Bioenergy and Animal Agriculture

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Bioenergy, a term that commonly refers to renewable energy derived from organic matter, is in the news. Seen as a way to diminish our dependence on fossil fuels, a means of revitalizing agriculture, a reduction in greenhouses gases, the advantages cited are numerous.

Two examples of bioenergy are the biofuels ethanol and biodiesel. Ethanol is produced from grains. Corn is the usual feedstock of choice, although vast supplies of cellulosic material offer additional opportunities. In newer ethanol plants, dry-milled grain is mixed with water to form a mash. Enzymes are added and the mixture is heated before being allowed to ferment. The main products are ethanol, carbon dioxide and animal feed. Animal feed is marketed as distiller's dried grains with solubles (DDGS). Biodiesel is made from vegetable oils and waste greases. Oil crops include soybeans, canola and rape. A by-product is protein-rich flakes which also have use in animal feed.

Because important byproducts of both ethanol and biodiesel production are animal feeds, a connection between these forms of bioenergy and animal agriculture is obvious. But in discussions about ethanol and biodiesel production, these connections to animal agriculture are seldom mentioned. An exception is in the case of economic analyses where a value is assigned to the animal feed byproduct as a source of revenue. For example, the share of the total revenue of an ethanol plant typically contributed by sale of DDGS ranges from 15% to 20%.

In spite of that, the first and foremost consideration when siting an ethanol plant is proximity to corn production, not livestock production. In fact, the major market for DDGS in North America is California and freight costs to this market from locations in the western corn belt are on the order of $45 per ton. This is for a byproduct that may account for 15-20% of plant revenue and is valued at $80 to $120 per ton as animal feed.

Environmental costs are another important consideration. In large-scale livestock production, especially hogs and chickens, less attention is being paid to the tie to a local land base for feed inputs or manure for crop production . The result is that manure is produced where sufficient crop land is often not available for utilizing the manure nutrients. On the cropping end, commercial fertilizers replace manure nutrients that otherwise might have been used. The feed is transported to the animals. However, the cost of transporting manure in the opposite direction cannot be justified because of its low value.

Just as is the case for food production, environmental problems will potentially be less in the case of agricultural production of bioenergy when the crop and livestock systems are closely coupled.

Why is the connection to animal production often ignored in discussions of bioenery? Is it an oversight? Maybe, maybe not. Are connections to animal agriculture unnecessary? Of course not. Crop and animal production are closely linked, whether for food production or the production of bioenergy.

Or, is the connection to animal agriculture being ignored because of an unwillingness to address the issues associated with dealing with an important byproduct, animal manure? For sure, the glamour of bioenergy is diminished when coupled with finding ways to handle manure in a way that is affordable to the farmer, friendly to the environment and acceptable to society.

Bioenergy is an important and desirable segment of our future. But since byproducts of bioenergy production are important sources of animal feed, ethanol plants will benefit from marketing DDGS to nearby livestock producers.

Furthermore, a large number of animals produces large quantities of manure, regardless of the proximity of the livestock and the crop land which is the origin of their feed. Thus, management of the manure must be a part of the total equation. For example, anaerobic digestion is a cornerstone for an integrated manure management system, setting the stage for innovative manure treatments that return value to the farmer and enhance environmental and social acceptability. And the biogas from anaerobic digestion of the manure (and other substrates) can be an important source of energy for a biofuels plant.

In Michigan, agriculture is important to the State’s economy. A successful Michigan agriculture depends upon close linkages between cropping systems and animal agriculture. These close linkages are essential whether agriculture is viewed as a food production system or as a source of organic matter for bioenergy.