Bioenergy and Animal Agriculture

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Seen as a way to diminish our dependence on fossil fuels, revitalize agriculture, and reduce greenhouse gases, the advantages of bioenergy are seemingly endless. But bioenergy, or renewable energy derived from organic matter, can’t be created in a vacuum. The process is closely entwined with crop production and animal agriculture and, subsequently, could also have a positive effect on Michigan dairy producers and the state’s overall economy. To realize that potential, the animal agriculture and bioenergy industries must be closely linked.

Fuel and Bioenergy

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 potential 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 dried distiller’s grains with solubles (DDGS). Biodiesel is made from vegetable oils and waste greases. Oil crops include soybeans and canola. A byproduct of bio-diesel production is protein-rich flakes, which also have potential use in animal feed.

Connecting the Industries

Because animal feeds are important byproducts of both ethanol and biodiesel production, the connection between bioenergy and animal agriculture is obvious. But these connections to animal agriculture are seldom mentioned in discussions about ethanol and biodiesel production. 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% (1).

In spite of that, the first and foremost consideration when situating an ethanol plant is proximity to corn production, not livestock production. In fact, one of the major markets for DDGS in North America is California. Freight costs to this market from locations in the western corn belt are approximately $50 per ton (2). This is for a byproduct that may account for 15 to 20% of plant revenue and is valued at $80 to $120 per ton as animal feed. Such cases illustrate the economic influence of livestock production on the bioenergy industry.

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 (3). 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 rarely can be justified because of its low dry matter content.

Just as is the case for food production, agricultural production of bioenergy will create fewer problems for the environment when the crop and livestock systems are closely coupled.

**Addressing the Links**

To return to the question of why animal production is often ignored in discussions of bioenergy, the answer may simply be that the connection is often overlooked. That answer is not entirely satisfying, though, because connections between bioenergy and animal agriculture industry are closely linked, whether for production of food or bioenergy.

Or, is the connection to animal agriculture being ignored because of an unwillingness to address the issues associated with dealing with animal manure? 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 because 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 produce large quantities of manure, regardless of the proximity of the livestock and the cropland 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.

**Conclusion**

Agriculture is a vital part of the Michigan economy. Successful Michigan agriculture depends upon closely linking cropping systems and animal agriculture. These links are essential whether agriculture is viewed as a food production system or as a source of organic matter for bioenergy.

**References**

