

Feed and Water Shortage

Feed or water shortage is one of the most dangerous and insidious problems in pig production, accounting for some of the biggest production losses encountered.

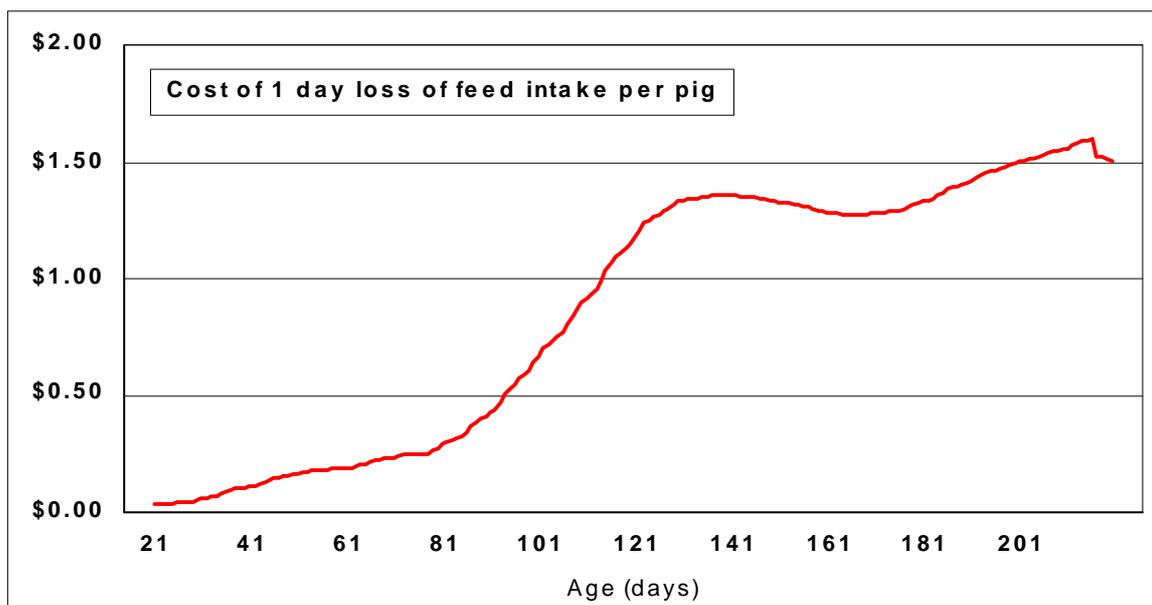
That statement may sound alarmist, but I'll to explain and justify it.

It's basically simple. You run a restaurant, and you only make money when the customers are eating food. If you shut the restaurant for a while, you don't sell any food. You lose money, and you can never get it back. If you are shut at lunchtime, your customers do **not** come back and eat two dinners to make up for it.

Without feed or water, pigs die. But not for a **very** long time. Unless they are particularly poorly, they can tolerate quite a long period with either no food or no water with absolutely no harm whatever.

So, if the feed or water system breaks down for a while - bin bridged, borehole pump tripped out, or whatever - you'll come back and fix the problem, see that the pigs are ok, and breathe a sigh of relief that it wasn't something more serious. Look, they're all eating Ok, they'll soon make up for what they missed. No pigs died, no harm done. Thinking no harm is done is exactly where you're wrong.

Feed or water shortage costs around \$1 to \$1.50. Per day. Per pig. Lose feed for a day in a typical finishing barn and it costs a thousand dollars or more. But you don't see a bill.



This chart shows a rough estimate of how much it costs to lose a day of feed intake for pigs of different ages. You may be surprised at a figure of \$1.50 for a 200 day old pig, when you don't even feed them that value of feed per day, and in any case you didn't actually feed them, so your costs should be lower. I'll try to explain where the figures come from.

Feed Use

Growing pigs use food in two basic ways -

- maintenance
- growth

Maintenance is what's needed just to keep the pig going. To replace the energy it uses and maintain its body tissues. You can regard this as a kind of "overhead cost". It does you no particular good, and it increases as the pig gets older and bigger. If all the pig ate was the

maintenance ration (enough for maintenance) it wouldn't grow, it would all be cost and no profit. You have to pay this maintenance cost whatever. If it doesn't get it out of the feed, it will take it out of its own body tissues.

Growth is the extra bit that makes the whole thing worthwhile. It's what the pig is there for, to grow. It's where the profit lies. This is a slight generalisation, but any food it eats in excess of maintenance - what it needs just to live - goes into growth. You can only get growth and make a profit if the pig eats more than maintenance.

Maintenance requirement is not a fixed amount, it goes up as the pig gets bigger. But, unfortunately, the amount it is prepared to eat over and above the maintenance amount goes down. Young pigs will eat several times the maintenance amount, but older pigs will only eat marginally more than the maintenance amount. When they're young, they'll eat 5 or 6% of their bodyweight each day. When they're older, they'll only eat 2 or 3%, and most of this is used for maintenance.

Younger pigs eat, say, 2 pounds of (dry) feed and put on a pound, older pigs eat, say, 7 pounds of feed to put on less than 2 pounds in weight. Although the rate of growth in pounds per day may stay constant or go up, the amount of feed it takes to put on the pounds goes up a lot more, because of the maintenance requirement.

So what happens if you don't feed a pig for a day?

Basically, all the costs - including the maintenance requirement - stay the same, but there is no growth, no profit. The older the pig, the worse it gets.

It's roughly like this - the young pig eats two pounds, it uses one pound for maintenance, and the other pound for growth and it puts on a pound in weight. The older pig eats 7 pounds and uses 5 pounds for maintenance, and uses the rest to put on two pounds in weight.

Forget to feed it for a day, and the young pig still needs its pound of food for maintenance. If it eats two pounds the next day, then one pound comes off the bottom line for the missed day. So you've fed it two pounds over two days, for no gain. Bad news - 20 or 30 cents a pig, but not too terrible.

Take an older pig, and you are struggling to catch up with that lost day's feed. Although feed is cheaper (per pound) for older pigs, the time it takes to recover that lost intake rises very sharply. So the cost incurred rises pretty sharply, you have to feed them for a number of days just to get back to where you were.

It makes no difference whether the shortage is of feed or water, as the two are so closely related. If there is no water, they will restrict feed intake very severely, and vice versa.

I should point out that the figures given above are estimates only, though based on sound principles, and they appear to correspond to monitored data. So far as I know, no one has scientifically carried out starvation trials in pig finishing situations. Although a lot of people have done it by accident, as we'll discuss later.

A common misconception

It is commonly thought that they will eat and drink more after the feed or water shortage to make up for the loss. This is wishful thinking. Not only is it untrue, the reverse is the case.

Look at the daily totals (in Barn Report) and it is clear that any shortage over a few hours gives a reduction in daily total. If, say, the feed system is tripped out until the next day, the usage on the next day may be higher - while the hoppers are filled, and perhaps while they fill their empty bellies - but the increase is always smaller than the decrease, except for very short term shortages. For example, the daily total is down 70% on one day, but up by only 20% on the next.

Subsequent to the shortage, daily intake is almost always down - lower than it was before the shortage. So, rather than eating more to make up for the lost day, they eat less. The loss of one day's feed is further compounded by lower intake on subsequent days. The reasons for this are not clear, but is most likely due to changes in the way that food passes through the

gut. For example, if they normally eat small meals several times a day and then starve for a day, followed by an oversize meal due to excessive hunger, it's likely to disturb the digestion.

When and how long

When the shortage occurs is just as important as how long it persists. The crucial factor is whether food is unavailable when they would normally eat.

For example, the following chart shows the averaged feed intake pattern for a particular batch of pigs under high temperature conditions, over a period of a few days. The left hand axis shows the hourly percentage (percentage of daily total consumed in that hour) and the bottom axis shows time of day.

There is a sudden rise in the morning (when the pigs wake up). In this example, it goes down during the middle of the day (inhibited by the high temperatures) and then recovers during the evening, with a sudden fall at sundown.

During the peak hours of consumption in the morning and evening, hourly intake is around 6 to 8% of total daily consumption.



A short period of feed outage may well be recovered. Feed outage from, say, midnight to 6 am will have a marginal effect, since this amounts to only around 5% of total daily intake. However, a feed outage from 6pm to midnight would have a major effect as this is over 30% of daily consumption. (The couple of hours from 7pm to sunset amounts to 15%.)

One might expect that - in the case of a short term outage during the day - the shortfall would be quickly made up by eating more later in the day. For example, that an outage in the above example from 5pm to 7pm would simply mean they ate later into the night.

The evidence does not substantially support this view. In the above example, pigs go to bed at sundown and appear only to aim for a gut fill at this time, and so will not eat more to compensate for losses earlier in the day.

Finding the effect

Feed intake losses can be seen relatively easily in Barn Report.

They are characterized by an atypical gap in the feed auger operation trace, often followed by an especially high short term peak.

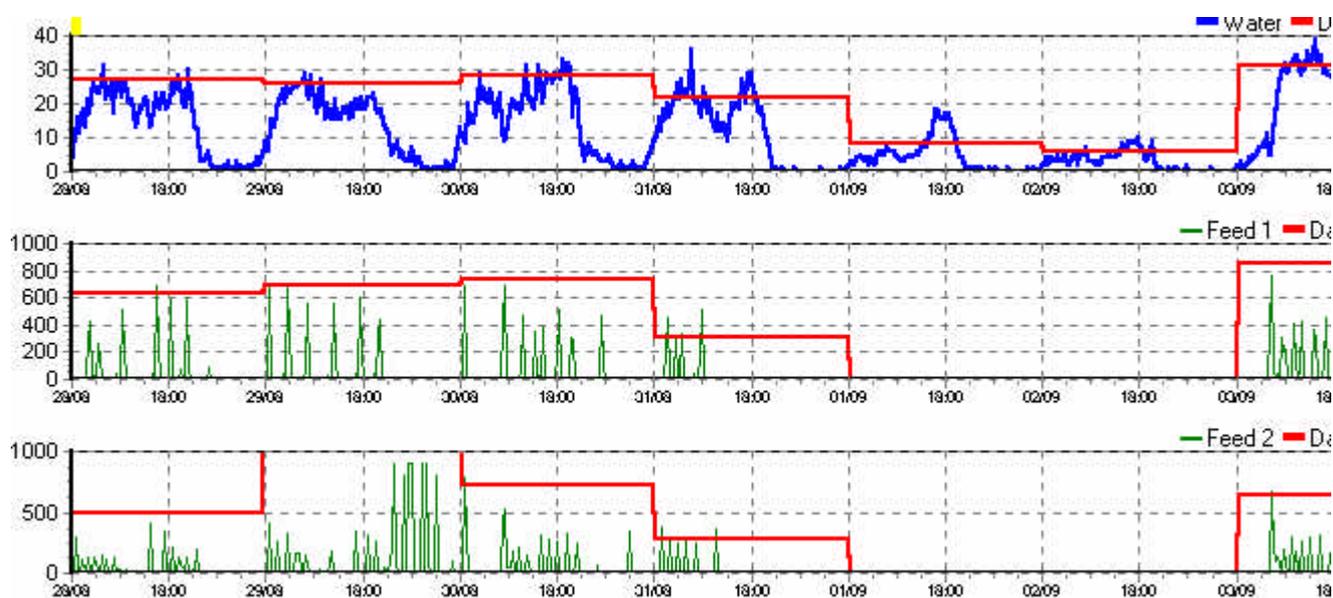
Of course, not every feed outage results in loss of daily total intake, as the outage may be covered by in-pen storage (i.e. the amount in the feed hopper) or by pigs being content to delay feeding slightly, or because it occurs at a time when little feed would be eaten.

Feed intake monitoring may also be "confused" somewhat by counting the time when an auger may have been running, but without feed being delivered (e.g. with a bridged bin).

To confirm - or otherwise - an overall loss of intake, compare the daily feed and water use on this (or these) days with the surrounding daily totals. The following day might be higher, but check whether it is high to the same degree that the outage day was lower. In many cases, water intake (daily total and pattern) is a more clear indication than feed auger operation.

Of course, producers without Barn Report (or without feed and water monitoring) can only guess the level of their losses.

Example



This picture from Barn Report shows an especially serious case, where feed augers failed to deliver feed for several days. In this case, it seems that the augers ran out around midday. Note that - after the water intake dip during the middle of the day - it fails to recover to normal levels in the evening, and that there is no night time consumption at all on that day.

On subsequent days, water intake is severely down - without feed intake, they only drink to replenish water lost by respiration and urination.

But you should also note that Feed 2 (feed auger 2) was operating erratically on previous days. Although it appears that daily use was up two days before, you can see that the water trace (covering the whole room) was actually down on that day. Hence, we can assume there were intake losses on that day also.

In this example, I estimate the feed outage was costing in the region of \$50 to \$100 an hour, after the first two hours, amounting to around \$4,000 in all.

Competition

Another aspect of feed or water shortage is worth bearing in mind.

Pigs in a group will not be affected equally by a shortage. There's a pecking order for access to food and water in pigs just as in chickens.

So if there is a shortage more dominant pigs will get their fill at the expense of the submissive, so some will be more affected than others. The effect will be to increase the weight range within the group, and increase the range of finishing dates. Increasing the range of days to finish (or range of weights at a particular finish date) can be just as economically damaging as poor conversion rates.

This competition-induced variation would also apply in the case of restricted accessibility - such as insufficient feeders or drinkers.

Discussion

The economic cost of a feed or water shortage depends on :

- time of day (and normal eating pattern)
- how long
- size of pig

At the beginning, I described feed and water shortages as a dangerous and insidious problem. The reason for this description being that while it has a significant economic impact, it is not obvious to the person on the ground.

Whilst most producers recognise that feed shortages could be a problem, they believe it is not a particular problem for them, and assume that it rarely has an economic impact.

Monitored data from a number of growing and finishing sites shows that problems with feeding systems are not only common, but frequently result in an impact on pig feed intake and thereby can be expected to have a significant economic effect.

The give away is a gap in the feed system trace (in Barn Report), liable to be followed by an especially large peak, with a lower than normal figure for daily feed use. It's confirmed by an associated dip in the daily water usage. However, it is unlikely to have an obvious impact on pig health.

Production losses in this respect can be significant, even for relatively short periods of shortage. Amount of in-pen storage is , clearly, a factor.

The lack of immediate evidence of economic impact on site at the time means that such incidents are less likely to be given particular regard, as compared to incidents with evident tangible loss - such as incidents involving pig death, or those incurring repair costs.

Accordingly, unsatisfactory operation is liable to be repeated, making sites liable to repeated production losses or hundreds or thousands of dollars.

On some sites, it is clear that auger systems trip out almost every day. This leaves such sites extremely vulnerable. Let's say, the regular worker - who is so used to it tripping out that he checks it very regularly - is absent. The relief worker is perfectly good in the normal way, but doesn't know how often it trips out. This very quickly translates into one or more feed shortages and losses of hundreds or thousands of dollars, but with no on site evidence of loss.

Costs or losses, such as they are, only appear as poor close out results - in poor FCR, wide range of finishing dates and so on - very distant from the point at which they were incurred. Poor results may, therefore, be ascribed to any number of indistinct causes.

I think there are a couple of other reasons why less regard is paid to feed and water shortage than it should. Firstly, that some will comfort themselves with the idea that - since no feed was being consumed - the loss of production is ameliorated by the reduction in feeding costs. Secondly, that the situation appears to be recoverable - the pigs will put on the weight later on - unlike death losses, where the loss appears to be absolute. Both of these are examples of bad thinking.

First, the pigs have to be fed, whether out of a hopper or not. If there is no food in the hopper, they will have to draw on bodily reserves, which will have to be replenished. (If this wasn't the case, then you could save on feeding costs by no feeding them one day a week. Obviously this wouldn't work.) Second, the loss is there, whether or not the pigs make up the weight later. If it takes longer to reach finish weight, it means more days on which you have fed them the maintenance ration for no return.

The role of monitoring

Monitoring of a number of sites has revealed that feed and water shortage is a significant problem on many farms.

Monitoring of feed and water using Barn Report gives a much clearer indication of the occurrence of feed and water shortages than is possible using daily measurements only - such as reading a water meter manually, or an hours meter on the augers alone. (These can indicate daily variations, but with little indication as to nature or cause.)

Using Barn Report, therefore, it is practical to assess the frequency and degree of feed and water shortages and thereby to estimate losses when they occur.

However, being a system which relies on daily summarisation, it will not help directly in preventing such losses. It can only provide evidence of degree and nature of such losses occurring and thereby gaining proper priority in resolution.

Summary & Conclusions

Feed and water shortage is a common problem and when it occurs, economic losses can be rapid and substantial.

Monitoring suggests that several dollars are commonly lost per pig, exhibiting as more days to finish weight, wider range of finish dates, and over all worse FCR.

The frequency of occurrence suggests that insufficient importance is assigned to the issue, and that problems may persist for long periods without any signs of resolution.

The scale of the problem indicates that producers should be strongly advised to install monitoring of feed and water in growing and finishing buildings. In many cases, producers could beneficially spend money on improved quality of feed system control, allied to better detection of faults and alarm signaling.

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