Land Application Worksheet for Swine Operations

NC STATE EXTENSION

In this example, farmer Jones has a farrow-to-finish swine operation in which lagoon liquid is applied through a travel gun to fertigate a field for corn. His RYE, based on soil type, is 120 bushels per acre, and the nitrogen needed is 120 pounds per acre. He will plant the corn crop in the same field that had soybeans last year. He has riparian buffers next to his field to further reduce the potential of nutrient or pesticide runoff. Farmer Jones collected a waste sample, and the waste analysis indicates 49 pounds of PAN if broadcast and 58.8 pounds of PAN if incorporated per acre-inch of effluent applied. There are also 38 pounds of P_2O_5 and 225 pounds of K_2O available per acre-inch.

Farmer Jones uses a starter fertilizer on his corn crop at a rate to supply 10 pounds of nitrogen per acre and 34 pounds of P_2O_5 per acre. He intends to supply the remaining nitrogen needed using liquid swine lagoon effluent. How much effluent does he need to apply to meet the nitrogen needs of his corn crop? How much will be needed to supplement the crop with additional K_2O or P_2O_5 to satisfy his soil test recommendations of 50 pounds of each nutrient per acre? The answers are given in the worksheet.

Determine Nutrient Needs of Crop

Step	Variables	Example	Your Farm
1. Crop to be grown		Corn (grain)	
2. Total nutrients required	a. N (RYE tables) (lb/acre)	120	
	b. P_2O_5 (soil test) (lb/acre)	50	
	c. K_2O (soil test) (lb/acre)	50	
3. Pounds of starter of pre-plant fertilizer used	a. N (lb/acre)	10	
	b. P_2O_5 (lb/acre)	34	
	c. K_2O (lb/acre)	0	
4. Residual N credit from legumes (Table 2) (lb/acre)		20	
5. Net nutrient needs of crop (lb/acre)	a. Nitrogen: Total need (item 2a) minus additional N from starter (item 3a), minus legume (item 4) N: 120 – 10 – 20 (lb/acre)	90	
	b. Phosphorus: Total need (item 2b) minus additional nutrients from starter (item 3b) P_2O_5: 50 – 34 (lb/acre)	16	
	c. Potassium: Total need (item 2c) minus additional nutrients from starter (item 3c) K_2O: 50 – 0 (lb/acre)	50	

Rate of Manure to Apply

Step	Variables	Example	Your Farm
6. Available nutrients in manure from waste analysis	a. Nitrogen		
	b. Available N broadcast: 98 × 0.5 (lb/ac-inch)	49	
	c. Available N incorporated: 98 × 0.6 (lb/ac-in)		
	d. Available P_2O_5: 38 × 1.0 (lb/ac-inch)	38	
	e. Available K_2O: 225 × 1.0 (lb/ac-inch)	225	
7. Application rate to supply priority nutrient	a. Priority nutrient	Nitrogen	
	b. Amount of priority nutrient needed (lb/acre from item 5a)	90	
	c. Rate of manure needed to supply priority nutrient (item 8b) ÷ (item7a): 90 ÷ 49 (ac-inch)	1.83 acre-inches needed	
8. Application rate to supply priority nutrient	a. Priority nutrient	Nitrogen	
	b. Amount of priority nutrient needed (lb/acre from item 5a)	90	
	c. Rate of manure needed to supply priority nutrient (item 8b) ÷ (item7a): 90 ÷ 49 (ac-inch)	1.83 acre-inches needed	
9. Pounds per acre of all nutrients supplied at the application rate required to meet the needs for the priority nutrient. For each nutrient, multiply the available nutrients (items 7a, 7b, 7c) by manure rate (item 8c).	a. N supplied: 49 x 1.83 (lb/acre)	90	
	b. P_2O_5 supplied: 38 × 1.83 (lb/acre)	70	
	c. K_2O supplied: 225 × 1.83 (lb/acre)	412	
10. Nutrient balance: net nutrient need (–) or excess (+) after application of manure at calculated rate. Subtract the net nutrient needs of the crop (items 5a, 5b, 5c) from the nutrient rate applied (items 9a, 9b, 9c).	a. N balance: 90 – 90 (lb/acre)	0	
	b. P_2O_5 balance: 70 – 16 (lb/acre)	+54	
	c. K_2O balance: 412 – 50 (lb/acre)	+362	

Source: Calculation format modified from Pennsylvania Department of Environmental Protection, *Field Application of Manure*, October 1986.