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SOILS

Economics, residual nitrogen drive topdressing decisions

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Adequate nitrogen is necessary for optimizing winter pasture production. One consideration for providing adequate nitrogen is to maximize nitrogen use efficiency (NUE). One way to improve NUE is to apply nitrogen during the late winter as a topdress application.

The reasons for improved NUE from late winter applications are that our primary winter pasture species (wheat, rye, triticale and ryegrass) make the majority of their growth during the spring phase, growing conditions are usually favorable and plant root systems are well established and able to take up the nitrogen. In addition, the time is less between nitrogen application and uptake for leaching or denitrification to occur or for it to be captured by weeds.

Following are a couple of considerations to help decide whether to topdress and, if so, how much nitrogen to apply.

First, what are the potential economic returns from topdressing nitrogen? Remember that nitrogen is only one cost contributor, but it is the only one we will discuss here.

For graze-out systems with stocker calves, compare the value of the potential additional gain with the cost of the nitrogen fertilizer. A couple of very general rules of thumb are one pound of nitrogen will produce about 16 additional pounds of usable, high quality dry matter forage, and it requires about eight pounds of that forage to produce a pound of gain. Using these general rules, for each pound of nitrogen, we expect to produce enough usable forage to produce approximately two pounds of gain. At the time of writing, nitrogen cost is approximately 60 cents per pound ($550 per ton urea) and estimated value of gain for the spring turn is approximately $1.50 per pound (BeefBasis.com). If nitrogen costs 60 cents per pound, and the anticipated value of two pounds of gain is $3, the marginal return would be $2.40 per pound of nitrogen fertilizer applied.

Second, how much nitrogen was applied in the fall and how much residual nitrogen is present? This will help in estimating how much nitrogen is potentially still there and available for the current winter pasture crop. In situations where substantial rainfall occurred or irrigation was

applied, nitrogen may have been leached from the root zone or lost to denitrification. Grazing during the fall phase also removes nitrogen from the system. Another general rule of thumb is approximately 30 pounds of nitrogen are removed per acre for every 100 pounds of beef produced. Remember though, as previously indicated, it requires approximately 50 pounds of nitrogen per acre to produce the required forage to make 100 pounds of beef. This can give a rough idea of how much nitrogen was removed during the fall grazing phase. For example, if total gain was 150 pounds per acre during the fall phase, we can estimate approximately 45 pounds per acre of our fall nitrogen was removed from the system. However, the most accurate way to get a good estimate of available nitrogen is to collect soil samples in late January or early February. To account for all available nitrogen, collect samples as deep as the winter pasture roots will likely penetrate. When collecting subsoil samples, make sure to collect in the depth increments recommended by the laboratory.

It is important to note that, as nitrogen rates go up, the response to each additional pound of nitrogen is less. In the Southern Great Plains, 120 to 150 pounds of available actual nitrogen per acre is usually all most winter pasture crops can economically utilize.

Many other factors, such as weather, winter pasture species, variety, soil type, weed and disease pressure, etc., contribute to the decision about topdressing nitrogen. While all these factors must be considered, evaluating potential economic return and taking credit for residual nitrogen are two of the most important considerations in making wise topdressing decisions. ■