



by Steve Martin

My love-hate relationship with the shaker box

IN THE era of on-line shopping and next-day delivery, there still seems to be something special about an old-fashioned paper catalogue.

Of the many that show up in my mailbox, I am only interested in a select few. Among those is the Nasco Farm and Ranch catalogue, which contains a few tools of the trade for a good nutritionist. With a few mouse clicks or a toll-free phone call you can be in the forage sampling business pretty quickly. And as far as I know it is the only place to order the famed Penn State Particle Separator – also known as “the shaker box.”

The shaker box showed up on the dairy scene pretty close to the same time that I did. And for much of my career, this tool for measuring forage particle length in rations has plagued me. In addition to being a time-consuming step in the ration formulation process, it is also a bulky thing to carry around. It always seems to rattle and be in the way in your vehicle, and it for sure doesn't fit in the overhead bin on airplanes!

The overall goal of the shaker box process is to help make sure the ration being fed has the correct amount of long, medium and short length forage particles to maximize both cow health and milk production.

The original version has two shelves and a bottom pan. The top shelf has holes about the size of your thumb, and those in the middle shelf are maybe the diameter of a pencil. By putting the allotted amount of total mixed ration sample on the top shelf, followed by a prescribed back-and-forth shaking motion, feed is separated into three groups of particle size/length. After weighing the three portions and figuring the percentages of each, you can compare the actual mixed ration to recommended standards for dairy cows.

Not a complicated process

Using a shaker box is not a complicated process, and to be sure it isn't an exact science. But it is close enough. Like I tell my kids during fence construction: “We're not building airplanes here; just get it close and nail it.”

For many years I talked about the shortcomings of this nutritional tool. Part of the reason is that it does have

some. Another part is that it adds an extra and often inconvenient step to the ration formulation process.

Early in my career, I was sure that the standards set with the boxes would result in what I considered an overly short ration. I felt strongly that the suggested values were too short and would result in a bunk mix that was too fine.

Back in those days (and based upon my limited experience at the time), I felt those short rations would lead to poor conversions and poor cow health. At that time I was working in central Texas with what were mostly high quality alfalfa-based rations. It wasn't uncommon to feed 20 pounds or more of excellent quality



alfalfa hay per cow per day. Rations were mixed with four-auger horizontal feed boxes and were full of long forage particles. We had learned the hard way what over-mixing these types of diets in the new vertical mixers would do to cows.

In my early experiences with the shaker box, rations that we had learned this lesson with would have shaken out to be just about right using the fancy set of boxes from up north. So I had pretty much made up my mind about the shaker box.

As corn silage production was developed on central Texas and my consulting geography expanded, I gained a comfort level with shorter particle length TMRs. And as I gained more experience feeding higher corn silage diets, many of my early feeding beliefs were challenged.

I also began to consider forage-fiber levels, rather than just forage levels. I learned to model in the computer what cows were telling us, and began to wonder if rations contain-

ing both alfalfa hay and corn silage could be evaluated correctly using the shaker box.

I also began to wonder, “Where did I put that old shaker box? After looking to no avail, I instead located the Nasco catalogue and ordered a new set. In something of an act of personal surrender, I started shaking ration samples again.

In general, I had learned that shorter particle length diets were okay and were safe for cows as long as dietary fiber levels were higher. Conversely, high quality alfalfa hay-based diets tended to be lower in analyzable fiber and thus needed to be longer to keep cows healthy.

The principle at work here is there

“Using a shaker box is not a complicated process, and to be sure it isn't an exact science. But it's close enough. Like I tell my kids during fence construction: “We're not building airplanes here; just get it close and nail it.”

tend to stay in the top of the rumen in the forage mat and stimulate healthy rumination.

So what do these two principles have to do with the shaker box? We have learned to use the shaker box alongside fiber levels in the diet to decide if the diet is healthy or not. Higher fiber diets that are often based upon corn silage can be shorter and still be safe, while lower fiber diets will need to be longer in order to be successful.

By using the shaker box, we can actually dial into what the correct percentage of sample per shelf needs to be in order to accomplish our goal of profitable milk production with good cow health. The new term used to describe this connection between fiber level and forage length is peNDF, or physically effective NDF.

A recent improvement to the old shaker box has been the addition of one more shelf; it splits what used to go into the bottom pan into two groups. This new level is similar to a screen-door that lets only the finest feed particles pass through. That allows for math to consider this portion of the diet correctly, as it has zero impact on building the rumen mat and supporting good rumen health.

When it is all said and done, the shaker box has proven to be a helpful tool in formulating successful dairy diets. To take it to the next level though, it is necessary to join this information with fiber levels in the diet. This insures that what the box is telling us is truly best for the cows.

After all, they were created to convert low quality roughage into meat and milk. It was our idea to feed them things like corn and soybean meal, so we need to do all we can to keep them healthy while we ask them to produce high volumes of milk each day.

And hopefully by doing so we can strike the correct balance between roughage and concentrates and be sure that we are truly feeding for the bottom line.

are at least two main ways the rumen can stay in a healthy state as it relates to roughage/fiber levels in the diet. The goal is the rumen needs to build a mat or “raft” of forage that floats on top and is needed to maintain normal muscular contractions that move ingested feed around in the rumen and back up the esophagus to be re-chewed. Then after being fermented, it drops out of the rumen mat and is soon flushed out a small hole in the bottom of the rumen. Feeding diets with longer hay particles helps keep this process going.

Short length, high fiber

The second way is to feed chopped forage particles that, although they are short, are much higher in fiber.

As an example, compare the fiber in alfalfa hay having a relative feed value of 200, to that of the stalk in corn silage. Corn stalks have significantly more fiber than alfalfa hay. Although forage particles with higher fiber may be shorter in length, they

The author is the founder of Dairy Nutrition and Management Consulting LLC, which works with dairies and heifer growers in Texas, New Mexico, Kansas, Colorado, Washington, California and South Africa.