



Milk urea nitrogen and bulk tank sampling

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Practically, the variation in milk urea nitrogen (MUN) measurements in a dairy herd shows a large variation. The standard deviation is estimated to be ± 4 MUN units (mg/dL). This means if the true value, for example, is 14, two-thirds of the cows will vary between values of 10 to 18.

Also keep in mind that somatic cell counts have an even bigger standard deviation than MUN values and, irrespective of that, we still use somatic cell count as a critical mastitis management tool.

The critical point is that these values are only really useful if we consider the measurements on individual cows or specific groups of cows, such as comparing first-lactation cows with older cows.

Herd (bulk tank) MUN values should therefore be applied in the same way as herd somatic cell counts when interpreting the results. A single MUN value is therefore NOT a reflection of any variation among feeding groups, parity, breeds, days in milk, or the relative contribution of each cow to the MUN values in the bulk tank. As a single bulk tank value simply reflects the average of the herd, all these factors will contribute to incorrect assumptions regarding management interventions in the herd.

Figure 1 illustrates the importance of knowing the MUN values of each individual cow. Although the mean value in this herd (on the test day) is within the acceptable norms, more than 48% of the cows are in the higher danger zone for MUN.

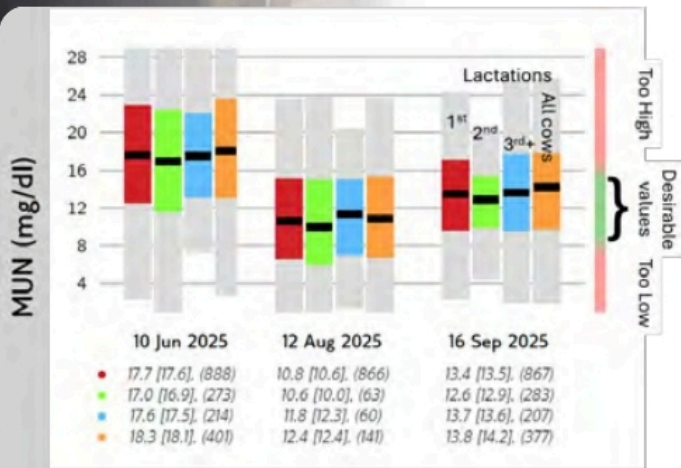


Figure 1 MUN values (average and spread) for a whole herd on three consecutive test days

Management reports from Logix Milk enable farmers to create reports for groups of cows, as illustrated in Figure 2, where the mean and spread (variation) of MUN values in a specific feeding group are investigated for management and nutritional purposes.

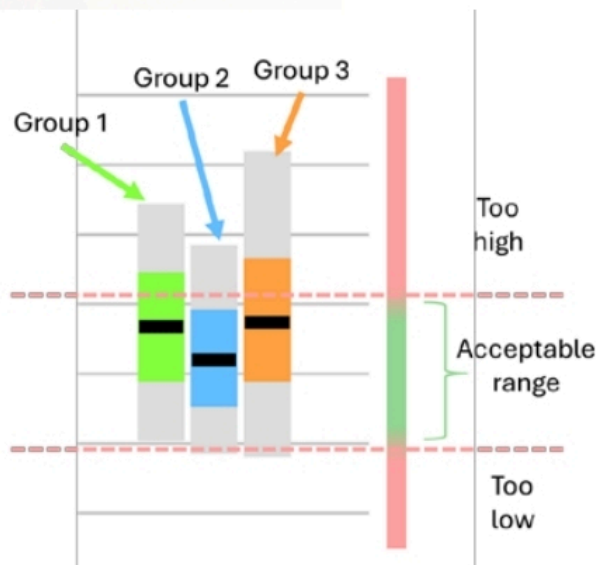


Figure 2 MUN values (average and spread) for specific feeding groups of cows in the herd

Figure 2 provides an excellent example of how separating MUN values of treatment groups of cows gives the farmer and his advisers a clearer picture of the situation in the herd. Only specific feeding groups are shown, which is possible only if the MUN values of individual cows are available. The MUN values of Group 2 is spot-on; the challenge with high MUN values in the herd therefore lies with the other feeding groups (Groups 1 and 3). In these groups, the average

values may appear to be within the desirable range, but a large proportion of cows still exceed the recommended MUN levels.

This illustrates the real danger of making general assumptions based on bulk tank average values for MUN. While many cows fall within the acceptable boundaries, this is essentially only because they form part of the whole herd. Cows fed differently show unacceptably high MUN values, and they not only face the risk of detrimental health effects but also contribute to unnecessary costs and reduced profit.

Dairy farmers and nutritional consultants should use MUN values to determine whether:

- » the feed ration is balanced;
- » the ration on formulated paper, mixed and fed (for each individual cow) is indeed the same as what the cows are actually eating;
- » the values used by the computer match the ingredients that went into the ration;
- » there are undetected equipment problems that may have altered the ration; and
- » each management group is fed optimally.

MUN testing and profitability

MUN levels that are too high or too low rob dairy farmers of income and erode profits. Overfeeding or underfeeding crude protein, or feeding an unbalanced protein-to-carbohydrate ratio, can decrease feed efficiency, increase feed costs, and lower milk production. Milk urea nitrogen analysis can effectively be used to identify potential problems in the feeding programme.

Research at Cornell University has indicated a 10-to-1 return on the cost of MUN testing. This reflects potential savings in feed costs and fewer days open (improved reproduction rate) if MUN testing results in the reduction of unacceptably high MUN levels through corrections to the feeding programme.

Higher levels of MUN concentration point to opportunities to improve the protein feeding system in individual herds, and

especially in specific cow groups. Exactly what needs to be done should be decided in consultation with an animal scientist specialising in dairy cow nutrition. High MUN values may indicate that crude protein levels are too high, rumen-fermentable non-fibre carbohydrates (NFC) are too low, or that the ratio of protein to NFC is not balanced.

In a comprehensive study involving 53 large dairy herds, it was determined that MUN herd levels had a definite impact on feed cost per cow per day (higher MUN equals higher feed costs).

Conversely, herds with consistently low MUN values tended to have lower income over feed costs. The results of the study demonstrate that milk urea measurements offer a useful tool for monitoring the efficiency of nitrogen utilisation in commercial dairy herds. The findings also suggest that diets should be balanced to achieve greater efficiency of nitrogen utilisation, lower milk urea concentrations, and reduced feed costs, while still supporting high milk production. This, in turn, improves income over feed costs.

There are many controlled studies that show a clear correlation between high levels of MUN and impaired reproduction.

Why should a farmer pay for MUN values on individual cows when a bulk tank result is much cheaper?

Milk urea testing has proved more effective in situations where cows are individually sampled. Milk urea nitrogen analyses on individual cows have the following advantages:

- » They enable the dairy farmer to troubleshoot within each ration, feeding regime, or age (parity) group by using MUN summaries.
- » The distribution of MUN levels in a group is precisely known, which is much more valuable than a simple weighted average from a bulk tank.
- » Milk urea nitrogen measuring instruments are rigorously tested for accuracy, and the results from the laboratories used by SA Stud Book can therefore be trusted.

- » Milk urea nitrogen values can be used to ensure the optimum levels based on breed, parity, seasonality, time of sampling (e.g. after feeding), production level, frequency of milking, feeding group, and days in milk of each cow.
- » They provide the dairy farmer with the most accurate information for determining whether a ration is maximising protein utilisation in each herd.
- » Bulk tank samples are useful for gaining a general picture of how the herd as a whole is performing; however, they do not provide sufficient management information, such as which strings are high or low, or whether a certain stage of lactation is out of line. These issues can easily be masked in a bulk tank sample, which will not indicate where to look for a ration or group problem. Averaging the results of individual cows or groups of cows is therefore recommended – something that is only possible with individual sample testing.

Feeding factors that impact MUN results

The key factor is to provide adequate rumen-available carbohydrates that supply the energy necessary for rumen microbes to convert ammonia into microbial protein. The following feeding situations can lead to higher MUN values in a dairy herd:

- » Feeding too much total crude protein in the ration may result in excess protein being wasted.
- » Feeding too much rumen-degraded protein and/or soluble protein can raise MUN levels, even if ration crude protein was normal.
- » If rumen acidosis occurs, microbial protein growth will be inhibited and ammonia will not be captured.
- » Rations low in fermentable carbohydrate (such as starch, sugar, or digestible fibre) can reduce microbial growth, leading to higher MUN values.

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