Manure provides higher returns than chemical fertilizers: study

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No significant differences in corn yield were found between organic and chemical sources of nutrients, but a Texas AgriLife Research economist said manure generates higher economic returns than anhydrous ammonia.

Dr. Seong Park, AgriLife Research economist, recently had his research published in the Agronomy Journal. The work was from studies he conducted in the Oklahoma Panhandle while at Oklahoma State University and finalized while in his new position at Vernon.

The long-term experiment involved the use of pig and beef manure on irrigated corn fields, he said. The testing was conducted in part due to a rapid growth of animal population and density in that region, as well as the northern part of the Texas Panhandle.

Park said when swine manure, which is normally stored in open-air lagoon systems, is properly applied and the economics figured, the effluent can be used as manure with minimal environmental and nuisance concerns.

Animal manure, he said, benefits producers by reducing waste management costs and the need for chemical fertilizers because it contains multiple essential crop nutrients, according to previous research. Park said the key between animal manure transitioning from a cost (for disposal) to a benefit (as a fertilizer) is determined by agronomic and economic factors such as chemical fertilizer costs and

equipment and labor needed to apply each.

Anhydrous ammonia was the most costly nitrogen source across all three equivalent nitrogen rates of 50, 150 and 450 pounds of nitrogen per acre, with costs of $30.86, $54.88 and $126.95 per acre, respectively.

He said the higher costs of anhydrous were due to the purchase price, which is not required normally with the use of beef and swine manure. Swine effluent had the lowest costs at $12.06, $17.98 and $34.51 per acre for the three application rates.

The lower costs for the swine effluent are associated with the ability to apply it through existing irrigation equipment, requiring only minimal purchase to pump from the lagoon to the center pivot, Park said.

Both the anhydrous and beef manure require the purchase of application machinery, he said, which adds a fixed cost. Because of that cost, beef manure application costs were higher than swine, at $30.52, $35.47 and $47.19 per acre, respectively at the same rate.

Beef manure, however, becomes a more economical choice if the crops are located away from the originating farm of either manure, Park said. While swine effluent has a lower breakeven price, it is too bulky to transport off-farm to other producers.

"The breakeven is figured by using the actual price of corn plus the cost of fertilizer," he said. "During this study, there was a widening margin in the breakeven between the animal manure-treated corn crops and anhydrous ammonia-treated corn crops, which generated an increased profitability for producers and increased the economic viability of marketing beef manure as a commercial fertilizer."

Park explained if beef manure averages $2.20 per ton with a shipping

cost of 50 cents per mile, it can be profitably transported up to 29 miles from its point of origin in the Oklahoma and Texas panhandles and be competitive with high anhydrous ammonia prices, as experienced from 2005-2007.

Another benefit of animal manures is the improvement of soil properties such as micronutrients and soil pH, Park said. Throughout his experiment the beef-manure and swine-effluent plots maintained higher soil pH levels than the corresponding anhydrous plots.

Additionally, continued application of anhydrous can lead to acidification and thus losses in productivity, he said. Appropriate nutrient-management practices should be implemented to prevent environmental damages.

Park also warned that site-specific conditions such as weather, animal waste management practices and soil properties would need to be taken into consideration when adapting this information to locations outside the Oklahoma Panhandle.

"This is a unique economic study on various nitrogen fertilizers using rare and valuable data from a long-term field experiment from 1995 to 2007," Park said. "The next step is to determine best nutrient practices based on this experimental data."

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