

The advantage for the Rambouillet ewes in total lambs was 18 percent and for their daughters a like 18 percent as compared to the one-fourth Panama ewes and their daughters, respectively.

Summary

The productive performance of 200 ewes of one-fourth Panama X three-fourths Rambouillet and high grade Rambouillet breeding has been studied over a five year period. Also included in the study were the records of 240 ewes that were added to the flock in equal numbers over a three year period. The latter group was composed of equal numbers of ewes that were raised (out of Dorset rams and the 200 original ewes) and purchased to represent the kinds of Western ewes available to Oklahoma sheepmen. The principal breeding season was in the period between May 20 and July 12, but during the last three years attempts were made to breed some of the open ewes during August or September.

The high grade Rambouillets have been more dependable for fall lambing and have produced and raised more twins, resulting in 20 percent more fall born lambs or 18 percent more total lambs than the one-fourth Panama ewes. Purchased yearling ewes produced more lambs as yearlings than one-half Dorset raised replacements produced as lambs. In their second productive year the raised one-half Dorset ewes out-produced the purchased ewes enough to almost catch up. The only group of raised one-half Dorset ewes that produced for the third time raised considerably more lambs than any other group of ewes of any age had during the trial. Thirty-eight ewes lambed at three years of age; all lambed during a 40-day period between October 15 and November 26; they produced 63 lambs and raised 58 lambs.

The replacements that have been raised and tested were the first ewe lambs in their respective years to reach a market weight of 90 pounds. Slower gaining lambs would generally be expected to be poorer producers.

Studies on the Effect of Microbial Enzyme Preparations Upon Gains and Ration Digestibility by Sheep and Cattle

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The interests of livestock feeders in the effect of added enzymes upon gains and feed utilization were stimulated when the Iowa researchers reported that a crude microbial preparation containing a high level of proteolytic enzymes increased gains of fattening cattle receiving

low-moisture corn, but had no effect when high moisture (above 14 percent water) corn was fed. Also it has been shown in a number of tests by researchers at the Washington State University that either moist heat or an enzyme preparation improved certain kinds of western barley feeds for chicks or swine. The purpose of these experiments were to study the effect of enzyme preparations in fattening and wintering rations for ruminant animals.

Sheep Trial

Procedure

Twenty lambs from western-type ewes bred to Hampshire rams were divided into two groups on the basis of weight and sex and individually-caged and fed the following ration for 52 days:

Ingredient	Percent
Cottonseed hulls	25.0
Cottonseed meal	5.0
Ground milo	59.5
Alfalfa meal	10.0
Sodium Chloride	0.5
Vitamins A & D	
Total -----	100.00

In the experimental diet (Ration 2) 0.25% of the enzyme preparation replaced 0.25% of ground milo. The enzyme preparation was produced by the Dawe's Laboratories and is sold under the trade name "Daw-enzyme." This product contained 840 units per gram of Dextrinizing Activity (Standard TAPPI Method T-643 sm-54), 116 units per gram of proteolytic activity (Pabst Brewing Co. 6/53), and 5.4 units of Gumase Activity (Pabst Brewing Co. 3/59).

Results and Discussion

The criteria of response in the sheep trial was rate of daily gain in weight and efficiency of feed utilization, and the results are shown in Table 1.

Table 1.—Effect of a Crude Microbial Enzyme Preparation Upon the Gains of Lambs.

Item	Ration 1 Basal Diet	Ration 2 Basal Plus Enzyme
Time on feed, days	52	52
Total gain, lbs.	200	189
Daily gain, lbs.	0.39	0.36
Feed efficiency, lbs.	9.2	9.2

In this experiment the enzyme preparation neither increased rate of gain nor reduced the units of feed required to produce a unit of gain. Feed consumption by all animals was excellent. The lambs were offered all they would consume of the rations when they were first placed on the experiment and continued to receive all the feed they would consume during the trial. It is of interest to note that other workers have reported similar results when sheep were fed fattening-type rations in which milo was the grain.

It is of further interest to note that other workers have found that a mixture of trace minerals stimulated gains of cattle fed fattening rations containing corn but were ineffective when milo was the grain. Perhaps the enzyme preparations contain factors other than enzymes that under certain conditions will improve certain rations. The results of the Oregon workers lends further credence to this idea. Using an artificial rumen, they obtained results supporting the idea that the action of the enzyme preparations was not due to the enzymes, *per se*. Certainly this is an important factor in interpreting results when, or if, an increase in gains results when these products are fed.

Cattle Trial

The second trial was designed to study the effect of a crude preparation containing amylolytic and proteolytic enzymes upon the digestibility of a cottonseed meal protein, which had received heat damage in processing.

Procedure

Sixteen uniform grade Hereford yearling steers weighing about 600 lbs. each were divided into 4 groups of 4 animals per group and fed their rations during respective 15-day preliminary and 10-day collection periods. Feces and urine were collected once daily and handled in the usual manner for such trials. The rations were as follows:

1. Basal
2. Basal plus enzyme
3. Basal plus heated cottonseed meal (autoclaved for 45 minutes at 15# steam pressure per square inch—psi).*
4. Basal plus heat (as in 2) plus enzyme.*

The Basal ration was composed of, in percent, of cottonseed hulls 40.0, corn starch 19.1, corn sugar 19.1, cottonseed meal 19.1, and a complete mineral mixture, 2.7. Vitamins A and D were supplied to meet the requirements of the animals.

The enzyme preparation was a commercial product by the Merck Sharp & Dohme Co. under the trade name of "Agrozyme." It contained, by the same tests reported earlier, 822 units per gram of dextrinizing

* Only the cottonseed meal was heated.

activity, 3300 units per gram of proteolytic activity and 5.6 units of gumase activity. Each animal received 1.8 grams of the enzyme preparation daily.

Results and Discussion

The results of the digestibility trial are shown in Table 2. The enzyme preparation had no effect upon ration digestibility or the retention of nitrogen when the cattle were fed a ration in which practically all the nitrogen was supplied by cottonseed meal. The enzyme preparation was also ineffective when the cottonseed meal was autoclaved for 45 minutes at 15# of steam pressure per square inch.

Table 2.—The Effect of a Crude Enzyme Preparation Upon Digestibility of Ration Components and Retention of Nitrogen by Cattle.

Rations	1 Basal Ration	2 Basal Plus Enzyme	3 Basal Plus Heat	4 Basal Plus Heat & Enzyme
Digestibility, %				
Dry Matter	65.6	68.2	67.4	65.7
Organic Matter	66.5	68.5	68.4	66.6
Crude Protein	54.9	54.4	53.3	54.5
Nitrogen-free extract	78.5	80.1	78.8	77.7
Crude fiber	36.6	41.3	40.8	37.2
Nitrogen Retained, %				
% of intake	34.4	32.5	32.6	33.4
% of Absorbed	69.2	64.9	61.0	67.5

Under the conditions of these tests, the enzyme preparation were ineffective in stimulating gains of sheep or increasing ration digestibility in cattle. As several workers have reported these products to be efficacious under certain conditions, it now becomes a challenge to find these conditions and what elements or compounds, if any, present in these crude products are responsible. As pointed out previously, there is reason to doubt that the beneficial effects obtained under other conditions are caused by the enzymes, *per se*. It remains for future research to clarify conditions under which favorable results can be expected when these crude preparations are fed. If or when this is done, these preparations might have a place in the rations of farm animals.