

## Non-Fat Dry Milk in Drought Diets

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**Composition of Non-Fat Dry Milk** : Protein: 34—37%, TDN: 90%, Lactose: 50 — 52%, Fat: .6 — 1.25%, Ash: 8.2 — 8.6%, Calcium: 1.35%, Phosphorus: 1.1% and Potassium 1.7%.

- Protein is 80% casein and 20% whey and is essentially 100% degraded in the rumen. (Taniguchi et al., 1995, *Journal of Animal Science* 73:236; Koster et al., 1996, *Journal of Animal Science* 74:2473; Stock et al., 1986, *Journal of Animal Science* 63:1561).
- Energy is equal to or better than corn. Contains 50% lactose which is rapidly degraded in the rumen.
- Source of rumen degradable protein for low-quality forage diets — stimulates microbial growth. (Stock et al., 1986, *Journal of Animal Science* 63:1574; Hendrix et al., 1973, *Nebraska Beef Cattle Report* 73:17; Prokop et al., 1976, *Nebraska Beef Cattle Report* 76:37).

### Usage

An excellent source of degradable protein, energy, calcium and phosphorus stimulates microbial protein synthesis by supplying peptides, amino acids and readily available carbohydrate (energy). Limitations are that non-fat dry milk will supply no undegradable protein. Higher levels also may cause negative associative effects from the lactose in forage-based diets. Handling bagged dry milk poses problems in storage and feeding. It is important to obtain advice on handling before determining value. Cubing with distillers grains or limit feeding with salt may be possible.

### *Protein in Forage-based diets*

Non-fat dry milk will work well as a degradable intake protein (DIP) source in corn silage based diets, grass hay diets, crop residue diets such as grazing cornstalks, harvested stalks, or wheat straw, and will work well in grazing low-protein range. Because this product is 100% DIP, adding more than is needed for DIP will not further increase protein supply to the animal. Unlike urea, toxicity is not a problem when fed at moderate levels (two to four lb/day).

### *Protein in Limit-fed concentrate diets*

In situations where cows are maintained by limit-feeding high-concentrate diets or with backgrounding calves on high-energy diets, non-fat dried milk will provide an excellent protein source. However, if diets contain feeds such as corn gluten feed, which are highly degradable protein sources, then non-fat dried milk will have less value for the animal.

### *Complementary protein sources*

Another approach for this product is to mix non-fat dried milk with other protein sources that may complement its use. A 50:50 mixture (DM basis) of non-fat dried milk and dried distillers grains will supply a 35% protein product that is 70% DIP, 30% UIP. This mixture is equivalent to soybean meal in degradability, but lower in total protein while feeding rates may be higher than with soybean meal, this mixture would work well in most feeding programs. This mixture ensures that microbial protein requirements are met in the rumen (DIP) while supplying enough bypass protein or UIP to meet the animal's protein requirements. This product appears to handle well as a pelleted cube along with distillers grains. Other UIP protein sources can be used with this product to help complement its protein profile. However, we recommend relatively cheap sources such as dried distillers grains, wet distillers grains, or feather meal. Because feather meal is much higher in total protein (85% CP; 60% UIP), very little is required relative to non-fat dried milk.

### *Energy source*

Higher levels of non-fat dried milk have been and can be fed. However, feeding greater than 3 lb per head per day or greater than 15% of the diet will primarily provide extra energy. The energy value is similar to corn. Lactose is the predominant sugar in non-fat dried milk and will probably feed like starch. Caution is required because the sugar is rapidly available in the rumen and the particle size is very small in this product. Proper mixing is required or limiting its use to avoid digestive upsets. Based on producer usage in 2002, higher levels of up to 5 to 6 lb per head per day appear to be manageable. Some have observed an increased incidence of bloat with higher feeding levels.

## Handling and storage

This product does not handle like traditional feedstuffs. The product is a very fine particle, dry product, and is available in bags. Therefore, the product should be removed from bags, which is challenging when large amounts are being handled. The product will not flow well through mills, but can be handled with front-end loaders, or belts. Because this is a dry product, moisture should not be added to the product during storage but moisture added at the time of feeding may improve handling characteristics and palatability.

## Ration Suggestions (1100 lb cow)

### Early Lactation

1. 60 lb corn silage, 2 lb NFD<sup>M</sup>, 0.55 lb DDG<sup>a</sup>
2. 25.5 lb grass hay (53% TDN, 6% CP), 2 lb NFD<sup>M</sup>, 2.8 lb DDG
3. 21 lb residue (45% TDN, 4% CP), 2 lb NFD<sup>M</sup>, 5.5 lb DDG, 2 lb concentrate<sup>a</sup>
4. 9 lb residue, 2 lb NFD<sup>M</sup>, 6.7 lb DDG, 6.7 lb concentrate

### Late Lactation

1. 55 lb corn silage, 2 lb NFD<sup>M</sup>
2. 28 lb grass hay, 2 lb NFD<sup>M</sup>, 1.6 lb DDG
3. 23 lb residue, 2 lb NFD<sup>M</sup>, 4.5 lb DDG
4. 9 lb residue, 2 lb NFD<sup>M</sup>, 3.3 lb DDG, 8.3 lb concentrate

### Gestation

1. 47 lb corn silage, 2 lb NFD<sup>M</sup>
2. 25 lb grass hay, 2 lb NFD<sup>M</sup>
3. 22 lb residue, 2 lb NFD<sup>M</sup>, 0.8 lb DDG, 1.7 lb concentrate
4. 9 lb residue, 2 lb NFD<sup>M</sup>, 9.15 lb concentrate

<sup>a</sup>NFD<sup>M</sup> = nonfat dry milk; DDG = distillers dried grains; concentrate containing any of the following: corn, milo, corn gluten feed, soybean hulls, wheat midds or DDG (DDG should be limited to 10 lb/day total); residue would be wheat straw, corn, milo or other comparable crop residue.

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