K-STATE Research and Extension
Herschel George
Southeast Kansas Watershed Specialist
674 Musket Rd.
Uniontown, Ks 66779
cell: 913-294-6021
Hgeorge@ksu.edu

Experimenting with Surface water pump systems

There seems to be continued interest in methods of pumping water to livestock in remote locations the purpose of rotational grazing and grazing of forage-based cover crops. In most situations in Eastern Kansas, the water source will be either a pond, a stream or a shallow hand-dug well. The greatest need seems to be for summer (or non-freezing) months of the grass-growing season; however, there is interest in systems that can tolerate freezing weather.

I will discuss two systems, both systems start with a 100-watt Solar panel with charge controller . Solar panels are getting more reasonably priced all the time and when used in conjunction with a voltage controller, a deep cycle marine-type battery provides the power for the pump systems. The panels do not come with a rack to mount anywhere. I have been constructing my own from angle iron and 2-inch pipe so the panels can be mounted onto a steel post at either 45 degrees or 90 degrees to the post (flat). During the summer months, these panels can be flat or horizontal.

I encourage producers to use the power output portion of the charge controller to power the pumps (rather than hooking direct to the battery). The advantage is that the charge controller will stop the pump if the battery gets below 10.5 volts. Draining batteries at lower voltages can damage the battery. Connecting to a battery directly can run the battery flat if a water line were to break or a tank overflow for some reason.

I have found a pump that I can leave on the soil surface above the surface of the water and use a garden hose to the intake water source.

Both of the systems require a “Deep Cycle” marine-type battery. Most any battery supply will carry these batteries. I tested the battery I use and found it pumped (using the SeaFlo pump) 2400 gallons over 10 hours, drawing the battery from 12.5 volts to 10.75 volts when the charge controller shut the system off as I had hoped it would. The test was using only about 6 ft. head or lift.

The first I will discuss is a positive displacement pump SEAFLO Model 55 pump.

- has the ability to pump 5 gal per min,
- has a built-in pressure shut-off system,
- ability to pump 100 ft. elevations,
- rated for continuous duty,
- carries a 4-year warranty,
- uses ½-inch NPT fittings.

Plus this new pump model has the improved pressure switch system.

A concern is that if there is a tiny leak in a hose or connection occurs, the pump will chatter (come on and off frequently). I like to add the accumulation (pressure) tank that will allow some leakage to occur before the pump start/stop/start/stop cycle. SEAFLO manufactures an accumulation tank. SEAFLO model SFAT-075-125-01

If a larger accumulator tank is used, it allows for greater leakage before the start/stop cycle. Initially, I used the Eastman 2 Gallon Expansion Tank. It worked very well but I believe for most producers, the SeaFlo accumulator tank would be my recommendation.

SEAFLO 55-Series Water Pump and Accumulator Tank System

This system is much less threatening to producers that want a “Plug and Pump” system.

Plus, it has a built-in pressure gauge and feet for the system to set.
A protein tub can be used to cover the system.

Adding a Hudson float (or Jobe float) as a shut-off valve can make this a system. The

advantage of a Hudson valve or Jobe Valve (or Apex valve) float is that they have a diaphragm shutoff system that causes them to shut-off completely when the full level occurs, (where other lever floats tweak the flow off as it approaches full). The Hudson valves work from the surface of the water, while the Jobe or Apex valves are set in the bottom of the stock tank.

I have found it easy to use garden hose connections on the pump and hose to the float valve. However, the

intake hose or pipe must be strong enough to not clasp during pumping. If garden hose is used as the intake line, I would recommend heavy ¾-inch hose. An alternative is to use HDPE (High density Polyethylene Pipe) or PVC pipe for both the intake and discharge (pressure) lines.

The second pump system I am trying is a 12 Volt Submersible Water Pump, similar to a Submersible DC Sump pump. It too, is connected to a deep cycle battery and a 100-watt solar panel with charge controller.

The reasons I would test this pump is that it has good flow rate, but a limiting factor is that it has a maximum lift of 8 meters (26 ft.). The pump handles more debris such as algae or dirt in the water. It is a centrifugal pump with no check valves. Another limiting factor is the pump has no switch to turn the pump on/off. Therefore, an electrical switch must be connected, if it is to be an automatic system.

It is my thought that this pump is good for pumping from ponds, streams, or shallow wells to cattle nearby. The drain back characteristic of the pump can help in this situation to assist in freeze proofing the pump. The use of the electric 2-wire sensor would be valuable during winter freezing conditions.

These 12-volt systems have higher amperage draw than the 24-volt systems on other solar pumps; we must include a relay or continuous solenoid to prevent burning the lower amperage electrical switches. I can speak from experience.

One switch is by Advanced Systems ALC 1275, which uses the two sensor wires to control the switch and pump. This switch has an 8 second time delay in the turn on/off so pump does not chatter on and off when the wind blows the water waves in the stock tank against these sensitive wires. This switch is rated for up to 7 Amp output, you must use a continuous solenoid otherwise, you will burnout the switch relay.

I have also found a Liquid Level Controller Sensor Module switch component board that works with a range of depth using a three-wire sensor system. It is lower in cost and works wonderfully, but it is only the circuit board that you receive, and it must be wired in and needs protected from weather and movement. Currently I am using a small Crayola box with rubber grommets where the wires enter the box. I am using the old extension cord as my three-wire sensor.
These circuit boards are for producers that can do their own electrical connections, as it requires more skill and patience.

Maybe the simplest of systems would be the pump coupled with a
Tethered float switch (Normally Closed) float switch that could be anchored to the side of the stock tank.

Currently I use a Quick Connect flat 12 Gauge 2 Pin Plug similar to many 4-wheeler sprayer systems. I purchase them from a local automotive repair place. I ask for the 12-gauge wire. When possible, I am hardwiring the system so no connection other than the pump has a plug to the power supply.