



Dairy Briefs



The Latest Information
on Dairy Cattle Nutrition

The Value of Milk Urea Nitrogen

Laura Martin, M.Sc



Recently DFO started reporting bulk tank Milk Urea Nitrogen (MUN) results for each milk pick up. MUN can be a great management tool to help nutritionists and producers ensure that the proper diets are being fed to the cows.

There are many factors that influence MUN, so before relying on MUN to make ration changes all factors should be carefully considered.

MUN is a measure of urea concentration in the milk. All cows produce urea as a result of protein metabolism in the rumen and urea passes easily into the milk. For Holsteins the typical MUN ranges from 10 – 14 mg/dL (Jerseys and Brown Swiss tend to have higher MUN values). If MUN is outside of this range it means that something is affecting the rumen and impacting protein metabolism. Values that are too high could mean that the rumen microbes aren't using all the protein that they are getting. Whether they are getting too much protein or there is something that is preventing them from using the protein may not be easy to figure out. Values that are too low might mean that rumen microbes are not getting enough protein and that may be limiting milk production.

When using MUN as a herd management tool, it is important to note that every herd is different. It is best to establish a baseline "normal" for your herd over a minimum 3 month period. Day-to-day values can fluctuate widely. Once a baseline is established, it is best to look at weekly averages of MUN values before making changes. Bulk tank tests give a snapshot of the whole herd, similar to bulk tank Somatic Cell Counts. It is best to use bulk tank testing as a signal, if the

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Inside this Issue...

The Value of Milk Urea Nitrogen

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range is outside the herd “normal”, to dig deeper into the source of the problem. If the herd is split into different production groups, with different diets, individual cow testing in each group can help decipher where the issue is coming from.

Cow and environmental factors can impact rumen health and therefore MUN values. As mentioned above, breed can affect MUN, with smaller breeds usually having higher MUN results. MUN is highest 60-70 days after calving, so cows early in lactation will show higher MUN. This may be a result of fresh/early lactation cows receiving a more nutrient dense diet than later in lactation. Also fresh cows that are breaking down body tissue for energy can show increased MUN levels. Cows milked 3 times a day tend to have higher MUN than cows milked 2 times. Ration changes are often made to cows milked more often to help support the higher production, and this may contribute to the higher MUN. Time since feeding and time of day can both affect MUN. MUN tests done at evening milking are often higher than those done in the morning, which may tie into time since feeding as MUN peaks 3-5 hours after feeding. Cows milked early in the morning are typically milked before this peak time and consequently show lower MUN. Time of year

can also impact MUN, with values highest in the summer months. Cows are at greater risk for acidosis in the summer, which can alter rumen protein metabolism and increase MUN values. These triggers for high MUN are hard to change but they do need to be considered before making major ration changes based on MUN results.

Protein is the main influencing factor on MUN levels, with dietary protein levels and sources both having a large impact. Protein levels in the diet influence how much protein the rumen microbes have access to; not enough and MUN is low, too much leads to high MUN. Protein source can also affect MUN levels. If the diet has too much rumen bypass protein, even though it might show having enough total protein in the ration, the rumen microbes do not have access to it and low MUN levels result. If diets are high in soluble protein, this is highly available to the rumen microbes and then it seems as if the diet is too high in protein.

The logo for summerSTART features the word "summer" in a lowercase, rounded green font, followed by "START" in a larger, bold, uppercase font with a white outline and a registered trademark symbol. A green swoosh underline is positioned beneath the text.

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Rumen microbes also need energy to metabolise protein. Diets that are too low in starch/sugars can result in high MUN, even if protein levels are good. The microbes can't use the protein coming into the rumen and so it appears as if there is too much protein in the diet. The main dietary impacts on MUN are summarized in Table 1.

There are many reasons why a ration may appear to be incorrectly balanced. Most farms in Ontario take multiple cuts of haylage each year. These cuts can have very different protein levels and profiles. There is often a delay, whether in communication or waiting for sample results, between starting to feed a new haylage and having a ration balanced for the new haylage. Even something as small as a moisture change in the haylage can affect how much protein the cows are receiving. Ensiled crops can have quite high levels of soluble protein, which can increase the longer they ferment. Re-testing forages throughout the year is an important management tool to ensure the ration is balanced properly. Corn silage also changes the longer it ferments. Sugar and starch in new crop corn silage is not as available to the cow as it is after the silage has had a chance to ferment. The low availability may cause high MUN in the fall due to inadequate energy limiting protein metabolism in the rumen. Corn/grain grind can have the same effect, with too coarse of a grind reducing available energy for the rumen microbes. The old story is that there are three rations for the cow: the one the nutritionist formulates, the one that gets mixed on-farm, and the one that the cows consume. Differences in these rations can lead to unexpected MUN results. Rations that are easy for the cows to sort may lead to large variations in MUN between cows and on a day-to-day basis.

MUN can be an excellent management tool when it comes to optimizing milk production for your herd. There are many factors that affect MUN values that should be assessed before making any changes. Talk to your nutritionist or feed rep about using the new MUN results to help make management and ration decisions on your farm.

Table 1: Dietary Effects on MUN Values

Low (<10)	High (>14)	Potential Causes
Not enough dietary protein	Too much dietary protein	-Cows not getting ration (sorting/poor mix) -Haylage change (moisture/cut) -Ration not balanced
Too much bypass protein	Too much soluble/degradable protein	-Cows not getting ration (sorting/poor mix) -Haylage change (moisture/cut) -Ration not balanced
High starch/sugar in diet	Low starch/sugar in diet	-Fermentation level of ensiled crops -Grain processing -Silage processing -Ration not balanced

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Mathieu Patenaude
Gillette Farms Inc.
Embrun, ON

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