

LOW COST COW/CALF PROGRAM

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Urea

The word itself puts fear into the minds of men. I assume that the cow doesn't worry about it. If she did, we would have a bunch of neurotic cows. Where does urea come from? We generally think of urea as the manufactured chemical that appears as the white prill contained in feed supplements and fertilizers. The combination of ammonia and carbon dioxide, under pressure, creates it. Another major source of urea, which concerns us personally, is that which floats around in our bodies. But we don't eat urea! Our diet, however, does contain urea but only very trace amounts. Milk and meat bring a tad of urea to the table. By far, the major source of urea is that which our bodies manufacture or synthesize.

Metabolism

There are two kinds of metabolism - anabolism (building tissues) and catabolism (degrading tissues). When the anabolic rate exceeds the catabolic rate, we experience growth or weight gain. When the reverse is in play, weight is lost. When the two processes are equal, we are all grown up. Both are essential for life. Catabolism produces the energy that is essential for all of life's functions such as warmth, breathing, heartbeat and occasional brain function. The two processes follow metabolic pathways that are intertwined to some degree. Thus, catabolism provides chemical intermediates that are required for anabolism. The end products of protein catabolism are carbon dioxide, bicarbonate and ammonium. We all are aware that the latter is toxic and we must get rid of it. Depending on the system's pH, ammonium passes directly through the kidney and exits with the urine. Usually, though, the ammonium combines with a carbon fragment in the liver and is converted to urea. Urea is not toxic. It is transported in the blood (blood urea nitrogen - BUN) throughout the body. Saliva contains urea so every time we swallow, urea enters the GI tract. Baseball players don't get much by this route. Urea can en-

ter the large intestine by crossing the intestinal wall to serve as a source of nitrogen in the synthesis of amino acids and protein by the microorganisms harbored there. Of course, the BUN eventually reaches the kidney and is excreted. Elevated BUN elicits a visit to the nephrologist.

What's With The Cow

The cow has the same anabolic and catabolic processes, as do we. Since she is a ruminant animal with pre-gastric fermentation, however, much of her dietary protein can be and is degraded to ammonia. It is likely then that she is confronted with big loads of ammonium and ammonia. Both are toxic and must be utilized by the rumen microorganisms or detoxified by conversion to urea in the liver. The rumen microorganisms require ammonia nitrogen to synthesize amino acids and build microbial protein. The nitrogen is necessary for the biomass to grow and multiply. Fermentable dietary energy also is required by the biomass. The two go together. The microbes' requirement for degradable protein is directly related to the fermentable energy consumed. When the fermentable dietary energy is low, the requirement for degradable protein is similarly low. We use the factor of 0.1 times Mcal of NEM consumed to determine pounds of degradable protein required. After accounting for the dietary degradable protein, supplemental requirements are generally very little.

Urea Cycle

BUN crosses the rumen wall and is a source of degradable protein available to the microorganisms. This is a finite supply so eventually it must be replaced. In walks the degradable protein contained in the diet and occasionally the supplement. If degradable protein is in the rumen, it will be degraded whether it is needed or not. Are there times when the dietary degradable protein is low relative to the fermentable energy? You bet. Are there times when the reverse is true? Again, you bet. When faced with the low protein scenario, consideration is given to supplementing the forage with urea. What if the degradable protein is in excess of the fermentable

energy? It is degraded, ammonia is formed which crosses the rumen wall and is converted to urea in the liver. BUN becomes elevated and eventually the urea will pass through the kidney to be excreted in the urine. This occurs when the forage is at its highest quality. The rub comes with the elevated BUN. Studies with dairy cows have implicated that BUN can alter the uterine environment, reducing conception rate. Various explanations are offered - the sperm are killed, toxic substances never clear the uterus to allow conception to take place, etc. In other reproductive studies, elevated BUN is not considered to be the culprit. Nevertheless, the BUN thing is in the popular press and extension bulletins. Dairy men are cautioned about feeding large amounts of degradable protein just prior to and at the time of breeding. Urea *per se* generally is not involved but oilseed meals containing high levels of degradable protein are involved. Veterinarians are well aware of the association of BUN with poor conception rates. When they see a supplement containing urea, a red flag goes up. This is understandable. **The Rancher who uses his highest-quality forage to condition his cows prior to calving is beyond excessive degradable protein when its time for breeding.**

Rumors

The supplement program we have developed through your consultation has been instrumental in allowing the ranch to remain economical through years of drought. Thank you,

Bill Milton Montana

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