CALVING EASE

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Sam Leadley, Attica Veterinary Associates

Where's The Hot Water?

- **What is your water demand? How much at what temperature and when?**
- **How much hot water do you actually need?**
- **How big a hot water tank will be needed to meet our peak demand needs?**

Hot Water Demand

Everyone feeding and caring for preweaned dairy calves needs hot water. And, it is very frustrating to not have enough volume of the necessary temperature when you need it!

How to plan? You need to lay out the typical work day hour-by-hour describing the activity. For example, mix milk replacer at 6:00 AM. or wash feeding equipment at 8:00 AM. Then for each activity you note the volume of hot water needed and the temperature.

Here is an example of how to get started with the minimum detail. At 6:00 AM we need 60 gallons of 105° water for mixing milk replacer and 30 gallons more of 105° water to feed the youngest calves. At 7:30 AM we need 10 gallons of 105° water for rinsing feeding equipment and 10 gallons of 135° water for washing the same equipment. We repeat this demand profile again at 4 PM.

Selecting the hot water heater and "Sticker Shock"

After even a quick review of hot water heater prices there will be a time needed for recovering from the prices. It becomes immediately apparent that the farm's goal will be to order the smallest heater with a modest recovery rate.

The plumbing industry uses a measure called "first hour delivery" to describe the performance capability of water heaters. By definition, first hour delivery is the calculated amount of hot water a fully heated water heater can deliver in the first hour.

This means you start with a water heater that has recovered to its thermostat setting (fully heated) and someone starts to use hot water. It does not mean the hot water will last for one full hour.

Remember, as a hot water tap is turned on the "dip tube" (that is where the cold water comes into the hot water heater) starts delivering cold water to the bottom of the tank. This cold water "pushes" the hot water out of the tank.

As this cold water comes into the tank it tends to mix with the hot water. This causes the water supply to turn warm, then lukewarm and finally cold. This is where the 70% rule comes from for determining the "first-hour-delivery."

How Large a Tank Do We Need?

Let's use the example above. We need a total of 90 gallons early in the morning and again in late afternoon. We have 50° water supply. By blending the 135° water from our tank we create 105° water by using 1 gallon of cold water with 1.8 gallons of hot water.

The 70% rule referred to above is based on both tank capacity and its recovery rate. If we draw all our water in a hurry – 20 minutes – the recovery capacity is not going to contribute much extra hot water. Thus, for high continuous demand we just estimate available volume as 70% of capacity.

Will a 60-gallon heater supply our needs? When estimating hot water demand we need to remember that our mixing temperature for mixing milk replacer is usually 110°. In contrast, when washing equipment we need to begin washing in 135° water.

So let's go back to our example. What if we buy a 60-gallon tank? Multiply 60 by 70% (0.7) to get 42 gallons available. If we blend 22 gallons of cold water with 38 gallons of hot water we have enough for making 60 gallons of 105° milk replacer. But, if we also want to make 30 gallons more of 105° water for the youngest calves we are out of luck! That would take another 20 gallons of hot water – we really need an 80-gallon capacity heater. Or, we could purchase an industrial-grade heater with a very high recovery rate.

For a detailed discussion of tank capacity and recovery rates you may want to look at: http://www.contractorsinstitute.com/downloads/Solar/Contractors%27%20Domestic%20Hot%20Water%20Educational%20PDF%27s/First%20Hour%20Delivery%20of%20Hot%20Water.pdf [You might have to copy and paste this URL to get to this site. I have used this site and it is safe.]

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