

# Zoo poop may hold renewable fuel secret

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NEW ORLEANS (AP) — Hippos and other plant-eaters in the zoo may hold the secret to renewable fuel, say researchers at Tulane University.

From those animals' feces, the scientists have identified more than a dozen different strains of bacteria that can help turn plant waste into butanol, an alcohol that can fuel internal combustion engines.

"It sounds — and is — humorous, the image of scientists running around the backside of a giraffe or hippo," said Eric Smith, associate director of the Tulane Energy Institute, "but these animals evolved an efficient way of consuming cellulose long before we thought about it."

Since the 1950s, butanol has been commercially manufactured using petrochemical processes, though it is also a natural result of fermentation.

Energy Institute scientists have been working for just more than a year on a project to identify and genetically engineer bacteria to create butanol. The work is funded in part through a grant the U.S. Department of Energy awarded to the coalition of six Louisiana universities that comprise the Clean Power and Energy Research Consortium.

"We are on the cutting edge here," said W.T. Godbey, a Tulane assistant professor of chemical and biomedical engineering and one of the project's investigators.

Once the researchers determine the best bacteria for producing biobutanol, they intend to genetically modify them to produce higher yields of the chemical and to digest cellulose so plant material that might otherwise wind up in landfills can be used to produce fuel.

Smith said butanol could offer a way around many of the problems that plague ethanol, an alcohol already in widespread use as a fuel source.

Butanol contains significantly more energy per volume than ethanol, blends more readily with gasoline and can be distributed through existing pipelines, whereas ethanol has to be trucked or moved by rail across the country and blended at the last minute since ethanol-gasoline blends are sensitive to moisture, Smith said.

In addition, there are questions about whether using ethanol actually saves energy, and it creates competition between fuel and food needs.

In the United States, most ethanol is produced from corn, a notoriously energy-intensive crop, and the total energy balance of the production process is unfavorable, Smith said.

"You don't really save that much energy over standard gasoline," he said. "Butanol is basically just a better fuel."

Godbey said researchers have been surprised by the number of animals they have found whose feces have proven valuable for butanol-producing bacteria. They are still evaluating

which of the samples contains bacteria best-suited to their purposes.

"Giraffe," he said, "made the top 13."

Within the year, Godbey said his team hopes to be able to produce enough butanol to power a small motor.

"Keep in mind," he said, "just producing it isn't the only problem. We also have to isolate it, purify it."

The bacterial fermentation process, he explained, produces a variety of metabolic byproducts, with butanol being "just one of dozens."

Ultimately, Godbey said his team's research is likely to appeal to an oil company that could opt to use biologically produced butanol as a fuel additive.

There is already interest to that end.

In 2006, British Petroleum and DuPont announced a partnership to develop butanol made from sugar as a biofuel in the United Kingdom.

But butanol also might carry applications for everyone from home consumers looking to get rid of old newspapers to sugarcane farmers wondering what to do with mountains of bagasse resulting from sugar processing, Godbey said.

Researchers envision sugarcane farmers eventually equipping their facilities to manufacture biobutanol during months when sugarcane is not in production, potentially providing for increased employment opportunities and profitability.

Instead of going to the landfill, those waste products could be used to make fuel, Godbey said.

"What we're doing is basically opening up a brand new energy source that used to be considered a waste."

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