



Heifer Management Blueprints

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Distillers Grains for Dairy Heifers

Introduction

Because of the recent expansion of the ethanol industry, either dry distillers grains with solubles (DDGS) or wet distillers grains with solubles (DWGS) have become widely available to the dairy industry. Often, distillers grains can be purchased at highly competitive prices, making it a highly attractive feed to include in dairy replacement heifer diets. Typically, nutrients in distillers grains make it a very desirable feedstuff, but positioning distillers grains in heifer diets can be challenging.

Feeding Distillers Grains to Dairy Heifers

The primary advantage in feeding distillers grains to dairy heifers is cost. There are no known biological or nutritional advantages or disadvantages associated with feeding distillers grains to dairy heifers. Research trials, which fed distillers grains to heifers, observed normal growth rates, normal reproduction and normal subsequent milk production.

Challenges with Feeding Distillers Grains to Dairy Heifers

The challenges associated with feeding distillers grains to dairy heifers are:

- Distillers grains are high in energy and excessive supplementation may result in over-conditioned heifers
- Distillers grains are rich in free, largely unsaturated oil of which the effects to feeding heifers is largely unknown
- Distillers grains are high and phosphorus and the phosphorus requirement of dairy heifers are low
- Distillers grains are low in lysine and the dynamics of lysine supply has not been extensively studied in dairy heifers

Feeding Guidelines

The nutrient and fatty acid contents of distillers grains with solubles are presented in Table 1. There are a moderate number of research trials that have successfully fed distillers grains to dairy heifers, but most trials were not designed to specifically evaluate distillers grains as a protein supplement per se. In most trials, researchers limited distillers grains to <20% of the dietary dry matter. Researchers at South Dakota State University have fed up to 40% of the diet as distillers grains which resulted in excessive heifer growth rates (>2.4 lbs/d). High supplementation rates of distillers grains results in diets high in dietary fat (7-9%) and the effects of high supplementation rates of unsaturated fat to dairy heifers has not been investigated. The fatty acid composition of distillers is primarily C18:2 which is bio-hydrogenated in the rumen to C18:0 (Table 1). Under certain dietary conditions (high intake, fast passage rate, low ruminal pH, etc.) not all C18:2 will be bio-hydrogenated resulting in some C18:2 being absorbed. Research with lactating cows and steers has demonstrated some isomers of C18:2 (conjugated linoleic acid : CLA) can be absorbed and these C18:2 isomers may have highly active metabolic effects. Research data with growing steers fed high concentrate diets have observed an increase in pelvic fat deposition and increases in C18:2 composition of adipose tissue. Because heifers are fed high forage, low energy diets with moderate ruminal passage rates, bio-hydrogenation of moderate amounts of C18:2 to C18:0 should readily occur. Because very little information is available on the possible negative or positive aspects of feeding unsaturated fats to dairy heifers, it is prudent to take a conservative approach and limit unsaturated fat content in heifer diets to approximately 5.0% of dietary DM (Table 2). This guideline results in suggested guidelines of feeding heifers up to 20.0%

of the dietary DM as distillers grains (Table 2).

An irreconcilable nutritional issue with feeding distillers grains to dairy heifers up to 20% of dietary DM is excessive levels of phosphorus will be fed (Table 2). Feeding phosphorus at 100-200% of requirements has not been demonstrated to effect animal health, but nutrient management programs may be compromised, as excess phosphorus will be excreted in the feces.

Distillers grains with solubles may also be high in sulfur (0.35-0.55% DM) and high dietary sulfur levels may be linked to polyoencephalomalacia in rapidly growing heifers. There is no direct evidence feeding distillers grains results in an increased incidence of polyoencephalomalacia, but dietary sulfur levels should be carefully monitored as a prudent nutritional management practice.

Forages and Distillers Grains?

Because distillers grains are high in energy, fat and phosphorus, forages that are low in these nutrients better facilitate the feeding of distillers grains. Good compliments to distillers grains include corn stalks, corn stalk silage, mature oatlage, wheat straw, oat straw, sorghum-sudan grass, low energy grasses, soybean stubble and other low energy forages. Heifer feeding programs based on high energy corn silage and high quality alfalfa hay or silage do not facilitate feeding high amounts of distillers grains in heifer diets.

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Table 1. Nutrient and fatty acid composition of distillers grains with solubles

Item	Unit	Average	Minimum	Maximum
CP ¹	% of DM	26.7	23.0	29.0
NDF ²	% of DM	30.2	24.7	39.7
NDF digestibility	% of NDF	59.0	39.5	74.9
Non-fiber carbohydrate	% of DM	35.8	24.2	45.9
Fat	% of DM	16.4	13.7	19.0
Fatty acids	% of DM	13.2	11.4	15.5
C20-C24	% of Fatty acids	0.8	0.4	1.1
C18:3	% of Fatty acids	1.5	1.3	1.9
C18:2	% of Fatty acids	53.9	51.8	58.0
C18:1	% of Fatty acids	25.0	21.8	26.1
C18:0	% of Fatty acids	2.1	1.9	2.2
C16	% of Fatty acids	14.2	13.5	14.8
C8-C15	% of Fatty acids	0.2	0.1	0.9
Ca	% of DM	0.1	0.0	0.5
P	% of DM	0.9	0.5	1.2
K	% of DM	1.2	1.0	1.5
Mg	% of DM	0.3	0.3	0.4
Ash	% of DM	5.7	2.9	8.8

1 Crude Protein, 2 Neutral Detergent Fiber

Table 2. Guidelines for feeding distillers grains with solubles to dairy heifers

Item	Heifer body weight, lbs			
	300	600	900	1200
Intake				
Dry Matter Intake, lb DM/d	8.4	15.1	20.3	23.1
Estimated Maximum				
Distillers Grains, % of DM	20	20	20	20
Distillers Grains, lb DM/d	1.68	3.02	4.06	4.62
Diet Density				
Dietary Fat, % of DM	5.0	5.0	5.0	5.0
Dietary Phosphorus, % of DM	0.37	0.37	0.37	0.37
Phosphorus Requirement				
Dietary Phosphorus Requirement, % of DM	0.25	0.25	0.20	0.18