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Value and Care of Farm Manure
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LIME

SOIL
MOISTURE

FERTILIZERS

ORGANIC
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LINKS IN PROFITABLE FARMING

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VALUE AND CARE OF FARM MANURE

BY JOHN W. SIMS

Careful utilization of by-products brings success instead of failure in many lines of business, and in farming, barnyard manure takes rank as the most important by-product. To care for it efficiently is good business, being important in the conservation of our greatest natural resource—soil fertility.

The most economical method of maintaining soil fertility is undoubtedly the careful conservation of barnyard manure produced on the farm, supplemented by the judicious use of commercial fertilizers.

Barnyard Manure Production in Michigan

Based on the number of the various kinds of livestock in Michigan, it is calculated that fifteen and one-half million tons of manure is annually produced in this state. Between 40 per cent and 50 per cent of the value of this product is lost before it is returned to the soil. By careful, inexpensive methods, this loss can be reduced to from 15 per cent to 20 per cent. A reduction of one-half of the present loss would save millions of dollars to the farmers of the state.

Amounts of Manure Produced Per Animal

The amount of manure excreted by various farm animals for every 1,000 pounds of live weight is as follows:

These weights are exclusive of bedding. (Lyon & Buckman)

1000 lbs. weight	Pounds per day	Tons per year
Horse.....	50	9.1
Cow.....	70	12.7
Swine.....	85	15.5
Sheep.....	34	5.2
Poultry.....	23	4.2

Composition of Various Manures

Many factors influence the composition of manure. Some of the most important of these are: Class of animal, age and condition of the animal, and kind of feed. The following table (Van Slyke) gives the pounds of nitrogen, phosphoric acid, and potash in a ton of manure as it is excreted by the animal. For example, the horse excretes 400 pounds of urine during the same period that 1,600 pounds of solid

manure is produced. The 1,600 pounds of solid manure contains 8.73 pounds of nitrogen, 4.8 pounds phosphoric acid, and 6.4 pounds of potash; the 400 pounds of urine contains 5.36 pounds of nitrogen, a trace of phosphoric acid, and six pounds of potash. This makes a total of 14.09 pounds of nitrogen, 4.8 pounds of phosphoric acid and 12.4 pounds of potash in the ton of horse manure, providing there has been no loss of either liquid or solid.

Composition of Manure

	Pounds Nitrogen	Pounds phos- phoric acid	Pounds potash
Horse.....			
Solid—1600 lbs.....	8.73	4.8	6.4
Urine—400 lbs.....	5.36	Trace	6.0
Total—2000 lbs.....	14.09	4.8	12.4
Cow.....			
Solid—1400 lbs.....	5.52	2.8	1.4
Urine—600 lbs.....	6.93	Trace	8.1
Total—2000 lbs.....	11.45	2.8	9.5
Sheep.....			
Solid—1340 lbs.....	9.89	6.7	6.0
Urine—660 lbs.....	8.90	0.3	13.8
Total—2000 lbs.....	18.79	7.0	19.8
Swine.....			
Solid—1200 lbs.....	6.59	6.0	4.8
Urine—800 lbs.....	3.13	0.8	3.6
Total—2000 lbs.....	9.72	6.8	8.4
Poultry.....			
Total—2000 lbs.....	18.95	16.0	16.0

Conserve Liquid Manure

It will be noticed that, while there is less urine produced, it contains about 79 per cent as much nitrogen and more potash than does the greater weight of solid manure. Then, too, the plant food in the urine is much more readily available than that in the solid manure. These facts make the loss of the liquid manure very costly.

The floors of stables should be tight to prevent the loss of the liquid manure. It should then be absorbed by bedding and other material. Bedding materials differ in their capacities to absorb liquids. One hundred pounds of wheat straw will absorb approximately 200 pounds of liquid, while the same amount of oat straw will absorb 250 pounds of liquid. One hundred pounds of dried peat will absorb approximately 600 pounds of liquid. Peat is often stored in the stable in summer and used in the gutters during the winter. It is very good for this purpose.

Handling Manure

Great losses occur in handling manure in the stable and after it is removed from the stable. Where special care has not been taken, practically one-half of the value is lost in handling, and that which is lost is the most readily available plant food.

Many farmers of this state practice drawing manure directly from the stable to the field. Whether this is done daily or weekly is determined by the number of animals kept. Undoubtedly this is the best method of handling the manure if it is possible. The field on which the manure is spread should not be so rolling that there will be a serious

loss by washing. Piling the manure in small piles in the field is expensive in labor and also occasions undue losses.

It is often necessary to store manure. Storing in pits or covered sheds is best. While it may seem to be expensive to construct manure pits, they will soon pay for themselves on farms where storage is necessary. (Write Soils Department, Michigan State College, for further particulars on manure pits).

It is probably not necessary to discuss the loss occasioned by piling the manure under the eaves or by scattering it over the barnyard. In case it is not possible to construct a manure pit, the manure should be placed in a compact pile, with nearly straight sides, to keep it moist and well packed. Rail or board pens are often built in such a way that the live stock can keep the manure trampled. Horse and cow manure should be mixed in order to prevent "fire fanging" in the horse manure. The mixture can also be handled more easily.



An expensive method of handling manure.

What Is Manure Worth Per Ton

A ton of barnyard manure contains approximately 500 pounds of organic matter. This material when applied to the soil, tends to make the soil better aerated, induces a better physical condition, increases the amount of available plant food, increases the water holding capacity of the soil, and promotes bacterial activity. All of these factors are important. Unlike plant food, organic matter is not easily purchased.

The plant food value of manure varies.* Considering that average mixed manures contain 10 pounds nitrogen, worth 11.56 cents per pound; five pounds of phosphoric acid, worth 5.86 cents per pound;

*Based on the following average of retail prices quoted by two Michigan fertilizer companies Dec. 12, 1931:

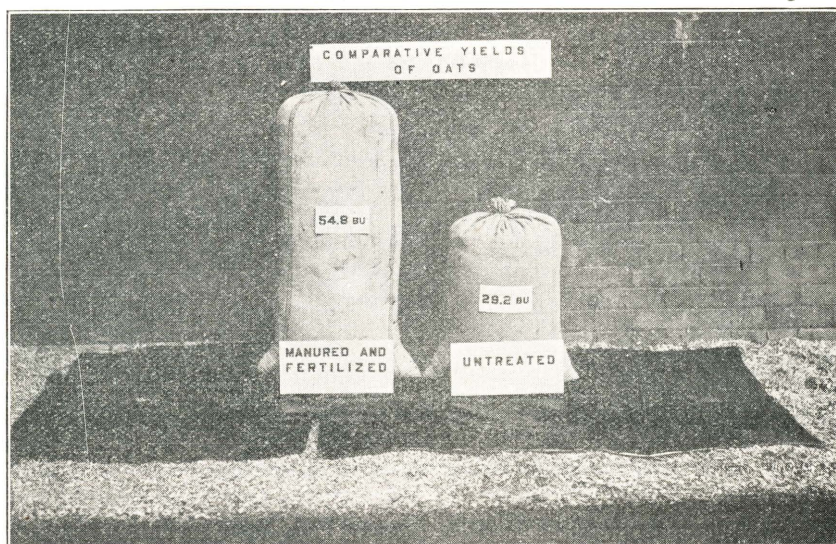
Superphosphate (20 per cent)	\$23.45
Sulphate of Ammonia (20 per cent)	46.25
Muriate of Potash (50 per cent)	53.50

and 10 pounds of potash, worth 5.35 cents per pound, the plant food in a ton of manure has a value of \$1.98. The value of the increase in crops (agricultural value) produced by the application of manure is usually higher than this amount.

Manure an Unbalanced Fertilizer

With the composition given above, six tons of manure would be the equivalent in plant food of 600 pounds of a 10-5-10 commercial fertilizer. The commercial fertilizer would be somewhat more quickly available. Compare this analysis with fertilizers usually recommended for upland soils (such as 4-16-4; 4-16-8; or 2-12-6). It is evident that manure is low in phosphoric acid. In case, then, that sufficient manure is used to supply enough phosphoric acid for crop growth, there is a waste of both ammonia and potash, both of which cost more than phosphoric acid.

In order to prevent this waste, a great many farmers of the state are reinforcing manure with 40 pounds of either 16 per cent or 20



Yields showing value of manure properly balanced with phosphate.

per cent superphosphate (acid phosphate) per ton of manure. This is scattered on top of the manure after it is loaded in the spreader. Some are applying the phosphate in the stable, using one pound of the fertilizer for every mature animal each day. Even though the manure is stored, the super-phosphate is not lost. Excellent results have been obtained by this reinforcing. The superphosphate is often drilled in the field after the manure is spread.

Effects of Manure Last Several Years

The length of time the effects of an application of manure are noticeable is so variable that no exact period can be given. The residual

effect of manure is much greater than is that of commercial fertilizer. The Ohio Experiment Station found that from 35 per cent to 45 per cent of the value was obtained by succeeding crops.

Well Rotted or Fresh Manure

It takes from one and one-half to three tons of fresh manure to make one ton of rotted manure. In the process of rotting a great deal of organic matter and much plant food is lost. In special cases it may be best to use rotted manure, but, in general farm practice, better results will be obtained by the use of fresh manure because of the greater number of tons available.

Where Use Manure

Very good results are obtained in Michigan by applying manure on sod to be plowed for a cultivated crop. Some (especially on light soils) prefer to apply the manure after plowing. This, of course, increases trouble with weeds. Top dressing wheat is another satisfactory use to which manure is put. Most farmers will plan to spread the manure in such quantities per acre that both sod and wheat can be covered.

How Much Manure Per Acre

Very few farmers have as much manure as is needed. In such cases applications of from six to eight tons per acre are more economical than larger applications. Because a good supply of organic matter is essential to produce a good yield of potatoes, heavier applications are often advisable when fitting the soil for this crop. To obtain best results, manure should be spread evenly. This is difficult to do by hand; so better results are to be expected by the use of a manure spreader, using the same number of tons per acre.

SUMMARY

1. Barnyard manure is a very important by-product on Michigan farms.
2. Under average conditions, between 40 and 50 per cent of the value of manure is lost.
3. Nearly half of the value of barnyard manure, including the most available part, is in the urine.
4. Tight stable floors and a good supply of bedding or other absorbent will prevent great loss.
5. Hauling manure direct from stable to field is usually a good practice.
6. If stored, manure should be kept moist and well packed.
7. Manure has greater value than the amount of plant food would indicate.
8. Manure should be reinforced with superphosphate to make it more nearly a balanced plant food and to prevent waste of ammonia and potash.
9. Manure is worth most when fresh.
10. Best results are usually obtained by using manure on sods to be plowed for cultivated crops and for top dressing fall seeded grains.
11. Always apply manure as evenly as possible, and, if the supply is limited, use light applications.