

Research Report RC-1991-2 May 1991

## A LESS COSTLY ON-THE-RANCH MOLASSES SLURRY MIXER

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### **Introduction**

A molasses slurry mixer was previously described in Ona Agricultural Research and Education Center Report RC-1989-7. Since then a mixer was developed that is less complicated and less expensive to construct for both material and labor cost. It is the purpose of this publication to describe this mixing unit.

### **Comparative Description of the Two Mixers**

The old mixer placed a shaft and paddle mixing unit the length of a 550 or 1000 gal. cylindrical tank. The mixing unit involved constructing a network of paddles onto a 3 in. shaft, placing the shaft with paddles into an opened-end tank, closing the tank, and installing a set of bearings and seals for the shaft at each end of the tank. The mixing unit shaft was then adapted to either a hydraulic motor or a PTO driven gear and chain mechanism.

The improved mixer simply involves fitting a 4 to 5 ft. shaft with two propellers, placing the mixing shaft vertically into the center of a 550 or 1000 gal. tank, and adapting the mixing shaft to a hydraulic motor ([Figure 1](#)).

### **Tank**

Any steel tank can be used for the slurry mixer (do not use galvanized). It is best to select a cylindrical tank short in length and deep in diameter. A 6 ft. long, 48 in. wide, 550 gal. tank works better than a 8 ft. long, 42 in. wide, 550 gal. tank; but both work satisfactorily. If a tank is purchased, place a 18 in. manhole in the top with the front edge positioned in the center of the tank. This allows adapting the mixing shaft into the manhole opening.

Place a threaded 4 to 6 in. diameter opening at the bottom on one end of the tank to dispense the molasses mixture. A discharge pipe is fitted to this opening. It can be stationary and equipped with a gate valve for controlling molasses flow, or the pipe can rotate up and down on the tank opening threads and eliminate the need for a gate valve. This pipe can be equipped with a hydraulic cylinder to control up and down movement from the tractor seat. A 2 in. opening can be used if the molasses slurry mixture will be pumped from the tank.

Old tanks already on inventory can be used by cutting an opening in the top center large enough to add feed materials and to install the mixing unit.

### **Mixing Unit**

The mixing unit consists of a 1 in. round steel shaft, two propellers, a hydraulic motor, and a brass bushing. The bottom propeller should be 12 to 15 in. in diameter for a 550 gal. tank and 15 to 17 in. in diameter for a 1000 gal. tank. These propellers can be purchased new for \$400 to \$600. A used propeller may be obtained from a marine outlet at a lower price. A custom built propeller is manufactured by Shep's Welding, Chiefland, FL for about \$200. The bottom propeller should be either keyed or bolted with a pin through the shaft.

The top propeller works as a beater blade and can be home made ([Figure 2](#)). It is constructed with a 4 to 6 in. long, 1 in. (ID) pipe (fits over shaft), with three 7 ½ x 3 x 3/8 in. flat-bar blades welded to the pipe. Blades should be placed at a 45° pitch in the same direction as the bottom propeller. This propeller is keyed or bolted with a pin through the shaft. The top propeller helps with the mixing process and prevents the bottom propeller from cavitation.

The bottom propeller should be positioned on the shaft about 12 in. from the bottom of the tank and the top propeller should be 12 to 15 in. below the top surface of the molasses mixture after all ingredients are added.

The shaft is stationed to the bottom of the tank with a brass bushing. The bushing can be fitted into a short piece of pipe welded to the tank bottom for easy replacement if the bushing wears.

### **Hydraulic Motor**

The mixing shaft is coupled to a hydraulic motor with a 1 inch shaft. The motor is fastened to the tank with adequate support to handle mixing stress.

For either a 550 or 1000 gal. tank use a Char-Lynn, 2000 series, 6.2 in<sup>3</sup> hydraulic motor (or equivalent). It is important that the mixing shaft turn 300 rpm or greater for good

mixing action. This motor will produce that speed with the hydraulics on a medium sized farm tractor (60-70 hp with 8-10 gal./min. hydraulics), and mix slurries containing up to 20 to 25 % dry ingredients. Larger tractors will turn the shaft faster but mixing speed can be controlled by tractor acceleration.

With these systems, a vortex will be created and the molasses slurry should be well mixed within 5 to 10 min after adding the dry ingredients.

<b>Material Cost</b>	
Round steel shaft, 1" x 5'	\$30
Boat Propeller, 15" diameter	
New, manufactured	
Used, manufactured	\$450
Custom built	
	\$50+
Home made propeller	
	\$200
Hydraulic motor, Char Lynn, 6.2 cubic inch	
	\$10
Hydraulic hoses	
	\$300
<b>Total (approximate with new propeller)</b>	<b>\$30</b>
	<b>\$800</b>

Figure 1

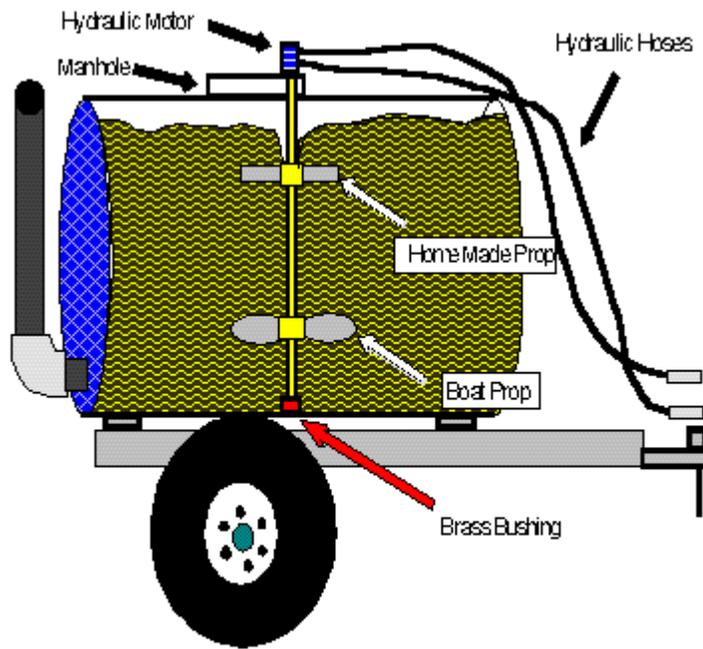


Figure 1. 550 gallon molasses blending tank with hydraulic driven mixing unit.

Figure 2

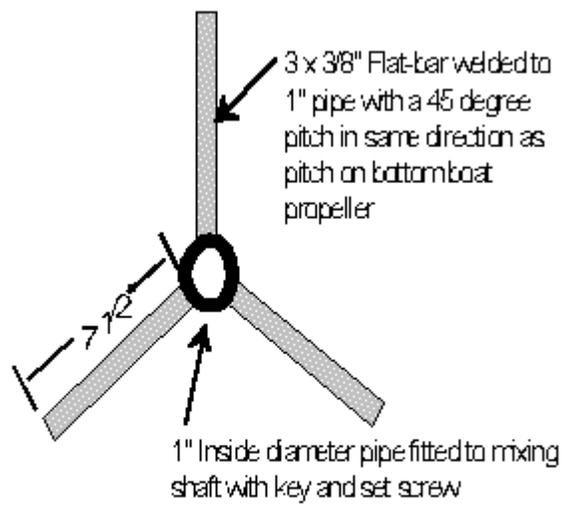


Figure 2. Home made propeller positioned on mixing shaft such that it is 12 to 15 inches below the top of the slurry mixture after all ingredients are added.