy +1.12% Pork fat	Control +2.24% Pork fat	Control +1.12% Lecithin +1.12% Pork fat
Composition, % of DM						
Dry matter	85.60	84.14	86.29	84.25	86.79	86.89
Crude protein	13.87	14.13	13.37	14.10	13.82	13.93
Crude fat	3.09	4.33	4.00	4.99	5.43	5.29
Acid detergent fiber	8.13	7.61	7.75	7.48	8.70	7.75
Calcium	0.89	0.86	0.90	0.81	0.87	0.87
Phosphorus	0.36	0.38	0.36	0.38	0.36	0.39

^aSynergy 19/14 is a patented processed product of Cargill, Inc., from soybean oil refining byproduct supplying 19% crude protein and 14% fat.

- plus 1.12% pork fat.
- 5) Control supplement plus 2.24% pork fat.
- 6) Control supplement plus 1.12% pork fat and 1.12% lecithin.

Upon arrival, cattle were processed with routine vaccinations, pouring for external parasites and implanting with Synovex S. The average of two weights on consecutive days was used as the initial weight. Individual weights were taken both after 56 days on feed and at the end of the trial. All weights were taken in the early morning before feeding. The live weights of the cattle taken prior to slaughter were used to calculate dressing percentage; however, the final finished weight was based on carcass weight divided by a common dressing

percentage (.625).

Final finishing diets (shown in Table 1) contained Rumensin (30 g/ton of ration DM) and Tylan (9 g/ton of ration DM). Major minerals and protein levels were constant for all rations. The cattle were started on rations containing 50% roughage and were stepped up by decreasing roughage at 10% increments through three step-up rations at approximately 6-day intervals. The laboratory analysis of bunk samples averaged over the feeding period is shown in Table 2.

The cattle were slaughtered after 126 days on feed and liver abscess data and hot carcass weights were collected. After a 48 hour chill, the carcasses were evaluated for marbling, maturity, rib eye area, fat cover over the rib eye and

percentage of kidney, heart and pelvic fat. Statistical analyses were conducted utilizing SAS-GLM procedure. The model statement included initial weight (as a covariate), treatment, replication and treatment by replication interaction. Treatment by replication interaction was used as the error term to test for treatment differences.

Four treatments were common between this trial and a similar one reported in the 1995 Nebraska Beef Report. These treatments were: control; Synergy to provide 1.12% lipid; pork fat to provide 1.12% lipid; and pork fat to provide 2.24% lipid. Diet energy levels, cattle types and days on feed were similar. Results were pooled for statistical analysis.

(Continued on next page)

Table 3. Cattle performance and carcass characteristics with two levels of lipids and one level of lecithin.

Treatments	Control	Synergy ^a 19/14	Control +1.12% Pork fat	Synergy +1.12% Pork fat	Control +2.24% Pork fat	Control +1.12% Lecithin +1.12% Pork fat	P Value
No. Cattle	36	36	36	36	35	36	
Pens/Treatments	3	3	3	3	3	3	
Performance							
Initial wt, lb (June 7)	852	855	852	844	863	865	CoVAR
Final wt, lb (Oct. 11) ^b	1260	1279	1267	1268	1277	1270	.58
126 day ADG, lb ^b	3.24	3.36	3.30	3.37	3.26	3.22	.58
Feed DM intake, lb	22.8	24.0	23.0	23.2	22.6	23.0	.57
Feed/gain ratio	7.05	7.15	6.98	6.94	6.94	7.16	.75
Carcass Characteristics							
Hot carcass wt, lb	788	800	792	793	798	794	.58
Dressing % ^c	62.8	63.2	63.0	63.2	63.2	63.1	.91
Fat cover, in	.52	.49	.54	.47	.50	.51	.86
Quality grade ^d	18.5	18.4	18.1	18.4	18.0	18.1	.48
Marbling ^e	5.21	5.19	5.08	5.31	5.06	5.09	.81
% Choice or above	68.6	66.7	54.3	62.9	60.6	55.9	
Rib eye area, sq in	12.7	12.8	12.6	13.1	13.1	12.3	.039
Yield grade ^f	3.27	3.33	3.42	3.25	3.26	3.33	.45
% Condemned livers	17.1	16.7	8.3	8.6	5.7	11.4	

^aSynergy 19/14 is a patented processed product by Cargill, Inc., from soybean oil refining byproduct supplying 19% crude protein and 14% fat.

^bFinal live weight adjusted by dividing carcass weight by .625, a common dressing percentage.

^cDressing percent = hot carcass weight ÷ full live weight x .96

^dLow Choice = 18, Ave. Choice = 19

^eSmall degree of marbling = 5, Modest = 6

^fYield grade evaluated by federal grader

Results

Supplemental treatments did not significantly effect daily gain, feed efficiency or carcass characteristics (Table 3). There was a trend for cattle supplemented with Synergy to consume slightly more feed and gain slightly more. Feed efficiency did not appear to be different among the treatments. Ration quality (absence of dust or fines) appeared to be higher for the rations containing Synergy and lowest for the control ration. When lecithin was added at 1.12% of the ration DM along with 1.12% pork fat, dry matter intake and steer performance were similar to those observed in the control steers.

Carcass dressing percent, fat cover, marbling, quality grade and yield grade were not affected by treatments. Percentage of condemned livers was not increased by lipid treatments over the control.

Four steers were removed from the overall analysis. One steer died unrelated to the treatment. Two other steers were more than two standard deviations below the average for daily gain and another steer experienced health

Table 4. Pooled results for two finishing trials with Synergy and pork fat supplements.

	Control	Synergy 1.12% lipid	Pork fat 1.12% lipid	Pork fat 2.24% lipid	P Value
No. of pens	6	6	6	6	
No. of steers	71	71	71	71	
Initial wt, lb	822	823	821	825	
Final wt, lb ^a	1240	1264	1255	1255	.35
Daily gain, lb ^a	3.33	3.52	3.46	3.42	.35
Feed DM intake, lb	23.6	24.6	24.1	23.8	.47
Feed/gain ratio	6.30	6.32	6.24	6.28	.63

^aFinal live weight and daily gain calculated by dividing hot carcass weight by a common dressing percentage (62.5).

problems and had sub-standard gains. As a consequence, one steer was removed from the control treatment, one from Synergy plus 1.12% pork fat treatment, one from control plus 2.24% pork fat treatment and one from the 1.12% pork fat plus 1.12% lecithin treatment.

Pooled results for the four treatments common between this trial and the similar 1995 trial are presented in Table 4. Non-significant increases in daily gain and feed dry matter intake are shown for Synergy over the control values. The 1.12% lipid addition to the diet from Synergy may not affect performance as much as it affects dry matter intake. The easy-flowing Synergy liquid

supplement appeared to improve ration quality by reducing fines or dust, which could be the reason for any increased feed intake. These results suggest lipid from soybean oil refining byproduct is as effective as pork fat (white grease) for supporting performance of finishing steers.

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²Synergy 19/14 supplement is a patented product of Cargill Molasses Liquid Products Division, Elk River, MN, and supplies 19% crude protein and 14% lipid from processed soybean oil refining byproduct.