Recordkeeping System for Crop Production – Manure Management Sheets
Cooperative Extension Service
L.W. Jacobs, S.U. Dohm, and B. A. MacKellar, MSU Department of Crop and Soil Sciences
March 1992
6 pages

Cooperative Extension Service • Michigan State University • Extension Bulletin E-2344 • March 1992 (New)

Recordkeeping System for Crop Production

Manure Management Sheets

New 3:92 500 SL-LB, Price $2.00. For sale only. FILE 17:21 (Farm Management)

This is one component of a paper Recordkeeping System for Crop Production. The total system includes Annual Record Books (*E-2341, pocket-size* and *E-2342, full-size*), Field File Folders (*E-2343*), Manure Management Sheets (*E-2344, 4 sheets*), and Enhanced Recordkeeping Sheets (*E-2345, 3 sheets*). The MSU bulletin, "Recordkeeping System for Crop Production," (*E-2340*) explains the use of the system.

This effort was supported in part by funds from the Michigan Agricultural Experiment Station. Additional funds were provided by the MSU Cooperative Extension Service (CES) and the Michigan Department of Agriculture through the Michigan Energy Conservation Program (MECP).

Manure Management Sheet #1

Nutrient Budget for a Livestock Farm

Part A. Estimate of the Annual Manure Nutrient Production

Enter the average number of livestock in each of the categories below. Multiply those numbers by the appropriate multiplication factors. Total the results to get the minimum volume of manure and the minimum amount of nutrients produced per year on the facility. If bedding, runoff water, feed or other substances enter the manure storage facility, the total volume of manure and pounds of nutrients will change.

Livestock Type	Average Size		Average Number of Livestock Housed Annually *	Manure Production		Pounds of Nutrients Produced per Year					
						Nitrogen (N)		Phosphate (P_2O_5)		Potash (K_2O)	
				cubic feet of manure per year per animal **	total volume produced annually	lbs per year per animal **	total produced annually	lbs per year per animal **	total produced annually	lbs per year per animal **	total produced annually
Dairy Cattle		150 lb		x 69 =		x 22 =		x 8.4=		x 18 =	
		250 lb		x 120 =		x 36 =		x 16 =		x 31 =	
		500 lb		x 240 =		x 73 =		x 30 =		x 62 =	
		1,000 lb		x 480 =		x 150 =		x 61 =		x 120 =	
		1,400 lb		x 680 =		x 210 =		x 85 =		x 170 =	
Beef Cattle		500 lb		x 180 =		x 62 =		x 46 =		x 53 =	
		750 lb		x 270 =		x 95 =		x 70 =		x 84 =	
		1,000 lb		x 360 =		x 120 =		x 91 =		x 110 =	
		1,250 lb		x 440 =		x 160 =		x 120 =		x 140 =	
	Beef Cow			x 380 =		x 130 =		x 100 =		x 110 =	
Swine	Nursery Pig	35 lb		x 14 =		x 5.8=		x 4.3=		x 4.4=	
	Growing Pig	65 lb		x 26 =		x 11 =		x 8.1=		x 8.8=	
	Finishing Pig	150 lb		x 58 =		x 25 =		x 18 =		x 20 =	
	Finishing Pig	200 lb		x 80 =		x 33 =		x 25 =		x 26 =	
	Gestating Sow	275 lb		x 55 =		x 23 =		x 18 =		x 18 =	
	Sow and Litter	375 lb		x 200 =		x 84 =		x 63 =		x 66 =	
	Boar	350 lb		x 69 =		x 28 =		x 22 =		x 22 =	
Sheep		100 lb		x 23 =		x 16 =		x 5.5=		x 14 =	
Horse		1,000 lb		x 270 =		x 99 =		x 38 =		x 75 =	
Poultry (per 100 birds)											
	Turkey	16 lb		x 510 =		x 420 =		x 360 =		x 200 =	
	Chicken Layers	4 lb		x 130 =		x 110 =		x 91 =		x 51 =	
	Chicken Broilers	2 lb		x 88 =		x 88 =		x 45 =		x 33 =	
				Totals:							

* Average number of livestock housed on the farm during 12 months. If animals are not housed for the full 12-month period, multiply the number of animals times the number of months the animals are housed on the farm, then divide by 12 to get the "Average Number of Livestock Housed Annually".

** Numbers adapted from MWPS-18, "Livestock Waste Facilities Handbook," 2nd Ed., 1985.

Manure Management Sheet #1

Nutrient Budget for a Livestock Farm

Part B. Estimate of the Annual Nutrient Removal by Crops

Field ID	Crop	No. of Acres (A) in the Field	Expected Yield (Y) per Acre	Estimated Quantities of Nutrients Removed by the Harvested Crops *					
				Total Yield for Field (A × Y)	Nitrogen (N)		Phosphate (P_2O_5)		Potash (K_2O)	
					lb N per Unit of Yield	Total lb N Removed from Field	lb P_2O_5 per Unit of Yield	Total lb P_2O_5 Removed from Field	lb K_2O per Unit of Yield	Total lb K_2O Removed from Field
1.					x	=	x	=	x	=
2.					x	=	x	=	x	=
3.					x	=	x	=	x	=
4.					x	=	x	=	x	=
5.					x	=	x	=	x	=
6.					x	=	x	=	x	=
7.					x	=	x	=	x	=
8.					x	=	x	=	x	=
9.					x	=	x	=	x	=
10.					x	=	x	=	x	=
11.					x	=	x	=	x	=
12.					x	=	x	=	x	=
13.					x	=	x	=	x	=
14.					x	=	x	=	x	=
15.					x	=	x	=	x	=
16.					x	=	x	=	x	=
17.					x	=	x	=	x	=
18.					x	=	x	=	x	=
19.					x	=	x	=	x	=
20.					x	=	x	=	x	=
					Totals:					

Part C. Total Farm Nutrient Balance for Livestock Farm

Manure Nutrients Produced **	**Total N :**	**Total P_2O_5 :**	**Total K_2O :**
Nutrient Removal by Crop Harvest †	**Total N :**	**Total P_2O_5 :**	**Total K_2O :**
Farm Nutrient Balance ‡	**N Balance :**	**P_2O_5 Balance :**	**K_2O Balance :**

* To calculate the quantities of N, P_2O_5, and K_2O removed from each field, multiply the total yield for each field listed (i.e., A x Y) times the lb of N, P_2O_5 and K_2O contained in each unit of yield. The "lb of nutrient per unit of yield" values can be obtained from the "Nutrient Removal" charts on the back of the **Field File**.

** Use the total pounds of N, P_2O_5, and K_2O produced in manures (from Part A).

† Use the total pounds of N, P_2O_5, and K_2O removed from all fields by harvest (Part B).

‡ Subtract the "Nutrient Removal by Crop Harvest" from the "Manure Nutrients Produced" to get each nutrient balance. If the balance is positive, then more manure nutrients are being generated by the livestock than the crops on the farm may be able to effectively utilize. If your farm falls into that category, seek assistance from your county Cooperative Extension Service office in developing a nutrient management plan. Improper handling of these excess nutrients may result in pollution of surface and groundwaters.

Manure Management Sheet #2

Manure Analysis Information

Farm_____

Manure Sampling Information *			Manure Analysis Results							Calculated Values for Nitrogen **	
				(lb/1,000 gal) or (lb/wet ton)				check(✓) correct units			
Date	ID	Source of Manure	% Dry Matter	Total N	NH_4-N	P_2O_5	K_2O	/wet ton	/1,000 gal	Organic N	Available Organic N

* Record date of the manure analysis report, select ID from Table A below, and indicate where the manure came from, ex., free stall barn, farrowing house.

** Calculations:

Organic N = Total N – NH_4-N

Available Organic N = Organic N **x** Mineralization Factor (see Table A)

Table A. Mineralization factors for organic N and average nutrient contents of manures.

Manure Type	Manure ID	Manure Handling	Mineralization Factor	Average Nutrient Content				
				NH_4-N	Total N	Total P_2O_5	Total K_2O	units
Swine	A	Fresh	0.50	6	10	9	8	/ton
	B	Anaerobic liquid	0.35	26	36	27	22	/1000gal
Beef	C	Solid without bedding	0.35	4	11	7	10	/ton
	D	Solid with bedding	0.25	8	21	18	26	/ton
	E	Anaerobic liquid	0.30	24	40	27	34	/1000gal
Dairy	F	Solid without bedding	0.35	4	9	4	10	/ton
	G	Solid with bedding	0.25	5	9	4	10	/ton
	H	Anaerobic liquid	0.30	12	24	18	29	/1000gal
Sheep	I	Solid with bedding	0.25	5	14	9	25	/ton
Poultry	J	Deep pit	0.45	44	68	64	45	/ton
	K	Solid without litter	0.35	26	33	48	34	/ton
	L	Solid with litter	0.30	36	56	45	34	/ton
Horses	M	Solid with bedding	0.20	4	14	4	14	/ton

Source: MWPS-18, "Livestock Waste Facilities Handbook," 2nd Ed., 1985.

Manure Management Sheet #3

Quantities of Manure Nutrients per Spreader Load

Farm_____

Chart #1

*** Spreader:**_____
*** Capacity**: _____

Manure Analysis			lb of Nutrients per Load **			
	Date	Source of Manure	NH_4-N	Available Organic N	P_2O_5	K_2O
A						
B						
C						
D						
E						

Chart #2

*** Spreader:**_____
*** Capacity**: _____

Manure Analysis			lb of Nutrients per Load **			
	Date	Source of Manure	NH_4-N	Available Organic N	P_2O_5	K_2O
A						
B						
C						
D						
E						

Chart #3

*** Spreader:**_____
*** Capacity**: _____

Manure Analysis			lb of Nutrients per Load **			
	Date	Source of Manure	NH_4-N	Available Organic N	P_2O_5	K_2O
A						
B						
C						
D						
E						

Chart #4

*** Spreader:**_____
*** Capacity**: _____

Manure Analysis			lb of Nutrients per Load **			
	Date	Source of Manure	NH_4-N	Available Organic N	P_2O_5	K_2O
A						
B						
C						
D						
E						

* If you use more than one manure spreader, identify the spreader by name or type on each chart. If the spreader is a tank wagon, indicate the "Capacity:" in gallons from the manufacturer's specifications. If it is a box or side slinger type spreader, use the ASAE heaped rated capacity for the volume, determine the density of the manure, and calculate the "Capacity:" in tons for one spreader load.

** Multiply the calculated "Available Organic N" value and the manure analysis values for "NH_4-N, P_2O_5 and K_2O", from **Manure Management Sheet #2**, times the spreader capacity to determine the quantities of each nutrient per spreader load. For example, 4 lb P_2O_5/ton x 3.5 tons/spreader load = 14 lb of P_2O_5 per spreader load. Use the analysis information for the manure listed on the **Manure Management Sheet #2** that corresponds to the "Source of Manure" specified.

Manure Management Sheet #4

Worksheet to Estimate the Quantity of Manure Nutrients Applied

Field ID:_____

Acres _____

Application Period (Mo/Yr)	Number of Loads Applied	Source of Manure	Days Before Incorpn.	Manure Spreader Chart #	Total Manure Nutrients Applied (lb)*		
					Total Avail. N†	P_2O_5	K_2O

Field Sketch **

* The "Total Manure Nutrients Applied" is calculated by multiplying the total loads of manure applied times the "lb of Nutrients per Load" from **Manure Management Sheet #3.**

** Manure should be uniformly applied to the whole field. If the whole field was not treated uniformly with manure, areas receiving different quantities of manure nutrients should be noted on the Field Sketch. Then, the quantity of manure nutrients applied to each area should be determined separately, and each area managed accordingly when planning for further nutrient additions (see **Field File Table 3**).

† The "Total Available N" is calculated with the following equation, which takes into account the losses of NH_4 by volatilization: "Total Available N" = ["Available Organic N/load" + ("NH_4-N/load" × RF)] × "Number of Loads Applied". Refer to MSU-CES Bulletin E-2340, "Recordkeeping System for Crop Production," p.17.