

# *Managing Tough Times*

## **Livestock Manure Can Reduce Fertilizer Costs**



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Livestock and crop producers can reduce or even eliminate purchases of commercial nitrogen (N), phosphorus (P), and potassium (K) by taking proper credit for manure nutrients applied to their fields. The N, P, and K value of the manure generated annually by a 100-sow farrow-to-finish operation can be worth over \$8,000 at the time it is hauled to the field. (Note that the cost of transporting manure to the field or land applying the manure to cropland is not included here.) Producers can profit from these manure nutrients on their own cropland or by selling the manure to neighboring crop farmers.

### **Replacement Strategy**

The fertilizer bill for a 150 bu/acre corn crop is approximately \$100/acre if only the value of the N applied and the P and K removed by the crop are considered. A 50 bu/acre soybean crop removes approximately \$40 of P and K per acre. Because manure contains more P and K relative to N based on corn crop removal, manure applied to corn based on crop N needs generally contains enough P and K to fertilize a second crop with both nutrients. Therefore, in a two-year corn-soybean rotation, the manure applied to a corn crop can easily be worth \$140/acre by eliminating the need for commercial N, P, and K for both the corn and soybean crops.

Ideally, you should apply manure based on its plant-available N (PAN) content and place it on fields that test low for P and K so that crop production fields can benefit from the added P and K. To maximize manure nutrient value, you need three things: a manure nutrient analysis, application equipment that can apply manure at the desired PAN rate, and soil test reports to determine which fields will benefit most from the P and K present in the manure.

### **Manure Testing**

A complete manure analysis from a soil testing laboratory that includes total N, ammonium N, phosphate ( $P_2O_5$ ) and potash ( $K_2O$ ) provides the most information about the nutrient content of the manure. However, because the turnaround time can be from a few days to a week or more, this information may not be available in time to determine proper manure application rates. You can also estimate manure nutrient content from table values in Purdue Extension publication ID-101, "Animal Manure as a Plant Nutrient Resource."

The N-meter, a simple device that can accurately estimate PAN in liquid manure samples in about 5 minutes, is a quick and practical method for managing manure at the time of spreading for most producers. While the N-meter does not supply information relative to manure P and K, nearly all liquid manure supplies more than enough P and K to grow a crop if manure is applied based on the N needs of the crop. Many Purdue Extension county offices have N-meters that you can borrow.

### **Manure Nutrient Crediting**

You must apply manure uniformly to take full advantage of the nutrients present. Calibrate spreaders to determine how much is actually being applied.

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First, determine the nutrient application rate you are using now. For example, if you currently apply 40 loads of manure with a 3,000-gallon tanker to a 20-acre field, this is 2 loads, or 6,000 gallons/acre. If a manure test indicates 37.5 lb PAN/1,000 gal. and a loss of 20% is expected at the time of application, there would be  $37.5 \times 0.8$  (20% loss) = 30 lb PAN/1,000 gal, or 90 lb. PAN per 3000-gal. load. At 2 loads per acre, this is an application rate of 180 lb. PAN/acre. If the crop you plan to grow will need only 150 lb. PAN, you can quickly adjust the rate as follows:

$$\frac{150 \text{ lb PAN}}{\# \text{ of loads}} = \frac{90 \text{ lb PAN}}{1 \text{ load}}$$

Therefore, the desired application is:

$$\begin{aligned} \# \text{ of loads} &= (150 \text{ lb PAN}) / (90 \text{ lb PAN/load}) \\ &= 1 \frac{2}{3} \text{ loads per acre} \end{aligned}$$

If there are no rate adjustments possible on the applicator, it is necessary to vary the tractor speed. When injecting manure, keep the knife tracks evenly spaced between passes. If manure is surface applied, overlap slightly to avoid gaps where no manure is applied. Although the P and K present in manure will generally not be lost between application and crop uptake, predicting the N remaining for crop use is difficult. If you apply manure in the fall and want to make sure that most of the N will be available for next year's crop, wait until soil temperature drops below 50 degrees.

Fortunately, you can use a soil test called the "presidedress nitrate test" (PSNT) shortly after the corn begins to grow to determine if additional N is needed to maximize corn yield. For a PSNT, take a soil sample

when corn is 6-12 inches tall, and send it to a soil testing laboratory. The turnaround time with this test is generally 24 hours. Because the PSNT determines if sufficient N is present in the soil to maximize corn yield, you can use it to determine if additional N is needed even if you did not know the original application rate or manure analysis at the time of spreading. Note that this information is only useful if the manure was applied uniformly across the field.

## Importance of Soil Testing

While manure nutrients can be worth \$100/acre or more, much of this value comes from the P and K rather than the N. Putting manure on fields with high P and K soil tests reduce the useful nutrient value of the manure to no more than half because the P and K in the manure have no added value on high testing soils. If you must use fields for land application that have high P soil tests, apply manure to meet the P requirement of the crop, and just add the additional N needed with commercial fertilizer. Rotate the fields on which you apply manure so that P does not accumulate. From an environmental standpoint, you should not apply manure to fields with P soil tests of 200 parts per million (400 lbs/acre) or more. For more information on manure sampling and analysis, calibration techniques, and other management options, check with your local Purdue Extension office.

## Reference

ID-166-W, 2008 Purdue Crop Cost & Return Guide.