

Role of Vitamin E and Selenium in Sheep Reproduction

Allen D. Tillman, E. C. Nelson, B. I. Osburn
and J. E. Smith

Procedures and Results

An experiment was conducted to determine if the Oklahoma State purified diet, which contains urea as the sole nitrogen source would support reproduction in ewes. The diet contained selenium but no additional vitamin E except the small amount in corn oil, which was fed at a level of 1% of the diet. All lambs died at birth or shortly afterwards and the ewes had symptoms of muscular dystrophy, indicating a vitamin E deficient diet.

An experiment was then designed to determine the value of selenium and vitamin E in the reproduction of the ewe. Four treatments are used as follows: (1) negative control, having no added vitamin E or selenium, (2) selenium added, (3) vitamin E added, and (4) both selenium and vitamin E were added. Corn oil, from which the vitamin E had been removed, replaced regular corn oil in the diets. Ewes which were about four months of age were placed on the trial in the summer of 1967 and have been fed their assigned diets up to the present time. Breeding was initiated in October and extended over a 60-day period.

The experiment is still underway and the observations are too incomplete for further report at this time.

Publications

One article has been reported on this project.

Erlinger, L. E. 1967. Effect of a purified diet upon reproduction in ewes. Thesis for M.S. Degree. Oklahoma State University, Stillwater.

Future Work

The experiment will be continued as outlined.

Non-Protein Nitrogen Studies With Ruminants

Allen D. Tillman, J. E. McCroskey, R. J. Panciera and E. I. Williams

Procedures and Results

As protein is the most limiting nutrient in the nutrition of man, work is underway to determine means of feeding more urea to ruminant animals. This has been and continues to be an active project. During

the past year, it was discovered that purified jackbean urease, when injected subcutaneously in cattle and sheep, increased gains of these animals if urea was fed as the major nitrogen source in the diet. Antibodies to urease are developed in the bodies of the animals and these antibodies inhibit the rate of hydrolysis of urea to ammonia and carbon dioxide. Ruminal and blood plasma ammonia levels are decreased in the immunized animals as was the hydrolysis of urea decreased in the ileum, cecum and colon. Many physiological studies are underway on these animals and the results should provide more insight on the mechanism of urea utilization. Results of such studies will provide the knowledge necessary for the practical use of urea in cattle and sheep rations.

Urea can be utilized in diets containing high levels of cane molasses if the phosphorus and zinc levels are adjusted upward. The higher calcium level of cane molasses is the cause for these needs. These results have practical value in areas where cane molasses is an economical energy source.

Liquid hemicellulose, obtained by steaming and applying pressure to wood in making pressboard, was found to be a good source of carbohydrate in diets where urea was the major nitrogen source. A 1:1 mixture of liquid hemicellulose and cane molasses gave excellent gains in sheep. These results indicate that wood carbohydrates may be valuable in the feeding of ruminants and that technology should be developed so that these carbohydrate sources available for ruminant feeding at an economical price.

Chemical urease inhibitors have not been found to be of value in urea utilization. Most of these inhibit other enzymes and reduce overall feed utilization.

A study is underway having as its goal to determine the effect of "near" urea toxicity upon the subsequent reproductive performance of pregnant cows. All animals were given enough urea via drench to cause toxicity, but when severe symptoms of urea toxicity were evident, they were given acetic acid (5% v/v) to neutralize the ammonia and death was prevented. High levels of ruminal fluid and blood ammonia were obtained on all treated cows. The project is designed to determine the effects of the high blood ammonia levels upon the developing fetus and upon the subsequent ability of the cow to conceive and produce another calf. The experiment is underway and the results are incomplete at this time.

Publications

The following publications appeared last year:

- Tillman, A. D. 1967. Urea utilization by ruminant animals. *Southern Veterinarian* 3:8.
- McCartor, M. M. and A. D. Tillman. 1967. The performance of beef steers fed isonitrogenous, isomineral all-concentrate rations. *Okl. Agr. Exp. Sta. M.P.* 79:97.
- Clifford, A. J., R. D. Goodrich and A. D. Tillman 1967. Effects of supplementing ruminant all-concentrate and purified diets with vitamins of the B complex. *J. Animal Sci.* 26:400.
- Merina, Hector Z. 1967. Effect of molasses on feed utilization by sheep. Thesis for M.S. Degree. Oklahoma State University, Stillwater.
- Clifford, A. J. 1967. Urea utilization studies with ruminants. Thesis for Ph.D. Degree. Oklahoma State University, Stillwater.

Five additional papers have been prepared from results obtained during the past year and four of these have been accepted by the *Journal of Animal Science*.

Future Work

Additional practical tests to determine how to use urea under typical Oklahoma winter range conditions are underway as are basic studies on the mechanism of urea toxicity.

Development of Methods for Relating Forage Properties to Intake and Digestibility

J. E. McCroskey

Rumen fistulated steers are being used to sample grazed bermudagrass and to compare different indicators for estimating forage intake. Undigestible cellulose (determined by nylon bag technique) and lignin are the natural grass constituents being compared as indicators of forage digestibility. Chromic-oxide and polyethylene glycol are external indicators being compared in estimating fecal output. By the use of these internal and external indicators intake of grazed forage is being calculated. Chemical composition of bermudagrass at various times during the year is being related to voluntary forage intake.
