

Using Manure From A Livestock Operation

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Long Term Swine Effluent Study

- **Question #1:**
 - **What soil factors change when swine manure is applied on an annual basis?**

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- **Question 2:**
 - **Are there crop growth problems associated with annual applications of swine manure?**

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- **Question 3:**
 - **Can a corn/soybean rotation be utilized with annual applications of injected swine manure?**

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- **Manure properties:**
 - **pH**
 - **N**
 - **P₁**
 - **K**
 - **Soluble salts**

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Long Term Swine Effluent Study

Manure pH:	<u>Year</u>	<u>pH</u>
	1995	7.7
	1996	7.7
	1997	8.1
	1998	8.0
	16 yr. Avg.	7.6

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Manure Nitrogen

Nitrogen (TKN)

<u>Year</u>	<u>(lbs./1000g.)</u>
1995	62
1996	55
1997	64
1998	62
16 yr. Avg.	44

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Manure Phosphorus

Manure P₂O₅

Year - (lbs/1000g.) -

1995 54

1996 46

1997 58

1998 64

16 yr. Avg. 31

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Manure Potassium

<u>Year</u>	<u>Manure K₂O</u> <u>- (lbs/1000 gal.) -</u>	
1995	39	
1996	35	
1997	33	
1998	35	
16 yr. Avg.	24	ORC

Manure Soluble Salts

<u>Year</u>	<u>Soluble Salts</u> <u>- (mmhos/cm) -</u>
1995	26
1996	30
1997	29
1998	34
16 yr. Avg.	25

Swine Effluent Study

- **Rates:**
 - **0, 2000, 4000, 8000 gal/a**
 - **Conventional fertilizer (C.F.)**
 - **(Nutrient equivalent to 8000 gal/a)**

Swine Effluent Study

- **Soil**
 - **Clarksdale, timber/prairie transitional**
- **Manure**
 - **Injected on 45 inch centers**
 - **Last rates applied 1999**
- **Initiated**
 - **1981 - spring applications**
- **Crop sequence**
 - **1981 - 1989 continuous corn**
 - **1990 - 2001 corn/soybean**

Spring Soil Analyses

- **pH**
 - **Surface foot somewhat higher than second foot.**
- **P₁**
 - **Most phosphorus not leaching beyond 12 inches**
 - **Higher rates show lateral movement**
- **K**
 - **Increasing levels as rates increased**
 - **Some downward movement**

Fall Soil Analyses

- **pH**
 - **Very low values at depth**
- **P₁**
 - **The 8-16 inch zone contains bulk of P₂O₅**
 - **Some movement into the 16-24 in. zone at high rates**
- **K**
 - **Excess K does not appear to be moving into lower depths.**

Effluent Economics

- **N**
 - **44 lbs. @ 75% = 33 lbs./1000g = 71.7 lbs. of Urea(46%-0-0)**
- **P₂O₅**
 - **31 lbs. @ 90 % = 27.9 lbs./1000g = 60.6 lbs of “Triple Super Phosphate”(0-46-0)**
- **K₂O**
 - **24 lbs. @ 90% = 21.6 lbs./1000g = 36 lbs. of Potash(0-0-60)**

Effluent Economics

- **Assume:**
 - **N is \$170/Ton or \$.185/lb of Urea = \$ 13.26 of Nitrogen/1000 gal.**
or
 - **N is \$ 235/Ton or \$.143/lb of Ammonia = \$ 10.25 of Nitrogen/1000 gal.**

Effluent Economics

- **Assume:**
 - **P_2O_5 (T.S.P.) is \$195.00/Ton or
\$.212/lb of P_2O_5 = \$12.85 of
Phosphorus/1000gal**

Effluent Economics

- **Assume:**

- **DAP @ \$ 210.00/Ton = \$.258/lb of P_2O_5 = \$ 15.63 of P_2O_5 /1000 gal**

(T.S.P. = \$.212/lb of P_2O_5)

- **Credit the N source \$.041/lb**

Effluent Economics

- **Assume:**
 - **Potash (0-0-60) is \$ 150.00/Ton or \$.125/lb K_2O = \$ 4.50 of Potassium/1000gal**

Effluent Economics Summary

- **N as Urea**

- **N - \$13.26**

- **P₂O₅ - \$12.85**

- **K₂O - \$ 4.50**

- **Total = \$30.61**

Per 1000 gal of Effluent

- **N as NH₃**

- **N - \$ 10.25**

- **P₂O₅ - \$ 12.85**

- **K₂O - \$ 4.50**

- **Total = \$ 27.60**

Effluent Economics Summary

• N as:	Urea	N H₃	28% UAN
• N -	\$ 13.26	\$ 10.25	\$ 15.99
• P₂O₅ -	\$ 12.85	\$ 12.85	\$ 12.85
• K₂O -	<u>\$ 4.50</u>	<u>\$ 4.50</u>	<u>\$ 4.50</u>
• Total =	\$30.61	\$ 27.60	\$ 33.34

Per 1000 gal of Effluent

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What to Monitor When Utilizing Effluent

- **Nutrient content of the effluent**
- **Soil tests - pH, P₁, K**
- **Effluent Soluble Salts**
- **Crop growth characteristics**

Long Term Swine Effluent Study

Corn Yields

Manure Rates gal/A	9 yr C/C		6 yr C/S	
	Bet.	Under	Bet	Under
	----	Bu/A ----	----	Bu/A ----
0	48	39	80	71
2000	105	125	137	142
4000	110	132	145	128
8000	122	129	149	133
C.F	118	124	138	122

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Soybean Yields

Manure	6 yr S/C	
Rates	Bet.	Under
<u>gal/A</u>	----- Bu/A -----	
0	37	34
2000	52	54
4000	56	54
8000	55	48
C.F.	50	46

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