

Dry Propylene Glycol

An alternative to drenching

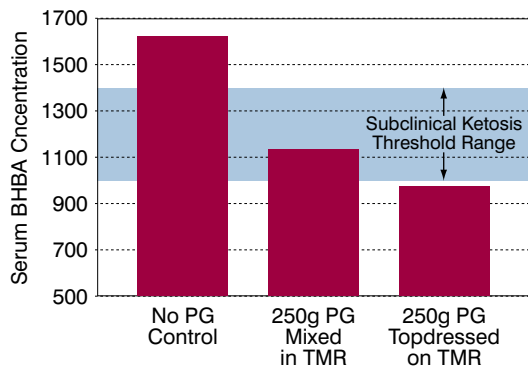
Ketosis is one of the most common metabolic disorders during the first month of lactation in high producing dairy herds. It is caused by negative energy balance due to insufficient energy intake to support energy output in milk. Although typical clinical signs of ketosis are hard to define, they may include poor appetite, muscle weakness, abnormal rumen contraction, high urine ketone test, decreased milk yield and lost of body weight. Subclinical ketosis differs from clinical ketosis in that there are excess circulating ketone bodies in blood but there is an absence of clinical signs of ketosis.

Clinical ketosis has been reported to be associated with increased risk of metritis, displaced abomasum and mastitis while subclinical ketosis is associated with reduction in milk, increased risk of clinical ketosis, metritis and impaired reproductive function. Cost of treating clinical ketosis, including the cost of lost production has been estimated at approximately \$US 150 per case and \$US 78 per case for subclinical ketosis. The incidence rate of clinical ketosis has been reported to be between 5 to 16 % and subclinical ketosis to be between 9 and 34%.

Oral drenching of liquid propylene glycol (PG) is a typical practice in the prevention and treatment of ketosis in fresh cows. Liquid drenching, however, requires skilled personnel, is labour intensive and sometimes can be detrimental to the animal who receives the oral drench.

Researchers at Penn State University investigated the use of a commercial dry PG product as an alternative, readily available energy source to alleviate negative energy balance and reduce the prevalence of subclinical ketosis in fresh cows. Dry propylene glycol was fed once daily starting at calving until 3 weeks after parturition. Cows received either no dry PG (control group) or 250 grams of dry PG per cow per day either mixed into the TMR or dry top-dressed onto the TMR.

The serum beta-hydroxy butyric acid (BHBA) threshold concentration used to define subclinical ketosis ranges from 1000 to 1400 $\mu\text{mol/L}$ (see graph



above). Based on this range, cows that received dry PG top-dressed were at lower risk of clinical ketosis compared to control cows. Cows receiving dry PG mixed into the TMR had normal serum BHBA levels indicating that they were in more positive energy balance compared to control cows. Dry matter intake was not different between groups. However, cows receiving the dry PG increased their intake more rapidly over the 3 weeks of lactation compared to the control cows.

In a more recent study, the same researchers demonstrated that 250 g of dry PG per cow per day elicited a 92% increase in the concentration of circulating insulin 1 hour after the administration of the dry PG top-dress. This surge in blood insulin indicated a similar biological response to drenching of liquid PG. Dry matter intake did not differ between groups in this study.

The researchers concluded that dry PG can be fed either by mixing into or by top-dressing onto the TMR. Mixing dry PG into the TMR distributes readily available energy at a slower rate for a longer period of time while top-dressing dry PG onto the TMR stimulates a surge of insulin secretion similar to a drench of liquid PG. Mixing dry PG into the TMR for a few days to a week after freshening can help to reduce incidence of ketosis and is economically equal to drenching liquid PG during this same time frame. The use of dry PG can provide additional energy to cows that are not eating well after freshening and/or are ketotic and can be used in place of liquid PG drenching.

source: Ruby Chung & Gabriella Varga, Penn State University