Race Horse Feeding Article

(Compiled by R.V.Malik CEO- Malik Engineers, Mumbai-makers of Pet Food Extrusion systems. Email: info@malikengg.com)

Introduced to the equine scene in the 1980s, extrusion is the most recent processing technique to hit the horse market. As with pelleting, the extrusion process begins by grinding and mixing the grain. The resulting product is then conditioned using both steam and pressure, with temperatures reaching about 260 F. Because of the added pressure and higher temperatures, the extrusion process does a more thorough job of gelatinizing grains--breaking those starchy bonds--than micronizing, steaming, or pelleting, it is noted.

Next, the conditioned mix is forced through an extruder--basically a steel tube with an auger that rotates the mix under increasing pressure. More steam and water are added, and the mixture is then shaped into nuggets using a die. The nuggets are exposed to cooler air, which makes them "pop" or expand. After drying, the final product contains less than 10% moisture to avoid mould growth.

Extruded feeds have met resistance in some circles and been hailed in others. Proponents note that extruded feeds have many of the same benefits as pellets--manufacturers can easily combine ingredients that horses can't sort out, the product has low dust levels, and its low moisture content makes for a long shelf life without the need for preservatives. In addition, the bulky nuggets can slow the horse's rate of eating, thus reducing the risk of colic and choke while helping satisfy the grazing urge.

Some studies have shown that, because of improved utilization of starches, extruded feeds also have greater overall digestibility than other feeds, including pellets. For instance, digestion of corn starch in the small intestine can be improved almost three times by extrusion. All of this means that the horse can extract more energy from less feed, which means you can feed less (based on weight) yet provide the same energy level as pellets or other feeds.

Critics of extruded feeds, however, argue that this is among the least palatable of horse feeds. The extrusion process also destroys some of the grains' natural vitamin content, so manufacturers must add excess amounts before extrusion in order to end with satisfactory levels. Extruded feeds also take up more space than other bagged feeds. And, like pellets, they are pricey and

prevent you from examining the quality of individual ingredients. However, it is also supported by some, that, the vitamins and flavours which cannot withstand high heat and shear encountered in the Extruder, could always be applied post Extrusion, by spraying or coating. That’s my contention as well.

Another potential pitfall to extruded feeds: It's possible that feeding high levels of a high-starch-containing diet could be a contributing factor in the incidence of developmental bone disease (i.e., osteochondritis dissecans) in growing horses. So if you're considering an extruded feed for a young horse, proceed with caution.

Add It Up

Unlike mechanical and heat processing, the tactic of adding non-grain ingredients to a feed doesn't alter grain's physical makeup. But it does aim to enhance the grain, particularly its nutritional value and palatability. While the list of potential additives is huge, here we highlight some of the most common, popular, and trendy ingredients.

Binding agents--Pellets need a binding agent to hold the ground grain particles together. In horse feed, molasses is probably the most common binder. Barley and wheat are other natural binding agents. Lignasol, an artificial binder, can be used.

Vitamins and minerals--While grains naturally contain some vitamins, levels are typically low and can fluctuate depending on the quality of the ingredient, explain Adams and Raub. In addition, they will naturally oxidize away. So feed manufacturers add high levels of stabilized forms of vitamins to help ensure optimum nutrition. Among the most common vitamins added to horse feeds are A (important for reproduction), E (a natural preservative/ antioxidant that helps ensure optimum function of the reproductive, muscular, circulatory, nervous, and immune systems), and H (a.k.a., biotin, helpful for improving hoof and hair quality and for the synthesis of fats, proteins, and glucose). Calcium, phosphorus, copper, zinc, and selenium are typical mineral additions.

Forage/fiber--As you know, horses need fiber. But these days, fiber doesn't just come from flakes of hay or grass pasture. Many feeds now include such highly digestible fiber sources as shredded beet pulp, soy hulls, or even alfalfa chaff. These help ensure that your horse receives adequate fiber and can also provide the calories (energy) usually lacking in high-fiber feeds. For instance, says Adams, shredded beet pulp provides as many calories as oats. In addition, he notes, "Soy hull- and beet pulp-based feeds are safer energy sources than grain because the majority of ingredients are digested in the hindgut, so you're not going to have that spike in glucose or insulin levels that causes hyperactivity."

Fat--Unlike grain starches, fat is easily digested in the horse's small intestine, yet delivers an energy punch at least equal to that of grain. According to Southern States, fat can supply 2.5 times more digestible energy than an equal weight of cereal grains. Thus, fat allows you to increase your horse's energy intake without increasing grain, and that minimizes the amount of starch for the digestive system to handle. Fat is also famous for adding shine to your horse's coat and is said to improve muscle performance. Vegetable oil--including soy, corn, and canola--is

the most common fat used in horse feed. However, stabilized rice bran, flaxseed meal, and copra meal are also popular sources. While the average horse feed has just 2-3% fat, many high-performance feeds or special-needs (i.e., lactating mare) feeds have 6, 8, 10, or even 12% fat content.

Flavoring--Most horses gobble down grain with obvious delight. But for those finicky eaters in the herd, flavorings can help ensure optimum nutrient intake. Molasses is the most common flavor additive in the equine industry--particularly famous as the "sweet" in sweet feed. Research at Purina Mills continues to show that molasses does increase feed palatability. (If you're worried about the sugar content of molasses, relax. Laboratory research has shown that good hays and fresh pasture have higher sugar contents than molasses.)

Alfalfa meal is often used to increase the palatability of pellets, says Adams. One study, he adds, even showed that cherry was the most appealing flavor to horses, although no feed manufacturer seems ready to exploit this discovery quite yet.

Other additives--Other equine feed additives include lysine, probiotics, and "natural health"-type products such as kelp meal and yucca. Lysine is an amino acid critical for growth as well as muscle and tissue development. Probiotics, which include yeast culture, and a variety of other products on the market help promote good digestion and overall intestinal health, particularly in relation to the health of microflora and digestive enzymes. Yucca, notes Adams, is an ammonia binder that reduces ammonia levels in blood and manure. Kelp meal is a source of micronutrients.

The bottom line on all additives, says Adams, is guarantees. "Anybody can say they have biotin or vitamin E," he explains. "You should look for feeds that guarantee a certain amount."

In addition, says Raub, make sure the additives are things that your horse actually needs. Otherwise, you could be wasting precious pennies on products that are not contributing any real nutritional value to your horse's diet. And you could be imbalancing his diet in other ways.

What Matters Most

When it comes to selecting the right feed for your horse, says Adams, Look for high-quality food that keeps your horse fit and happy--regardless of what's in it or how it looks.

After all, concludes Raub, "Even if you use all the processing methods that are available, a low-quality ingredient will still be a low-quality ingredient. You can't take wheat straw and process it into a great feed."

Extrusion, (unlike micronisation a completely different 'cooking' process) is a controlled moisture and pressure (pressure cooking) method combines to rapidly heat and cook the starch and protein content of cereal grain and oil seeds. The cooking temperature is strictly controlled to avoid any over processing or burning the protein and fat content in the grain. Then the cooked grain is quickly cooled to remove any retained heat so it does not continue to 'cook', and to also minimize damage to the vitamin content of the grain.

The extrusion process expands the starch particles, and opens the way for a more direct and therefore efficient digestive enzyme attack on the gram starch and proteins as the food mass passes through the small intestine.

Any number of grains are nowadays extruded, and Barley grain appears to be the primary candidate for the process. By doing so the increase of starch digestibility is increased from around 23% for raw grain, to above 65% for extruded. Boiling barley also has a marked benefit over raw grain in that the digestibility factor rises double (to about 50%) that of the raw unprocessed gram. However, the boiling process is not controlled in our own kitchens, and lot of the natural vitamin content is damaged or 'cooked out', and is then not available for uptake, plus, it is a time consuming job, although personally I do not find it a problem.

- Some of the benefits for using extruded grains in our horse's rations are -

  More efficient digestion and utilisation of the grain, and therefore the ration.
- They provide a cool energy source with less behavioral disturbances. Improves the safety of grain feeding as cooking kills harmful bacteria and eliminates any anti-nutritional factors present in the grain, especially protein grains such as soybeans and peas.
- Extruded feeds also reduce wearing on the teeth; and aged horses find it a convenient source of 'easy pickings', compared to those that have to chew and grind levels of hard or raw grains such as corn, sorghum or raw barley.
- By feeding extruded grain it leads to a reduction in heat production through limiting excess starch being fermented and releasing heat in the hindgut. This in turn also results in the horse sweating less under hot conditions, better digestion, a reduction in the amount needed to be fed, saves money, improves palatability and reduces wastage.
- Extruded feeds are suitable for all classes and ages, including foals and especially in aged horses where digestive function is often less efficient.

I wish to add, that, for producing a high quality Horse feed pellet, we at Malik Engineers have developed efficient and economical Extruders which are of Medium Shear Category. It is thought these Extruders are more stable with controllable process parameters for producing good Horse feed at low energy consumption compared to High shear ones which are more suitable for light density puffed product.

(With inputs from "Horse Feeding Myths & Misconceptions" by Dr. Marty Adams)

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