Researching Alternative Fuels

Southern SARE welcomes proposals that address alternative energy in the context of a sustainable ag system. A search of the national SARE project data base turns up fewer than 30 such projects that range from harnessing wind or solar power for farm use or producing fuel from farm by-products or livestock waste. Here's how some researchers in the Southern Region have approached alternative energy with SSARE grants.

(above) Dairy farmers are likely to be good cooperators on alternative fuel research projects because cattle feed and/or manure are often components of such projects. Photo courtesy of Trantham's Happy Cow Creamery.

(right) On a cold winter day in Pennsylvania, wet mash from John Painters on-farm still is trucked a short distance across the farm to the dairy barn where it will be fed as a 17% protein supplement. Photo of project OS05-023 by J. Craig Williams.

Livestock and Feedstock: Distiller's Grain and Fuel Ethanol

An On-Farm Research Project led by Peggy Korth of the non-profit Water Assurance Technology Energy Resources (WATER) in Texas is evaluating a process that not only converts corn or other livestock feed into a high protein supplement for dairy cattle but also produces fuel ethanol.

When the Arkansas dairy that was cooperating with Korth's project went out of business, the project almost came to a halt. Then she was contacted by Pennsylvania State University Tioga County Extension Agent J. Craig Williams who was working with a farmer looking for help in setting up a feed supplement/ethanol still. So Korth's project stayed on track; it just went to John Painter's farm in northern Pennsylvania.

John Painter and his three sons manage about 300 holsteins who graze on alfalfa and cool season grasses much of the year. The rest of the time they rely on harvested feed stock. The Painters had purchased the second hand still to enhance a portion of the corn ration by converting it into a high protein feed supplement called distillers grain. Water removed from the wet mash can then be distilled into fuel ethanol to run irrigation pumps and power gasoline engines on the farm.

The project aims to show that a medium sized dairy can add value to livestock feed while simultaneously producing non-polluting fuel for farm use. The dairy has been brewing feed since February, and the Painters are scheduled to make their first batch of ethanol in April.

"When a farmer enters into energy crops, he should not forsake food crops," says Korth who continually looks for ways to meld food and fuel self-sufficiency.

She says future research needs on the topic are vast, including comparisons of different feed crops as to the amount of feed supplement and ethanol they produce as well as the broader topics such as crops that can make use of drought-prone areas that are not considered agriculturally viable lands.

County agent Williams who came late into the research said he's had to learn a lot in order to help the Painters. "I don't have a bench mark for what's a good ratio of raw materials and end product. Penn State has a great learning opportunity in this project."

Williams, who has been involved in past NE SARE projects, also counts SARE support of national and state County Agricultural Agent Association demonstrations and trainings an important part of his professonal development.

For more information search the SARE data base for OS05-023. Contact Peggy Korth at rpk.gvtc.com.

Forage, Biomass and Biogas Integrated Systems for Animal Waste Management

In 1994 M.J. McFarland of Texas A&M led a research project that developed a system of biogas (methane) production from an anaerobic digester of dairy manure. Other parts of the project evaluated the potential of land application of digester effluent and solid manure on switchgrass for biomass energy and forage production. This large, systems project also evaluated the ethanol and potential energy production from switchgrass and screened solids treated via AFEX and the use of AFEX-treated switchgrass and solids as an alternative animal feed.

The project ended a year before the biogas generation was anticipated. A recent telephone call obtained this update from McFarland, who is now retired.

"Technically the biogas generator worked fine. However the dairy owner moved, and we loss our source of manure. We also found out that the large amount of water needed to run the generator made the dairy owner lose interest. It would work better if the dairy owner originated the idea rather than having researchers bringing the idea to the producer."

For comparison McFarland points to the volunteer work he is doing managing projects for the NRCS RC&D in his community.

"We have found a high value market for compost mixed with sand—athletic fields. The industry is so eager for the product that they pay all overhead and administrative costs of the research and put our results to work right away."

For the final project report search the SARE project data base for project AS94-014

The Use of Renewable Energy to Improve the Sustainability of Southeastern U.S. Pond Aquaculture

Producer buy-in was the main reason Barrett Vaughan of Tuskegee University and cooperators from several states chose to pursue a planning grant rather than a full research grant to evaluate renewable energy sources for catfish pond aeration.

The project is bringing together researchers to coordinate efforts for developing renewable energy water circulation technology on a scale and at a cost suitable for catfish farmers. They will be looking at both diffused-air and propellar circulators powered by the sun. Their objective is to produce a proposal that will include pilot, experimental, field scale and economic evaluations of several solar-powered circulating systems. The amount of electricity required to aerate catfish ponds is a barrier to sustainability for the industry.

The planning grant will give them a year for meetings and touring catfish farms to find suitable cooperators, obtain commitments from cooperating institutions and the participation of end users. During those meetings they will discuss current research findings and determine research needs for renewable energy water aeration.

Energy research is expensive, often requiring costly cutting edge technology. Bringing the stakeholders into the planning stage will assure that the resulting research will actaully address issues important to producers such as set up costs, maintenance and space allotment in the pond for the equipment. *To keep up with the progress of this project search the SARE data base for LS05-181.*

Fixed Film Anerobic Methane Digester

Michael Green of Oklahoma used a producer grant to find out if it would be feasible to heat his 20 X 20 greenhouse with methane made on the farm. He found out that his method was simple, cheap and produced enough methane to heat his greenhouse for three months. However, it all came to a halt when the dairy that supplied the manure went to a flush system. Green sought manure from other sources but could not find a practical way to get the quantities needed, so after eight months the project was abandoned.

He terms the method "easy to make, easy to store and easy to use." The system started with two 55-gallon drums welded together vertically to make a tall, 110-gallon container. They were painted black and put in a sunny location. Loaded with about 75 gallons of fresh manure, the unit would produce about 1600 cu. feet of gas. When it quit bubbling, more manure could be added to keep producing.

The methane rose to the top of the unit where it flowed through an air hose to an inner tube for storage. Since methane can't be compressed like natural gass, the inner tubes made low-cost expandable bladders, which were stored in the barn until the methane was needed in cold weather. Green said the methane stored well, and he didn't percieve any loss of volumne.

The gas traveled from the inner tube through another air hose to a propane burner in the greenhouse heater. Each inner tube held about 400 cubic feet of methane and would fuel the heater for eight hours, enough to get the plants through a cold night. A second inner tube could be hooked up the next morning if needed.

Obtaining enough fresh manure was the limiting factor in this system, according to Green, who thinks so much fresh manure is needed that a person would need to live near a feedlot or some other CAFO. In his opinion chicken farmers seeking uses for the manure already on their property and who also need to heat chicken houses in the winter would be the most likely cooperators on projects evaluating this technology.

Search the SARE database for project FS02-150.