LACTATIONAL FEED INTAKE AND SOW RETENTION

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In our analyses we are often driven by averages. It can be average daily gain, average daily feed intake, average temperature in the barn or even average weight of pigs. Yet it is the extremes in each of these that cause the most problems. The old saying is "I have my head in the oven and my feet in ice water, so on average I am OK". We are seeing that it is variation in temperatures within a grow finish barns that can cause many problems. I have also argued that average weights at marketing show little while it is the tail end pigs that cause the most problems. Feed intake can be examined in the same way. Average feed intake shows general trends within the group, but it may be that the extremes, especially the low extremes are better indicators of the problem.

Figure 1: Odds of removal from the herd during subsequent parity based on the occurrence of low feed intake during days 2 through 14 of lactation

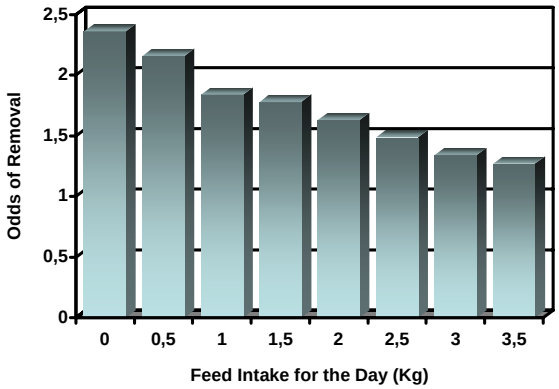

Figure 1 shows the results of one such analysis. This retrospective study involving 499 sows (GAP, English Belle, body weight 220.69 ± 1.12 kg, parity 1-8) was conducted at the University of Minnesota, Southern Research and Outreach Center, Waseca. Data on daily feed intake (based on feed disappearance), body weight and backfat thickness were collected from sow cards. Litter birth weight, parity, lactation length, removals (cull, death or euthanasia) and numbers of stillborn and mummies were obtained from the PigCHAMP database of the research unit. A logistic regression model (SAS, Proc Logistic) was fitted to analyze the association of farrowing and lactation factors with sow removals before subsequent farrowing. For analysis, parity was categorized into three levels as parities 1 and 2, 3 to 5 and ≥ 6 and mummies and stillborn were categorized as either present or absent. Litter birth weight, backfat thickness and body weight at day 108 of gestation, lactation length, average lactation feed intake were included in the model as continuous variables.

This graph estimates the odds of removal if a sow eats a low amount of feed in one day during days 2 through 14 of lactation. It shows, for instance, that a single day on feed, eating less than 1 kg of feed is associated with at least a doubling of the odds of removal.

Table 1. Odds ratios (OR) and confidence intervals (CI) showing the association between farrowing and lactation factors with sow removal before subsequent farrowing

Explanatory Variables	Odds ratios and confidence interval
Average daily lactation feed intake (kg)	0.543 (0.424-0.695)
Backfat thickness at day 108 of gestation (mm)	0.846 (0.783-0.915)
Mummies: absent vs. present	1.618 (0.701-3.732)
Stillborn: absent vs. present	0.640 (0.341-1.201)
Lactation length	0.964 (0.829-1.121)
Parity: 1 and 2 vs. parity ≥ 6	0.929 (0.336-2.566)
Parity: 3-5 vs. parity ≥ 6	0.871 (0.407-1.864)
Body weight (kg) at day 108 of gestation	1.015 (0.999-1.032)
Litter weight birth weight (kg)	0.985 (0.902-1.076)

Results of the regression analysis are presented in Table 1. The odds of a sow being removed from the herd before another farrowing decreased ($P \leq 0.05$) by approximately 46% with an increase in average daily lactation feed intake by 1 kg. The likelihood of removal decreased ($P \leq 0.05$) by 15% with increase in backfat thickness at day 108 of gestation by 1mm. Body weight at day 108 of gestation, lactation length, litter birth weight, parity and presence of mummies and stillborn did not have significant association with the likelihood for removal.

Removal, in this case, can be for any number of reasons. It includes mortality, euthanasia, culling for reproduction reasons and culling for lameness. We purposely did not separate the reasons. We have found that common causes can result in different reasons reported. For instance, lameness can result in reproductive failure as the primary cause for removal. Likewise, similar cases of lameness can result in mortality in one case and culling in the next. Therefore it is often useful to pool the outcome, as in this case.

The interesting part in this study was that tracking the overall average feed intake for individual sows, or for a group, resulted in an estimate of feed intake effect that is much lower. By studying averages, we assume that there is a linear effect, that a drop in feed intake for a sow has the same effect, whether it is dropping from 8 kg to 7 kg or from 1 kg to 0 kg. This is unlikely as we probably have a nonlinear relationship. We should assume that the effects of decreasing feed intake become more severe as it drops closer to zero. It is an assumption that is often not addressed in our research studies.

If we assume nonlinearity, not only must our research methods change, but also our management and intervention methods. It is a much different challenge to reduce the number of sows that are off feed, than to increase the overall feed intake. If we don't get a sow on feed again its likelihood of removal goes up quite quickly. It is much more than simply trying to get a sow to eat when it is off feed.

As in most cases, however, the answer is not to try get feed into an inappetant sow, it is identifying those sows early and keeping them from going off feed. This is an area that needs quite a bit of study but here are a few suggestions of possible causes for analysis in your herd:

- Lameness – sows need to get up to eat food, and we are seeing a number of claw lesions. Pain is one of the more predictable pressures on appetite.
- Metritis – infections of the uterus have often been seen, especially during the summer.
- Low water availability – there is still quite a bit of variation in water flow between farrowing crates. Especially in the first few days after farrowing, there needs to be large amounts of water available to the sow.
- Treatment regimes – it appears that some herds use inappatence as the main signal for treatment. Earlier treatment based on other signs have a higher likelihood of success.

Feed intake cards have often been criticized for their relative inaccuracy. This may be so and it may be more useful to record low feed intake occurrences only. In our hands it provides a better management guide for maintaining sows in the herd.

Over the last number of years we have looked at reasons for culling sows and, to be frank, sometimes we have been more confused than knowledgeable. In comparison to mortality, culling decisions are, to a large part, behavioral, and involves the characteristics of the decision maker as well as the characteristics of the farm at the point in time that the culling decision is made. In other words, a sow that is culled one week may not be culled the next. Culling is the result of the priorities of the manager, the requirements of sows to meet the breeding target, and the supply of gilts. One manager may consider lameness to be a more important factor than the next manager. Another manager may cull heavily for reproductive reasons such as litter size.

Even said difference between culling and death are sometimes not that straightforward. Depending on the market and the frequency of culling, mortality rates can be higher in one farm than the next, as a higher proportion of the sows are euthanized.

On top of these problems, the reasons given for a sow removal are variable, unstandardized and not very explanatory. Simply, we don't trust them, especially comparing herds. Even in simple measures such as lameness, one herd may record the sow as lame while another may record it as unable to breed. Therefore we tried to look at the data in slightly different manners.

What we try to do is to understand the reasons for removal, without relying on the reasons given.

Figure 2: Proportion of herd three phases

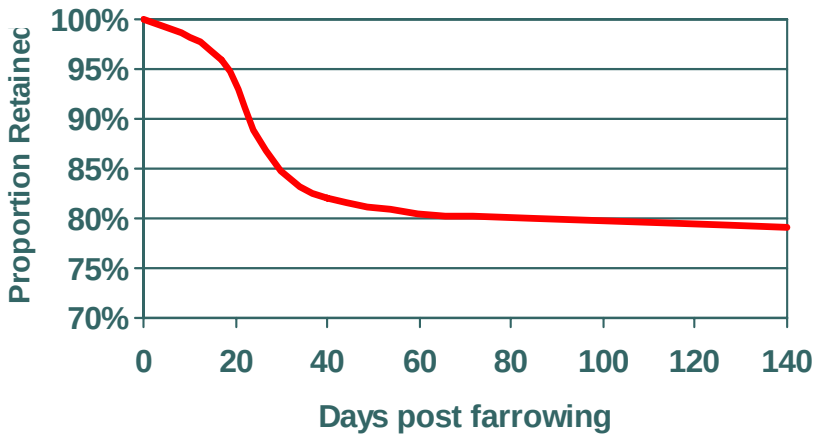

Figure 2 shows an analysis that we have used to describe patterns of retained sows in comparison to their farrowing date. The first phase is the lactation period which is approximately the first 17 days post farrowing. Removals in this time period are almost all mortality. Additionally, mortality risk is much higher during this period. Therefore we tend to look at this phase's removals as an opportunity for improving the survivability of sows during a period of high lactational stress.

The second period extends from approximately 17 days until 30 days post farrowing. This is the highest risk period for removal. We divide this stage is removal into three types. The first is mortality, usually euthanasia, shortly after weaning. These removals can be lumped in with the lactation phase removals, as the problems started in the farrowing room, if not before. This second group is those sows that are immediately culled after weaning. These are divided into the general reasons of old-age, as signified by parity, lameness or other conformance issues, as signified by a lack of a reproductive reason, and reproductive reasons. In most herds we find that old-age and conformance are the predominating reasons.

The last time period is between 30 days and the next farrowing. Most of these sows are removed for reproductive reasons, mostly due to returns to estrus or a lack of exhibiting estrus. Overall, mortality and conformance are relatively low reasons for culling during this part of the curve.

As we look at the differences from week to week in the culling patterns, most of the so-called elective culling occurs during the second period. This is a readily identified pool of sows that can be culled or retained depending on the demand for matings to meet the breeding target. We have shown that when the herd is short of sows to meet matings, the sows that are bred experience a higher mortality rate, suggesting that marginal sows are sometimes bred.

The shape of this curve varies widely from farm to farm, as the reasons for removals vary. Producing a graph such as this is something that is quite feasible within sow record-keeping packages such as PigChamp. With the large enough data set it is also useful to create different curves for the early parities of one and two, the middle parities of 3 to 5 and the older parities. One would hope that the curves are better for younger parities, but that is not always the case. I think that there are three general types of farms to consider in reducing sow removal rates:

- The herds with high lactational pressure. This is often a function of marginal feed intake or other problems, but exhibits itself as a high level of mortality in the first phase and high euthanasia rates along with culling for conformance in the second phase.
- The herds with poor reproductive performance. This is exhibited by a higher rate of removals in the third phase due to excessive returns.
- The herds with poor performance in parity one and two. These herds have a lower performance levels in parity one and two than in parities three through five. Gilt development should be re-examined here.

Such a breakdown is not perfect but it allows us to use the data and hand in a more robust manner. It allows us to look more closely at lactational losses.

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