

remaining 73 percent of wastes from confined animals already is returned to the land, the economics of doing that can be assumed to be favorable.

The discussion suggests that the economics of collecting and transporting the nitrogen in animal wastes not already being used by farmers are unfavorable. And they likely will remain so unless the price of nitrogen fertilizer rises substantially (but we cannot say how much) above present levels.

Losses of nitrogen in fertilizer are high, estimates typically running from 30 to 50 percent or more. The nitrogen, as nitrate, is leached to groundwater, carried away in runoff, and volatilized by denitrification. If the losses of nitrogen in animal wastes are, or could economically be made to be, less than this, then the economics of substituting animal wastes for fertilizer would be improved.

We have seen no studies of this issue. However, losses of nitrogen in animal wastes may also be high. CAST (1980, p. 13) says that animal manure

"... must be carefully preserved and applied to realize its maximum benefits. It is a highly perishable commodity. The nitrogen and potassium are readily lost by leaching, and nitrogen is lost also by ammonia volatilization."

CAST cites the 1978 USDA study on use of organic wastes as indicating that 63 percent of the nitrogen in manure now returned to the land is lost to volatilization and leaching, and that at best this could be reduced to 45 percent. According to CAST (p. 13), this reduction in loss would increase the amount of nitrogen from collectible manure from about 9 percent to 12 percent of the amount now supplied in fertilizer.

It seems clear that the potential for increasing the supply of nitrogen (and other nutrients) by greater utilization of organic wastes is very limited.

The potential from naturally occurring nutrients in soil organic matter