

Soybean oil

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totally by ethanol produced primarily from sugar cane or distressed corn.

Ten of these alcohol-powered tractors have been field-tested in Brazil for three years, accumulating more than 20,000 hours of operation at Ford and government-run facilities throughout the country. Several units also have been tested in Zimbabwe and in the United States at the University of Nebraska, the University of Iowa and Michigan State University. The alcohol-fueled engines have demonstrated excellent reliability, as well as well as thermal and overall efficiencies equal to those in comparable diesel-powered engines.

New Engine Design

Joe Carter, manager of FTO's engine design department, explains that the major challenge facing Ford in the development of these prototype alcohol-powered tractors was to put together known technologies in the right proportions to allow the engine to use the alcohol, and to use it most efficiently. Materials compatible with alcohol had to be found, as well as a way to optimize efficiency in consuming alcohol.

Ford 3.3-, 4.2- and 4.4-liter engines were developed for Brazil

using Ford's basic three-cylinder diesel-engine design. Mr. Carter notes that the lower portion of the engine block in all cases if Ford's standard diesel design except for a larger piston combustion bowl to reduce the compression ratio to 12-to-1.

"We retained standard diesel valve timing, ruggedness and manufacturing tolerances," Mr. Carter says. "The Otto-cycle head is fitted with spark plugs calibrated for the heat range of alcohol, but it is similar to a diesel head otherwise."

Diesel injection equipment is replaced by a governor-controlled updraft carburetor mounted to a water-jacketed manifold. The engine uses an electronic ignition system.

Alcohol is supplied to the carburetor from a tin-plated fuel tank by an electric fuel pump. The carburetor and other fuel-system components use material finishes compatible with 180 to 200 proof ethanol.

Performance is Excellent

The 3.3- and 4.2-liter engines have undergone extensive testing. The 4.4-liter engine was developed especially for use on sugar-cane farms where greater power is needed.

According to Mr. Carter, the results have been excellent, surpassing initial expectations. The alcohol units have performed as

well as their diesel counterparts. As for fuel economy, Mr. Carter points out that although the alcohol engines consume approximately 1.5 times the fuel of diesel engines at the same output because of alcohol's lower caloric value, they offer slightly higher thermal efficiency and significantly more power.

Cost Effective Too

Additional testing currently going on at the University of Iowa's College of Engineering is designed to examine not only how well a Ford ethanol tractor performs a variety of farm tasks, but also its cost effectiveness.

According to Paul Peterschmidt, project director of Biomass Research, the Ford test unit successfully completed ten field tasks through harvest using ethanol produced from distressed corn. Dr. Peterschmidt reports this is a fairly inexpensive fuel, which, as a co-product of distillers' grains and solubles, should become even more economical during production.

"We continue to test ethanol-powered tractors and are very excited about their potential," Howard says. "We also continue to be actively involved in a variety of other alternate-fuel research programs."

Wayne cattlemen plan dinner

HAWLEY — The Wayne County Beef Cattlemen's Association will hold its annual dinner, March 21 at 7:30 p.m., at Lucan's Farm Resort, Long Ridge Road, Hawley.

Guest speaker will be J. Paul Espy, Green Ridge Beef Farms, Tyrone, Huntington County. An owner and operator of a cattle feed lot consisting of five farms totaling 650 acres, Espy finishes 1,000 yearlings each year. A Penn State graduate with B.S. and M.E. degrees, he is past president of the Pennsylvania Cattlemen's Association and 1983 Cattleman of the Year. A member of the board of directors of the National Cattlemen's Association in 1981, he is currently the president of the Pennsylvania Beef Council.

A full course dinner will be served at 8 p.m. with cocktails available at 7 p.m. The general public is invited to attend. For reservations on further information please phone directors: Vernon Crum 729-7274, Hayden Bagnick 937-4121; Don Januszewski 689-2158; or Frank Bell 253-1937. Tickets are \$12.50 per person in advance or \$15 at the door. Reservations should be made by March 12.



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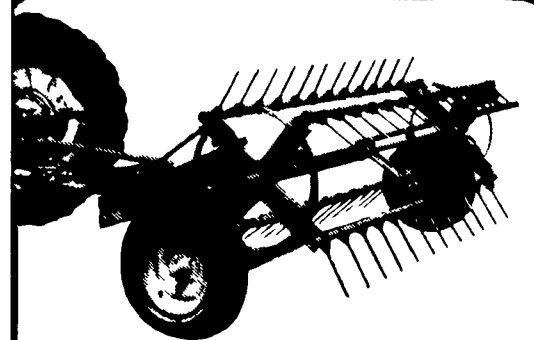
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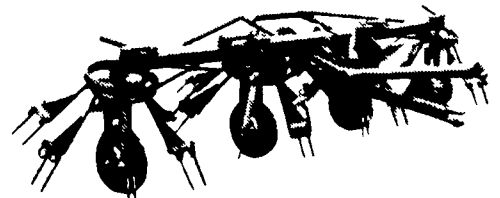
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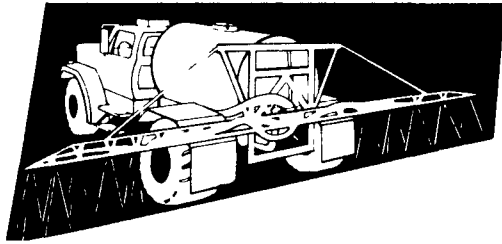
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