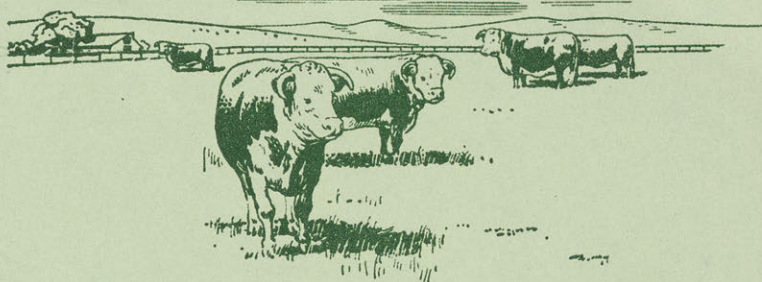


# Cattle Calls



December, 1985

To: Kern County Cattlemen

*Ralph L. Phillips*

From: Ralph L. Phillips  
Livestock Farm Advisor

Subject: Pumping Water for Range Livestock

The amount and distribution of water is a vital tool for managing arid rangeland. Good water distribution will improve livestock distribution and improve range utilization. In many situations water can only be provided by hauling or pumping from wells. For years the windmill has been a dependable source of power for pumping water.

Dan W. McKenzie, with the U. S. Forest Service, has prepared a publication, "Range Water Pumping Systems." This publication brings us up-to-date as to what types of pumping systems are available today for pumping water in remote areas. This newsletter is not intended to make you a pumping engineer. Its intent is to provide general information about the latest technology concerning range pumps and alternative power sources (wind or sun) to run them.

McKenzie pointed out walking beams and spring counterbalances can improve the efficiency of existing wells. Most of the other techniques discussed in this publication require considerable investment in new equipment.

## Walking Beam Counterbalance

Several techniques have been developed to allow the conventional windmill to start at lower wind speeds. The most common way is to attach a counterweight walking beam to the pump rod of a jack pump. On a fully counterbalanced windmill, the counterweights are equal to all the weight of the pump rod, one-half the water weight, and one-half the friction forces in the pump and stuffing box. This allows half the work to be done on the upstroke and half on the downstroke as compared to all the work being done on the upstroke of a non-counterbalanced windmill. This could reduce the amount of power or wind needed to start the windmill by about 33 percent.

## Spring Counterbalance

Another type of counterbalance uses tension springs. One end of the spring is attached to the top of the windmill tower, the other to the pump rod. Each 48 inch long by 2 inch diameter spring (New Holland bailwagon springs) will counterbalance

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about 100 pounds. In general it will require two to four springs, depending on the weight of the pump rod.

#### Cam Operated

A cam operated windmill is another device designed to reduce starting torque. It is designed so that more time is spent on the lift stroke and less time is spent on the downstroke. When used in conjunction with a counterbalance, the starting torque can be reduced by about 32 percent.

#### Automatic Stroke Control

Don Avery, Engineering Professor Emeritus from the University of Hawaii, has developed a device called an automatic stroke control that will work on a conventional windmill. This adjusts the stroke of the pump to the wind speed, thus allowing more water to be pumped with the same amount of wind, particularly at higher wind speeds.

#### Long Life Well Cylinder

Standard well cylinders have a life of 6 months to 2 years; long life well cylinders have extended the time between cylinder pump service by as much as five to six times when compared to conventional jack pumps with leathers. Also, it can be removed from the well without pulling the drop pipe. Before changing to this type of cylinder be sure it will fit the conventional or existing cylinder barrel and that the seating cup will fit into and seal the bottom of the pump. This system costs three to seven times more than the standard well cylinder.

#### New Types of Systems

The new wind turbines are lighter weight and more efficient than the old windmills. Some are equipped with generators that can run AC or DC motors to power submersible or jack pumps. These have proved successful in a few situations but are not used on a large scale for pumping water for range livestock. At this point, availability of equipment and cost of equipment have been the limiting factors.

Another source of power is the solar photovoltaic system. Solar panels convert solar energy directly to DC power and are used successfully in the space program. The technology has developed rapidly and now the cost of solar units has dropped considerably. Today, several companies are making photovoltaic units designed to fit existing windmills and jack pumps. These units can be installed with a minimum of effort. At this time, plans are to retrofit a photovoltaic pumping units in Kern County and in San Bernardino County. Information will be collected so we can compare the conventional windmill and photovoltaic pump.

"Range Water Pumping Systems - State-of-the-Art Review" is a publication that will provide you with additional water pumping information. It contains more detail and a list of manufacturers plus additional reading material. This publication is available upon request to:

Dan W. McKenzie, Mechanical Engineer  
USFS Equipment Development Center  
44 East Bonita Avenue  
San Dimas, CA 91773

The above discussion has pointed out that water yield can be increased. Cost and availability of equipment will be a big factor affecting installation of any of the pumping systems. However, other factors should be considered. One should consider whether the additional water will increase the carrying capacity of the range. Will there be enough additional water to support another watering trough several miles away. Will the existing well yield enough water to run the new system or will the well be pumped off most of the time. In some cases a potential increase in water will not be the answer.

RLP:mh

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