

Feeding Rabbits

Mark A. Grobner
California State University, Stanislaus
One University Circle
Turlock, CA 95382
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With the cost of rabbit feed increasing almost as fast as gasoline prices, I thought this would be a good time to review some basics in rabbit nutrition and feeding. I can see from the rabbit list servers that there is a great interest in rabbit feeding. I also hope to stimulate growers to take a closer look at how and what they feed their rabbits. Feed is one of our biggest expenses and an area we are least likely to take a long look at.

When feeding rabbits, one must consider the whole animal. We are not just feeding muscle, fur or fetuses growing in the uterus. Likewise, we must look critically at the ingredients and more importantly, the individual nutrients that make up the feed.



Photo courtesy Dave Harris

Figure 1. Rabbit feed is a combination of ingredients in pelleted form to provide for a rabbits daily needs.



Photo courtesy Dave Harris

Figure 2. Rabbit pellets are a combination of several different ingredients blended to provide the daily nutrient requirements of a rabbit.

While rabbit feed is pelleted, it is made up of various ingredients specifically formulated to provide the nutrients required by rabbits.. The typical ingredients include alfalfa meal, grain and grain by-products, protein supplements and trace minerals. These are added to the diet in amounts to balance the levels of nutrients in the pellets.

There are four main nutrients we concern ourselves with making up a proper diet. These are water (measured as dry matter), protein, energy and fiber. Dry matter is an indication of how much water (or lack of water) there is in the feed. In the wild, rabbits eat diets that contain 70-90% water (think lettuce and vegetables) while our pelleted feed is less than 10%, usually around 5-6% water. We compensate for this lack of water by using water dishes or automatic waterers. Water is an oft overlooked yet critical nutrient required by rabbits. A deficiency can lead to dehydration, electrolyte imbalance and

blockages forming in the gastrointestinal tract. These all lead to death and along the way a decrease in milk production and reduced overall production.

Dry matter is measured by heating the feed to remove moisture. A feed sample, generally ground, is weighed and then placed in an oven to evaporate any water from the sample. The feed is weighed after it is dried and the difference in weight from before drying to after drying is attributed to water.

It is important to understand water content of the feed since it dilutes other nutrient contents and it adds weight to the feed. A high water content feed will not deliver the same amount of nutrients per pound as a dry one. When asked how much to feed a rabbit, I hear common phrases like I feed a cup a day to dry does and bucks. This can lead to problems, especially if the amount of water in the feed is not known. Also, there is the question of the size of the container one is calling a cup (Figure 3).



Photo courtesy Dave Harris

Figure 3. The cans above range in volume and can hold a different amount of feed.

Be sure you know what a cup is when someone tells you they feed a cup. You also have to be careful of the water content as mentioned above, since it too can change the amount of feed delivered.

Protein is one of the more important and most expensive nutrient to provide. When providing protein, it is important to understand we are really providing amino acids, building blocks of proteins. The proteins found in feeds are broken down in the digestive system to amino acids which are then absorbed. These absorbed amino acids are used in the body to build proteins in the body.

There are twenty amino acids that are used to make the various proteins needed in the rabbit (and all life on earth). Each organism has a specific requirement for the amount of each amino acid taken in each day. Different proteins have different levels of each specific amino acid, so there is no one protein that usually meets the daily requirements. Alfalfa is a good source of protein, but requires supplementation in order to provide the proper balance of amino acids. It is possible to feed a high protein diet that would starve rabbits for lack of a particular amino acid.

The next major nutrient provided in the feed is energy. A prime source of energy are the carbohydrates found in various grains and grain by-products included in rabbit feed. Fats can also serve as an energy source although rabbits tend to not like diets high in fats (unlike their human counterparts) and feed high in fat is hard to pellet. Both carbohydrates and fats provide the fuel for cellular function. They both can be broken down to provide cellular energy.

Carbohydrates are primarily found as starch in plants. Starch is a polymer (long chain) of glucose units. Glucose is the simplest form of carbohydrate that is found in plants and animals and serves as a primary energy source. Starch is readily digested in rabbits being broken down to the glucose subunits. Too much starch in the rabbit diet has been implicated in digestive upset and enteritis in rabbits. There is only a certain amount of starch that can be digested at a given time in the rabbit gut, overloading this system allows some starch to pass to the cecum undigested where resident bacteria are able to ferment it. This fermentation leads to a microbial imbalance in the hind gut and diarrhea.

Fat also is an energy source found in the diet. Fats contain $2\frac{1}{4}$ as much energy per weight as carbohydrates so it is a much more efficient means to store energy. They can add lots of energy to a diet with little added amounts. High levels do make for poor pellet quality. Also, rabbits eat to satisfy their energy requirements so feeding too high of energy can lead to rabbits consuming too little of the diet to meet other nutritional needs.

Fiber is also a carbohydrate, but is in a form unavailable to the rabbit. It is made up of the same glucose units found in starch, just arranged so the rabbit cannot digest it. Fiber, although not providing nutrients, is an important part of the rabbit diet. It functions to aid in passage of materials through the rabbit gastrointestinal system and is required for the proper functioning of the cecum that separates the soluble from insoluble materials in the rabbit gastrointestinal tract.

The primary source of fiber in most rabbit feeds is alfalfa. As fiber content of a feed increases, energy levels decrease and vice versa. The amount of fiber in the diet is not the only concern when looking at the role of fiber in rabbit nutrition. The form of the fiber, either long stem or fine cut, plays a critical role (Figure 4). Fine cut hay, with small fiber particles can disrupt the separation of soluble and insoluble particles in the rabbit digestive system leading to the cecum becoming plugged with a clay-like material.



Photo courtesy Dave Harris

Figure 4. Coarse hay versus finely chopped hay routinely used in rabbit feed. Notice the small particle size in the chopped hay.

Other considerations in feeding rabbits is the size of the pellet (Figure 5) and the cleanliness of the feed (Figure 6). Rabbits tend to prefer smaller pellets. Long pellets can be picked up and as the rabbit bites, part of the pellet falls from the rabbit's mouth to the ground.



Photo courtesy Dave Harris

Figure 5. The smaller pellets on the left are preferred by rabbits.

In receiving feed bulk, it is common to find extraneous materials in the feed. This is feed left in the truck or delivery system from a previous load of feed. This can often be feed delivered for another species, in my area we often find dairy feed remnants mixed in with the rabbit feed.



Photo courtesy Dave Harris

Figure 6. Rabbit feed contaminated with corn and other feed ingredients.

For further information on rabbit nutrition, there is no way we can cover it all in one column, I recommend the following books:

Rabbit Feeding and Nutrition by Peter Cheeke, Academic Press, ISBN 0121706052

The Nutrition of the Rabbit by C de Blas, CAB, ISBN: 9780851992792