FATS AND PROTEINS
RESEARCH FOUNDATION, INC.
3150 DES PLAINES AVENUE • DES PLAINES, ILLINOIS 60018
(5 MINUTES FROM CHICAGO'S O'HARE AIRPORT)
TELEPHONE AREA CODE 312 827-0139

THE DIRECTOR'S DIGEST
D. M. DOTY
TECHNICAL DIRECTOR

November 15, 1968
No. 53

HYDROLYZED FEATHER MEAL IN DAIRY CATTLE RATIONS

Professor Rakes and his associates at North Carolina State University have recently reported results of some feeding trials using hydrolyzed feather meal as a protein supplement for lactating dairy cows (J. Dairy Science 51: 1701-1702, 1968). This work was supported in part by a grant from FPRF. The abstract as presented in the paper follows.

> When a 15-day prepartum adaptation period was allowed, addition of hydrolyzed feather meal to the concentrate portion of the ration at 3.5, 6.7, and 9.7% levels did not significantly alter the feed intake, milk production, or body weight of dairy cows during the first 12 wk postpartum. The abrupt addition of the same amounts to the concentrate fed dairy cows in various stages of lactation caused substantial reductions in concentrate consumption.

The results show that hydrolyzed feather meal is a very satisfactory protein supplement for dairy cattle. There is, however, a practical feeding problem when hydrolyzed feather meal is used in that a period of adaptation may be required for rations containing this supplement.

A limited number of reprints of the complete paper are available. If you wish a copy please request it from the Foundation office.

Reprinted from the JOURNAL OF DAIRY SCIENCE, Vol. 51, No. 10, Pages: 1701–1702

Hydrolyzed Feather Meal as a Protein Supplement for Lactating Dairy Cows

Abstract

When a 15-day prepartum adaptation period was allowed, addition of hydrolyzed feather meal to the concentrate portion of the ration at 3.5, 6.7, and 9.7% levels did not significantly alter the feed intake, milk production, or body weight of dairy cows during the first 12 wk postpartum. The abrupt addition of the same amounts to the concentrate fed dairy cows in various stages of lactation caused substantial reductions in concentrate consumption.

Hydrolyzed feather meal, a byproduct of the poultry processing industry, represents a potential source of protein for dairy cattle feeds. Use of this product to supply a portion of the protein needs of chicks (6), swine (1), sheep (2), and wintering calves (5) has been reported. The major difficulty encountered with hydrolyzed feather meal in ruminant rations has been associated with its relatively low palatability (5). Since lactating dairy cows generally consume larger quantities of concentrate mixtures than do other classes of livestock, this problem might be expected to severely limit use of such a product in mixtures formulated for dairy cows. However, the volume of hydrolyzed feather meal available, its high protein content (80–87% CP), and its relatively low cost per unit of protein make justifiable an investigation of its use as a protein source for dairy cows.

The objectives of our experiment were to determine the extent of feed refusal problems when different levels of hydrolyzed feather meal are added to the rations of cows accustomed to receiving soybean oil meal as the supplementary protein source; and to determine the effects of using this material as a protein supplement on the milk production and body weight changes of dairy cows during the first 12 wk of lactation.

Experimental Procedure

Trial 1. Twenty-four Holstein and four Jersey cows, with at least one completed lactation, and four Jersey first-calf heifers were used. At approximately 15 days prepartum each animal was randomly allotted to one of four treatment groups receiving the concentrate mixtures shown in Table 1.

These rations contained equal amounts of crude protein. During the prepartum period the animals were allowed to become accustomed to the different feeds. From time of calving until 12 wk postpartum, these mixtures were available on a free-choice basis during two, 2-hr periods daily. Free access to corn silage (2.2% crude protein) was allowed during a 12-hr period and to an alfalfa-grass hay (16.5% crude protein) during a 6-hr period daily. Refused feed was weighed and recorded immediately after each access period. With the exception of a 2-hr exercise period each day, the animals were restrained in tie-chain stalls. Steamed bonemeal was provided in the exercise lot, and water in the stalls.

Experimental observations made on a per cow basis were as follows: 1) concentrate mixture consumed daily, 2) daily hay consumption, 3) daily silage consumption, 4) daily 4% fat-corrected milk production as calculated from daily AM and PM milk weights and weekly fat tests determined by the Babcock method, and 5) average weekly body weight change as determined from weekly weights. The significance of differences among treatment means was determined by the analysis of variance procedures described by Snedecor (4). An additional analysis of the milk production data from the cows with previous lactations was made after making covariance adjustment of the values for the influences of first lactation 4% fat-corrected milk production and the number of previous parturitions.

Trial II. Twenty-seven lactating Holstein cows were fed Ration 1 (Table 1) ad lib. for at least 21 days. They were then randomly allotted to one of three treatment groups and fed Ration 2, 3, or 4 for three days. The method of feeding and access periods were similar to those in Trial I. The daily concentrate consumption for each cow was recorded for the seven days immediately preceding the trial and for the three days of the trial.

TABLE 1. Composition of concentrate mixtures provided to the different treatment groups.

	Ration			
	1	2	3	4
Corn no. 2, 8.7% CP	77.80	81.6	85.0	88.3
Soybean oil meal, 45.8% CP	20.2	12.9	6.3	0
Hydrolyzed feather meal, 84.8% CP	0	3.50	6.70	9.7
Dicalcium phosphate (%)	1.00	1.00	1.00	1.00
Trace-mineralized salt (%)	1.00	1.00	1.00	1.00
Vitamin A added (IU/kg)	6,615	6,615	6,615	6,615

TABLE 2. Average concentrate, hay, and silage consumption; milk production and body weight change (Trial 1).

Item	Control	Ration		
	1	2	3	4
Concentrate consumed, kg/day/cow	11.9	10.9	10.3	8.8
Hay consumed, kg/day/cow	2.8	2.7	3.0	3.1
Silage consumed, kg/day/cow	15.4	15.1	15.3	17.3
Actual milk produced, kg/day/cow	23.7	22.8	23.9	22.4
Milk fat	4.1	3.9	4.1	3.9
4% fat-corrected milk produced, kg/day/cow	23.9	22.5	24.4	22.0
Body weight change, kg/week/cow	—1.7	—1.5	—3.2	—1.8

Results and Discussion

In Trial I the level of concentrate consumption decreased with increasing levels of hydrolyzed feather meal addition. However, none of the differences was statistically significant ($P > 0.05$). Covariance adjustment of the values for the influences of first lactation 4% fat-corrected milk production and number of previous parturitions did not significantly change the magnitude or the rank of the treatment means.

In Trial II, when the change to feather meal containing concentrate mixtures was made abruptly, the depression of intake was much more drastic. The decrease in average daily concentrate consumption during the three days immediately following the change compared to that during the previous seven days was 3.2 kg (31.3%), 3.9 kg (41.2%), and 6.8 kg (70.9%) for those cows on Rations 2, 3, and 4 (Table 1), respectively.

In Trial I the amounts of silage and hay consumed by the cows receiving the 9.7% hydrolyzed feather meal concentrate mixture (Ration 4) were greater than by those in the three other groups. However, with the concentrate consumption, none of the differences between groups was significant ($P>0.05$).

No significant differences between the groups with regard to fat-corrected milk production, or body weight changes were noted.

The adaptation period in Trial I was apparently of major importance in causing the cows to consume relatively normal amounts of concentrate mixtures containing hydrolyzed feather meal. Abrupt addition of this material to commercial dairy concentrate mixtures at even the 3.5% level could be expected to be accompanied by feed refusal. Gradual addition of hydrolyzed feather meal over an extended period would seemingly minimize this problem.

A. H. RAKES, D. G. DAVENPORT, J. D. PETTYJOHN
Department of Animal Science
and
A. C. LINNERUD
Department of Experimental Statistics
North Carolina State University
Raleigh

Acknowledgments

This study was supported in part by grants from the Fats and Protein Research Foundation, Inc., Des Plaines, Illinois, and the Carolina By-Products Co., Greensboro, North Carolina.

References

(1) Combs, G. E., W. L. Alsmeyer, H. D. Wallace, and M. Koger. 1960. Enzyme supplementation of baby pig rations containing different sources of carbohydrate and protein. J. Anim. Sci., 19: 932.
(2) Jordan, R. M., and H. G. Croom. 1957. Feather meal as a source of protein for fattening lambs. J. Anim. Sci., 16: 118.
(3) Jordan, R. M., and P. S. Jordan. 1955. Comparative value of feather meal and soybean oil meal as a protein supplement for fattening lambs. J. Anim. Sci., 14: 1211.
(4) Snedecor, G. W. 1956. Statistical Methods Applied to Experiments in Agriculture and Biology. 5th ed. Iowa State University Press, Ames.
(5) Wise, M. B., and E. R. Barrick. 1963. Hydrolyzed feather meal as a source of supplemental protein for wintering calves. North Carolina State Univ., Animal Sci. Mimeo. Rept. no. 118.
(6) Wilder, O. H. M., P. C. Ostley, and B. R. Gregory. 1955. The use of chicken feather meal in feeds. Poultry Sci., 34: 518.