

FOR THE LADIES

Friday, May 3, 1963

6:30 p.m.—Dinner, Gillett Hotel. (Make reservations with Mrs. R. F. Cox, 421 Edgerton, Manhattan.)

Presiding—Mrs. N. V. Hudelson, Pomona, President, Kansas Cow Belles.

Saturday, May 4, 1963

9:00 a.m.—Coffee, Justin Hall (Home Economics Building)
Animal Husbandry Ladies

10:30 a.m.—Food Preparation Demonstrations, Foods and Nutrition Class in Principles of Food Demonstration, School of Home Economics, Kansas State University.

12:00 noon—Lunch, Animal Husbandry Arena.

6:30 p.m.—Block and Bridle Banquet (see general program).

*From 8-10 a.m.—Livestock will be in pens in the arena for visitors' inspection and comparison.

PROGRESS IN ANIMAL NUTRITION

D. Richardson

Not one nutrient has been created, yet tremendous progress has been made in the relatively new field of animal nutrition, primarily by scientific investigations that have more clearly defined nutrient needs and interrelationships in the animal body and more knowledge of nutrient content and availability in various feedstuffs. Contributions also have been made by improved feedstuff preparation, animal breeding, management, and disease control.

Modern systems of livestock production tend to remove animals from nature's environment and place them in man-made environment to obtain greater economic returns. This necessitates greater care in formulating rations to meet nutrient requirements.

Feed is stored nutrients. By the process of digestion, feed is broken down to its constituent nutrients such as amino acids, simple sugars, fatty acids, minerals, and vitamins, to be absorbed and used in the body. Best ration formulation is accomplished by knowing the nutrient needs of the animal, the availability of nutrients in feedstuffs and combining feedstuffs so they supply the required nutrients. Meeting the nutrient needs of animals efficiently results in greater economic returns.

A great step forward was made when it was recognized that not all diseases and health problems are caused by infectious organisms. We now know that many disease problems are brought on by nutrient deficiency and some by excessive amounts of certain nutrients. In fact, a properly fed animal may be less susceptible to infectious diseases or at least more likely to make a normal recovery.

Most of the early work with livestock rations was concerned with protein, fat, and fiber. Later, the importance of minerals was recognized. Many deficiencies were observed. Eventually, vitamins and their importance in nutrition were recognized. We now have additives that are not nutrients but exert influences that are normally classed under nutrition.

Protein

Everyone who reads this recognizes the importance of sufficient protein in an animal's ration. However, 25 to 35 years ago a tremendous amount of experimental work was done to convince livestock producers that protein concentrates were needed in swine, poultry, cattle, and sheep rations.

Once the value of protein was established, many probably fed more than was needed. It soon became apparent that the "extra protein" was supplying other nutrients such as minerals and vitamins. With increasing knowledge as to how to "balance a ration," the tendency was to reduce the amount of protein fed. That it cost more than other ingredients was a factor also. The writer feels that the tendency at present is to feed too little protein in many cases.

We recognize that protein is made up of about 24 amino acids. We know that certain amino acids must be supplied for simple-stomached animals like man, pig, and poultry. Those amino acids are the ones that cannot be synthesized in the digestive tract or body in sufficient quantity to meet the normal needs of the animal. The term "essential" amino acids has come to mean the amino acids that must be supplied in the feed. Protein supplying a good quantity of "essential" amino acids is said to have good quality.

Ruminants (cattle, sheep) are not concerned with quality of protein so long as there is sufficient in the ration. Regardless of the kind of

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protein fed, most of it will be converted to microbial protein in the paunch and then digested in the true stomach and small intestine of ruminants. It is important to recognize that there are nutrients other than protein in ingredients that supply protein. Therefore, one ingredient or supplement that supplies protein may or may not be better than another. The overall nutrient content of a supplement and what is needed must be considered before you decide which one might be best.

Oilseed meals, animal and milk by-products, and legumes are all good sources of protein. The best single ingredient from the standpoint of quality protein is soybean oil meal.

Protein substitutes such as urea and ammonia can be used by cattle and sheep to synthesize protein in the rumen (paunch). This is accomplished by microorganisms (microscopic plants). They use the nitrogen plus readily available energy from grain (plus probably other nutrients) to grow. Protein is produced in their bodies. Later they are digested and make amino acids available to the animal.

Urea should be used only with rations containing 4 pounds or more of grain per day per animal. It is not protein but can be used as a substitute and lower supplement cost if used properly. There is no difference in its value whether used in dry or liquid form.

Fat

It is desirable to have 3 to 3.5% fat in livestock rations. In addition to being an excellent source of energy, fat must be present for best utilization of the fat-soluble vitamins, A, D, E, and K. Most grains contain around 3% fat. Solvent-processed oilseed meals contain very little fat and are less valuable than "old process" meals for feed.

Fats and oils can be added to feed when price does not exceed two or three times the cost of grain. In addition to the energy value, they tend to lubricate machinery, preserve fat-soluble vitamins, reduce dust, and increase palatability, unless the fat is rancid.

Minerals

Minerals have two general functions:

1. Structural: build bones, teeth, and soft tissue like muscle and blood.
2. Regulatory: soluble salts in blood and other tissues affect irritability of nerve and muscle, catalysts, form enzymes, hormones, etc.

Minerals are usually classified as (1) macro (used in greatest amounts): calcium, phosphorus, sodium and chlorine, and (2) micro or trace (used in very small amounts): potassium, sulfur, manganese, magnesium, iron, copper, cobalt, zinc, iodine, etc.

In plants, the forage portion is usually a good source of calcium but not phosphorus. The seed portion is a good source of phosphorus but practically no calcium.

Normal rations generally provide all micro minerals needed. In abnormal rations, like all-concentrate for cattle, probably most of the micro minerals should be added. Small amounts of good-quality legume roughage, like dehydrated alfalfa meal, will take care of micro or trace element needs.

Excess minerals could prove harmful. An example is excess calcium causing parakeratosis in swine.

Vitamins

Vitamins are the latest nutrient discovery. We did not have the word "vitamin" until 1911-12. Yet, much in ancient literature indicates that man and livestock have always been faced with troubles caused by vitamin deficiencies.

Vitamins are classified as (1) fat soluble (A, D, E, and K) and (2) water soluble (C, Thiamine, Riboflavin, Niacin, Pantothenic Acid, Pyridoxine, Inositol, Biotin, Folic Acid, Choline and B₁₂). Perhaps there are other undiscovered vitamins. Vitamin function primarily in the enzyme system.

Vitamin A or its precursor must be fed to all animals. Carotene from

green plants and harvested roughages has been, and still is the main source of vitamin A for livestock. Carotene is converted to vitamin A in the wall of the small intestine. Synthetic vitamin A is now available. Any ration deficient in vitamin A should have additional carotene or vitamin A added to meet the needs of the animal.

Vitamin D aids mineral metabolism and helps prevent rickets. There should be no deficiency so long as animals are exposed to sunlight. Vitamins E and K are supplied in sufficient amounts in the normal ration or are synthesized in the digestive tract.

Ruminants synthesize a bountiful supply of the water-soluble vitamins in the paunch, so there is no reason to supply them. Care must be taken to formulate swine rations to supply these vitamins or add them to the ration.

Additives

Additives are not nutrients but substances added to rations to increase rate of gain, feed efficiency, or in some way aid in more economical production. Some are worth while but some are not worth the space they occupy in a sack of feed. The feed additive business amounts to about \$120 million per year.

Stilbestrol. When fed at the rate of 10 milligrams per head daily or implanted at 12 to 36 milligrams, stilbestrol normally increases rate of gain and feed efficiency significantly with steers on a fattening ration. It has little or no value for heifers. Implants for steers on pasture increase gains about 25 to 35 pounds per season. Fattening lambs can be fed 2 milligrams per head daily or implanted with 3 milligrams. Never implant more than 6 milligrams. No breeding animal or swine should receive stilbestrol.

Antibiotics. Certain antibiotics have proved beneficial in livestock rations. The benefit seems to be associated with level of disease present. Aureomycin, Terramycin, or Penicillin fed at the rate of 5 to 10 milligrams per pound of feed in swine-fattening rations has generally increased rate of gain and feed efficiency. Aureomycin and Terramycin at the rate of 15 to 25 milligrams per head daily in lamb-fattening rations tend to prevent overeating. The recommended level of Aureomycin or Terramycin for calves or cattle is 10 milligrams per 100 pounds body weight; however, normally 70 milligrams per head daily are fed. Use of greater amounts would become therapeutic doses and should be supervised by a veterinarian.

Arsenicals. Arsenicals help control certain scours. Follow recommendations on labels closely.

Tranquilizers. Tranquilizers are of no value in livestock rations.

Chemobiotic. Dynafac has produced variable results. Its benefit in rations is doubtful.

Rumen factors. This is a rather vague and somewhat misleading term. Products now on the market are of very doubtful value.

Enzymes. Enzymes are organic catalysts that help break down food in the digestive tract. Theoretically, added enzymes should be of value; however, enzyme preparations available to date have not been consistently of value.

Yeast. Yeast is a good source of water-soluble vitamins for swine and poultry, and the protein has some value. Adding yeast to cattle rations has no value. In fact, it has been harmful in some cases.

Summary

The improvement in practical feeding of livestock today is based on facts obtained from scientific investigations. Further improvement will depend on present and future research.