

# Manure versus fertilizer: The economic showdown of 2022

The key to maximizing manure's value is to expand its impact on more acres.

| by Scott Fleming

**T**here is no certainty when it comes to farming. The only thing we can really plan on is that next year will not be the same as this year.

The agricultural markets are a prime example of this. Commodity prices are almost 50% higher than they were at harvest, fertilizer prices are double what they were just one year ago, and crop protection price spikes are just short of insane. All of these input cost increases place additional value on the unsung hero in animal agriculture: manure.

## Knowing your numbers

Establishing a value for manure can be difficult. In my article, "Navigating manure analysis priorities" in the February 2021 issue of *Journal of Nutrient Management*, I touched on this very topic.

Manure has a tremendous amount of value, but the true value of manure may never be known. Not only does it supply nitrogen (N), phosphorus (P), and potassium (K), but there are a complete host of micronutrients present.

Manure also has a value outside of the fertility component. The way manure can feed the soil is drastically different from commercial fertilizers. Appropriate manure applications are a great contributor to overall soil health.

Manure feeds the soil in many ways. The primary method manure is used is as a fertilizer source. The foundation of establishing a fertilizer value of manure is breaking it down into each of its components. The math isn't overly hard, but it isn't simple, either.

Nitrogen is the first nutrient in a fertilizer analysis, so we will start there. Nitrogen may be one of the more complicated equations, namely because there are so many different nitrogen sources.

The easiest way to value commercial fertilizer is the price per unit of nutrient. This takes the source's nutrient value and breaks it down into dollars per unit of fertilizer. To calculate dollars per unit of fertilizer, you must first calculate the units of nutrient per ton of fertilizer. Once the total pounds of nutrient per ton of fertilizer is calculated, you can then divide the price per ton of fertilizer by the units of nutrient per ton of fertilizer.

### Example 1:

Urea (46-0-0) at \$930/ton  
 $2,000 \text{ lbs/ton} \times 0.46\% \text{ N} = 920 \text{ units N/ton}$   
 $\$930/\text{ton} \div 920 \text{ units N/ton} = \$1.01/\text{unit N}$

### Example 2:

32% UAN (32-0-0) at \$800/ton  
 $2,000 \text{ lbs/ton} \times 0.32\% \text{ N} = 640 \text{ units N/ton}$

$\$800/\text{ton} \div 640 \text{ units N/ton} = \$1.25/\text{unit N}$

Phosphorus and potassium price per unit of nutrient can be determined in a similar manner. Phosphorus can throw a curveball, though, due to the nitrogen that comes along with the phosphorus. When it comes to crediting nutrients and economics, the nitrogen in monoammonium phosphate (MAP) or diammonium phosphate (DAP) fertilizers should certainly receive a credit. In this example, the nitrogen component of phosphorus fertilizer will be ignored for simple phosphorus value calculations.

### Example:

MAP (11-52-0) at \$800/ton  
 $2,000 \text{ lbs/ton} \times 0.52\% \text{ P} = 1,040 \text{ units P/ton}$   
 $\$800/\text{ton} \div 140 \text{ units P/ton} = \$0.77/\text{unit P}$

## What are you applying?

Knowing the value of your manure is impossible without knowing what is actually in your manure. There are book values available for most common types of manure, but these values are just an approximation of what may be in manure. The only sure way to know what is in your manure is through submitting your samples for analysis. While manure analysis could certainly have a fixed cost associated with it, not analyzing may have a far greater cost.

Through collective observation of manure samples analyzed at Rock River Laboratory over the last year, a substantial amount of variability is observed. A statistical analysis of liquid dairy manure was performed to determine the amount of variability.

Nitrogen seemed to have the most even distribution of values, but it also showed a fair amount of variability. The average total nitrogen value was 16.4 pounds per 1,000 gallons with a normal range of 11.9 to 21 pounds of total nitrogen per 1,000 gallons.

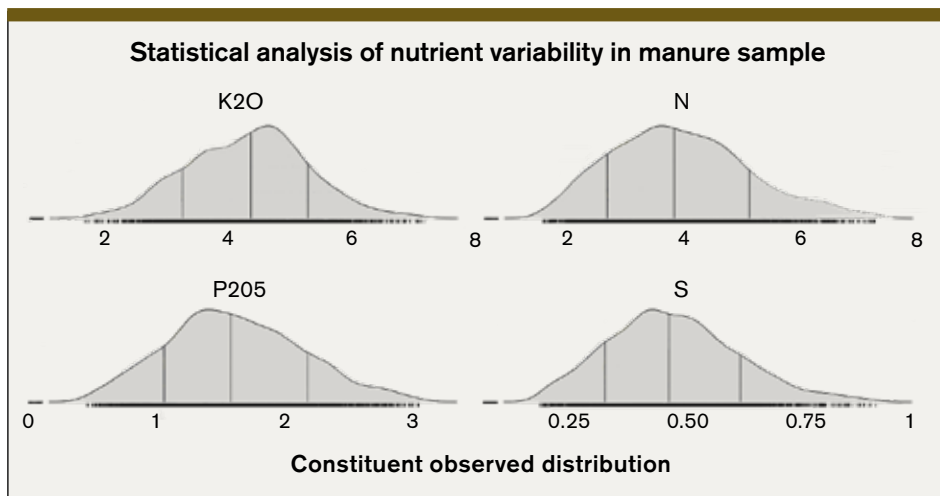
Phosphorus and potassium have a less even distribution but a wider range in analysis. The average phosphorus value was 6.56 pounds of total P with a range of 4.33 to 8.79 pounds of total P. The potassium showed an even greater range of values, with an average value of 17.91 pounds and a range of 13.7 to 22.2 pounds of total K.

This would result in a total value of \$32.36 for just 1,000 gallons of liquid dairy manure. When you multiply that price by your application rate, manure is no longer a liability. It is bringing a mountain of value as a fertilizer.

### Spread it out

The key to maximizing manure value is expanding manure's impact on acres. Manure application is not a simple or inexpensive endeavor. Agitation, laying hose, setting tanks, trucking, pumping, and application all come with a hefty price tag per acre. While these costs can be highly variable, we can look to the 2021 Iowa Farm Custom Rate Survey for some guidance. The custom rate guide lists the cost per 1,000 gallons at \$10 to \$15 for dragline application with an average charge of \$11.65 per 1,000 gallons. At a fairly standard application rate of 12,000 gallons per acre, that would be \$139.80 per acre in manure application costs.

When we consider the value of the manure from our prior work, the nitrogen value alone exceeds the application costs. This 12,000 gallons of liquid dairy manure has an applied value just short of \$400 per acre! Simple math says that for every dollar we spend on application, we are receiving almost



two dollars back in fertilizer.

There is also a cost to not fully utilizing your manure. This can come from reduced crop yield and higher commercial fertilizer inputs. As previously stated, manure is the total fertility package. Not only does it bring crop nutrients into the soil, but it is also feeding the biological life in the soil. The soil biology will thrive and help free up soil and manure nutrients.

The added expense associated with commercial fertilizer applications is easy to measure. The yield loss component of commercial versus manure is where things can get challenging. Without implementing “no manure” check strips, there is no measure of lost potential. Commercial fertilizer will supply the necessary nutrients to the crop, but it is not the same as the full complement of macronutrients, micronutrients, and organic matter supplied by manure.

In agriculture, it is easy to put a pencil to the hard costs. It is painless to put a number on a ton of saved fertilizer. With solid record keeping, analysis and benchmarking, and cost analysis, we can estimate the per acre costs of manure application.

However, there are also hidden costs in farming that are tough to measure. One of the greatest is the untold cost of not spreading manure around. Excessive manure application will inevitably lead to an extreme concentration of nutrients. When extremely high rates

of manure are applied to fields, or the same fields are used for manure application year after year, the soil will begin to accumulate excess nutrients. Excessive nutrients in soil can have a detrimental effect on the uptake of other nutrients. While this is an area where more research is needed, it is something that is best avoided.

Additionally, things like phosphorus drawdown are very slow processes. It could take decades of no manure application to return phosphorus values into the recommended range. All the while, manure must be applied to fields that are likely further and further from the production site at an ever-growing cost.

With record keeping and sound data to back it up, we can remove a fair amount of uncertainty around manure application. The first steps include finding out what is in your manure and establishing a value. Track down your commercial fertilizer prices and figure out the cost associated with each nutrient. Once the costs of commercial fertilizer are established, it is easy math to determine the fertilizer value of the manure. And again, spread manure around. It is an incredibly valuable resource and should be treated as such. ■



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