Land Application Example

John P. Chastain

The purpose of this section is to provide a comprehensive example related to nutrient balancing. This example will demonstrate the application of several of the concepts presented. The example will be related to calculation of application rates and estimation of the total amount of land needed to utilize plant nutrients in an environmentally responsible manner.

Example

A poultry producer had the litter from a stacking shed tested for plant nutrients by a laboratory. The laboratory report provided the following results on an as-sampled or wet basis.

	lbs / ton
Ammonium-N	11.0
Organic-N	46.6
Nitrate-N	3.8
Incorporated Available Nitrogen Estimate	40.5
Surface Available Nitrogen Estimate	37.2
P_2O_5	39
K_2O	45
Moisture Content = 10.9%	

The litter will be applied to cropland using a side-discharge spreader with incorporation on the same day.

1. What value should be used as the estimate of the plant available nitrogen?

40.5 lb PAN / ton

2. Assume that the nutrient data shown above is the current rolling average for litter on this farm. Calculate the application rate for corn if the nitrogen requirement is 133 lb N/acre in tons per acre.

133 lb N / ac ÷ 40.5 lb PAN/ton = 3.3 tons / acre

3. Each broiler house has grow-out space for about 25,000 birds. It has been determined that 150 tons of litter is spread per house per year. How many acres of corn would be needed per broiler house based on N?

150 tons/year ÷ 3.3 tons / ac = 45.5 acres of corn

4. How much phosphorous, expressed as P_2O_5, is applied to the cornfields in this example?

The manure analysis report indicates that the litter contains 39 lb P_2O_5/ton. Therefore, the total amount of P_2O_5 applied is:

3.3 tons/ac x 39 lb P_2O_5/ton = 129 lb P_2O_5 / ac.

5. Is this application of P_2O_5 greater than the crop need? If so, how much greater?

From Table 5.3 it can be seen that the amount of P_2O_5 removed with the grain is 44 lb/ac. Therefore, application of 133 lb of PAN/ac provides 2.9 times (129 ÷ 44) as much P_2O_5 as is required by the corn.

6. Calculate the application rate for corn based on phosphorous removal by the grain.

44 lb P_2O_5/ac ÷ 39 lb P_2O_5/ton = 1.1 ton/ac

7. Can a manure spreader be calibrated at such a low rate? What should the producer do?

Very few, if any, manure spreaders can be calibrated to provide this low of an application rate. One option would be to apply litter at a rate of 2.2 to 3.0 tons per acre every other year and use a commercial source of nitrogen after providing proper credit for manure-N.