

SUNFLOWER SEEDS IN RATIONS FOR BEEF CATTLE

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North Dakota is the leading state in the production of sunflowers. Two and a half million acres or more were harvested in 1981 with oil-type seeds grown on over 90 percent of the acres. The remainder of the acreage was of the confectionary types.

Previous research on seeds is not indicative of the present nutritional value of hybrid flowers with oil content of from 38 to 45 percent. Crampton *et al.* (1972) reported a value of 78 percent TDN (1.56 Mcal/lb of digestible energy) for seeds. Morrison (1956) listed a TDN value of 76 percent. The "fat" content was reported at about 25 percent in both sources so these values were either from the old open pollinated type or confectionary seeds. Kercher *et al.* (1974; 1980) reported on feeding of sunflower seeds to cattle. In one of the experiments reported the seeds probably contained less than 15 percent oil, so the results are difficult to compare to our data.

Rafalowski and Park (1982) included 0, 10, 20, and 30 percent sunflower seed in a dairy concentrate fed to 16 lactating dairy cows. These levels added 4, 8, and 12 percent oil to the concentrate. The 10 percent level of seeds significantly increased milk production and the 10 and 20 percent levels significantly increased efficiency of energy utilization for milk production.

Park *et al.* (1981) fed 10, 20, and 30 percent sunflower seeds to growing dairy heifers. There were no differences in daily gain for the treatments. However, there was a decrease in dry matter intake with each increase in oil (seeds), with an increase in efficiency of feed conversion when the seeds were added.

Sunflower seeds used in these trials had the following percentage composition: hulls, 22; oil, 41.9; protein, 18.6; calcium, 0.18; phosphorus, 0.58; acid detergent fiber, 15; and acid detergent lignin; 2.5.

In trial 1, 12 Hereford steers were allotted to two lots to evaluate the use of sunflower seeds at a level of 3 pounds per head daily, replacing rolled barley. This ra-

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TABLE 1. Sunflower Seeds For Finishing Steers (105 days) (exp. C-48)

Treatment	Control	Control + Sunflowers
Lot Number	1	2
Initial wt., lb.	595	607
Final wt., lb.	858	889
Average daily gain, lb.	2.45	2.68
Feed per pound of gain, lb.	10.59	9.86
Average Feed per day, lb. total (as fed)	25.94	26.48
Corn silage	13.15	13.30
Molasses beet pulp pellets	2.00	2.00
Alfalfa pellets	2.00	2.00
Rolled barley	8.74	6.20
Sunflower (whole)	—	3.00

tion provided 1.25 pounds of the highly unsaturated oil per head daily or about 7.5 percent of the dry matter in the diet since the flowers contained 41.9 percent oil. A second group of yearlings (Angus and Galloway) were used to measure the effect of feeding the seeds as 40 percent and rolled barley as 60 percent of the ration with the concentrate mix fed to appetite.

In a third trial, 18 heifers of Angus and Hereford breeding were allotted to three treatments to evaluate sunflower seeds as a protein supplement. The heifers initially averaged about 590 pounds. A ration was formulated which was marginal in protein. Three pounds of seeds were added to one ration, no protein added to a second ration to serve as a negative control with soybean oil meal added to the third ration to serve as a positive control.

TABLE 2. Sunflower Seed For Finishing Steers (105 Days)

Treatment	Control	Control + Sunflowers
Lot Number	1	2
Initial wt., lb.	661	62
Final wt., lb.	949	919
Average daily gain, lb.	2.74	2.54
Feed per pound of gain, lb.	10.23	10.83
Average feed per day, lb. total	28.07	27.51
Corn silage	13.50	13.50
Molasses beet pulp pellets	2.00	2.00
Alfalfa pellets	2.00	2.00
Rolled barley	10.56	6.06
Sunflower (whole)	—	4.04

The cattle were weighed every 21 days with no feed offered for 15 hours prior to weighing. Feed intakes were recorded daily. All cattle were fed to appetite twice daily. Water was available at all times.

TABLE 3. Sunflower Seeds for Growing Heifers (105 days)

Treatment Lot Number	Sunflower 1	No Protein 2	SBOM 3
Initial wt., lb.	578	589	591
Final wt., lb.	797	810	860
Average daily gain, lb.	2.09	2.11	2.55
Feed per pound gain, lb.	11.67	13.00	10.74
Average daily feed, lb. total	24.3	27.4	27.4
Corn silage	12.9	14.5	14.7
Beef pulp	5.4	5.5	5.4
Sunflower seeds	3.0	—	—
Soybean oil meal	0.5	—	1.25
Cracked corn	4.5	7.4	6.1

RESULTS AND DISCUSSION

The summary of results for trial 1 are presented in table 1. No difficulties were encountered in feeding the 3 pounds of oil seeds in the ration. The steers receiving the flowers gained 9.4 percent faster and required 6.9 percent less feed per pound of gain for the 105-day trial. Haircoats on steers receiving sunflower seed (oil) showed more bloom.

Results in trial 2 were different (table 2). There was no evidence of digestive upsets, but after 63 days on feed steers consuming the flowers ate less feed than the controls. The average daily consumption of seeds at this time was over 4 pounds per head daily, for an intake of about 1.8 pounds of oil. The remaining 42 days had a slight increase in feed intake, but the intake was not equal to that of the control group. The steers had an average consumption of 4.82 pounds of sunflower seeds for a daily intake of 2 pounds of oil during the last 21 days of the trial. The average daily intake of seeds for the 105-day trial was 4.04 pounds (1.69 pounds of oil). The steers fed flowers gained 7.8 percent less and required 5.7 percent more feed per pound of gain than did the control steers. Cook and Dinusson (unpublished data) found in digestion trials that 10 percent seeds appeared to increase digestibilities of ration dry matter and gross energy, but higher levels tended to reduce digestibilities of energy and dry matter. This could explain the lower gain and efficiency of the steers fed seeds

at the 40 percent levels. It appears that a daily intake of about 1 pound of oil from seeds is the highest level that beef cattle can tolerate without upsetting the rumen flora and fauna and reducing digestibilities of fiber and energy.

Results of trial 3 were similar to the results of trial 2 and are shown in table 3. Heifers which received 3 pounds of sunflower seed (lot 1) daily never consumed as much feed (in any of the five periods-105 days) as the other two groups. Three pounds of flower seeds plus 0.5 pound of soybean oil meal per head daily should have provided adequate protein, yet the gains were no greater than in the lot where no additional protein was fed. Feed efficiency (lot 1) was slightly better than for the heifers in lot 2 (no added protein). The heifers receiving the soybean oil meal (lot 3) gained the fastest (21 percent) and required less feed per pound of gain than either of the other lots.

Kercher *et al.* (1974, 1980) made the statement, "Raw sunflower seeds should probably be considered as an energy supplement rather than a protein supplement." Their digestion studies using lambs and cattle showed digestibility of the protein in the sunflower and the nitrogen retention was much less for the protein in rations which included sunflowers than those where soybean oil meal was used as the protein source. Cook and Dinusson (1981) also found that with each increase in oil from sunflower seeds, protein digestibility in the rations decreased from 4 to 16 percent. Therefore, the high-oil seeds, even though they contain over 18 percent protein, appear to be a poor protein supplement when fed in a manner to exceed an intake of 1 pound of the oil daily.

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