



IFAS EXTENSION

## **Plant Protein By-product Feedstuffs for Dairy Cattle<sup>1</sup>**

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A number of by-product feeds of the fermentation industries have been used for feeding livestock due to a reduction in exports and an increase in the production of beer and alcohol. Fermentation by-product feedstuffs have been used in dairy rations since the nineteenth century and are noted in the 2nd edition of *Feeds and Feeding* (1900). In a review of distiller feeds in dairy cattle rations by Warner (1970), a pooled summary of Cornell experiments are presented. In his conclusions, distillers dried grains were equal or superior to corn gluten feed, brewers dried grains, soybean meal and linseed meal. Corn grains were superior to rye grains.

### **BREWERS' DRIED GRAINS**

Brewers' dried grains are the dried extracted residue of barley malt alone or in combination with other cereal grains resulting from the manufacture of beer, and may contain pulverized dried spent hops in an amount not to exceed 3%, evenly distributed. Brewers' dried grains are well liked by dairy cattle, provide bulk to the concentrate mix, and serve as a good bypass protein (degraded relatively slowly in the rumen). They may be included in the concentrate at a rate of 20 to 25% or in complete feeds to provide an intake of 8 to 10 lbs daily per cow (as fed). Higher

amounts may reduce the overall desired energy concentration of the ration.

### **WET BREWERS' GRAINS**

Wet brewers grains are used extensively by larger dairies in areas near breweries. They are commonly sold by the ton and/or bushel. A bushel of wet grains is equal to about 11 to 13 lbs of dried grains. Most dairymen prefer purchasing by ton rather than bushel. Wet brewers grains contain 20 to 30% dry matter and are usually delivered daily to large dairies and twice weekly to smaller dairies. Recommended rate of feeding is 20 to 35 lbs daily per cow or a maximum of 9 to 10 lbs dry matter daily per cow. Use of larger amounts may reduce dry matter intake because of excess water in the ration, especially where large quantities of silage are used. Research shows reduced dry matter intake as the moisture level of the total ration approaches 50%. Brewers grains, either wet or dry, are a medium source of energy. Wet brewers grains deteriorate quite rapidly during hot weather and should be fed within 2 to 3 days and during cool weather in about 5 to 6 days. Placing wet material on a concrete slab, under plastic or shade, and covering with salt (10 to 25 lbs/ton) will delay spoilage during hot weather.

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## CORN GLUTEN FEED

Corn gluten feed is the commercial shelled corn that remains after extraction of the larger portion of the starch, gluten and germ in the manufacture of corn starch or syrup. About 12 to 13 lbs of corn gluten feed is produced per bushel of corn processed.

Renewed interest has occurred in recent years in corn gluten feed due to increased availability and favorable pricing. Research has demonstrated that dry or wet corn gluten feed could be used for dairy cattle feeding at levels up to 25 to 30% of the total ration dry matter or about 10 to 15 lbs daily per cow. Dairy farmers have been successful with higher levels of corn gluten feed where forages such as corn silage and alfalfa hay were abundant. However, since considerable variation occurs in color and quality of corn gluten feed, restricting the level to 20 to 25% of total ration dry matter is suggested. Light-colored product is usually preferred since a darker colored product may indicate that heat damage has occurred during drying. However, as more steep water is added, the product also will become darker in color.

## DISTILLERS' DRIED GRAINS

Distillers' dried grains are by-products resulting from the yeast fermentation of grain for the production of ethyl alcohol. Other similar products are distillers' dried solubles and distillers' dried grains with solubles. The common name used by most feeders is distillers grains. While corn is the predominant grain, other grains may be used in the process, such as barley, rye, wheat, or sorghum grain.

Distillers' grains usually contain about 27% protein (90% dry matter) and is similar to corn in energy content. There is some variation in protein content, fat, color and texture between suppliers. Distiller's grains are a source of good bypass protein since the protein is degraded relatively slowly in the rumen.

Distillers' feeds have been used in cattle and ruminant rations since the nineteenth century. Distillers grains are an excellent source of energy and are frequently used to improve palatability and nutrient balance of ration. Levels normally recommended in dairy cattle rations are 20 to 40% of

the concentrate and 20 to 30% of the total ration dry matter.

Malt sprouts consist of dried sprouts and rootlets produced during the malting (germination or sprouting) of barley for beer manufacturing. The sprouts are separated from the malted barley and pelleted. Barley malt sprout pellets contain about 16% protein, 63% TDN and 24% acid detergent fiber (ADF) (as-fed). A dietary maximum of 15 to 20% is suggested due to their lower energy value. Availability and costs have been very competitive in recent years in the southeast.

## WHOLE GIN-RUN COTTONSEED

Whole gin-run cottonseed is a nutritionally adequate and acceptable feed for dairy cattle. The lint fibers clinging to the seed add to their value. The physical form of whole cottonseed (WCS) is a suitable feed without further processing. Whole cottonseed contains about 26 to 31% ADF, 85 to 90% TDN, 15 to 21% crude protein and 15 to 17% fat (as fed). Since cottonseed may contain less protein (12 to 15%) and more fiber than listed in standard feed composition tables when grown or harvested under adverse conditions, a laboratory analysis is suggested.

Expected responses in milk yield and milk fat percentage are not always attained when feeding whole cottonseeds, apparently due partially to possible roughage interactions. Dry matter intake is usually increased when WCS is included with fair quality roughages and more acid silages. Whole cottonseed may depress intake if fed at greater than 15% of the ration dry matter or greater than 7 to 9 lbs per dairy cow per day. Success has been obtained with higher levels. Even so, recommended amounts for maximum response are 4 to 7 lb daily per cow.

Effect on milk fat percentage is variable, with studies reporting from 1 to 3 points increase (from 3.3 to 3.5 etc.) to that much decrease, depending on the roughage source and amount. Increasing calcium from 0.70 to 1.0% of ration dry matter appears to have little or no benefit in WCS rations.