Ruminant feed break through converts cellulose to useable form

FORT COLLINS, Colo. — A Colorado State University engineer says he has developed a method that could become the basis of a new source of ruminant feed throughout the world within the next few years.

Bruce E. Dale of the University's department of agricultural and chemical engineering said he has found a way to greatly increase the digestibility of such material as corn stover, wheat straw or rice straw so that it becomes an animal feed that compares favorably with grain.

Dale said the process could have a profound influence on worldwide agriculture. He noted that numerous scientists throughout the world have devoted years of research trying to find a way to convert cellulosic materials to animal feed.

"We feel that the process will be a practical, agricultural tool within a few years and should vastly increase the potential animal feed in the world," Dale said.

He added that the method also can be used to convert cellulose to alcohol, although cellulose-alcohol conversion requires more steps than cellulose-animal feed conversion and, therefore, will require more development.

Besides providing a new source of animal feed, which should be less costly than current feeds, Dale said the method should make more grain available for human consumption.

He explained that much of the world's grain that could make good, human food is fed to cattle. "In this situation, the world's affluent can bid away grain from the less affluent," he said. Since Dale's discovery should make non-food sources available as cattle feed, more grain suitable for human consumption should be available.

"We, in the affluent countries, can have our cows and eat them, too, and not bid away grain supplies from the less wealthy countries," Dale explained.

Dale pointed out that his discovery is not aimed at the needs of individual farmers. Rather, once machinery is developed to make the process practical on a large scale, it would be attractive to farm co-ops and large cattle-feeding operations. For overseas use in remote areas, machinery probably could be mounted on trucks or barges and made available to farmers through government assistance, he said.

Dale explained that cellulose-animal feed units could be built in various sizes, but that a unit could treat 1 to 2 tons of cellulose material per hour probably would cost around $100,000. He estimates that such a unit would serve the needs of a 5,000-head feedlot operation and pay-back in that case would take less than two years.

Dale said that Colorado State University has filed for a patent on his method and that a number of companies in the United States and abroad have expressed interest in developing the machinery to make the cellulose-animal feed process practical on a large scale.

Dale said machinery that he has used on a small scale is relatively simple. Therefore, he is optimistic that a company could complete development of large-scale machinery within about two years.

The CSU engineer explained that basic machinery required for the process are compressors, a pressure chamber for about 200 pounds per square inch of pressure, and conveyors.

Dale said he will continue research on the process itself and on machinery neccesary to make the process work on a large scale, perhaps with a stationary pilot plant.

"We know the process works. Now, we need to find out more about precisely how it works and how we can do it even more efficiently," he said.

Dale reported that his process operates successfully on alfalfa to make it a higher quality feed and on wheat straw, rice straw and corn stover, all materials that have a cellulose content of about 35 percent to 40 percent and a lignin content of about 15 percent. Lignin is a material that acts like cement and is contained in the cell wall of plants.

Wood materials, which have a much higher lignin content, do not seem to respond as well to the treatment as straws. However, Dale said he is continuing work with wood materials.

Some companies also are interested in his process to make alcohol, Dale said.

He pointed out that making alcohol, which is combined with other fuels to make gasohol or diesohol, is much more economically feasible with cellulose than with feed grains.

"As compared to corn, cellulose material is much cheaper, there is less price fluctuation, and it's not a food.

"Most of the interest in making alcohol from corn came about through large subsidies and a depressed corn market. About 70 percent of the variable costs of making alcohol from grain are due to the grain itself. Since corn prices have increased, the cost of making alcohol from corn has gone up as well," Dale said.

Dale will be conducting further research on the best ways of converting cellulose materials to alcohol with Antonio Moreira, also a CSU engineer in the agricultural and chemical engineering department.

"The idea of using alcohol as a fuel is good, but making alcohol from grain requires a supply of fairly low-priced grain. Hopefully, cellulose conversion can be the key to revitalizing the alcohol fuel industry," Dale said.

Dale, a chemical engineer, has been at Colorado State University for the past 2½ years where he is an assistant professor in his department. One emphasis of research in the CSU agricultural and chemical engineering department is on converting agricultural waste to food and fuel products.

Deadly pine tree disease now found across U.S.

COLUMBIA, Mo. — Scientists are studying a deadly disease of pine trees that is now known across the U.S. after being first identified in Columbia, Mo., just two and a half years ago.

"It's the same disease that has been an epidemic in Japan for over 50 years," said Marc Linit, University of Missouri-Columbia entomologist.

He and Victor Dropkin, chairman of UMC's Department of Plant Pathology, have been invited to present research papers at the International Union of Forestry Research Organizations World Congress in Japan, September 6-17. There they will confer with Japanese scientists to gain a better understanding of the disease cycle.

Called pine wilt, this disease involves trees, nematodes and insects.

"You first notice the disease when you wound the tree and see that no resin flows from the wound," Dropkin said. "Still the tree looks fine. Then in three weeks, the tree is dead."

At the World Congress, Dropkin will present a paper giving an update of pine wilt disease in the U.S.

Linit will report on the insect vectors that transport the disease-causing nematodes from infected to healthy trees.

Dropkin is studying the nematode-tree interacations to see if there is any way to control the pest. The nematode is the same species that attacks pines in Japan.

Among other things, he hopes to identify resistant varieties of pine trees.

Since the disease was first identified in Missouri in February, 1979, it has been found in 33 states on 21 species of pine trees and six species of conifers other than pine. Twenty-two counties in Missouri have reported the disease.

"We not feel the disease is native to the United States and that the Japanese probably imported the problem from us," Linit said.

He explained that the insect that transmits the nematode in the U.S. is "primarily a longhorned beetle" — a close relative to the beetle that transmits the disease in Japan.

"These longhorned beetles attack dead or dying trees," Linit explained.

"They develop in the wood of trees and, after they emerge, they feed on the bark of healthy trees. This feeding does not cause damage by itself."

The beetles sometimes carry nematodes in their bodies. If they do, the nematodes will leave the beetle's body and enter the wound made by the insect during feeding on the tree. The nematodes multiply rapidly within the tree and cause a rapid death.

"As the trees die, they become attractive to the longhorned beetle which lays its eggs under the bark," Linit said. "Its larvae tunnel into the wood. As these larvae mature to the adult stage, nematodes gather on and in the adult beetle's body and get transported to another tree."

And so it goes. The more trees that die, the more likely others will die of pine wilt disease.

Linit and Dropkin are concerned because they have no way to control pine wilt disease.

"We can only recommend sanitation—cutting and burning the infected material," Linit said.

"We need an indepth study of the nematode and the insect vectors before we can recommend other control practices."

Another problem is what Linit calls "a lack of a track record" as far as the disease is concerned.

"During 1980, the year of the bad drought, the disease was particularly bad in Missouri. It hasn't been so bad this year, so we suspect that water stress caused by the drought may influence the disease."

Berks Equine Council meets

LEESPORT — The Berks Equine Council will be meeting next Tuesday at 7:30 p.m.

Dr. Dean Richardson will be the featured speaker, discussing orthopedic problems in foals.

The meeting will be held in the auditorium of the Berks ag center. It is open to the public.