

HOW THE TMR HORSE BISCUIT WAS DEVELOPED

Harlan Anderson
Idle Acres, Cokato, MN

I am the fourth generation of Anderson's to operate the same farm since 1871. My father before me and I have always had a special interest in growing and feeding alfalfa and grass hay. These perennial crops are very good at soil conservation for the next generations of Anderson's. Forages also have played a big part in the diets of our cattle, working horses and sheep feeding.

I am also a graduate of the College of Veterinary Medicine, University of Minnesota. I started out as a dairy practitioner in Carver and Wright County.

I have sold alfalfa and grass hay to horse owners in the western suburbs of the Twin Cities for nearly 40 years in the form of small square bales.

I sold my veterinary practice because of the dying dairy industry. I looked to nutrition with interest. First I worked on dairy nutrition and developed a plan for beginning dairy farmers. This included the making and delivering a Total Mixed Ration (TMR) to these new dairy farmers.

I have a long history of making and delivering hay to horse owners. Coming from production agriculture, I questioned why the horse owner would feed my high quality hay on the floor of the box stall? I would ask why the horse owner was feeding grain to a horse they did not want to gain weight or produce any products such as milk. The production farmer in me started asking who is balancing the feed ration these horses are eating. I, as the person delivering hay, had no idea what was being fed for grain or concentrates. When I would talk to people in the feed business, the answer was "it makes no difference what kind of hay, it is just busy food".

After selling my practice and looking back over my years of treating horses, I realized that ¾'s of my calls, on an emergency basis, were for some sort of nutritional mistake. Almost all were related to the feeding of cereal grains. Occasionally it would be from changing the quality of hay too fast.

After many years of asking questions and observing horse owners feed their horses, I developed what I now call a TMR biscuit. It is a complete diet for horses except for salt and fresh water. Alfalfa and grass is the basis of the biscuit and is also the foundation to the nutrition. Alfalfa and grass is not just busy food but the preferred source of nutrients by the horse.

Biscuits were chosen so that the horse would have a proper fiber source to feed the hindgut. When forages are pelletized they are ground to a powder and the scratch factor dairy nutritionist talk about is lost. My biscuits have fiber lengths of 1.25 inches.

Biscuits do not allow the horse to sort the leaves of alfalfa from the stems. Biscuits allowed me to use science to balance the diets. Biscuits allowed me to deliver a product that every mouthful is the same.

TMR's have been used with success in poultry diets, hog diets, dairy diets, beef diets, as well as dog and cat diets. Many times I ask people what the most common dog food was when I graduated from vet school in 1973. The usual answer is Purina Dog Chow but I believe it to be table scraps. That is how young the dog food industry is.

As a dairy practioner, I have also seen what a TMR mixer has done for the dairy producer. The first thing I noticed was that the farmer now had a scale to weigh what he was actually feeding.

Poultry producers were probably the first to make extensive use of TMR rations. I personally do not remember many chickens or turkeys being fed a mixture of feed that is put together by the chicken farmer or the turkey farmer.

Hog farmers have been evolving their products over the last 30 years. I have worked with Robert Fitzsimmons and Sons from Good Thunder, Minnesota for the last 20 years. I noticed they really started to not only control production efficiency but the health of their hogs when they purchased the old Purina Feed Mill in Mapleton, Minnesota. From my involvement with them, I came to the realization that if you can control the animal's diet you can control most of the health issues.

For the last 15 years I have been trying to find an easier way to deliver hay to the horse owner. In the past, the horse owners have been buying small square bales from local dairy farmers that had produced a surplus of hay for their dairy cows so they would not run out. The horse owners benefited for many years from the opportunity of buying a by-product of the dairy industry. The loss of small dairy farmers also meant the horse owner would be loosing this great cheap by-product, the small square bale.

Just like the dog that was fed table scraps, the horse today is fed what is available with no knowledge of nutrition. One day the dog would get a t-bone and the next day he may get peas. The same is true of today's horse. One week they might get grass hay the next week they may only get alfalfa hay. One week there may be a special on one brand of horse feed and next month it may be another. In the cases of both the dog and the horse, who is balancing the nutritional needs of either animal? Do the people feeding either animal know anything about the proper nutrition of either animal?

Today's TMR dog food has almost eliminated any nutritional diseases in dogs.

When I work with Robert Fitzsimmons and Sons, I have absolutely no input as to what is in the TMR hog feed that is delivered to my operation. When John Fitzsimmons makes the feed he relies on a nutritional consultant to formulate the mixture.

Since I graduated from vet school I have watched what TMR's have done not only to the efficiency of feeding these production animals but I have also observed the tremendous improvement it has had on the health of these animals.

Once I had my equipment set up, I had the idea that I would make the traditional hay cube and deliver it to the horse owners in a way that was more convenient, better for the horse and would be cheaper to purchase.

One day while working with the equipment I was ready to try a TMR for horses. I realized that I did not know how to balance a horse ration. With equipment running, I ran to the house and to call friends of mine at the U of M Vet School and asked for an equine nutritionist. The answer was "we do not have anyone that works on equine nutrition". I got the same answer when I called the U of M An. Sci. Dept. I also called Iowa State University, South Dakota State University and the University of Wisconsin at River Falls with the same answer. I was surprised because I had always had access to very qualified nutritionists in production animal agriculture.

That evening I called Dr. Jerry Olson, the best dairy veterinarian and nutritionist I know. I asked him to balance a horse ration for me. He indicated that he did not know how but he knew who could. That is how I was introduced to Dr. Sarah Ralston at Cook College, Rutgers University in New Jersey.

Six years of feeding trials have been completed at Rutgers University by Dr. Sarah Ralston. The first five years there were 12 new weanlings each year with 6 fed TMR biscuits free choice. The other 6 weanlings were fed the traditional way with half of the calories in meal form from a commercial pelleted feed and the balance of the calories from a hay source.

The first year the results were not predicted and it was decided to repeat the same trial. The second year results supported the first year results. The third and fourth year a different commercial pelleted feed formula was used. The results were again replicated just as what was seen in the first year. There were small changes made in the TMR biscuits. After the first year it was decided to remove all forms of corn from the TMR biscuit. After the second year it was decided to remove all forms of oats. The third and fourth year's biscuits had no cereal grains but used wheat bran and the same yeast culture to help balance the rations.

A number of conclusions can be derived from these results. The TMR's average daily gain is greater than the traditional free choice hay and meal feeding of commercial pelleted feed. The average daily gain per Mcal consumed was better with the TMR biscuit in all years. TMR biscuit fed weanlings gain more on less Mcal than was predicted by 1989 and 2007 NRC requirements for these horses. With the increased rate of gain there were no growth related diseases or physical conditions observed. It was also noted that during the feeding trials, horses fed TMR biscuits were not observed wood chewing like has been the experiences of those feeding a total mix of a complete pelleted feed.

In recent years the horse industry has been plagued with questions of horses developing symptoms of insulin insensitivity. I had a request from Dr. Shannon Pratt-Phillips at North Carolina State University at Raleigh, North Carolina for three types of no grain biscuits. It was her request to develop a high energy (low sugar and low starch) biscuit to be fed free choice. It was the intention of this research to increase the body score two categories with rapid weight gain with no grain. The second request was for a maintenance product to be fed free choice to maintain a body score for the same period of time. The third request was for a low calorie

product to be free choice that would cause a decrease in the body score 2 categories. This study has led to the possibility that the issue of insulin insensitivity is a result of high glycemic-index feeds fed to horses and not with horses fed a forage only diet. With only one study there is a need for further study to support these findings.

Dr. Kevin Kline at the University of Illinois, Champaign/Urbana has long had an interest in the possibility of feeding a TMR diet to horses. At the recent Equine Science Society meeting we discussed a possible research project. He was feeding a ration that was 50% cereal grain and was having a significant problem with gastric ulcers in his Standard Bred herd of horses. We agreed to a reduction to 25% oats and soybean meal grain portion, and the balance an alfalfa/grass mix. The primary trial was feeding a TMR biscuit and then a biscuit with no additives fed with a twice a day meal of the equal amount of oats and soybean meal. It was agreed to add a few horses that were fed the same biscuit with no additives and no grain mix. This feeding trial has been completed but not all of the data has been analyzed. The numbers are preliminary and have not been published. At this time, the preliminary numbers are following other data I have collected.

TAKE HOME MESSAGES

There is certainly more need for research feeding trials in horses. From the last 6 years of Land Grant University feeding trials, I am beginning to see some significant advantages to feeding a TMR forage based biscuit to horses. The horse can digest forages better and more efficiently than cereal grains in meal form. There is good indication that the feeding of cereal grains in meal form will be harmful to the horse's digestive system.