

**A COMPARISON OF BARLEY DISTILLERS DRIED GRAIN,
SUNFLOWER MEAL AND SOYBEAN OIL MEAL AS
PROTEIN SUPPLEMENTS IN BACKGROUNDING RATIONS**

BY

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Introduction:

Agricultural statistics for North Dakota, (1984), show that North Dakota farmers planted approximately 2.9 million acres of barley, 2.6 million acres of sunflowers and 750,000 acres of soybeans. Sunflowers and soybeans are principally grown for their oil but the meal by-product is very valuable as a protein supplement for livestock feed. Soybean oil meal (SBOM) contains approximately 44% crude protein and sunflower oil meal (SFOM), depending upon the amount of hull that has been removed before oil extraction can contain anywhere from 28-44% crude protein, with the most common level being 34%.

The newest protein by-product, barley distillers dried grain with solubles (BDDG), comes from the distillation of ethanol from barley. Laboratory analysis of the BDDG has resulted in a crude protein value of approximately 26%.

The purpose of the investigation is to compare the capabilities of sunflower meal and barley distillers dried grain to replace soybean oil meal in backgrounding rations for calves. The economics of feeding these supplements will be documented as well.

There is no previous work with the distillers dried grain being produced in North Dakota. However, some limited work has been conducted by animal scientists at Montana State University. Moss and co-workers, (1983), used dry pelleted barley stillage in dairy cow rations and found pelleted BDDG to be equivalent to SBOM as a protein source if it replaced SBOM based on pounds of protein. When replaced on a volume or weight basis performance was lowered. Moss and Kezar, (1982), evaluated wet barley stillage in a digestion trial using sheep and when compared to an all alfalfa diet, rations containing 80% wet barley stillage had a lower TDN value and slightly higher protein digestion, which suggest that barley distillers grains may have some ruminal by-pass characteristics. These digestion trial results also suggest that the energy value of wet stillage was considerably higher than that of the alfalfa hay being used. Moss and Kezar concluded that wet stillage could be considered as a good intermediate source of both energy and protein for ruminants.

Dickinson Branch Station Research:

In the fall of 1985, weanling crossbred Charolais X (Angus X Hereford) heifer calves that ranged in weight from 480 to 560 pounds were used to compare the feeding value and economics of these supplements when fed on an equal protein basis. To better partition animal response to the supplementation the heifers were divided into lightweight, middleweight and heavyweight classes, with the weight classes serving as replicates. The supplements were fed for a period of 112 days.

To minimize variability, the starting and final weights were determined using the average of two consecutive daily weighings with interim weights taken at 28 day intervals.

Diets designed to compare the three protein supplements were formulated on a pound of protein basis to contain 12.5% crude protein and are shown in Table 1.

Results of the feeding study have been summarized for each supplement type and are shown in Tables 2, 3 and 4.

Summary:

When compared to SBOM daily gains for heifer calves supplemented with sunflower meal were the same. Daily gains for calves supplemented with barley distillers dried grain averaged .15 pounds more per day.

Average feed cost per hundredweight gain favored the heifers supplemented with sunflower meal and barley distillers dried grain resulting in \$2.86 and \$3.19 less feed cost per hundred pounds of gain respectively.

In the formulation of rations used in this study, barley distillers dried grain supplied the additional protein needed to meet the desired level of 12.5% crude protein, and replaced 7.5% of the barley grain. Since those calves receiving barley distillers dried grain posted the most rapid gains and required 1.4 pounds less feed, on an as fed basis, per pound of gain we concur with the findings of Moss and co-workers, (1982), that barley distillers dried grain provides not only protein but energy for body weight gains as well.

Net returns for each weight class of cattle for each supplement were calculated. Calves fed the BDDG product either broke even or made small net dollar returns. Calves fed sunflower meal were also profitable with the exception of the heavyweight group which had a net loss of \$17.89. Calves fed SBOM posted net losses in the middle and heavyweight groups but had a net gain of \$6.66 in the lightweight group, which was the most profitable weight class among all treatments.

These are limited data, but indications are that BDDG and SFOM are excellent substitutes for SBOM as protein supplements for beef cattle when fed on a pound of protein basis.

Table 1. Rations Formulated to Contain 12.5% Crude Protein

Ingredient	Ration % (100% Dry)		
	SBOM	BDDG	SFOM
Soybean Oil Meal (44% CP)	7.3	-0-	-0-
Sunflower Oil Meal (34% CP)	-0-	-0-	10.9
Barley Distillers Dried Grain (26% CP)	-0-	18.2	-0-
Barley	44.0	36.5	40.4
Ground Wheat Straw	14.5	14.6	14.5
Corn Silage (32% DM)	32.8	29.3	32.8
Limestone	1.4	1.4	1.4

Table 2. Weights, Gains and Economics of Heifers Supplemented with Barley Distillers Dried Grain (BDDG)

	Lot 4 Lt. Wt.	Lot 9 Md. Wt.	Lot 3 Hvy. Wt.
No. Head	5	5	5
Days Fed	112	112	112
Initial Wt., lbs.	499	536	562
Final Wt., lbs.	769	803	860
Gain, lbs.	270	267	298
ADG, lbs.	2.42	2.39	2.66
Feeding Economics:			
Feed/hd., lbs. (As Fed)	3455	3514	3758
Feed/day, lbs. (As Fed)	30.9	31.4	33.6
Feed/lb. of gain, lbs.	12.7	13.8	12.6
Feed cost/hd., \$	118.77	121.46	129.64
Feed cost/cwt. gain, \$	43.82	45.49	43.50
Feeder calf cost/hd., \$	279.22	299.94	314.94
Feed cost/hd., \$	118.77	121.46	129.64
Gross return/hd., \$	405.17	425.54	445.21
Net gain or loss, \$	+ 7.18	+ 4.14	+ .63

**Table 3. Weights, Gains and Economics of Heifers Supplemented
with Soybean Oil Meal (SBOM)**

	Lot 6 Lt. Wt.	Lot 8 Md. Wt.	Lot 5 Hvy. Wt.
No. Head	5	5	5
Days Fed	112	112	112
Initial Wt., lbs.	488	535	563
Final Wt., lbs.	755	787	827
Gain, lbs.	267	252	264
ADG, lbs.	2.38	2.25	2.36
Feeding Economics:			
Feed/hd., lbs. (As Fed)	3519	3827	3757
Feed/day, lbs. (As Fed)	31.4	34.1	33.5
Feed/lb. of gain, lbs.	13.2	15.2	14.2
Feed cost/hd., \$	117.65	127.99	125.49
Feed cost/cwt. gain, \$	44.06	50.79	47.53
Feeder calf cost/hd., \$	273.06	299.60	315.39
Feed cost/hd., \$	117.65	127.99	125.49
Gross return/hd., \$	397.37	417.27	428.18
Net gain or loss, \$	+ 6.66	- 10.32	- 12.70

Table 4. Weights, Gains and Economics of Heifers Supplemented with Sunflower Oil Meal (SFOM)

	Lot 7 Lt. Wt.	Lot 2 Md. Wt.	Lot 10 Hvy. Wt.
No. Head	5	5	4 <u>1</u> /
Days Fed	112	112	112
Initial Wt., lbs.	500	535	562
Final Wt., lbs.	777	791	817
Gain, lbs.	277	256	255
ADG, lbs.	2.47	2.29	2.27
Feeding Economics:			
Feed/hd., lbs. (As Fed)	3661	3495	4014
Feed/day, lbs. (As Fed)	32.7	31.2	35.8
Feed/lb. of gain, lbs.	13.2	13.6	15.7
Feed cost/hd., \$	115.31	110.14	125.76
Feed cost/cwt. gain, \$	41.63	42.85	49.32
Feeder calf cost/hd., \$	279.89	299.60	314.86
Feed cost/hd., \$	115.31	110.14	125.76
Gross return/hd., \$	409.06	419.60	422.73
Net gain or loss, \$	+ 13.56	+ 9.86	- 17.89
<u>1</u> / One heifer removed with broken leg.			