

Water Leakage Approximation

In normal circumstances, water use falls to zero at some point in the day. This is usually around 4 or 5 am, when all pigs are asleep or there is a very low level of activity. Any water use when no pigs are drinking must therefore be due to leakage, most commonly from worn or poor quality drinkers. This is shown in Barn Report by a "zero shift".

Water leakage can therefore be approximated by assuming the minimum value (in any 15 minute period) as a background level throughout the 24 period. For example, if the lowest level measured is 1 gallon in 15 minutes, the leakage would be about 96 gallons per day. That is, we're extrapolating apparent leakage from the quiet period of consumption to the whole day.

It's accepted that this is only a very crude approximation, not least because the fact that a meter has notched up a gallon doesn't necessarily mean that a whole gallon was used in the time period. It could be simply that a pig drank a small amount, which pushed the meter past the gallon mark.

This explanation works for small amounts of apparent leakage, but not for larger amounts, or persistent readings. We can think of this as a Confidence Level of the prediction.

For example, suppose the lowest level we measured in a 15 minute interval on a particular day was 1 gallon.

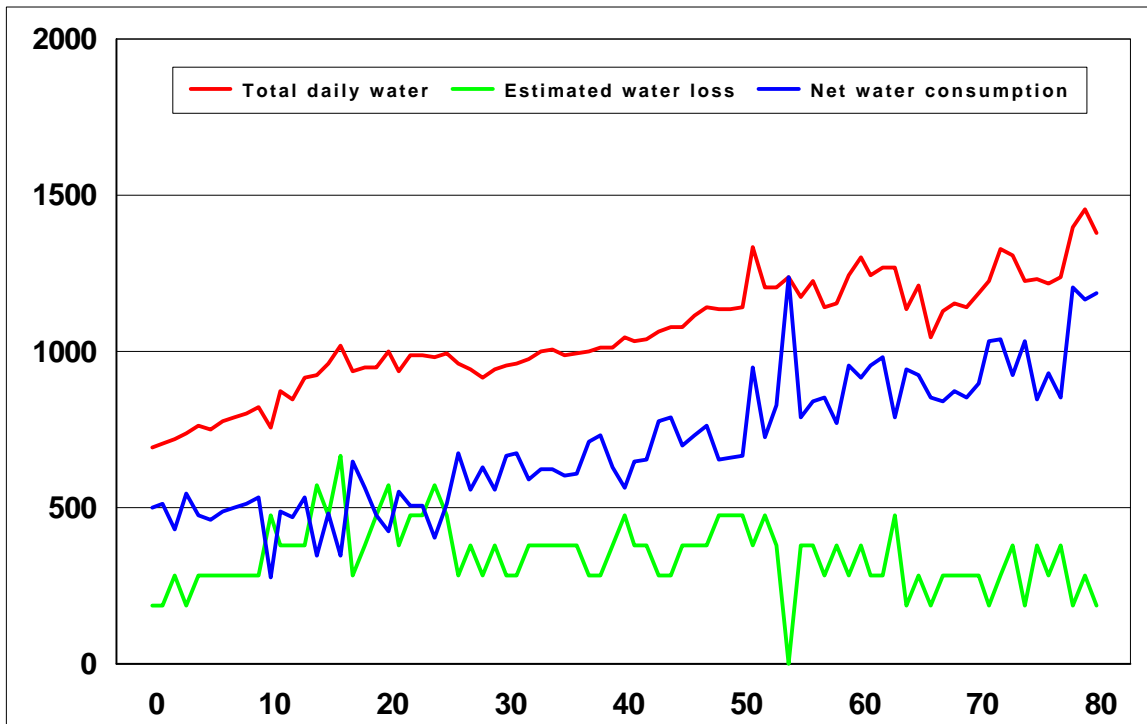
This extrapolates to 96 gallons a day, but it may be much less (or more) than this, because the meter only registers one gallon. The actual value could be a tiny fraction of a gallon (just enough to go over the 1 gallon mark). We can't be very confident of our 1 gallon estimate for that particular day.

However, if we look over a period of days and see that it's never less than a gallon, we can be more confident. It's unlikely that the meter is always sitting there about to pop over the one gallon mark. Equally, if it's two gallons, then we can be sure that it was at least a little over 1 gallon, and so on.

The larger the amount and/or the more consistent the readings, the more confident we can be that a zero shift reading is leakage.

It could be that a zero shift is due to pigs drinking - that is, there is never a point in the day or night when no pigs are active. (This suggests behavioural problems, but this is considered elsewhere.) In this case, we would expect to see the zero level shift gradually rise in just the same way that total consumption rises, as the pigs grow - pigs would drink a larger volume in this quiet time, just as they do at other times.

Example



This chart shows the *total daily water* consumption (red line) logged in a finishing building of around 950 pigs over a period of 80 days.

Estimated water loss shows the daily water loss/leakage estimated by the method described above. The minimum reading is 2 to 7 gallons (in any one 15 minute logging interval). Only one day (day 54) had a minimum value of 0 galls.

Subtracting the estimated water leakage from the total gives the *Net water consumption*.

Note that the leakage estimate remains relatively constant over the period. This contradicts quiet time pig consumption, which would be expected to increase in line with total consumption.

The bulge in total use over the period 10 to 30 days corresponds with higher levels of "zero" period use, confirming the suggestion of water leakage.

The "jagged" trace of net water consumption is mainly because of the lumpiness of leakage estimate (i.e. that 1 gallon "zero" consumption equals 96 gallons of leakage).

If the estimated water leakage is right, then it amounts to 33% of total water use, and means that actual water intake by the pigs has been over-estimated (by 50%).

Summary

In this example, the leakage approximation technique indicates around 1/3rd of water is leakage, representing inaccuracy in intake measurement, and increased production costs due to additional slurry disposal.

Using a standard figure of 0.5c per gallon (to cover acquisition and disposal), the average cost amounts to about \$1.75 per day, or \$600 per year in this building, which is one of 4 on the site. This translates to an additional production cost of about 31c per pig produced.