

OATS AS A FEED FOR BEEF CATTLE

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Oats is lower in energy and more bulky than other common feed grains since it threshes with the hull intact. The hull commonly accounts for 24 to 30 percent of the weight of the oat kernel. Since oat grain yield and quality are highest under relatively cool growing seasons, it is produced and fed primarily in the northern part of the Great Plains. Quality, as measured by bushel weight, commonly varies inversely with temperatures during the kernel filling and ripening period of the grain. A traditional pattern in movement of feed oats is for high-quality, heavy-test-weight "race horse" oats to move from northern producing areas to south and easterly directions. Energy content of oats varies directly according to bushel test weight, which in turn is dependent upon size of groat (whole seed minus the hull) and kernel plumpness.

Starting on Feed

Oats is an ideal grain for starting cattle on feed because of its high hull and fiber content. Many experienced cattlemen prefer to start weaned calves on oats as the only or major grain, gradually shifting over to higher-energy grains as the animals become adapted to grain consumption. The greater bulk and lower energy density of oats compared to other grains is particularly valuable for helping calves learn to eat and getting older cattle started on grain safely. Oats may constitute 50-70 percent of the grain mix while cattle are becoming accustomed to a full feed. The level of oats should be reduced over time to 20-30 percent of the diet.

Creep Feeding

Whole oats is one of the more popular creep feeds used in the northern plains. Calf performance and creep feed intake may not quite compare to that of more elaborately formulated commercial preparations, but oats requires no processing, is available on many farms and gives satisfactory results.

Growing Replacement Heifers

Replacement heifers should not have access to self-feeders which contain only oats. Experience suggests this program will allow more fattening than desirable in young beef females, with negative effects on their subsequent milking ability and longevity in breeding herds. Blending a chopped forage with the oats rather than feeding the forage separately will reduce these problems.

Growing and Finishing Cattle

Oats has earned the reputation of being a good "growing" feed but of having lesser value than corn, barley, grain sorghum or wheat when used as the major energy source in finishing rations. Oats is only worth about 85 percent the value of corn or barley per ton when fed as one-half or more of the grain diet for finishing cattle. Rations containing very high levels of oats or even

rations with no roughage do not produce comparable gains to those of corn or barley. This is particularly true during the last 40 to 60 days of the finishing period. Good quality oats (35 pounds per bushel or heavier) can be used at levels up to one-third of the concentrate intake in finishing type rations without reducing rate of gain or markedly affecting feed efficiency. Oats may have a place in all-concentrate diets as a supplement for cereals which have low fiber contents.

Oats, however, is still a concentrate feed. Death can occur from acidosis and enterotoxemia due to over-consumption of oat grain by young animals. As with all other concentrates, sudden excess consumption must be avoided. Attempts to self-feed whole oats may result in scouring, bloat, and even death. These symptoms are associated with acidosis and enterotoxemia, problems common to excess concentrate intake by ruminants. Similar to other grains, abscessed livers have been reported on high grain diets with oats as the major concentrate source.

Processing Oats

Calves chew oat grain sufficiently well until approximately 10 months old. Little or no benefit is gained from processing oats prior to this time. Grinding oats is usually not required for young calves, unless the grain fed with the oats is also ground. Grinding ensures a more complete mixing of the feeds.

Feeding rolled or ground oats to yearlings results in a 5 percent improvement in feed efficiency compared to feeding oats whole. In some studies, cattle fed whole oats have consumed more grain per day but gained at the same rate compared to cattle fed rolled or ground oats. This indicates lower utilization of the whole oats by older cattle. This is probably because calves chew oats more thoroughly than older cattle.

Fine grinding oats, coupled with pelleting, has improved performance of growing cattle over either whole or ground oats. Studies have shown that gains can be improved 11 percent and feed efficiency improved 13 percent by grinding and pelleting compared to feeding oats whole. Costs of pelleting and necessary transportation likely will offset much of this advantage.

High moisture oats (over 23 percent moisture) is equal to dry oats for finishing cattle. However, problems can be encountered by "bridging" in bottom-unloading upright storage with high moisture oats.

USDA Grades of Oats

The following are USDA Grades of oats:

U.S. No. 1 oats	36 lbs/bushel plus
U.S. No. 2 oats	33lbs/bushel plus
Heavy oats	38-40 lbs/bushel
Extra-heavy oats	40 lbs/bushel plus

Grain Composition

Oats usually contain 11-14 percent crude protein. However, some of the newer high producing varieties will have 10 percent or less protein. Crude fiber content of oats is usually 11 percent or higher, compared to 2 percent for grains that thresh free of hulls. Recent observations suggest that varieties may vary in nutritive content.

Oat grain and forage both tend to be lower in potassium content than most other comparable grains or forages. Because of the larger hull content, oats averages slightly higher in calcium content than other grains, but calcium level is still essentially negligible at 0.1 percent of dry matter. Phosphorus content of oats is about 0.33 percent. Approximate total digestible nutrients (as-fed basis) for oat grain are as follows:

	Light Wt Oats under 30 lbs	Medium Wt 30 to 34 lbs	Heavy Oats 35 lbs and up
TDN (%)	66	69	72

Bushel Weight

Bushel test weight is closely related to energy content and inversely related to fiber content. Test weight is recognized as the only practical means outside the laboratory to describe quality variations in oats. For each pound bushel test weight less than 32 pounds, assume a 2.5 percent lower energy value. For each pound bushel test weight above 32 pounds, assume a 2 percent higher energy value per pound. For example, if test weight of one lot is 28 pounds per bushel:

$(32 - 28) \times 2.5 = 10\%$ lower energy value per pound.
 $100\% - 10\% = 90\%$
 $69\% \times .90 = 62.1\%$ TDN

Similarly, if the choice is between 38 pounds and 32 pounds:

$(38-32) \times 2\% = 12\%$
 $100\% + 12\% = 112\%$
 $69\% \times 1.12 = 77.3\%$ TDN

While this method may not be perfect, it provides a workable method for arriving at relative energy values for comparing different lots of oats.

Varietal Differences

Oats quality and bushel test weight vary substantially among varieties, geographic location, growing season temperature and rainfall. Very high temperatures during the kernel filling and maturation period, incidence of certain plant diseases such as crownrust, and several other environmental factors can adversely affect oat grain quality. Information to date suggests little difference in energy value of oat varieties for ruminant animals (cattle and sheep) due to variety alone. However, varietal differences associated with wide differences in bushel test weight suggest substantial differences in energy content.

Some newer varieties of oats contain as much as 16 percent protein on a bin-run basis. This higher protein content of certain varieties should be considered in ration formulation since these cultivars may furnish one-half to one-third more protein than conventional oat cultivars. This can be an important factor in reducing or eliminating the need for purchased protein supplement.

Oats for Pasture

Oats is the small grain most commonly used for forage purposes in areas where it can be grown successfully. It can be seeded as an emergency forage crop in years when normal hay supplies are short and when the normal growing season is shortened for any reason. On a production per acre basis, oats is competitive with most annual forage crops in the northern Great Plains. Oats can be grazed when 6 to 8 inches tall. An oat crop will provide about 50 cow days of grazing per acre in dry climates and approximately 100 days in climates with more moisture. Grazing should be managed to remove the forage before becoming too stemmy, or in about 60 days. Oats can be planted in early August and used for grazing during September. Medium- to late-maturing varieties produce the most forage. If large acreages are planted for forage, grow two varieties of different maturities. This will provide several days difference in maturation, permitting a greater acreage to be harvested at highest nutritive value. Grain yield is not seriously affected by grazing until plants reach the jointing stage of growth.

Oats for Hay

Oat hay makes a satisfactory hay crop if cut when stems and leaves are still green. Oats make the most nutritious hay when cut in the soft dough stage because of the higher protein content. Considerable energy is stored in the kernels at maturity, but extreme shattering losses will occur if harvest is delayed until this stage of development.

Oats used for forage has a greater tendency than wheat or barley to accumulate potentially toxic levels of nitrate in plant forage under conditions of drought, hail damage, or other growth factors that cause cessation of normal growth patterns. Under such conditions, a laboratory diagnosis of oats forage for nitrates would give helpful information relative to its safety.

Oatlage

Oat plants have hollow stems, presenting a problem in obtaining thorough oxygen exclusion during ensiling. This can present a problem in making good quality wilted oat silage or oatlage in horizontal silos. If an upright silo or plastic tube silo is available, they should be used for oat silage because of the more thorough packing and more efficient oxygen exclusion that can be obtained relative to horizontal silage storage.

Minimum safe moisture levels to ensure good oxygen exclusion in oatlage is about 55 percent moisture in upright or tower silos and 65 percent in horizontal silos. Oatlage should be capped tightly with plastic whether in horizontal or tower silos to maintain anaerobic conditions. Packing is critical for air exclusion.

Unless tower silos or sealed silage storage can be used for storing oatlage, it may be preferable to windrow the oat forage and make dry hay rather than contend with oatlage of reduced quality due to inability to sufficiently exclude oxygen from the hollow stems in the ensiling oat forage.

Research at South Dakota State University indicates that oat haylage may be the preferred method of utilizing oats forage for cattle feed. In comparison with oat hay, cattle gains were higher for haylage (2.28 pounds daily) than for hay (1.78 pounds daily). The higher weight gains were obtained on about the same dry matter intake for haylage as for hay. This resulted in a 21.8 percent advantage in feed efficiency for haylage dry matter over hay. Taking into account differences in harvesting and storage losses, net cattle gains were 24 percent more from oatlage than from hay harvested from equal land areas. A subsequent trial indicated the advantage for oatlage over dry hay might be as large as 48 percent in terms of cattle gains from land area.

Straw

Oat straw is a widely used by-product for wintering brood cows in the midwest. Research trials conducted at the NDSU Dickinson Research Center indicate satisfactory performance by mature gestating brood cows when oat straw comprised 50 percent of the ration. A recent North Dakota comparison indicated similar cow wintering performance between cows fed corn residue bales free choice or coarsely ground oat straw when both groups of cows received a half ration of good quality hay. Oat straw is slightly more digestible and more palatable than wheat or barley straw but less palatable and digestible than millet straw.

Maturity Effects on Forage

Protein and energy digestibility decline rather dramatically while the fibrous fractions of the plant increase as the plant matures from late boot to mature seed stage. Once it has headed, oats matures more rapidly than other small grains and may quickly become more mature than desired for forage, resulting in head shattering and seed loss.

Other Forms of Oats

There are hull-less varieties of oats, but they are rarely grown. Oat groats (whole seed minus the hulls) are comparable to corn in feeding value, but the price is not usually attractive for cattle feeding. Experimental results support the experiences of cattlemen that oats grain is a very good "growing feed" but less than satisfactory as a major component of high-concentrate finishing rations.