

Grains and Processing

Grains are common, highly palatable sources of nutrition for horses, and are often incorporated into concentrate feeds. The most common grains fed to horses are corn, oats, barley, wheat and milo (sorghum) (Table 1). Grains are higher in energy (calories) and lower in fiber compared to roughage. It should be noted that all grains have reverse calcium: phosphorous ratios and are low in most vitamins. Consequently, grains fed singly or in combination should not be fed without the addition of forage and/or an appropriate vitamin/mineral supplement (such as Blue Seal Min-A-Vite Lite, Blue Seal Sunshine Plus or Kent Equine Choice Topline 12 or 32) to ensure proper balance.

effort to improve nutritional value to the horse. Processing horse feeds may also reduce dust, as well as harmful microbes, molds or fungus. Common processing techniques include rolling, cracking, crimping, steam-flaking and cleaning. In this way, processed horse feed is a far cry from processed human food, such as frozen dinners and snack cakes. Processed horse feed is designed to improve intake and digestibility of rations. The notion of processing has more negative implications in human nutrition and therefore should not be considered one and the same.

chew and digest, therefore lending potential benefits for horses with poor dentition or who have increased nutritional demands. Horses with limited digestive capacities may also benefit from processed horse feeds that are easier to chew and breakdown. Most

processed horse feeds have also been balanced with proper amounts of vitamins and

Heat processing seems to have the most benefit, particularly for corn and likely for barley, in part because the process results in gelatinization of starch and ultimately improved availability [4]. Processing may not affect softer seed-coated grains, such as oats, to the same degree, however it is not detrimental either [3, 4]. More research is certainly needed in this area of equine nutrition. Following is a brief description of grains commonly fed to horses.

Corn

corn has higher energy and lower fiber (about 5%), protein and lysine compared to oats and barley (see Table 1). Less starch from corn is digested and absorbed in the small intestine compared to oats, meaning an increased risk of excess starch reaching the hindgut [2]. Slow introduction of corn into the diet in small quantities is recommended for these reasons. When fed in a properly balanced ration, digestive upset should not be an issue. Because of its low fiber content, feeding excess corn will not keep a horse warm as safely or effectively as roughage.

Whole corn should be processed (cracked, rolled, flaked, chipped) before being fed directly to horses. Ground corn should only be fed when it is being incorporated into a pelleted or extruded feed. Corn is also a source for several nutritious by-products used in horse feeds. These include corn distillers dried grains for its protein, oil (energy) and B vitamin content, and corn germ for its high oil (energy) content.

Oats

Oat kernels are soft, making it easy for a horse to chew, and are often considered a palatable and safe grain for horses. Oats are much less energy dense than corn when considered on a volume or weight basis (Table 1). Oats also contain more fiber (about 10-13%), protein, lysine and fat compared to corn. Interestingly, the oat starch may be more readily digested in the small intestine compared to corn starch, reducing the likelihood of excess starch reaching the hindgut. It is not necessary to process whole oats when fed to horses; the slight improvement in digestibility does not make up for the cost of processing.

Barley

The energy, protein, starch and lysine content of barley is in between that of corn and oats. Slightly less starch from barley is digested in the small intestine compared to corn or oats, and should be fed in a similar manner as corn. Barley is a nutritious grain for horses, and its palatability is often increased by mixing it with other grains such as oats or corn. The brewing industry commonly uses barley in fermentation processes, resulting in an important byproduct used in the feed industry - brewers' dried grains. Brewers dried grains are sometimes added to grain concentrates as a good source of fiber and protein, yet it remains low in starch.

References

been dehulled is low in fiber but retains readily available carbohydrates. Because wheat has small, hard kernels, it can be difficult for horses to digest. Therefore, it should be processed (cracked) before being fed to horses. Wheat is grown predominantly for human consumption, but many byproducts are used in horse feeds. Wheat middlings, or midds,

are a common byproduct, and are high in fiber but low in energy compared to the whole wheat grain. Wheat midds are very fine, and are used almost universally in pelleted products not only for fiber but for its binding properties. Other commonly used wheat byproducts include wheat mill run (combination of bran and midds), wheat shorts and red dog.

Milo (Sorghum)

Sorghum has a similar nutrient composition to corn, the exception being that it is slightly lower in energy (Table 1). Grain sorghum has a small, hard kernel that needs to be processed before being incorporated into horse feed. Sorghums contain tannins, which provide some protection against mold growth, but have a bitter taste and reduced protein digestibility. Because of these issues, it is usually mixed with other, more palatable

<i>Grain</i>	<i>DE</i>	<i>CP %</i>	<i>ADF %</i>	<i>Ca %</i>	<i>P %</i>
--------------	-----------	-------------	--------------	-------------	------------

	(Mcal/kg)				
Corn					
<i>Cracked</i>	3.88	9.4	3.4	0.04	0.30
<i>Ground</i>	3.88	9.1	3.4	0.04	0.30
<i>Steam-flaked</i>	3.88	9.4	3.4	0.04	0.30
Oats					
<i>Rolled</i>	3.27	13.2	14.6	0.11	0.40
<i>Whole, 32 lb/bu</i>	3.23	13.6	13.5	0.07	0.30
<i>Whole, 38 lb/bu</i>	3.33	13.6	13.5	0.01	0.41
Barley					
<i>Rolled</i>	3.67	12.4	7.2	0.06	0.39
Wheat					
<i>Bran</i>	3.22	17.3	15.5	0.13	1.18
<i>Rolled</i>	3.83	14.2	4.4	0.05	0.43
<i>Middlings</i>	3.40	18.5	12.1	0.16	1.02
Milo (Sorghum)					
<i>Dry-rolled</i>	3.75	3.75	5.9	0.07	0.35
<i>Steam-flaked</i>	3.75	3.75	5.9	0.07	0.35

DE (Mcal/kg) = digestible energy in megacalories per kilogram
CP = crude protein

Ca = Calcium
P = Phosphorus

- ## References
1. Griffin, A. 2009. Grains for horses and their characteristics. eXtension, accessed March 9, 2011.
http://www.extension.org/pages/Grains_for_Horses_and_Their_Characteristics
 2. Lewis, L. 1996. Harvested feeds for horses. In: Feeding and care of the horse. Pp. 62-102. Lippincott, Wilkins & Williams. Media, PA.
 3. National Research Council. 2007. Nutrient requirements of horses. National Academies Press. Washington, DC.
 4. Coleman, R.J. 2001. Grain processing for horses: does it pay? In: Advances in Equine