On-Farm Energy Production Unlikely to Reduce Manure Fertilizer Value

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Last summer, the USDA Economic Research Service (ERS) reported to congress on the use of manure for fertilizer and energy. Their primary conclusion was manure has value as fertilizer and energy. I don't imagine this conclusion surprises many pork producers. A secondary, although perhaps more important, result of their investigation was that increased use of manure for on-farm energy will not reduce its value as fertilizer.

Converting manure to energy does not substantially reduce manure's fertilizer value, because the potential energy in manure is stored as carbon. Most processes to convert energy from manure do so by removing carbon while leaving the mass of plant nutrients intact. Generally speaking, this is same for biological waste treatment processes. Microorganisms use the energy stored in organic matter for growth and release Carbon dioxide or Methane as an end product of their metabolism.

Hardly any treatment process removes Phosphorus or Potassium from marketable end products. Nitrogen is another story. Its availability as fertilizer depends on the energy conversion process. Anaerobic Digestion is the most technologically feasible method to make energy from the dilute hog manure produced by flush and pull-plug systems in Oklahoma. Anaerobic digestion conserves nitrogen. Fecal protein and urine urea are converted to ammonia during digestion. Ammonia can be lost to the atmosphere if the digester effluent flows into a lagoon, but you can't blame its loss on the digester.

Net cost per animal unit (1 AU = 1,000 lb live weight) of applying swine manure on a phosphorus removal basis is given in Figure 1. The ERS breaks costs down by farm size, region, and willingness of neighbors to accept manure. Net cost is the cost required to develop application plans, take soil samples, transport manure to the application site, and spread manure; minus the fertilizer value of the applied manure. Depending on its location, a hog farm in Oklahoma could be considered either Western (farms surveyed in OK, UT, and CO) or Southern (AR, TN, KY, Al, GA). Either way, the cost to spread manure is lower in Corn Belt than in Oklahoma for all but the smallest Western farms. The cost of application decreases dramatically for CAFOs (> 1,000 AU) as the percentage of adjacent land owners willing to accept manure increases (Figure 1).

Since anaerobic digestion conserves nutrients, adding a digester will not reduce the amount of land needed to spread plant nutrients, but it might increase the value of those plant nutrients to a potential buyer. Whether adding a digester makes economic sense for energy production is a topic for another day.

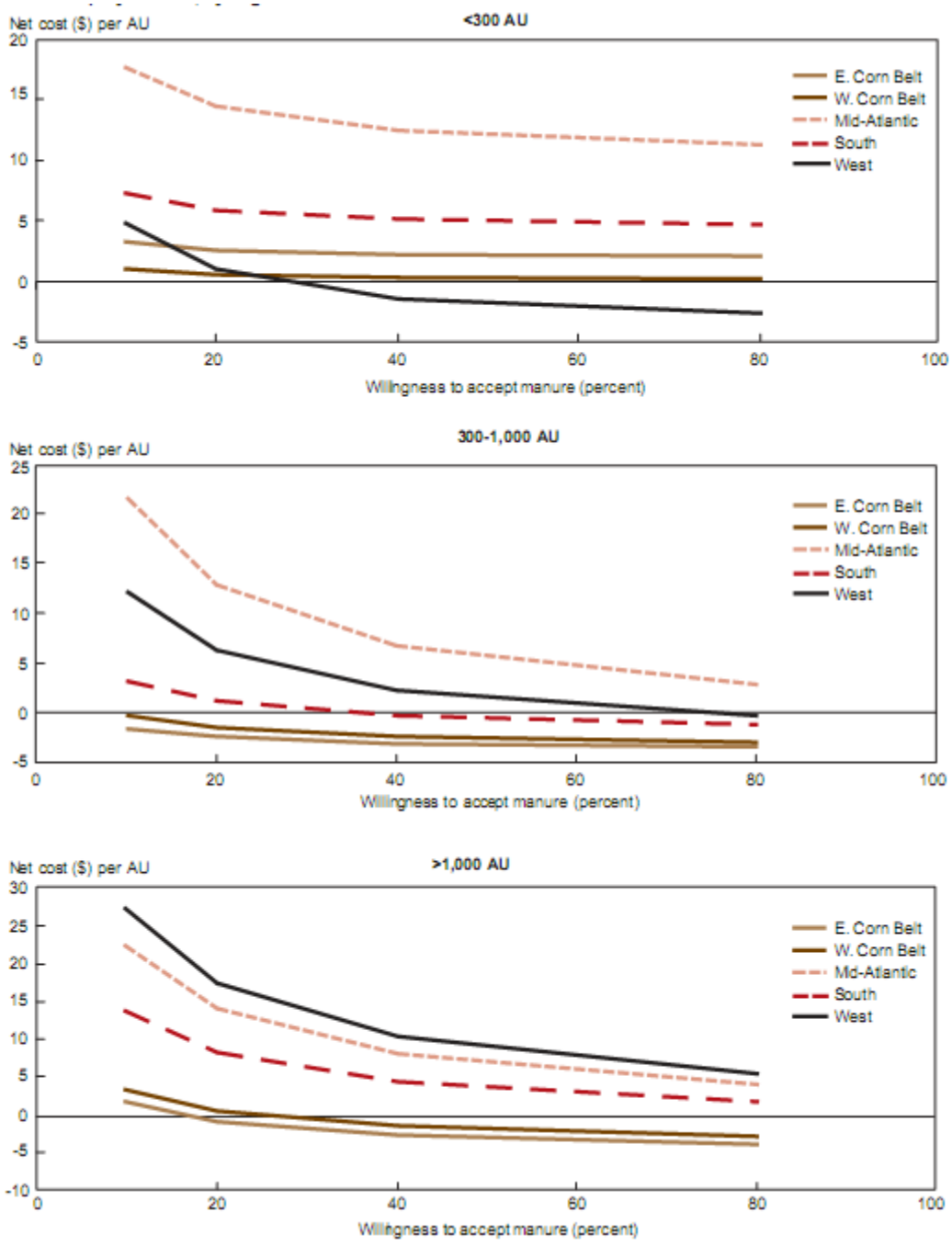

Figure 1. Net cost of manure applications for various sized swine farms by region versus percentage of adjacent landowners willing to accept manure from the farm. (from Ribado et al, 2003).

References:

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