Western Canadian DHI Services began offering milk urea nitrogen (MUN) testing in May 1999. In Ontario, 2½ years of MUN testing have shown how the results can be used to evaluate lactation diets. But before discussing the Ontario experience, here is the background required to understand how the cow’s diet affects MUN.

As illustrated in the diagram below, ammonia (NH₃) is produced when protein is degraded in the rumen. Ideally, rumen microbes capture this NH₃ to make microbial protein. But to do this efficiently, they require adequate amounts of energy-yielding carbohydrates (CARBO). When degradable protein is fed in excess, NH₃ which is not captured by the microbes is absorbed through the rumen wall into the bloodstream. Blood draining from the digestive system travels directly to the liver which detoxifies NH₃ by converting it to urea.

Amino acids absorbed in the small intestine from the digestion of bypass and microbial proteins are mainly used to synthesize protein. But the nitrogen removed from amino acids which are not required for protein synthesis is also converted to urea by the liver. Urea produced by the liver enters the circulation. From here it may be excreted in urine, recycled into the rumen or absorbed by the mammary gland.

To summarize, blood and milk urea levels can be elevated by:
- degradable protein intakes which exceed the ability of rumen microbes to capture the NH₃ produced. This may be due to inadequate intakes of energy-yielding carbohydrates.
- high levels of bypass protein with amino acid profiles which are not balanced to meet the cow’s requirements. Nitrogen from the excess amino acids is converted to urea.

Initial interest in blood and milk urea levels was stimulated by the results of several research trials which suggested that elevated concentrations could lead to decreased conception rates.

Results of a 13 month study involving 60 Ontario herds were as follows:
- Results from DHI’s infrared MUN test were as accurate as those produced by a more expensive international reference method;
- Metered milk samples collected by DHI are ideal for measurement of MUN. Accurate results cannot be obtained from quarter stripping samples.
- MUN results are useful as a tool for monitoring the efficiency of protein utilization in dairy herds.
- High MUN levels were associated with feeding high levels of protein. Low MUN levels were associated with feeding high levels of fermentable carbohydrates. MUN levels were affected by the balance between dietary protein and energy.
- Group average MUN was not associated with group reproductive performance measured as the proportion of services that result in pregnancy. MUN data produced by routine testing will not be useful as a diagnostic tool either to predict future reproductive performance or to investigate a potential cause of previous fertility problems.
- High herd average MUN levels were associated with increased milk fat yields, but not with increased milk or with total protein yield.
- High MUN concentrations were associated with higher feed costs but not with higher gross revenue – unbalanced diets are unprofitable.

source: S. Godden, Ontario DHI fact finder, 41-006-98