

What is Milk Urea Nitrogen and How is It Interpreted?

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Milk urea nitrogen (MUN) is another tool to assess the protein and energy balance status of a group of dairy cows and can be used for minimizing feed costs while maximizing production. Milk urea nitrogen indicates the amount of urea found in milk and these values are closely correlated with the concentration found in the blood. MUN values can be used in conjunction with evaluating milk production records, feeding management practices, and dry matter intake, degradable protein, undegradable protein, nonstructural carbohydrates, and water intakes.

What does milk urea nitrogen mean to the dairy cow?

When a dairy cow consumes protein, it can be broken down to ammonia in the rumen, absorbed as amino acids and peptides in the small intestine, or excreted in the feces. Excess ammonia, however, is absorbed across the rumen wall and passes to the liver via the portal vein where it is converted to urea. Urea then can either be recycled back to the rumen through saliva or be excreted in the urine. The important thing to know is that the amount and rate of carbohydrate digestion in the rumen are the primary regulators of microbial protein synthesis. In order to capture the ammonia, the rumen bacteria require an energy source, fermentable carbohydrates. Therefore, sufficient, but not excessive, amounts of fermentable carbohydrates (nonstructural carbohydrates) must be provided for optimum rumen function and microbial synthesis. Excretion of excess urea is an energy requiring process since cows have to expend 2 Mcal or more of energy to excrete the excess urea through the urine. This cost is estimated to be equivalent to 0.5 kg milk per unit increase in milk urea nitrogen. Excess concentrations of urea in the blood can affect milk production, reproductive efficiency, embryo survivability, immune function, and the environment. It has been shown that there is a strong positive correlation between blood urea nitrogen and milk urea nitrogen.

What does milk urea nitrogen mean to the dairy farmer?

MUN can be a useful tool when looking at a dairy ration and possible causes of low milk production and fertility. Urea is an indicator of the balance of the rumen system so excessive levels of MUN (greater than 18 mg/dl) signal a red flag in a protein imbalance, a shortage of carbohydrates or poor microbial environment in the rumen. Therefore, high levels of MUN may reduce milk production resulting in economic loss.

The first thing to check is milk production. If the dairy cows produce less milk than expected, excess protein consumption results in elevated MUN levels. This low milk production may be caused by diets with high MUN levels (i.e., a very high percentage of alfalfa haylage or lush vegetative pasture) resulting from incorrect feeding management, too high degradable protein, or insufficient fermentable energy in the ration. At the same time, keep in mind that diets containing too much undegradable intake protein do not supply adequate amounts of ammonia for optimal rumen microbial synthesis resulting in low MUN levels. The amount of water a cow consumes can also affect the concentration of MUN and inadequate water (i.e., dehydration) would be expected to increase the concentration of urea in the blood and milk.

What values to look for?

The concentration of MUN does vary between cows, season of the year, and breed (Jerseys are higher than Holsteins). Although scientists differ in their suggested “normal ranges”

for MUN's for groups of dairy cows, a general rule of thumb is that the average herd MUN should fall between **10 and 16 mg/dl**. If the average MUN level is outside the normal range, it is a good idea to determine the cause. It is recommended a minimum of 10 cows be sampled to determine an average MUN value for a group of dairy cows.