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The Cost of N Fertilizer

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Today's producers are facing record high fertilizer prices. Adding insult to injury, this is on top of two years of record drought causing poor growth of pastures and hayfields. Because of this, farmers are shopping around for any cheap source of nitrogen (N) and praying for rain to bring their forages back to life. Producers should know that not all sources of N are equal and cheap sources could end up costing more in the long run.

I checked with some local sources and found, at the time this article was written, that the price of ammonium nitrate (34% N) was around \$450 per ton, ammonium sulfate (21% N) costs around \$350 per ton, liquid N-Sol (32% N) costs \$450 per ton and broiler litter (2.85% N) costs around \$45 per ton. Using this information, we can find the true cost for each N-source.

Commercial fertilizers have an acidifying effect on the soil meaning they tend to lower soil pH and increase the need for lime applications. For example, it will take 61 pounds of ground limestone to neutralize the acidity in 100 pounds of ammonium nitrate and 110 pounds of lime to neutralize acidity in 100 pounds of ammonium sulfate. Therefore, to accurately measure the cost of these sources of N, you need to consider the cost of lime required to maintain soil pH for good forage growth.

Let's assume we want to put 100 units of N per acre on our summer pasture. If I convert the cost of fertilizer to \$/unit N I can more accurately compare the sources and the following will be true:

Ammonium nitrate (34% N) - \$450/ton = \$0.66/unit N or \$66 per acre
Liquid N-Sol (32% N) - \$450/ton = \$0.70/unit N or \$70 per acre
Ammonium sulfate (21% N) - \$350/ton = \$0.83/unit N or \$83 per acre
Broiler litter (2.85% N) - \$45/ton = \$0.79/unit N or \$79 per acre

One hundred units of N from ammonium nitrate requires 180 pounds of lime to neutralize the acidifying effect. At \$30 per ton, lime costs \$0.015 per pound; therefore the total cost for using ammonium nitrate is \$68.70 per acre. One hundred units of N from N-sol requires 172 pounds of lime bringing the cost up from \$70 to \$72.58 per acre. One hundred units of N from ammonium sulfate requires 523 pounds of lime to neutralize the acidity so the actual cost is \$90.85 per acre.

Knowing this, it makes sense that ammonium nitrate is the cheaper source of nitrogen although it has a higher cost per ton. However, because of the world we live in today ammonium nitrate is tightly regulated by the federal government and some fertilizer dealers no longer carry it in bulk. Most dealers are carrying ammonium sulfate and N-Sol. If you have a choice and are willing to deal with the regulations and paperwork, ammonium nitrate is the better pick of the three.

So, what about broiler litter? At \$45/ton broiler litter (2.85% N) you are paying \$0.79/unit N or \$79 per acre for 100 units N. Broiler litter does not acidify the soil as do some commercial fertilizers and in fact may even improve soil fertility with the added organic matter. In addition, broiler litter contains phosphate (P_2O_5) and potash (K_2O) which are not included in the nitrogen sources discussed in this article. Applying equal amounts of P_2O_5 and K_2O from commercial sources could increase the cost by \$60 per acre or more depending on soil test recommendations.

Unfortunately, in the wake of high nitrogen prices, increased interest in the use of broiler litter has made the product a little scarce in the local area but it is readily available in North Alabama if you are willing to pay the additional trucking expense. On the down side, nitrogen content of broiler litter is highly variable depending on the source and management, so it should be tested to ensure nitrogen applications meet forage needs. The use of broiler litter also has its share of the paperwork headache because of current state regulations on the use of animal manures as fertilizer.

In summary, if you can get it, broiler litter may be the better source of N for cattle producers looking for a way to improve forage production without exhausting capital resources. Although it may cost more per unit N in relation to ammonium nitrate, the added phosphate and potash and the “liming effect” make it a reasonable choice in comparison. The only potential pitfalls are the availability of litter and the paperwork associated with its use.

Ammonium nitrate is clearly the cheaper source of commercial fertilizers used in this example but tight federal regulations make it hard to find at local fertilizer dealers. Ammonium sulfate and N-Sol are easy to find but have a greater cost when considering lime requirements to maintain soil pH. In my opinion, if you are using commercial fertilizer and cannot afford to apply lime with it, you may want to consider using lime exclusively, especially if soil pH is already low. The acidifying effect of commercial fertilizer added to an already low pH will further decrease the plants ability to use the nitrogen resulting in poorer performing forages. Where soil test pH is low, lime used exclusively may improve soil pH to the extent that forages perform better by being able to utilize the residual fertility from last year’s nitrogen applications. The only way to know for sure is to soil test.

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