FATS AND PROTEINS RESEARCH FOUNDATION, INC.

Director's Digest

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ADDED FAT DIETS PROVIDE THE GREATEST RETURN PER HEAD

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COMMENT: This is a review of a paper published in Kansas State's "1991 Cattle Feeder's Day Report" by Sarah Muirhead of Feedstuffs. Appeared in August 5th, 1991 edition of Feedstuffs.
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The purpose of this study was to evaluate the effects of feeding three graded levels of crude protein - 11.8 , 12.8 and 13.8% without fat or with 4% added fat on the feedlot performance and carcass characteristics of rapidly growing beef calves.

For the study 240 large-framed English-Continential crossbread calves with an average initial weight of 643 lbs. were received in late November of 1989. The calves were provided access to water and bromegrass hay. They were then processed and implanted at arrival and again on day 84.

The diet step-ups given to the calves are shown in Table 1. After the 20-day receiving period, all cattle were individually weighed over a two-day period. They were then allotted to pens and treatments.

Treatments used were:(1) **LPNF**, 11.8% crude protein with no added fat;(2) **MPNF**, 12.8% crude protein, no fat;(3) **HPNF** 13.8% crude protein, no fat;(4)**LPAF**, 11.8% crude protein, with added fat;(5) **MPAF** , 12.8% crude protein , added fat;

(6) **HPAF**, 13.8% crude protein, added fat.

To provide the supplemental fat to the diets, yellow grease was added at 4% on a dry matter basis. Corn gluten meal and blood meal were used to adjust dietary protein levels. Table 2 provides the nutrient analysis of treatment rations. After the receiving period during which time they received decoquinate, the calves were adjusted to monensin over a 28-day period.

The researchers reported finding that dry matter intake was not affected by protein or fat levels. For the 168-day feeding period, overall dry matter intake was 17.8 lb. (Table 3).

A trend for decreased intake, the researchers said, was noted for calves consuming the added fat diets. As energy density increases, they said, intake will drop somewhat. Within a fat level, they said, dry matter intake appeared to increase with increasing levels of protein. They explained that intake generally responds positively with increasing percentage of protein in the diet.

Average daily gain was also not found to be affected by treatments. The researchers reported that average daily gain was increased linearly up to 132 days on feed (Figure 1). The protein level, they said, marginally affected average daily gain during period 3 (day 84-132).

The researchers said this suggests that as these calves were maturing or with more days on feed, their protein requirement for growth was probably being met as a result of increased intakes. They also said that a crude protein content of 12.8% with added fat for the entire 168-day feeding period seems sufficient to maintain acceptable performance. For the entire feeding period, average daily gain was approximately 3.73 lb. daily.

During the first period (day 0-41), the researchers said protein level effects on feed conversion did not act independently of the fat addition (Figure 2). They said steers not receiving added fat, converted less feed to live weight gain than steers receiving added fat. As protein level increased, they said steers receiving no added fat became more efficient in a linear manner. Steers receiving added fats, however, responded to increasing protein levels in a curvilinear fashion.

Feed conversion was improved by added fat by 3.2% and 3.8% after 132 and 168 days on feed, respectively (Figure 3). The researchers said the added fat did not seem to alter these calves' protein requirements, because no protein level by fat interaction was observed for cumulative feedlot performance.

In terms of carcass characteristics, the reasearchers found the treatments

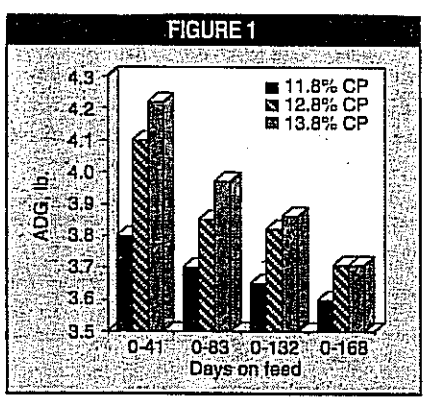
not to have affected hot carcass weight. They noted, however, that diets containing the added fat appeared to have a more consistent response of increasing HCW compared with no fat addition. The dressing percentage was increased 0.9 percentage units by the added fat. As the protein level increased, so did dressing percentage in a linear manner.

The added fat, the researchers said, resulted in a 2.9% increase in rib-eye area. A protein level quadratic response for rib-eye area was observed; 13.9 for LP, 14.5 for MP and 14.0 in. for HP. In this study the researchers said MP provided the largest REA compared with LP and HP. They pointed out that it is possible that the additional 1% crude protein in the HP diets was being converted to energy rather than directed toward lean deposition.

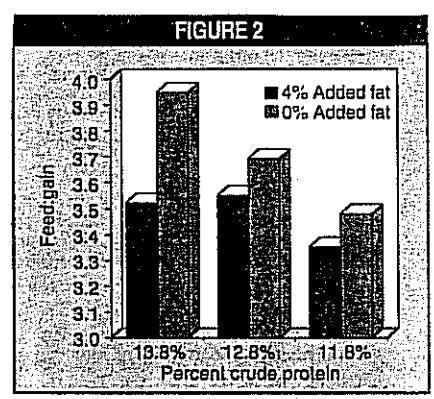
A protein level by fat addition interaction was found to be evident for adjusted back thickness (Figure 4). Within the NF group, adjusted back thickness peaked at MP then declined. In the AF group, the researchers said, the opposite was true.

From an economic standpoint, the researchers determined upon first examination of the treatments cost per gain that it was more cost effective not to include the added fat. However, they said improved feed conversion and increased carcass weights for the added fat treatment groups provided the greatest return per head (Figure 5).

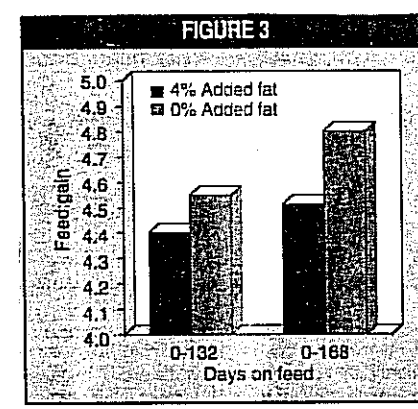
The researchers concluded that the protein requirements of large-framed English-Continental crossbred calves was not affected by the inclusion of added fat as yellow grease in their finishing diets. However, when a 13.8% crude protein diet with 4% added fat on a dry matter basis, the greatest net return per steer was found compared with other protein-added fat combinations.



Main effect of protein levels on cumulative average daily gain during finishing period. Linear increase (P<0.06) with increasing protein level from day 0-132.

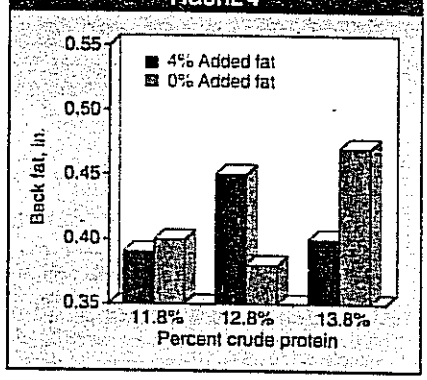


Feed conversion for day 0-41. Protein level by added fat interaction (P<0.07) was evident.



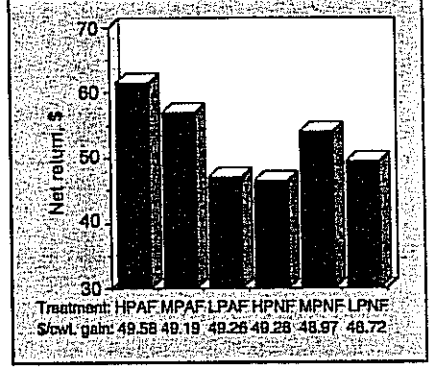
Main effect of fat on feed conversion from days 0-132 and 0-168 (P<0.05). Within a feeding period, means are different.

FIGURE 4



Protein level by added fat interaction (P<0.006). Means differ with unlike superscripts.

FIGURE 5



Cost per hundredweight of gain and net return by treatments. The intersection of a treatment and cost per hundredweight of gain will give the net return per head in that treatment.

TABLES

1. Percent composition of step-up period, finishing diets, as-fed basis

	Step-Up				No added fat			Added fat		
Ingredient	1	2	3	4	LPNF	MPNF	HPNF	LPAF	MPAF	HPAF
Corn										
Dry-rolled	45	51	59	65						
Steam-flaked					56.2	55.3	54.4	53.4	52.5	51.6
Alfalfa hay	33	22	11	4						
Corn silage	15	18	20	20	21.8	21.8	21.9	21.9	22.0	22.0
Molasses	5	5	5	5						
Yellow grease	1	1	1	1				2.9	2.9	2.9
Supplement										
Step-up	1	3	4	5						
Finisher*					5.14	5.14	5.15	5.17	5.18	5.18
Corn gluten meal						0.69	1.38	0.56	1.25	1.95
Blood meal						0.46	0.91		0.46	0.92

Step-up period was 20 days.
Finishing period was 168 days, from Nov. 29 to May 16,1990.
*Finisher supplement provided 0.75% urea in all treatments.

2. Nutrient composition (%) of finisher treatment diets, dry matter basis

	No added fat			Added fat		
Nutrient	LPNF	MPNF	HPNF	LPAF	MPAF	HPAF
Dry matter	70.5	68.6	68.9	69.6	69.5	69.8
Crude protein	11.8	12.8	13.8	11.8	12.8	13.8
Acid detergent fiber	4.04	7.13	6.50	7.20	7.07	6.90
Total digestible nutrients	87.6	86.8	87.5	86.7	86.9	87.1
Net energy main., Mcal/cwt.	95.9	95.6	95.4	101.7	101.4	101.1
Net energy gain, Mcal/cwt.	64.0	63.8	63.6	68.2	68.0	67.8
NEg to protein, Mcal/CP	5.42	4.98	4.61	5.78	5.31	4.91
Calcium	0.51	0.67	0.51	0.54	0.52	0.59
Phosphorus	0.25	0.25	0.27	0.25	0.26	0.25
Magnesium	0.10	0.11	0.11	0.10	0.11	0.11
Potassium	0.66	0.75	0.67	0.67	0.67	0.71

Monensin and tylosin were fed at 15 and 10 g per ton, respectively, for 2 weeks, then monensin was increased to 30 g per ton.

3. Effect of protein and fat on feedlot performance and carcass characteristics of large-framed, finishing, beef steer calves

	No added fat			Added fat		
Item	LPNF	MPNF	HPNF	LPAF	MPAF	HPAF
Feedlot performance						
No. of pens	5	5	5	5	5	5
No. of steers	40	40	40	40	40	40
Initial wt., lb.	646	645	641	642	640	641
Final wt., lb.	1,259	1,264	1,259	1,248	1,260	1,261
Adj. final wWt., lb.[a]	1,195	1,217	1,204	1,200	1,233	1,241
Dry matter intake, lb.	17.8	17.9	17.9	17.0	17.7	17.8
Daily gain, lb.	3.65	3.69	3.68	3.61	3.81	3.81
Feed conversion[b]	4.88	4.87	4.87	4.72	4.65	4.67
Carcass characteristics						
Hot carcass wt., lb.	782	797	788	785	807	812
Dressing percent[cd]	64.7	65.6	65.2	65.5	65.7	66.0
Rib-eye area, in.[2ef]	13.7	14.2	13.9	14.0	14.7	14.0
Kidney-pelvic-heart fat, %[e]	2.1	2.3	2.3	2.4	2.5	2.5
Marbling score	5.1	5.1	4.8	4.9	4.9	4.9
Quality grade	Ch[10]	Ch[10]	Si[00]	Si[90]	Si[90]	Si[90]
Yield grade	2.5	2.6	2.5	2.6	2.4	2.8
Retail yield, %	50.9	50.8	50.9	50.8	51.3	50.2

[a]Adjusted with an average DP of 65.46%; adj. final wt = HCW/0.6546.
[b]Main effect of fat level, P<0.052.
[c]Main effect of fat, P<0.004.
[d]Linear effect of protein, P<0.03.
[e]Main effect of fat, P<0.0001.
[f]Quadratic effect of protein, P<0.006.