The Myths About NPN

By Jackie Nix

If you could get the same productivity out of your cattle for less cost, wouldn't you consider it? The practice of utilizing non-protein nitrogen (NPN) sources in ruminant feed supplements is long established and has been highly successful over the years. Research has documented that proper use of NPN in feed supplements will maintain production or actually increase production in cases where protein deficiency is present. However, there are many misconceptions concerning the use of NPN in ruminant diets. The purpose of this article is to explore the science behind the use of NPN in ruminant rations. Additionally I will list some of the advantages and disadvantages of this practice so that cattle producers may form an informed opinion on the practice. Before we discuss NPN, it is necessary to understand some basics about how the rumen functions in order to understand how NPN fits in.

Rumen Physiology

The rumen (the first compartment of the ruminant stomach) is essentially a fermentation vat at the beginning of the ruminant digestive system. The rumen houses many species of microbes that feed on the rumen contents. It is important to remember that when you feed a cow you are essentially feeding the rumen microbes. Fatty acids (used as a primary energy source by the cow) and B-vitamins are by-products of the fermentation of rumen contents. Enzymes produced by these rumen microbes break down most of the protein consumed by the animal. One of the resulting by-products from this protein digestion process is ammonia. Ammonia can be utilized in one of two ways. The microbes can use it to manufacture microbial protein or, if the ammonia level exceeds the microbes' ability to utilize it, the ammonia is absorbed through the rumen wall into the blood stream where it is carried to the liver. The liver then detoxifies ammonia and converts it into urea to be excreted into the urine. A portion of the urea is recycled back to the rumen through saliva. Enzymes similar to those that break down proteins rapidly break down urea into carbon dioxide and ammonia in the rumen. This ammonia may also be utilized by the rumen microbes or may pass into the blood stream just as the ammonia resulting from protein digestion.

Rumen microbes use ammonia released from the breakdown of proteins and non-nitrogen sources as a part of their diet. Other necessary nutrients for microbial growth are carbohydrates and minerals. It is essential that ammonia be released simultaneously with available energy for ammonia to be converted into microbial protein. Also, phosphorus, sulfur and trace minerals must be present within the rumen environment in order for microbes to manufacture essential amino acids. The cow receives beneficial protein for its own needs when the bacteria and protozoa pass from the rumen to the abomasum and intestines where the microbes themselves are digested.

What is NPN?

NPN or non-protein nitrogen refers to a source of nitrogen that is not derived from protein. Urea is the most common source of NPN in livestock feeds and supplements. The urea utilized in livestock feeds is a synthetic compound manufactured specifically for feed and fertilizer use. It is not harvested from the

urine of slaughtered animals. Synthetically manufactured urea functions in the same way within the rumen as naturally occurring urea.

Advantages NPN

The primary advantage for use of NPN in ruminant supplements is cost savings. Addition of urea or other NPN sources to a feed supplement allows the effective crude protein level to increase for relatively low cost. Because microbial protein actually utilized by the ruminant animal is the same whether NPN or true protein is utilized, animal performance is maintained. Research has documented that proper use of urea or other NPN sources in healthy, mature ruminants does not result in a decrease in production and in cases of protein deficiency, production is actually increased. Therefore, it makes economic sense to replace a portion of the true protein within the supplement with NPN for cost savings. Depending upon the price of the true protein source being substituted (for example: soybean meal or cottonseed meal), the savings may be substantial. As an example let's compare two similar protein supplements. The cost per head per day for the ForageMax 25% Supplement block, which contains urea, is about $0.22. The cost of a similar all natural protein supplement, the Sweetlix® 16% Poured Block, is about $0.27 per head per day. What is more telling though is that the cost per pound of crude protein is $0.59 for the ForageMax 25% Supplement Block while the cost per pound of crude protein is $1.13 for the Sweetlix® 16% Poured Block. The addition of urea to the ForageMax 25% block resulted in a savings of $0.54 per pound of crude protein provided!

Disadvantages of NPN

While NPN-containing protein supplements can be a great tool for maximizing profitability in cattle operations there are some disadvantages to consider.

NPN should not be utilized with lightweight calves, as their populations of rumen microbes may not be adequate to properly utilize the NPN. Also, calves less than a year old shouldn't receive NPN-containing supplements as a major portion of their dietary intake because the quality of the microbial protein formed may be inadequate for the high requirements of growing ruminants. It also goes without saying that non-ruminants such as horses, pigs, etc. should not be allowed access to feeds or supplements containing NPN. Because these animals lack a rumen and the microbial population necessary to utilize the NPN, toxicity can result. For these reasons, NPN-containing supplements are recommended for mature ruminants only.

If fed <u>incorrectly</u>, NPN can be toxic. Toxicity results when the ammonia released from the NPN exceeds the rumen microbes' ability to convert it into protein. Excessive amounts of ammonia enter the blood stream, thus overloading the liver's ability to detoxify. The rumen pH will rise and normal rumen function will eventually cease altogether. Symptoms of ammonia toxicity include nervousness, excessive salivation, muscular tremors, respiratory difficulty and titanic spasms. Death usually occurs within ½ to 2 ½ hours. Contact a veterinarian immediately to treat cases of ammonia toxicity. As an emergency measure until the vet arrives, you can drench the affected animal(s) with household vinegar. The acetic acid in the vinegar will neutralize the ammonia and lower rumen pH levels, thus preventing additional ammonia from entering the bloodstream.

Using NPN Properly

Supplements containing NPN offer an economical solution to the problem of poor quality forages. NPN allows you to offer higher levels of effective protein to your cattle to help maintain or increase productivity for less cost than "all natural protein" supplements. When fed properly, there is very little risk for toxicity. These NPN feeding tips will help avoid the possibility of toxicity.

- For simplicity sake, only use one type of commercial protein supplement containing urea at a time. If you must use more than one type of supplement that contains NPN, be sure to balance the ration so that no more than 25 to 30% of the total crude protein in the entire diet comes from NPN sources to avoid possible toxicity problems.

- When choosing among free choice protein supplements containing urea make sure that consumption of the supplement is regular and controlled so that cattle are unlikely to over-consume NPN. Urea or other NPN sources are best utilized when consumed in small amounts over a constant period rather than slug feeding. Slow release of ammonia is preferred to a rapid release.

- Do not feed urea-containing supplements to horses, non-ruminants or ruminants without a mature functioning rumen (pre-weaning). Refrain from feeding urea-containing feed supplements to sick cattle that have impaired rumen function (for instance an animal recovering from acidosis or bloat). Also avoid feeding urea-containing supplements to weaned calves less than one year old. These calves should be fed an all-natural protein supplement for maximum productivity.

- Do not feed supplements containing NPN to starved cattle, especially starved cows with calves at their side. Starved cows will try to consume greater than recommended levels of the supplement, plus since their milk production will be poor their calves may be forced to consume supplement before they develop a functioning rumen. Mature cows in good flesh receiving adequate forages can safely and effectively utilize NPN-containing supplements, even with calves at their side. Cows with adequate nutrition will provide enough milk so that calves will be very unlikely to consume enough of the supplement to cause problems.

- Do not feed urea-containing supplements to "shipped in" cattle that have been starved for several days. Give them a chance to overcome the stress of shipping and fill up on "all natural protein" supplements before introducing NPN-containing supplements.

Sweetlix® Protein Supplements Containing Urea

Under the correct circumstances, urea-containing supplements are a smart option for increasing the effective protein level in the diet of mature ruminants without breaking the bank. Sweetlix® offers livestock producers a variety of economical protein supplements containing urea in order to maximize feed conversion in mature ruminants. In all cases, Sweetlix® ruminant nutritionists have carefully formulated safe levels of urea as well as balanced levels of necessary energy and minerals to avoid possible toxicity problems when fed according to recommendations as part of a balanced diet. Sweetlix® auto-regulated consumption technology results in supplements with known and consistent consumption rates. Cattle consume small amounts throughout the day for optimum conversion of urea into microbial protein. Consistent hardness prevents the problems associated with inconsistent intake. Also, the high molasses content in EnProAl® supplements provides the energy and minerals needed by microbes to utilize the added urea. There is no need to feed added corn or other grains in order to properly utilize the NPN in EnProAl® protein supplements. Just follow the simple guidelines for use on the product labels for safe, economical supplementation. Some of the EnProAl® products available that provide NPN as a portion of the total protein content include: **EnProAl® 25% Plus, ForageMax 25%, EnProAl® 24% Supplement, and EnProAl® 25% Supplement**. Pressed block protein supplements containing NPN include: **Sweetlix® 36% Plus Mag Pressed Block** and **Sweetlix® 37% Protein Pressed Block**. Contact your local Sweetlix® dealer, visit www.sweetlix.com or call 1-87SWEETLIX for additional information on each of these products and how you can use these supplements within your operation to help save money while optimizing productivity in mature cattle.

In summary, use of protein supplements containing NPN can be an economically smart alternative for healthy, mature ruminants. When fed properly, these NPN-containing feed supplements help to raise effective protein levels in the total diet to maintain or increase production but at a substantially lower cost than products containing 100% true protein. Sweetlix® supplement products containing urea are carefully formulated to provide safe levels of NPN. Sweetlix® auto-regulated consumption technology results in supplements with regular, consistent consumption rates. Slow consistent consumption of Sweetlix® supplements helps to optimize urea conversion to microbial protein and to avoid possible toxicity. Added molasses in EnProAl® supplements helps cattle more efficiently utilize the added urea for maximum benefit. Just follow the simple guidelines on the product labels for safe and economical supplementation of low quality forages. For situations in which NPN is not a viable option, Sweetlix® offers several high quality all-natural protein supplements including the **EnProAl® 16% Supplement** and **EnProAl® 20% Supplement**. No matter what your situation, Sweetlix® has a quality supplement for you. For more information about the Sweetlix® line of protein supplement products for cattle and guidance to help you decide how they can fit into your management situation, visit your local Sweetlix® dealer location or call 1-87SWEETLIX or visit www.sweetlix.com.

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