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Feather Meal As A Protein Source For Range Cows

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Story in Brief

Hydrolyzed feather meal (HFM), a treated by-product of the poultry industry was compared to soybean meal as a protein source for 64 dry, pregnant beef cows grazing dormant, native range in winter. Feather meal furnished approximately one-half the protein in supplements containing 15 or 40 percent crude protein. The trial was conducted for 85 days from November 15, 1976 to February 8, 1977. Cows were group-fed in bunks and rotated among pastures at 2-week intervals. Weight gains were similar for HFM and soybean meal supplements although HFM fed cows tended to gain more than soybean meal fed cows at the 15 percent protein level and less than soybean meal fed cows at the 40 percent protein level. Some palatability problems were encountered at the highest HFM level with 2 of 16 cows in that group refusing to eat supplement. Gain differences between 40 percent and 15 percent protein levels were highly significant, indicating that protein was limiting in this study. Weight gains between HFM and soybean meal supplemented groups were similar although HFM produced a glossier hair coat than soybean meal.

Introduction

The high cost of the traditional plant proteins for cattle supplements has stimulated much research into alternative protein sources. Unfortunately years of research with NPN and other substitutes have not produced satisfactory results.

One possible source of protein for cattle feeds which has not been extensively utilized is hydrolyzed feather meal (HFM), a by-product of the poultry processing industry. Poultry feathers are approximately 80-90 percent keratin, an indigestible protein which becomes relatively well digested when treated with pressure and steam heat (hydrolyzed). The resulting product is a dark meal with excellent pelleting properties. Feather meal is widely used in poultry and swine feeds as a source of cystine. Limited research has also shown HFM to be a good replacement for plant proteins in sheep, dairy and steer supplements. If cows grazing dormant native range could utilize protein from HFM efficiently, HFM could potentially lower the cost of winter supplementation for Oklahoma producers.

The objective of this trial was to evaluate the performance of beef cows fed protein supplements in which HFM replaced approximately one-half the protein supplied by soybean meal.

Materials and Methods

Sixty-four dry, pregnant Hereford cows were randomized into four supplemental protein treatments. Supplements fed were 15 or 40 percent crude protein with either soybean meal of HFM and fed at the rate of 2 lb/head/day prorated for feeding 6 days per week. Supplement compositions are shown in Table 1. Feather meal was calculated to provide about one-half the crude protein in one 15 percent and one 40 percent protein supplement. All supplements were fed as ¼-inch pellets and fed in bunks allowing 3.7 ft of bunk space per cow. Cows grazed dormant native range grass with no hay fed during the trial which lasted from November 15, 1976 to February 8, 1977. Initial, final and 28-day intermediate weights were taken after overnight shrink without feed or water. Cows were rotated among pastures at 14-day intervals.

Ruminal fluid was sampled by stomach tube two days after termination of the study. On the day of sampling, supplements were fed to cows of each group so that all cows were sampled at approximately 1 hr after supplement was consumed.

Results and Discussion

Cow weight gains were greater ($P<.05$) for both 40 percent protein supplements than for 15 percent supplements indicating that protein was limiting during the trial (Table 2). Gains of cows fed HFM supplements were not significantly different from gains of cows fed soybean meal supplements at the 15 percent protein level although cows fed HFM at the 40 percent protein level gained less ($P<.05$) weight when compared to soybean meal at the 40 percent protein level. A possible explanation for the reduced gains by HFM supplemented cows at the 40 percent protein level could be palatability of a supplement containing 29 percent feather meal. Two cows refused to eat this

Table 1. Supplement composition (air dry basis)

	Supplements			
	15% CP	15% CP	40%	40%
Ingredients (%)	Soy	HFM	Soy	HFM
Rolled corn	53.8	62.9	- - -	22.6
Molasses		5.0	- - -	5.0
Ground alfalfa hay	15.0	15.0	5.0	15.0
Cottonseed hulls	10.0	5.0	5.0	- - -
NaH_2PO_4	2.7	2.5	2.2	2.5
Dicalcium phosphate	.8	.8	.5	.8
$NaSO_4$	.8	.7	2.0	1.8
Trace mineral mix	.05	.05	.05	.05
Hydrolyzed feather meal		8.0	- - -	29.4
Soybean meal	16.9	- - -	85.3	22.8
% crude protein, actual	13.4	15.2	41.5	34.6

Table 2. Cow weight changes and rumen ammonia levels

	Supplements			
	15% CP Soy	15% CP HFM	40% CP Soy	40% CP HFM
No. of cows	16	16	16	16
Supp, lb/day	2	2	2	2
Total wt gain, lb	1.0^{c}	17.1^{c}	61.8^{a}	38.4^{b}
Rumen ammonia, Mg/100 ml	5.0^{c}	6.0^{bc}	6.5^{b}	10.6^{a}

[a, b, c]Means in a line with the same superscript letter do not differ ($P<.05$).

supplement and were removed from the study after about two weeks. Although the 14 cows remaining on the 40 percent HFM treatment consumed all their supplement each day, weight changes within this group tended to be more variable than within the 40 percent soybean meal fed cows suggesting a more erratic intake of the HFM. The 15 percent protein supplement with HFM was readily consumed. Rakes *et al.* (1968) reported that dairy cows sometimes refused to eat when HFM was abruptly added to their concentrates although results of the present range study indicate that palatibility should not be a problem if the level of HFM is relatively low. The HFM used in this study was lower in crude protein (74 percent CP) than anticipated from book values. This resulted in the 40 percent HFM supplement being about 5 percent lower in CP than the calculated value of 40 percent. The fact that high HFM supplement contained approximately 5 percent less protein than the 40 percent supplement with soybean meal could partially explain the advantage in cow weight gain seen with the 40 percent protein soybean meal supplement.

It was noted that haircoats of HFM supplemented cows tended to be glossier than haircoats of soybean meal fed cows. This could possibly be the result of the high sulfur amino acid content of HFM.

Ruminal ammonia levels (Table 2) were higher for cows fed both 40 percent protein supplements, as expected. However, both 15 and 40 percent protein supplements with HFM produced higher ammonia levels than the respective soybean meal supplements. This was surprising since most reports show feather meal to be less soluble in rumen fluid than soybean meal. (Thomas and Beeson, 1977).

Since data from this study as well as studies with dairy cattle, lambs and steers have shown that HFM can replace a portion of plant proteins in supplements, the critical factor in determining the usefulness of HFM will be cost. The December 26, 1977 F.O.B. Kansas City price for HFM was $232.50/ton compared to $173.00/ton for soybean meal (source, Feedstuffs). These prices convert to a cost of 14.5¢/lb crude protein for HFM containing 80 percent crude protein and 19.7¢/lb for crude protein for soybean meal (44 percent). This is a savings of 26.4 percent per pound of protein in favor of HFM. This study indicated that HFM could be used to reduce supplemental protein costs for cows grazing native range without any great effect on cow weight change. Producers should, however, avoid sudden changes to supplements containing high levels of HFM since this change can result in feed refusals by some cows.

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