

A Short Analysis Of:  
**Manure Management for Water Quality: Costs to Animal Feeding Operations of  
Applying Manure Nutrients to Land.**

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[T]he literature on managing manure with a consideration of environmental impacts hits on several recurring themes. Animal manure is costly to move relative to its nutrient value, limiting the area to which it can be economically applied. Large operations generally do not consider the nutrient value of manure in making livestock management decisions, thus treating manure as a waste. This leads to over application of manure on land nearest to the facility. Restrictions on manure applications in order to meet environmental goals will increase the cost of raising animals by increasing the amount of land that is used for spreading manure and the distance that manure must be hauled.

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CAFOs routinely try to avoid the costs of proper manure handling and application by shifting these costs to the region they inhabit. Larger CAFOs lost their ability to shift some of these costs earlier this year:

New regulations—enacted by the Environmental Protection Agency in February 2003—require the largest confined animal operations to meet nutrient application standards when disposing of their manure by spreading it on cropland. The EPA regulations affect only those largest farms designated “concentrated animal feeding operations,” or CAFOs. While making up only about 5 percent of animal feeding operations, they contain 50 percent of all animals and produce over 65 percent of excess nutrients. If all CAFOs meet the nutrient standards outlined in the new regulations, increases in production costs could be felt throughout the food and agricultural system. (page iii)

The reason costs of production at CAFOs will increase when EPA regulations force these facilities to follow responsible application practices is quite simple. The cheapest way to move manure around a CAFO is to employ a liquid manure system. However, the concentrations of nutrients in this manure—for example, 1000 gallons of hog manure effluent will only yield about 15 pounds of nitrogen—make it very expensive to haul the effluent any distance to use it as fertilizer. As the USDA study notes:

*Complying with the EPA regulations will require CAFOs to spread their manure over a much larger land base than they are currently using, and most will need to move their manure off farm. Only 18 percent of large hog farms and 23 percent of*

large dairies are currently applying manure on enough cropland to meet a nitrogen standard. Further, even if they spread manure over their entire land base, only 20-50 percent of all large hog farms operate enough land to meet land application standards, depending on whether a nitrogen or phosphorus standard is to be met. (Page iii)

The increased costs to CAFOs from responsible spreading are significant. The USDA finds that:

Livestock and poultry producers' net income is predicted to decline by \$1 billion if 40 percent or more of all U.S. cropland is available for spreading manure. **On the other hand, if cropland farmers accept manure on only 20 percent of cropland, the per-animal cost to CAFOs for disposing of their manure would increase such that they would likely reduce their production.** (Author's emphasis, Page iii)

The requirement to spread manure on 40% of available crop land around the CAFO is complicated by four factors. First, the tendency of CAFOs to cluster in the same area for efficiency means that more facilities are competing for the same amount of land. Second, some manures (such as hog manure, for example) contain heavy metals and salts that may build up in cropland and either contaminate the land or cause crop production to decline. Third, spreading contracts usually require landowners to relinquish control over access to their land and over how and when manure is applied. And fourth, application of effluent is likely to cause odor, air pollution and water pollution concerns. When combined, these factors are likely to cause many, if not most landowners to reject spreading on their land. Thus, the likelihood of a single CAFO actually being able to secure spreading contracts on forty percent of the land surrounding it is very small, and the chance that a cluster of CAFOs would be able to accomplish this is almost negligible.

In addition, the forty percent requirement represents a best case scenario because these predictions are for spreading based on a nitrogen standard. In areas where eutrophication of waterways is a concern, spreading must be done based on the phosphorus content of the manure, and this requires far more land for application. The USDA reports that:

*Phosphorus-based standards are more costly than nitrogen-based standards. A farm level analysis of hog and dairy CAFOs suggests that their production costs could increase by twice as much, on average, under a phosphorus-based versus a nitrogen based standard. The higher cost associated with the phosphorus standard reflects higher concentrations of phosphorus in manure than of nitrogen, relative to crop nutrient needs. (Page iv)*

*The willingness of cropland operators to accept manure is critical in determining whether land application is feasible for disposing of all manure in regions with high animal concentrations. For example, in the Chesapeake Bay Watershed,*

under a phosphorus-based standard, if less than 60 percent of cropland receives manure because of cropland operator preferences, there would not be sufficient land for spreading manure within a 90-mile radius of manure production. (Page v)

One aspect of these costs is that they may cause a regional shift in the density of CAFOs as large integrators search for the cheapest areas in which to operate. The USDA found that:

[I]n general, costs will be lower in the Corn Belt than in other regions. Crop production is more prevalent there and livestock concentrations are lower, so manure does not have to be hauled as far off the farm to reach adequate land. Costs to hog producers, in particular, will depend greatly on where farms are located. Costs are highest in the Mid-Atlantic where hog densities are greater and cropland is not as common a land use in counties where hogs are raised. Under a phosphorus standard and with 20 percent of crop operators willing to take manure, hog farms in the Mid-Atlantic, South, and West would experience a 2- to 3-percent increase in production costs, while hog farmers in the eastern and western Corn Belt would be virtually unaffected. Large dairy farms tend to be more homogeneous across the regions we examined, so dairies in the North and South both experience similar increases in production costs (about 3 percent for a phosphorus-based standard when 20 percent of crop operators accept manure). (Page iv)

Based on this analysis, one could anticipate pressure for hog CAFO expansion in the Corn Belt while other areas of the country could experience closures of hog CAFOs as costs increase. According to the USDA, dairy costs are similar enough across the United States that all dairies should experience the same levels of cost increases. This would remove any incentive for dairies to relocate.

However they are incurred, the increased costs for large CAFOs should make smaller farmers more competitive. The USDA forecasts that:

If farmers' willingness to accept manure is limited, prices for animal products could increase by up to 6 percent, while prices for feed crops (e.g., corn, oats, and soybeans) could increase by 1 to 3 percent. However, if manure is accepted on 40 percent or more of cropland in each region, prices for crops and animal products are all likely to remain unchanged. Results will also depend on domestic and international market dynamics (which influence price responsiveness). (Page iv)

Since the likelihood of spreading on forty percent of the farmland is so small, it is probable that the overall effect of the new EPA regulations will be to raise the cost of those producers who are currently shifting more of their costs to the region through irresponsible manure application. This should provide an incentive to cut production and raise prices, and it should create a more favorable market for small producers. In fact, the USDA found that if they follow the EPA guidelines, "[p]roduction cost increases for small and medium-size animal feeding operations are generally less than 1 percent. This

result holds under all scenarios we evaluated...”(Page v).

Based on past experience with large CAFOs, one would not expect them to voluntarily spread manure in a responsible manner if it increased their costs, nor would one expect them to quietly accept a loss of market share due to increased costs of production. The USDA also anticipates this reluctance and states that:

*the estimated cost increases suggest that many AFOs will not have sufficient incentive to voluntarily meet nutrient standards without financial assistance. Financial assistance may be available to all animal operations, which would offset some of the costs associated with improved manure management. USDA’s Environmental Quality Incentives Program (EQIP) is designed, in large part, to provide relief to animal operations attempting to comply with EPA regulations. (Page vi)*

Thus, the USDA suggests that large CAFOs be subsidized to induce them to spread manure responsibly. This will allow CAFOs to continue to avoid the costs they have incurred by crowding too many animals onto a section of land--costs that are currently shifted to the regions they occupy through irresponsible manure spreading. Using subsidies to reimburse CAFOs for costs inherent in the kind of facility they have chosen to operate, will allow them to continue over-producing both animals and manure.

However, even subsidies cannot save the CAFOs if residents in the regions around them refuse to let them spread manure on their lands. The USDA views this as a very real possibility:

*Crop producers’ willingness to accept manure is a very important determinant of manure-spreading costs. A number of factors impede greater use of manure, including uncertain nutrient content, soil compaction associated with heavy manure application machinery, and odor. (Page vi)*

The USDA never suggests solving the problems it has identified by the most obvious method--reducing the density of animals in confined operations. Instead, it suggests more research and subsidies to overcome these problems:

Research on how these impediments might be overcome  
Education on the benefits of using manure  
Financial assistance for crop farmers using more manure  
Advances in feed management to reduce overall manure management costs  
Phytase in hog feed to reduce phosphorus concentrations (Page vi)

Even with all these approaches, the USDA believes the cost problems caused by the new EPA regulations remain serious enough that:

[t]he costs of complying with manure management requirements could instigate structural and geographical shifts in the livestock and poultry sectors. Our

analysis indicates that the highest per-unit costs for meeting a nutrient standard are often borne by the largest operations. (Page vi)

How quickly these costs will effect the way the industry operates will depend on the level of subsidies. But since the entire EQIP program contains less than half the money required to compensate the largest producers for losses under the new EPA rules, one can anticipate that the final result will be to force these operators to internalize some of the costs they have been avoiding if they elect to keep producing in the United States. This should either lead to more responsible manure management by large CAFOs or (and this is more likely) an accelerated departure of these operations to foreign countries with less stringent environmental regulations.