



The Florida Senate

Interim Report 2011-103

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Committee on Agriculture

POTENTIAL CREATION OF BIO-FUEL FROM EQUINE BEDDING WASTE

Issue Description

The Department of Agriculture and Consumer Services (DACS) regulates certain aspects of the state's horse industry. Responsibilities include the regulation of the health of horses, and also, in conjunction with the Department of Environmental Protection (DEP), ensuring the safe disposal of animal waste. Currently, Florida has many horse parks, livestock centers, and farms where animal waste and animal bed waste is readily available.

Background

In its role regulating the health of horses, DACS Division of Animal Industry is responsible for preventing the introduction of serious equine diseases by carrying out programs to ensure horses entering the state meet certain health certification and testing requirements, maintaining surveillance for dangerous transmissible diseases of horses and controlling or eradicating such diseases, if they are detected. The Department of Agriculture and Consumer Services' statutory authority for this role is found in section 570.36, F.S., and Chapter 585, F.S. The Florida Administrative Code (FAC) rule numbers 5C-4, Admission of Animals for Exhibition, 5C-6, Brucellosis, 5C-14, Equine Piroplasmiasis, 5C-18, Equine Infectious Anemia, 5C-20, Dangerous Transmissible Diseases and 5C-22, Contagious Equine Metritis, more specifically guide the department in its duties.

The DEP derives its statutory obligations in this matter under sections 403.061, 403.087, 403.088 and 403.0885, F.S., with further guidance provided by FAC rules 62-620, Wastewater Facility and Activity Permitting, 62-660, Industrial Wastewater Facilities, and 62-670, Feedlot and Dairy Wastewater Treatment and Management.

Preventing Animal Waste from Contaminating Surface and Ground Waters

Concentrated Animal Feeding Operations (CAFOs) are facilities where large numbers of livestock or poultry animals are confined for various purposes including feeding, breeding, training, milking, egg production, meat production, etc. For example, a dairy with 700 or more mature dairy cows, a "broiler" chicken facility with 125,000 or more chickens, a horse training or racing facility with 500 or more horses would be considered large CAFOs. Facilities that have fewer than the threshold number of animals are simply called Animal Feeding Operations (AFOs).

When large numbers of animals are confined in relatively small areas, their manure builds up and can be a source of pollution for both surface water and ground water. Animal manure contains high concentrations of organic material, nitrogen, phosphorus, and fecal bacteria. Many large CAFOs (such as broiler chicken and horse facilities) typically remove manure in dry form. Dry manure is often stored under roof and subsequently taken offsite for use as fertilizer. However, some facilities stockpile large amounts of dry manure on bare ground, potentially resulting in runoff to surface water or seepage into ground water. Additionally, some large CAFOs such as dairies flush wastes with water, and can produce large volumes of wastewater.

Because of their potential to be significant pollution sources, CAFOs nationwide are subject to federal and state wastewater permitting. CAFOs are regulated under the National Pollutant Discharge Elimination System (NPDES), which is part of the federal Clean Water Act. NPDES rules require CAFOs to obtain wastewater permits if they discharge pollutants to surface water. The Department of Environmental Protection (DEP) has adopted the federal CAFO requirements in Rule 62-620.100(3)(r) – (w), F.A.C. and is authorized by USEPA to

issue NPDES wastewater permits in lieu of the federal government. In Florida, 49 dairies, 1 beef feedlot, 2 chicken egg producers and 5 equine facilities currently have large CAFO wastewater permits.

Additionally, DEP is currently revising Chapter 62-670, F.A.C to develop a non-NPDES permitting rule for large CAFOs and certain AFOs. The rule will primarily affect facilities that handle their manure, litter, bedding and wastewater in a manner that might result in seepage of pollutants to ground water.

State waste disposal regulations are designed to work in conjunction with animal feeding operation rules so that facilities that are permitted under animal feeding operation rules will be exempted from solid waste permit requirements. Anaerobic digestion and composting are largely exempt operations when conducted as part of what is defined as normal farming operations. If the unit is operated on the waste-generating horse farm, there is the permit exemption regarding normal farming operations – 403.707(2)(e) F.S., 62-701.320(2)(d), and 62-709.305(2), F.A.C. Normal farming is defined in 62-701.200(76), F.A.C. Note that the exemption in 62-709.305(2), F.A.C., relates to composting (on and off farm uses) and anaerobic digestion (on-farm uses only).

Biomass

According to information gathered from the federal Department of Energy (DOE), bioenergy technologies use renewable biomass resources to produce an array of energy related products including electricity, liquid, solid, and gaseous fuels, heat, chemicals, and other materials. The success of bioenergy efforts depends, to a large degree, on the quantity and quality of biomass available, and on the industry's ability to cost-effectively use biomass for energy production and identify effective and sustainable sources of feedstock. Bioenergy ranks second (to hydropower) in renewable U.S. primary energy production and accounts for three percent of the primary energy production in the United States.

Under this DOE definition, equine waste and bedding material would be classified as biomass. The term "biomass" means any plant derived organic matter available on a renewable basis, including dedicated energy crops and trees, agricultural food and feed crops, agricultural crop wastes and residues, wood wastes and residues, aquatic plants, animal wastes, municipal wastes, and other waste materials. Biomass can be used to produce biofuels for transportation or bioenergy for power production.

Biofuels

Biofuels are liquid or gaseous fuels produced from biomass. The expanded use of biofuels offers an array of benefits for energy security, economic growth, and the environment. Current biofuels research focuses on new forms of biofuels such as ethanol and biodiesel, and on biofuel conversion processes.

The conversion of biomass solids into liquid or gaseous biofuels is a complex process. Today, the most common conversion processes are biochemical- and thermochemical-based. However, researchers are also exploring photobiological conversion processes. The conversion of biomass, such as equine waste, into a biofuel, still has technical and economic barriers to overcome.

Biopower

Some biomass is used as fuel to produce electricity. Biopower technologies using material such as equine bedding waste, primarily involve gasification and anaerobic digestion.

Biomass gasifiers

Gasification operates by heating biomass in an environment where the solid biomass breaks down to form a flammable gas. This offers advantages over directly burning the biomass. The biogas can be cleaned and filtered to remove problem chemical compounds. The gas can be used in more efficient power generation systems called combined-cycles, which combine gas turbines and steam turbines to produce electricity. The efficiency of these systems can reach 60%.

Anaerobic Digestion

Anaerobic digestion, or methane recovery, is a common technology used to convert organic waste to electricity or heat. In anaerobic digestion, organic matter is decomposed by bacteria in the absence of oxygen to produce methane and other byproducts that form a renewable natural gas. Methane and other gases can be used to produce electricity or heat. Anaerobic digestion is a common technology in today's agriculture, municipal waste, and brewing industries. The primary benefits of anaerobic digestion are nutrient recycling, waste treatment, and odor control. The economic viability of this process for energy production is generally dependent on scale including the amount of waste that is available as a feedstock and the potential transportation costs.

With more than 35,000 Thoroughbred horses in Marion County alone, the disposal of stall waste is a concern. Animal waste contains pollutants that can contaminate surface and ground water supplies when disposed of improperly. Currently, individual farms are responsible for stall waste disposal. Known as the "Horse Capital of the World," Ocala/Marion County is home to 431 Thoroughbred breeding and training farms covering more than 70,000 acres of Florida's pastures.

Findings and/or Conclusions

The bioenergy potential from equine waste offers substantial energy and environmental benefits. The production of ethanol and biodiesel from equine waste is still largely in the research and development phase. However, the DEP reports that bioenergy production projects from equine waste using anaerobic digestion or gasification appear closer to commercial viability, particularly if equine waste is added with other agricultural waste and wastewater residuals.

State-Funded Renewable Energy Projects Using Equine Waste

Farm to Fuel Project

The Florida Farm to Fuel program has funded one project using equine waste to produce biogas through anaerobic digestion. This facility is the first completed project that received funds from Commissioner Bronson's "Farm to Fuel" grant program. Sigarca, Inc., was awarded \$500,000 and the company and its partners invested an additional \$539,000 to develop the facility. The project is located at the Southeastern Livestock Pavilion in Marion County. The facility processes horse manure into renewable energy, organic soil and soil tonic (bio-fertilizers) and gives Florida's substantial equine industry an environmentally superior method of disposing of animal waste.

The facility produces enough electricity to meet its needs and provide excess energy to the Southeastern Livestock Pavilion. The organic soil and bio-fertilizers produced will be bagged and marketed to local nurseries and landscaping companies.

The patented, dry-fermentation process that is the core technology of the project was developed by Dr. Jose Sifontes, who led a team of experts from the University of Florida's Institute of Food and Agricultural Sciences, Marion County Extension Office, Kenaf USA, Sifontech, LLC, and Equine Waste Management, LLC. The facility does not produce runoff, noise or noxious odors.

The demonstration project will last for one year and studies will be conducted to evaluate the plant's performance and its ability to operate on a larger, commercial scale. Hopefully the outcome will lead to the creation of a full-scale bio-energy plant using the same technology but with a greater output.

Florida Renewable Energy and Energy Efficiency Technology Grant Program

As part of the state's effort to stimulate the renewable energy industry in Florida in 2009, the Florida Energy and Climate Commission issued a \$2.5 million grant to the Florida Thoroughbred Breeders and Owners Association to fund the Ocala Equine Energy Project. The project is based on a process that converts energy contained in organic matter, in this case equine waste, into various gases in an oxygen-starved, high-temperature, controlled environment. The process is designed to convert waste to renewable energy, reduce reliance on land application

and landfills, and minimize surface and groundwater pollution. The project has just recently completed its design phase and is beginning efforts to secure necessary permitting.

Options and/or Recommendations

- Option 1 Through legislative deliberation determine an appropriate approach regarding the use of equine bedding waste as a renewable bio-fuel source.
- Option 2 Continue monitoring Florida projects to evaluate whether viable business models develop for the bioenergy potential for equine bedding waste for the purpose of considering the potential benefits of some form of state incentives to encourage projects.
- Option 3 Continue with past levels of grant incentive projects that would include consideration for equine bedding waste through currently established programs to increase renewable energy options such as the Farm to Fuel program and Florida Energy and Climate Commission energy grants.
- Option 4 Increase grant support or state funding for renewable biomass energy projects that would include equine bedding waste projects for consideration.