Milk urea nitrogen- a useful aid to feeding cows during joining?
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We ask a lot from our milking cows every spring, as we expect them to calve down with minimal problems, produce heaps of milk by October or November and then get back into calf by Christmas.

After calving, it can take cows 10 to 12 weeks for their appetite to reach maximum, yet their peak milk yield occurs at around 6 to 8 weeks into lactation. Consequently, cows are in negative energy balance, that is they "milk off their back", until they can eat enough feed to provide the nutrients for their milk production. Cows will not ovulate and cycle until ten days after the point of most negative energy balance.

High yielding cows produce more milk because they either utilise more of their body reserves for milk production and/or they have bigger appetites than the rest of the herd. Therefore it often takes them longer to begin to cycle.

Feeding management during the joining period
The longer it takes cows to reach energy equilibrium, the longer it takes for them to start cycling. Cows should calve down in good body condition, at least condition score 5 and preferably 6 . Cows should be well fed in their first few weeks after calving, to reduce the length of the period when they "milk off their back". Research has shown that it is the energy consumption in the first week after calving that is the most critical in determining the time to first ovulation and heat. Therefore intake of dietary energy should be sufficient so as not to limit milk yield or to increase the period from calving to conception.

In recent years, another dietary nutrient has been found to be an important contributor to the success or otherwise of insemination, namely protein. The previous article described how an excess of degradable protein increases the ammonia concentration in the rumen, thus requiring dietary energy for the liver to convert this toxic ammonia to the much less toxic urea, which is then excreted in the urine. Therefore high intakes of degradable protein mop up energy from the diet, reducing milk yield and increasing the number of days for the cows to reach energy equilibrium.

Very high intakes of rumen degradable protein can also reduce conception rates. High blood urea levels can kill sperm and fertilised ova in the uterus, thus causing cows to return to service.

Milk urea nitrogen
Milk urea nitrogen (MUN) content is a measure of the concentration of urea in the milk and relates directly to blood urea levels, and hence the level of rumen ammonia that is wasted. Unfortunately we do not know sufficient about the factors affecting MUN levels in grazing cows or at what MUN levels, fertility is likely to be adversely affected.

Most of the research into MUNs has been conducted in North America and Europe, where cows are often hand fed total mixed rations, hence eat a more consistent ration throughout the day. However we have collected some information on MUN levels in grazing cows in southern Australia, which can be used as a guideline to help in spring feeding management. It is important that decisions on herd management during joining should be based on MUN levels from bulk milk samples rather than results from individuals or small groups of cows.

Units of measuring MUNs. There are various ways to express the MUN level, which can make it hard to compare results from different testing laboratories. For example, they can be expressed as % urea in the milk (that is, grams of urea per 100 ml of milk), or milligrams (mg) of urea nitrogen per 100 ml milk. Some laboratories even express MUN levels as millimoles (or mM) per litre of milk. The most conventional way of expressing MUN levels is in mg of urea nitrogen per 100 ml milk.

Excess MUN levels. The higher the MUN level, the more protein that has been degraded and wasted in the rumen, hence the more likely that cows may suffer reduced feed conversion efficiency and poorer fertility. However these problems are only likely to become apparent when MUN levels exceed certain trigger levels. Our studies in northern Victoria have shown that MUN levels in spring can be higher than 30 mg MUN/100 ml (which corresponds to 0.064% urea or 10.7 mM/l). Dairy researchers in the US have found that levels exceeding 20 mg MUN/100 ml (which corresponds to 0.043% urea or 7.1 mM/l) can reduce herd fertility. They then recommend feeding strategies to maintain MUN levels at no more than 16 mg MUN/100 ml.

As yet, we do not have firm guidelines for Victorian dairy farmers, but we recommend that herd MUN levels should be closer to 20 than to 30 mg/100 ml. Northern NSW dairy specialists suggest that fertility problems are more apparent when MUN levels at mating exceed 23 mg/100 ml.

Overcoming the problems of high MUNs

While well managed herds are unlikely to have critically high MUN levels, some farmers do report problems of urine scalds and poor fertility. High pasture protein intakes, associated with cows grazing clover dominant pastures may not necessarily lead to excess MUN levels as the cows' associated high intakes of water may help flush the urea (as urine) from the body.

In situations where excess degradable protein is suspected and/or where urine scalds are evident, high energy, low protein supplements should be fed. These can take the form of maize silage, citrus pulp, low protein cereal grains or milking cow pellets. This was discussed in the previous article.

Conclusions

Further research is required in Victoria before MUNs can be routinely used as diagnostic tools to assist producers in their feeding management during joining. To date the only visual indicator of excess MUN levels is urine scalds. However, dairy producers experiencing or suspecting poor herd fertility should seriously consider monitoring bulk milk MUN levels. If they exceed 23 mg MUN/100 ml in the month prior to joining, preventative feeding action should be undertaken.

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