



InnovatE

APL's E-news for innovative producers

Issue 30
February 2008

Towards higher feed intake of sows during lactation

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The article below summarises findings to date of APL Project No. 2133

Lactation feed intake and lifetime performance

The lactating sow has to nurture her litter and maintain body condition to be able to rebreed successfully shortly after weaning. However, the demands on modern sows have increased due to genetic improvement of performance. For example, an increase in litter size at birth implies that the sow has more piglets to nurse during lactation. The modern sow has less body reserves available due to reduced backfat levels. Further, selection for higher growth rate has led to a higher mature weight and hence higher maintenance requirements.

The sow will mobilise body reserves if nutrient intake is insufficient to sustain performance. Excessive body weight loss has been shown to lead to several reproductive problems (review by *Eissen et al., 2000*), which ultimately reduces lifetime performance of sows. The effect of feed intake during lactation in the first and second parity on lifetime performance was investigated by *Hermesch and Jones (2007)*. Lifetime performance of sows was defined as the number of piglets born alive (LNBA) and number of piglets weaned (NWEAN) by a sow over her lifetime. The study was based on 250 gilts and 202 second parity sows, which had their first litter between May 2002 and April 2004 allowing them to complete eight parities by November 2006. A step up feeding system was used during the first week of lactation gradually increasing the daily feed allowance. The average lactation length was 21 days. The mean feed intake of gilts and second parity sows was 4.3kg and 5.4kg per day respectively. It should be noted that average lactation feed intake is influenced by a number of factors including the level of restriction during lactation and length of lactation. Thus comparisons between herds should be based on objective measures and take into account these factors.

The effect of lactation feed intake on lifetime performance was expressed relative to the highest feed intake class, which was set to zero. Gilts eating less than 3.5kg feed per day had less piglets born alive (-14.2 piglets) and weaned less piglets (-11.7 piglets) during their lifetime than gilts eating more than 5kg per day during lactation (Figure 1). Further increases in feed intake during lactation did not lead to further improvements in lifetime performance of these gilts.

Second parity sows with a feed intake during lactation below 3.5 kg had the lowest lifetime performance (Figure 2). However, lifetime performance continued to be impaired for sows eating 5 kg per day or less in comparison to sows eating 6 kg or more each day.

These results show that lifetime performance was reduced when sows ate below certain thresholds. In the current study, thresholds were 3.5 kg per day in gilts and 5.0 kg per day in second parity sows. However, these thresholds may depend on the nutrient content of the diet, the maintenance requirements of the sow, the body reserves the sow has available during lactation and the demands of the litter. Therefore, these thresholds may differ between herds.

Overall, 20% of gilts and 30% of second parity sows ate less than 3.5 kg per day and 5.0 kg per day respectively during lactation highlighting the need to increase lactation feed intake in these sows.

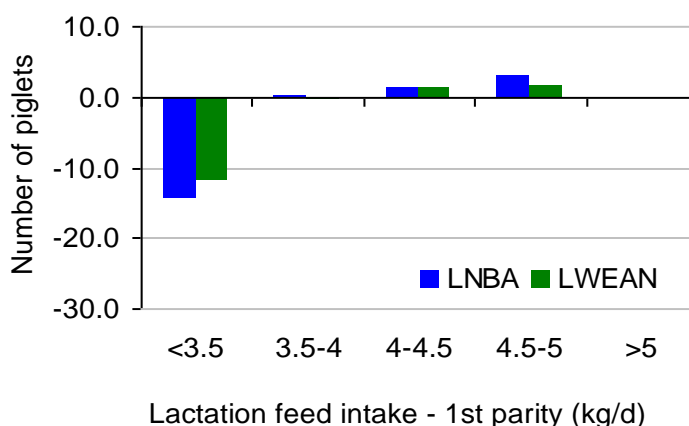


Figure 1. The effect of lactation feed intake in the first parity on number of piglets born alive (LNBA) and weaned (LWEAN) over the lifetime of the sow.

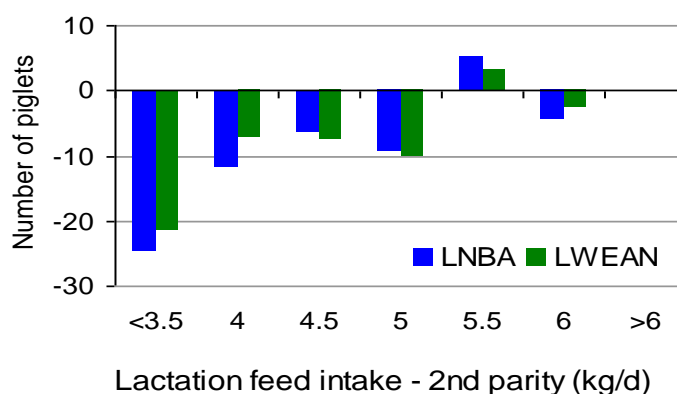


Figure 2. The effect of lactation feed intake in the second parity on number of piglets born alive (LNBA) and weaned (LWEAN) over the lifetime of the sow.

Key message

Lifetime performance of gilts and sows will be reduced if they eat less than certain threshold amounts. The thresholds will differ from herd to herd and are determined by the nutrient content of the diet, the maintenance requirements of the sow, the body reserves the sow has available during lactation and the demands of the litter.

Producers should target gilts farrowing in summer

Understanding factors that influence the food intake of lactating sows will assist in identifying groups of sows that are more at risk of having low feed intake levels. The effect of parity on lactation feed intake is shown in Figure 3 (Jones and Hermes, 2007). Gilts had a substantially lower average feed intake during lactation in comparison to later parities. The mean feed intake was 4.25 kg in gilts versus 5.24 kg in second parity sows. Across all parities, gilts ate 1.27 kg/day less during lactation

than multiparous sows. In comparison, a previous Australian study by *Handley et al. (1995)* found a smaller difference of 0.73 kg/day between gilts and multiparous sows.

It is well known that heat stress causes a reduction in feed intake. Changes in feed intake of lactating sows due to the month of farrowing were similar in gilts and multiparous sows (Figure 4). Overall, gilts and sows farrowing in January ate about 1 kg less than gilts and sows that had farrowed in July.

Putting the effects of season and parity together implies that gilts farrowing in summer ate 2.2 kg/day less than older sows farrowing in winter. Therefore, targeting this group is most critical to achieve higher feed intake levels and consequently better lifetime performance.

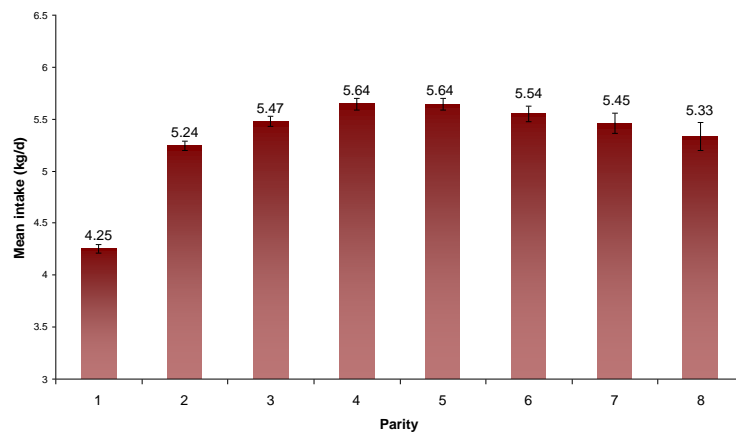


Figure 3. The effect of parity on feed intake of sows during lactation

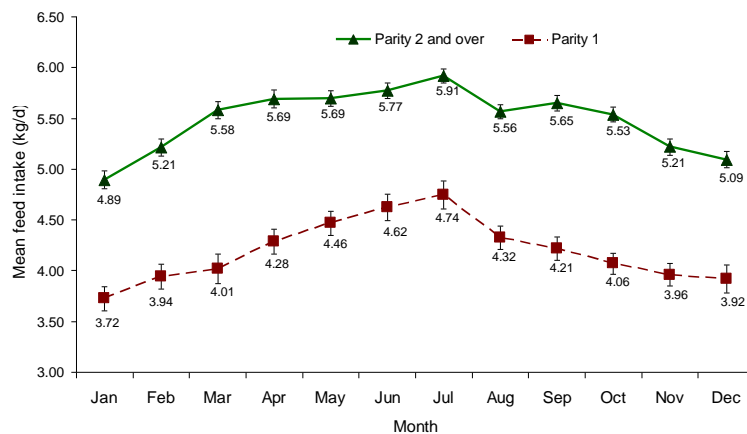


Figure 4. The effect of month of farrowing on feed intake during lactation for gilts and multiparous sows

Feed intake records are required

It is generally true that objective measurements are required to improve performance in a trait. The same principle applies to lactation feed intake of sows. Often feeding charts are used by staff to monitor daily feed intake of sows during lactation. Two example charts are shown in Figure 5. The first sow increased her daily feed intake continuously during the step up phase and continued to eat 9kg (4.5kg in two meals) each day. In contrast, the second sow increased its feed intake to 6kg per day on day 7 of lactation followed by varying feed intake levels for the rest of lactation. Daily feed intake levels were substantially below the maximum daily allowance for this sow.

Individual feeding charts are a valuable tool for staff to better target feeding strategies to the needs of each sow. It is especially important to monitor feed intake of gilts and lactation feed intake should be closely monitored during the summer months. Feeding strategies may include provision of a third meal to females with reduced feed intake. In addition, the level of restriction particular at the beginning of lactation should be reviewed.

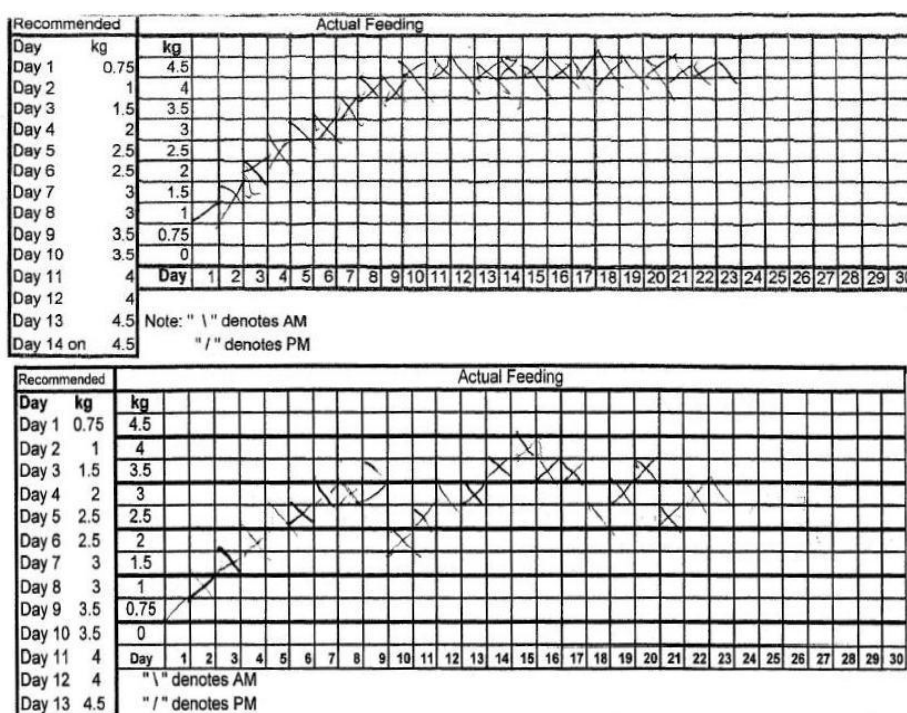


Figure 5. Example feeding charts of two individual sows

Key message

Individual feeding charts are a valuable tool for matching feeding strategies to the needs of the gilt/sow - especially in the summer months.

Feed intake during lactation is heritable

Daily feed intake records available from feeding charts were used for genetic analyses of traits describing lactation feed intake (Hermesch, 2007). The analyses included average feed intake during whole lactation and measures of feed intake over five-day periods during lactation.

Average lactation feed intake had a heritability of 0.19 (moderate heritability) and a repeatability estimate of 0.36 (Table 1). Heritability and repeatability estimates were only slightly lower for five-day measures recorded between day 6 to day 20 of lactation. In contrast, average feed intake from day 1 to day 5 of lactation was not a heritable trait and had a lower repeatability of 0.15.

Genetic correlations between lactation feed intake and five-day measures of feed were obtained to investigate genetic relationships between traits. All three feed intake measures recorded over five-day periods from day 6 to day 20 of lactation were genetically the same trait as average feed intake during the whole lactation. Therefore, these five-day measures may be used in pig breeding programs to

improve lactation feed intake. The use of these five-day measures of feed intake during lactation reduces recording costs. Further analyses are under way to estimate genetic relationships with other performance traits and reproductive traits of the sow. This information is required for the development of selection strategies that incorporate sow feed intake during lactation in pig breeding programs. In addition, some Australian pig breeders have started recording feed intake in lactating sows to obtain data for their breeding program.

Table 1. Means as well as heritability and repeatability estimates for traits describing feed intake of sows during lactation

Whole lactation	Mean	Heritability	Repeatability
Average lactation feed intake (kg/d)	5.11	0.19	0.36
Average feed intake over parts of lactation			
Day 1 to 5 (kg/d)	2.69	0.02	0.15
Day 6 to 10 (kg/d)	5.43	0.17	0.27
Day 11 to 15 (kg/d)	6.08	0.14	0.29
Day 16 to 20 (kg/d)	6.11	0.12	0.30

Summary

Feed intake of sows during the first and second lactation affects the lifetime performance of sows. Gilts farrowing in summer had substantially reduced feed intake levels during lactation. Producers should focus on this group of sows specifically. As a first step, feeding charts should be used to obtain objective information about feed intake of sows during lactation. This information is useful for staff to target feeding strategies specifically for individual sows and can also be used for genetic improvement. A first genetic analysis showed that feed intake of sows during lactation is heritable and will respond to selection. Further genetic analyses are underway and some breeders have started recording lactation feed intake in sows to evaluate selection strategies that consider feed intake of sows during lactation in pig breeding programs.

Acknowledgement: The data were kindly provided by Stuart and Tracey Neuendorf.

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