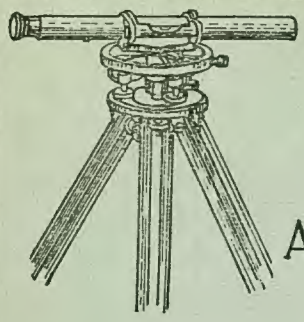

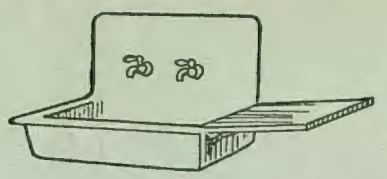

AGRICULTURAL ENGINEERING NEWS LETTER

AGRICULTURAL EXTENSION DIVISION
UNIVERSITY OF MINNESOTA

UNIVERSITY FARM, ST. PAUL, JANUARY 15, 1933—No. 10

THE NEBRASKA TRACTOR TESTS

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People are usually glad to know that unbiased reliable information is available concerning matters of interest to them. Such information regarding tractors and their possible performance can be readily obtained as a result of the Nebraska Tractor Tests, which are the outcome of a law passed in 1919 in that state.

The law provides that a stock tractor of each model sold in the state must be tested and passed upon by a board of three engineers under State University management. The tests are not competitive. Their purpose is not to point out one tractor as being best. The only award is a statement of performance of each machine under test.

The tractors are delivered at University Farm, Lincoln, Nebraska, where the tests are conducted. The tests are made on the lowest grades of fuel sold throughout the state on which the tractor manufacturer claims that the tractor will operate. That is, if only gasoline is recommended as fuel, the test will be made on the lowest grade of gasoline sold in the state or, if it is claimed that the machine will operate on either of two or more fuels, the test will be made on the least volatile. The manufacturers are asked to specify the kinds and grades of lubricants to be used. The fuel and lubricants are supplied by the University and charged to the manufacturers.

The manufacturer is asked to have a representative present throughout the test to see that the tractor is properly operated and that the test is fair to the tractor in every way. No representative is permitted to handle the tractor or any of the testing equipment during the test except by authority of the engineer in charge.

The belt tests are made with an electric dynamometer. The University supplies belts of various materials, thicknesses, widths, and lengths. The tractor manufacturer may select any of these or may furnish his own. Tractors are given credit only for the power delivered to the dynamometer.

The drawbar tests are made on a half-mile track that is not level but has several short grades. By dragging, rolling, and sprinkling when necessary the track is kept in as uniform condition as is possible. The load for these drawbar tests is furnished by a dynamometer car. This car consists of an electric generator mounted on a tractor chassis and driven from the drive wheels of this chassis when it is pulled by the tractor under test. The load is varied by adjusting the electrical resistance.

Samples of both fuels and oils used are tested at the Mechanical Engineering laboratories. The quantities of fuel used in the various tests are carefully noted so the quantities per unit of work and time may be computed. The quantity of oil used is also noted and in the case of engines using recirculating oil systems the oil is also tested at the end of the tractor test or when the oil is drained. The quantity of water used in each part of the test is also noted.

Before the tractors are put to the actual tests, they are given a limbering-up run, the object being to work out the stiffness found in a new machine and prepare it for actual work. The test track is kept in condition with the tractors on these preliminary runs. The tractor is operated by an employee of the manufacturer during this preliminary work but records of all repairs, adjustments, oil consumption, loads carried, and actual running time are kept by an observer. This period is usually about twelve hours but reasonable additional time is allowed if desired. It should be kept in mind that only regular stock equipment such as is ordinarily sold to the trade may be used in the tests.

After the limbering-up run, the tractor is started on the regular tests in the hands of the University representatives. Three belt-power tests are of especial interest. The operating maximum load test continues for one hour after constant operating conditions have been obtained. The object of this test is to determine the maximum power developed and the fuel consumption at a carburetor setting that is practicable for field operations. The horse power developed in this particular run is about 97 per cent of the absolute maximum and the carburetor setting used is continued throughout the remainder of the tests. Following this is the rated load test, also continuing for one hour. If the manufacturer has given the tractor a rating, the corresponding load must be carried at this time. If the tractor has not been given a rating, the load carried will be about 85 per cent of the operating maximum load. The object is to determine if the tractor will carry its rated load in the belt, and to secure a record of fuel consumption and other operating data. A varying load test is made with the tractor carrying rated load, no load, one-half load, maximum load, one-fourth load, and three-fourths load in runs of twenty minutes each. Any unsatisfactory performance in the way of governor action and fuel consumption is likely to be brought out in this test.

The main part of the drawbar tests consist of a ten-hour run, as nearly continous as possible, pulling a load at the speed recommended for plowing so the rated drawbar horse power will be developed. Opportunity is also given to determine the greatest horse power which the tractor is able to develop at the drawbar at the various forward speeds. These latter tests are made for a distance of about 1,000 feet each.

As a result of these tests some rather interesting and valuable information is available. Concerning the operation in the belt the following items are noted: h.p. developed, r.p.m. of the crank shaft, fuel consumption in gallons per hour, horse power hours per gallon and pounds per horse power hour, water consumption in gallons, temperature of the cooling medium and air, and barometer readings. The same information is obtained during the ten-hour drawbar test with these additions: the drawbar pull in pounds, speed in miles per hour, and percentage of slippage of the drive wheels. Because of the shortness of the maximum drawbar pulls no record is attempted of the fuel consumption.

These tests are official only in the state of Nebraska, but because of their completeness and the fact that they follow the tractor testing recommendations of the American Society of Agricultural Engineers they are accepted quite generally in tractor circles. A three-page report of each test is issued soon after the test is completed. Copies of these original reports may be obtained for five cents each from the Department of Agricultural Engineering, College of Agriculture, Lincoln, Nebraska. They also have bulletins containing summaries of the tests. The Cooperative Tractor Catalog, published by the Implement Trade Journal Co., Kansas City, Missouri, and the Tractor Field Book by the Farm Implement News, Chicago, each year give the information obtained in the Nebraska tests of all current models of tractors.

Published in furtherance of Agricultural Extension Act of May 8, 1914, F. W. Peck, Director, Agricultural Extension Division, Department of Agriculture, University of Minnesota, cooperating with U. S. Department of Agriculture.