## **MSU Extension Publication Archive**

Archive copy of publication, do not use for current recommendations. Up-to-date information about many topics can be obtained from your local Extension office.

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

The PDF file was provided courtesy of the Michigan State University Library

## Scroll down to view the publication.

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

# Recordkeeping System for Crop Production

## **Manure Management Sheets**

		۰.		ľ
	1			
		_		Ŀ
			1	

MSU is an Affirmative-Action Equal-Opportunity Institution. Cooperative Extension Service programs and materials are open to all without regard to race, color, national origin, sex, handicap, age or religion.

Issued in furtherance of Cooperative Extension work in agriculture and home economics, acts of May 8, and June 30, 1914, in cooperation with the U.S. Department of Agriculture. Gail Imig, Director, Cooperative Extension Service. Michigan State University, E. Lansing, MI 48824.

This information is for educational purposes only. Reference to commercial products or trade names does not imply endorsement by the Cooperative Extension Service or bias against those not mentioned. This bulletin becomes public property upon publication and may be reprinted verbatim with credit to MSU. Reprinting cannot be used to endorse or advertise a commercial product or company.

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.

	Average Size		1.52			1 August	Pounds	s of Nutrients	Produced p	er Year	and the
			Average Number of	Manure Pr	Manure Production		Nitrogen (N)		$e(P_2O_5)$	Potash	(K <sub>2</sub> O)
Livestock Type			Livestock Housed Annually *	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	N HOLSE AND AND A	x 69 =	19:04:00	x 22 =	and the state	x 8.4=	W. S. S. C. S.	x 18 =	NY ANT AND
		250 lb	ENERS AND A	x 120 =		x 36 =	NY SEAN AND	x 16 =	CANAL STATE	x 31 =	NY NY NY
San Starten Starten		500 lb	street, and the	x 240 =	Same Street	x 73 =	4-302) - 4-50	x 30 =	anna anna	x 62 =	
	A CHARLEN AND AND AND AND AND AND AND AND AND AN	1,000 lb	We will will be a set of	x 480 =	S. TALL STRATE	x 150 =	en la se	x 61 =		x 120 =	
A0292 NO.83	A CONTRACTOR	1,400 lb		x 680 =	CAR-AND REAL	x 210 =	and the second	x 85 =		x 170 =	
Beef Cattle		500 lb		x 180 =	5 - 1 - S	x 62 =		x 46 =		x 53 =	
		750 lb		x 270 =		x 95 =		x 70 =	1.11	x 84 =	
		1,000 lb		x 360 =		x 120 =	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	x 91 =		x 110 =	1.
		1,250 lb		x 440 =	and the second second	x 160 =		x 120 =		x 140 =	
14 J. C.	Beef Cow			x 380 =		x 130 =	1 Summer	x 100 =	in the Part	x 110 =	
Swine	Nursery Pig	35 lb		x 14 =		x 5.8=		x 4.3=		x 4.4=	AN AND AND
	Growing Pig	65 lb	CAS SAGES	x 26 =		x 11 =	SVACE DAL	x 8.1=	( particular	x 8.8=	All All Rate
Sec. Sec.	Finishing Pig	150 lb	AND DE LES	x 58 =	atta base and	x 25 =		x 18 =	(4) (h) (h) (h) (h) (h) (h) (h) (h) (h) (h	x 20 =	
1. 19 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Finishing Pig	200 lb	All Salar	x 80 =	A Shannelle	x 33 =	Carlo Maria	x 25 =		x 26 =	A Standard
	Gestating Sow	275 lb		x 55 =		x 23 =		x 18 =	$e^{A_{1}} = \mu^{A_{1}} + \cdots + \mu^{A_{n}}$	x 18 =	and the
The Kentherson	Sow and Litter	375 lb		x 200 =	Martinada	x 84 =	Regentered	x 63 =	A Charges	x 66 =	ARE AREAS A
States States	Boar	350 lb		x 69 =	al and a star of the	x 28 =		x 22 =	AL PROPERTY	x 22 =	
Sheep		100 lb		x 23 =		x 16 =	in the second	x 5.5=		x 14 =	1
Horse		1,000 lb		x 270 =		x 99 =		x 38 =		x 75 =	
Poultry (per 1	and a supervise of the second s	IN ALL ST	State of the second	CANER AND AND		CALL OF ANY			State State	Sec. B. Martin	19332673
and the state	Turkey	16 lb		x 510 =	Contention of	x 420 =		x 360 =		x 200 =	thread a strike
	Chicken Layers	4 lb		x 130 =	a shall a shall be	x 110 =		x 91 =		x 51 =	
	Chicken Broilers	2 lb		x 88 =	Print Print	x 88 =	Railer and the	x 45 =		x 33 =	

\* 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

	1 Mar 1			in the second second	Estimated Q	uantities of Nu	trients Remove	d by the Harves	sted Crops *	
		1 1 1 × 1	Expected Yield (Y) per Acre		Nitrogen (N)		Phospha	te ( $P_2O_5$ )	Potash	n (K <sub>2</sub> O)
Field ID	Crop	No. of Acres (A) in the Field		Total Yield for Field (A × Y)	lb N per Unit of Yield	Total lb N Removed from Field	lb P <sub>2</sub> O <sub>5</sub> per Unit of Yield	Total lb P <sub>2</sub> O <sub>5</sub> Removed from Field	lb K <sub>2</sub> O per Unit of Yield	Total lb K <sub>2</sub> O Removed from Field
1.				1. S. A. A. M.	x	=	x	=	x	=
2.					x	=	x	=	x	=
3.			1	and Date	x	-	x	=	x	₩1 m. sat
4.					x	=	x	=	x	=
5.					x	=	x	=	x	=
6.					x	=	x	-	x	=
7.	Section Sector			1	x	=	x	=	x	=
8.					x	=	x	=	x	=
9.					x	=	x	=	x	=
10.			1.00		x	=	x	=	x	=
11.		42, 53, 14	and the stand		x	=	x	=	x	=
12.					x	=	x	=	x	=
13.	1		San Statistics		x	=	x	=	x	=
14.		1			x	= 7	x	=	x	=
15.	14 A A A A A A A A A A A A A A A A A A A				x	<b>=</b>	x	=	x	=
16.		and the second second			x	=	x	=	x	=
17.					x	=	x	=	x	=
18.					x	=	x	=	x	=
19.	14		Supervision of		x	=	x	=	x	=
20.		1.			x	=	x	=	x	=
					Totals:					1

#### Part C. Total Farm Nutrient Balance for Livestock Farm

Manure Nutrients Produced **	Total N :	Total P <sub>2</sub> O <sub>5</sub> :	Total K <sub>2</sub> O :
Nutrient Removal by Crop Harvest †	Total N :	Total P2O5 :	Total K <sub>2</sub> O :
Farm Nutrient Balance ‡	N Balance :	P <sub>2</sub> O <sub>5</sub> Balance :	K <sub>2</sub> O 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, P2O5, and K2O produced in manures (from Part A).

<sup>†</sup> Use the total pounds of N, P<sub>2</sub>O<sub>5</sub>, and K<sub>2</sub>O 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. <u>Improper handling of these excess nutrients may result in pollution of surface and groundwaters</u>.

#### Manure Management Sheet #2

## **Manure Analysis Information**

### Farm\_

Manure Sampling Information *		ampling			Manure Ar	nalysis Re	sults			Calculat	ed Values
			(lb/1,	000 gal) or	(lb/wet to	on)	and the second second	ck(✓) ect units	and the second	rogen **	
Date	ID	Source of Manure	% Dry Matter	Total N	NH <sub>4</sub> -N	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	/wet ton	/1,000 gal	Organic N	Available Organic N
S. Hard	E.C.	1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1								1. 1. 1.	
1.18			and a	3. 7 m m	29/2011	and the	March 10	1995	1.18	-	
1. 1. 1.	the second	Stie Cal	See Ser	13 19 19 19	1000	N. 37.		1			Carlo Sta
1.1.1.1	Televille	Carlo and	Storal .	1.1.1.2.1	4 A. A.		9.26	1.00		St. Palace	110-12-12-12-12-12-12-12-12-12-12-12-12-12-
1.00	and a	a second	Same -		1947 (ST. 4)		1.4	36.01	1.1.1		
		1000	2000 TO 1				1. 3.4		Star Star		
-			a state								Sale S
	1		1.5				Ser.	12.20	1		1 Carlos
1 de la				Sec. Com					1		
	Real I					and the second	0.05		19.00		
The state			Ser.		and and a	a farmer				2.2.2	
			estelle -	1. 1. 1. 1. 1.				1			

\* 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.

			1.1.1	Average	e Nutrier	nt Conten	ıt
Manure ID	Manure Handling	Mineralization Factor	NH <sub>4</sub> -N	Total N	Total P <sub>2</sub> O <sub>5</sub>	Total K <sub>2</sub> O	units
Α	Fresh	0.50	6	10	9	8	/ton
В	Anaerobic liquid	0.35	26	36	27	22	/1000gal
С	Solid without bedding	0.35	4	11	7	10	/ton
D	Solid with bedding	0.25	8	21	18	26	/ton
Е	Anaerobic liquid	0.30	24	40	27	34	/1000gal
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
I	Solid with bedding	0.25	5	14	9	25	/ton
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
М	Solid with bedding	0.20	4	14	4	14	/ton
	ID A B C D E F G H I J K L	IDManure HandlingAFreshBAnaerobic liquidCSolid without beddingDSolid with beddingEAnaerobic liquidFSolid without beddingGSolid with beddingHAnaerobic liquidISolid with beddingJDeep pitKSolid without litterLSolid with litter	IDManure HandlingFactorAFresh0.50BAnaerobic liquid0.35CSolid without bedding0.35DSolid with bedding0.25EAnaerobic liquid0.30FSolid without bedding0.35GSolid with bedding0.25HAnaerobic liquid0.30ISolid with bedding0.25JDeep pit0.45KSolid without litter0.35LSolid with litter0.30	IDManure HandlingFactorNH4-NAFresh0.506BAnaerobic liquid0.3526CSolid without bedding0.354DSolid with bedding0.258EAnaerobic liquid0.3024FSolid without bedding0.354GSolid without bedding0.354GSolid with bedding0.255HAnaerobic liquid0.3012ISolid with bedding0.255JDeep pit0.4544KSolid without litter0.3036	Manure IDManure HandlingMineralization FactorNH4-NTotal NAFresh0.50610BAnaerobic liquid0.352636CSolid without bedding0.35411DSolid with bedding0.25821EAnaerobic liquid0.302440FSolid without bedding0.3549GSolid with bedding0.2559HAnaerobic liquid0.301224ISolid with bedding0.25514JDeep pit0.454468KSolid without litter0.303656	Manure ID Manure Handling Mineralization Factor $NH_4$ -N Total N $P_2O_5$ A Fresh 0.50 6 10 9   B Anaerobic liquid 0.35 26 36 27   C Solid without bedding 0.35 4 11 7   D Solid with bedding 0.25 8 21 18   E Anaerobic liquid 0.30 24 40 27   F Solid with bedding 0.35 4 9 4   G Solid with bedding 0.35 4 9 4   G Solid with bedding 0.35 4 9 4   G Solid with bedding 0.25 5 9 4   H Anaerobic liquid 0.30 12 24 18   I Solid with bedding 0.25 5 14 9   J Deep pit 0.45 44 68 64	IDManure HandlingFactor $NH_4-N$ Total N $P_2O_5$ $K_2O$ AFresh0.5061098BAnaerobic liquid0.3526362722CSolid without bedding0.35411710DSolid with bedding0.258211826EAnaerobic liquid0.3024402734FSolid without bedding0.3549410GSolid with bedding0.2559410HAnaerobic liquid0.3012241829ISolid with bedding0.25514925JDeep pit0.4544686445KSolid without litter0.3036564534

N	Ianure ]	M	anagement	t Sheet #3	

## **Quantities of Manure Nutrients per Spreader Load**

P205

K2

Farm

\* Spreader:

\* Canacity

#### \* Spreader:\_\_\_\_\_ Chart #1 \* Capacity: lb of Nutrients per Load \*\* Manure Analysis Available Source of NH<sub>4</sub>-N Organic N Date Manure

	Manure .	Analysis	lb of Nutrients per Load **								
	Date	Source of Manure	NH4-N	Available Organic N	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> 0					
A				The second second		Sec.					
В	1. S.			10.55							
С	14.5	14 14 14 14				- so					
D			States of the								
E	·			S.S.Barres	19 10 10 18 18 18 18 18 18 18 18 18 18 18 18 18						

## Chart #3

A

B

C

D

E

\* Spreader:\_\_\_\_\_ \* Capacity: \_\_\_\_\_

## Chart #4

Chart #2

\* Spreader:\_\_\_\_\_ \* Capacity: \_\_\_\_\_

	Manure .	Analysis	Ib of Nutrients per Load **						
	Date	Source of Manure	NH4-N	Available Organic N	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O			
A				A STATE	A. Sala		A		
В			and the second	6. 35.90	Ker Sh	5.01	В		
С		- 10 M				1.1	C		
D		1.19.19.19.19					D		
E					See 1.54		E		

	Manure .	Analysis	Ib of Nutrients per Load **								
	Date	Source of Manure	NH4-N	Available Organic N	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O					
A			A. S. Maria		S. S.	10 and					
B			a mage	and shake							
С		althe start	and set								
D			N.A.								
E	A start				and the	1-10-20					

\* 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 "NH4-N, P2O5 and K2O", from Manure Management Sheet #2, times the spreader capacity to determine the quantities of \*\* each nutrient per spreader load. For example, 4 lb P2Os/ton x 3.5 tons/spreader load = 14 lb of P2Os 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.

## Worksheet to Estimate the Quantity of Manure Nutrients Applied

Field ID:\_\_\_\_\_

Acres

Application	Number of		Days	Manure	Total Mar App	nure Nut lied (lb)*		Field Sketch **		
Period (Mo/Yr)	Loads Applied	Source of Manure	Before Incorpn.	Spreader Chart #	Total Avail. N†	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O			
										6.0.1
						 50 V			- 10 ×	
			*							
					10 M (0)				A	
					TANK .					
	1						3.1.1.1.1		1.00	
105-10 M									and served	
					a set a s In set a s	-				
										1 10 1

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

\*\* <u>Manure should be uniformly applied to the whole field.</u> 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<sub>4</sub> by volatilization: "Total Available N" = ["Available Organic N/load" + ("NH<sub>4</sub>-N/load" × RF)] × "Number of Loads Applied". Refer to MSU-CES Bulletin E-2340, "Recordkeeping System for Crop Production," p.17.