Recently, Michigan Milk Producers Association (MMPA) and other milk marketing organizations began testing for milk urea nitrogen (MUN) from bulk tank samples. Dairy Herd Improvement (DHI) testing organizations also provide MUN testing for samples from individual cows.

What is MUN?
Urea is a normal constituent of blood and body fluids, such as milk. It is formed from ammonia, which is produced in a cow’s rumen from the breakdown of feed proteins and from normal daily metabolism of absorbed amino acids and body proteins. Ammonia is transported in blood to the liver and kidneys where it is converted to urea. Excess ammonia circulating in blood is very toxic and urea is much less so. The conversion of blood ammonia to urea is the body’s way of preventing ammonia toxicity. This conversion of ammonia to urea occurs in mammals including humans and is part of normal body metabolism. The body excretes excess blood urea in urine and milk. Urea is a normal constituent of milk and is part of the non-protein nitrogen fraction of milk. Urea circulating in a dairy cow’s blood and in milk is closely related. Obtaining a bulk tank milk sample to determine MUN is a much easier, non-invasive way of evaluating nitrogen (protein) status of all the milking cows in a herd than obtaining a blood sample from a number of individual cows. Therefore, monitoring bulk tank MUN concentrations has potential as a management tool to evaluate protein feeding of individual herds.

Testing for MUN
Urea concentrations in blood are affected by two factors: the breakdown of dietary protein to ammonia by rumen microorganisms and the normal body metabolism of tissue protein. Much of the dietary protein that enters the rumen is degraded to ammonia by the microorganisms and then utilized to synthesize ruminal microbial protein. Because of this process, the dairy cow is uniquely capable of converting lower quality protein sources into high quality microbial protein...
that the cow can use to produce protein in milk. Changes in blood urea concentrations can be affected by the amount of dietary protein fed and by the efficiency with which rumen microbes convert rumen ammonia to microbial protein. Thus, monitoring bulk tank MUN concentrations offers the potential for dairy farmers, nutritionists, and veterinarians to evaluate ration protein nutrition. Feeding excess protein levels, especially of rumen degradable protein (RDP), may result in MUN concentrations above a normal concentration range. Other factors that can influence MUN concentrations include breed, stage of lactation, level of milk production, cow health, season of year, ration energy concentration, and feed intake.

**Using Bulk Tank MUN Concentrations**

Urea concentration in milk is very small as compared with milk fat and protein. MUN values are reported as milligrams urea/deciliter milk (mg/dl) and can range from 0.5 to 40 mg/dl. Summarizations of several published reports suggest MUN concentration should be between 12 and 16 mg/dl.

If MUN concentrations are greater than 16 mg/dl this may indicate that dietary protein is being used inefficiently. Concentrations of MUN lower than 12 mg/dl may indicate that ration protein levels may be too low to maximize ruminal fermentation and lactational performance. As discussed above, MUN is influenced by many factors. Tracking and graphing bulk tank MUN data for an individual herd as it becomes available from your milk cooperative or processor would be an effective approach to establish a MUN baseline over time. Attempting to use a single test result or only a few MUN values to make ration changes could result in making incorrect ration formulation decisions. After monitoring bulk tank MUN over a period of time, if MUN concentrations are not within the suggested normal ranges of 12 to 16 mg/dl, the possible factors that may be influencing MUN concentrations should be evaluated. Collecting MUN data from individual cows or groups of cows can help pinpoint potential problems to make more informed ration formulation decisions.

**Summary**

Bulk tank MUN data may be a useful tool to assist in monitoring the feeding program and perhaps to relate to excessive nitrogen excretion in manure. Remember bulk tank MUN concentration represents the milk from all of the lactating cows and thus is only a gross evaluation. Individual cow or management group MUN concentrations are required to pinpoint where high or low MUN concentrations are occurring and if adjustments in protein nutrition are warranted in one or more cow groups in the herd.