Paul C. And Edna H. Warner Endowment Fund for Sustainable Agriculture Report Form

Utilizing multiple water systems for small scale livestock operations in a water deficit area: Pumping water from the Cuyahoga River

Project completed by:
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Project Description:
Evaluating water systems for small scale livestock operations that reside in water deficit areas; then selecting, testing and implementing the most feasible system.

Five water systems/methods examined:

1. Filling a portable tank with residential well/cistern water and distributing it to livestock tanks via portable tank in vehicle.
2. Trucking/Hauling city water to farm, then distributing that water to livestock tanks at multiple pasture locations via vehicle and a portable tank.
3. Collecting rainwater in barrels, transporting to tank sites and pumping.
4. Upstream (gravity) water storage units and distributing to tanks.
5. Pumping water from the Cuyahoga River and distributing to tanks.

Findings
The first method above is the one that I was using at the onset of this project. Due to the labor intensity and time it takes to fill a portable tank and haul water to each livestock tank, as well as the prohibition of new well drilling in the National Park, this method is not sustainable. If my residential well would dry up from over-use I would be forced to use a cistern system, which would force me to use method #2.

Method #2 Hauling water to farm: This method is where water is purchased and hauled to the farm and pumped into a cistern tank. It is costly; a single tank filling costs about $400, plus 0.64 per mile delivery charge. In addition, the distribution to livestock would still be time and labor intensive. Therefore, methods #1 and #2 are not feasible.

Method #3 of rainwater capture was not pursued because of lack of funds and drought conditions. In examining this method though, the distribution of collected water would still be a challenge, as would the consistency.

Method #4 may be practical on private lands with the right topography, but within National Park boundaries this was not going to be acceptable. The collection and or use of stream water is heavily regulated and monitored by NPS. This method would not be permissible without extensive impact studies and therefore not feasible for a small farm to replicate.

The final method, Method #5 chosen to evaluate was pumping water from the Cuyahoga River. After evaluating all the possible methods, this seemed to be the most viable given the limitations and the possibilities. To begin, the design plan chosen was a solar powered water system. The solar model was chosen for several reasons: it is environmentally sustainable, location of river relative to access to utilities, no additional utility fees, NPS restrictive guidelines for land use. The river site selection was made based on maximum sun exposure and proximity to livestock fields. Once the system and site were

chosen the installation began by installing a 170 watt solar panel, placing the API pump in the river and testing the unit. The initial tests were successful. The next challenge, as with all the methods, was distributing the water from its source to the livestock water tanks that are located in multiple pastures in multiple locations. I decided pump the water into a series of hoses, utilizing 1" 330PSI hose that runs from the pump and panel to several pastures along the riverside of the property. In addition, to protect the pump, a pressure control system was installed that will automatically shut the pump off if necessary.

To date, the solar water pumping and distribution system is working very well. The biggest challenge was getting and waiting for National Park Service approval. An impact study and proposal had to be submitted to and approved by the park. The only other challenges at this point are that I will probably have to remove the pump during the winter months to keep lines from freezing. And, the silting of the river requires that the pump be cleaned off occasionally, especially after storms when the turbidity of the river increases. These methods can easily be replicated by other farmers, even those leasing public lands. Water use rights allow an individual access and use of the river without hindrance from NPS rules, although, methods for distributing the water do require park approval. Moving forward I would like to test possible techniques to make the project usable year-round, and automated, both would have a huge impact on the return on investment.

Expenses and Returns

Item	**Expense ($)**
Pump and solar panels (kit)	2515.00
Well hose (pump to controls)	299.48
Well cap and casing	50.00
poly pipe (400ft)	74.99
Stock tanks (3@100gal)	239.97
Concrete mix	3.70
Expansion tank, gauge and fittings	139.43
Misc. fittings	43.39
Steel mounting post (not funded)	19.92
Total Funded Expenses	**$3365.96**
Total Expenses	**$3,385.88**

Financially, if this system were not in place, I would have the cost of purchasing water, the cost of utility for pumping it and the labor cost of its distribution, therefore, there is a great financial benefit. The return is not only monetary, there has been a reduction of labor and time for myself in no longer spending 45 filling the portable water tank and then transporting that water to the livestock tanks. Now I only have to check and fill the tanks daily as needed right on site. If an automated system can be used this will eliminated all but occasionally checking tanks and equipment.

Education

The process, progress and findings of this project have been presented to the other Countryside Initiative Farms at our business meetings. In addition, there is a photo journal of the project on the Countryside Conservancy website which has been publicly shared via social media outlets. It can be viewed at the following link: www.cvcountryside.org. Interested parties can see the pump in action during a farm tour hosted by Countryside Conservancy and the Village of Peninsula's Chamber of Commerce, August 4th 2013. Call me at 330-657-2726 to reserve a tour time on that day.