First analysis of factors influencing feed intake of sows during lactation

Susanne Hermesch

Animal Genetics and Breeding Unit, University of New England, Armidale, NSW 2351

Introduction

During lactation, sows need to eat a sufficient amount of feed to meet the requirements of milk production to nurture their litter and to sustain their body condition. Overall, information about feed intake of lactating sows is limited. In addition, information about other factors influencing feed intake of the sow may be incomplete. These factors include feeding strategy, lactation length, litter size and weight of the litter the sow is nursing as well as sow body weight and body condition. Therefore, a direct comparison of feed intake across farms should be done with caution. The importance of sow lactation feed intake for a high lifetime reproductive performance has been discussed in the previous paper by Bunter et al. (2006). A large project is underway at QAF Meat Industries, funded by the Pork CRC, to evaluate breeding strategies that include feed intake of the lactating sow. However, feed intake of sows during lactation may also be recorded as a management tool to improve performance (Welch, 2005), which is practiced at Neuendorf Farming.

It is the aim of this paper to describe information available for feed intake of sows during lactation as recorded in a commercial piggery and to identify factors that influence sow feed intake during lactation.

Description of data

1. General data description

Litter records were available for sows that farrowed between May 2002 and October 2005 at Neuendorf Farming in Kalbar, QLD. Information available for each litter included litter size, number of piglets cross fostered, piglet mortalities until weaning and number of piglets weaned. Sows were fed twice a day and the amount of feed given to each sow during the morning and afternoon feed was recorded for each day during lactation. A step up system was used during the first days during lactation. Feed was increased if the sow was able to eat all feed provided in the last meal. New feed provided was wet with water. In addition, an estimate was available for the amount of creep feed given to the piglets starting on day ten of lactation.

This information was combined with the standard PIGBLUP data file to obtain pedigree and performance records of these sows. The data included 559 Large White and Landrace sows with 1552 litters. The majority of litters were out of Large White sows (N: 1251).

2. Sow feed intake

The daily allowance of feed was gradually increased after farrowing until approximately day seven of lactation (Table 1). All characteristics of feed intake showed substantial variation as indicated by the high coefficients of variation. The extreme coefficients of variation observed for feed intake of day 1 and day 2 of lactation are due to the categorical nature of the trait (not normally distributed). The proportion of sows eating no feed at all at a particular day ranged from one to four percent from day three to 14 days. The average weaning age was 23 days and sows weaned before 20 days (7%) may have had some difficulty during lactation. Reasons for earlier weaning need to be evaluated in more detail. Outliers were removed for total feed intake during lactation and mean daily feed intake reducing number of records to 1492 and 1452, respectively. The mean daily feed intake was lower in this study in comparison to an earlier study at QAF Meat Industries presented by Bunter et al. (2006) accompanied by higher coefficient of variation. Within parities, coefficients of variation were higher in parity one (CV%: 25.5%) and parities five and above (CV%: 28%) than parities two to four (CV%: 22%).

Table 1. Number of records, mean, standard deviation (sd) and coefficient of variation (CV%) of individual feed intake (FI) characteristics.

Trait	N	Mean	sd	CV%
FI day 1	1512	0.79	0.66	83
FI day 2	1512	1.97	1.02	52
FI day 3	1512	2.96	1.09	37
FI day 7	1512	5.28	1.76	33
FI day 10	1512	5.64	2.02	36
FI day 14	1484	6.00	2.25	37
FI day 21	1303	5.77	2.30	40
Total FI day 1 to 7	1512	23.7	6.55	28
Total FI day 8 to 14	1512	39.8	11.8	30
Total FI day 15 to 21	1303	35.9	13.1	36
Total FI during lactation	1492	113.2	31.0	27
Mean daily FI	1452	4.93	1.23	25

Analysis of feed intake of the sow during lactation

Average daily feed intake during lactation (AFI) was analysed using Proc GLM of the SAS analytical system (SAS, 1999). Season defined in calendar month, year of farrowing, breed and parity were all significant effects for sow feed intake. In addition, the interaction between breed and year of farrowing was approaching significance (P-value of 0.056). However, significance decreased (P-value of 0.095) for this interaction when litter size at the beginning of lactation was part of the model.

Parity was the most important factor influencing sow feed intake. Gilts ate nearly one kg feed less each day than second parity sows (Figure 1). Feed intake was largest in parity four and declined slightly for older sows. Parity group six included sows in parity six and above. In comparison, the difference between first and second parity was 0.56 kg in the QAF Meat Industry data presented by Bunter et al. (2006). In addition, the overall feeding level was higher in the QAF data with 5.78 kg in the first parity versus 6.34 kg and 6.58 kg in the second and third parity. Lactation feed intake increased

continuously from the first to the fourth or fifth parity in four studies reviewed by Eissen et al. (1999), although the difference between first versus later parities was not as profound as observed here.

A further important factor influencing sow feed intake was month of farrowing (Figure 2). There was a clear trend of higher feed intake levels for decreasing temperatures. For example, sows ate 5.20 kg each day in the middle of winter (July) versus an average feed intake of 4.30 kg in December. Sow feed intake was lowest in February and highest in June in the Corowa data set presented by Bunter et al. (2006) with a difference of more than one kg per day between seasons. These studies show that season has a profound effect on feed intake of sows during lactation in Australia.

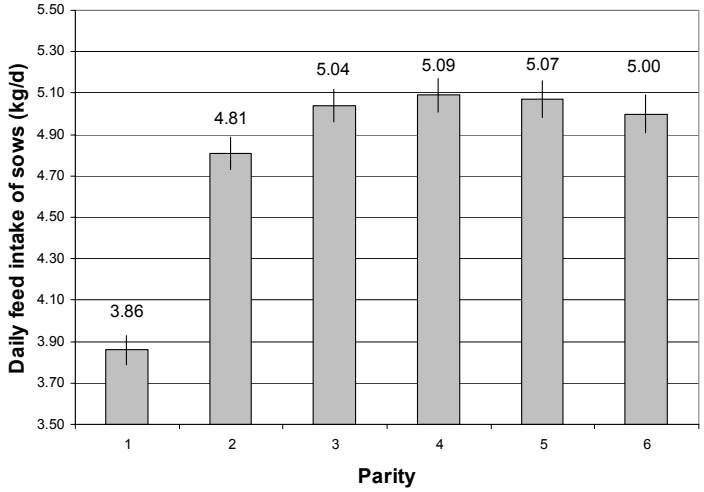

Figure 1. The effect of parity on sow feed intake during lactation.

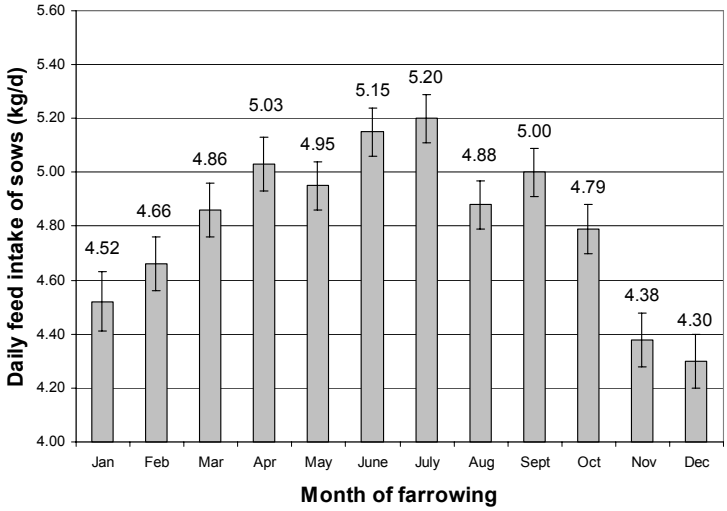

Figure 2. The effect of month of farrowing on sow feed intake during lactation.

Daily feed intake of sows during lactation increased linearly for a litter size of five piglets to a litter size of ten piglets and did not change significantly once litter size at the beginning of lactation exceeded ten piglets (Figure 3). A similar non-linear relationship

between lactation feed intake and litter size was presented by Eissen et al. (1999). Litter size was not defined for all studies included in the review and was based on number of piglets weaned in some studies, which is recorded after lactation feed intake. Number of piglets weaned is recorded after feed intake of the sow and litter size at the beginning of lactation should be used for the analysis of the effect of litter size on feed intake of sows during lactation.

The greater suckling intensity of more piglets leads to higher milk production of sows (ie Revell et al., 1998). Eissen et al. (1999) argue that the greater need for energy results in larger feed intake. Results show that the higher demands of larger litters resulted in higher feed intake of the sow for litter sizes of less than ten piglets only. There was no relationship between litter size and lactation feed intake for larger litter sizes with more than ten piglets, as was also shown in the review by Eissen et al (1999).

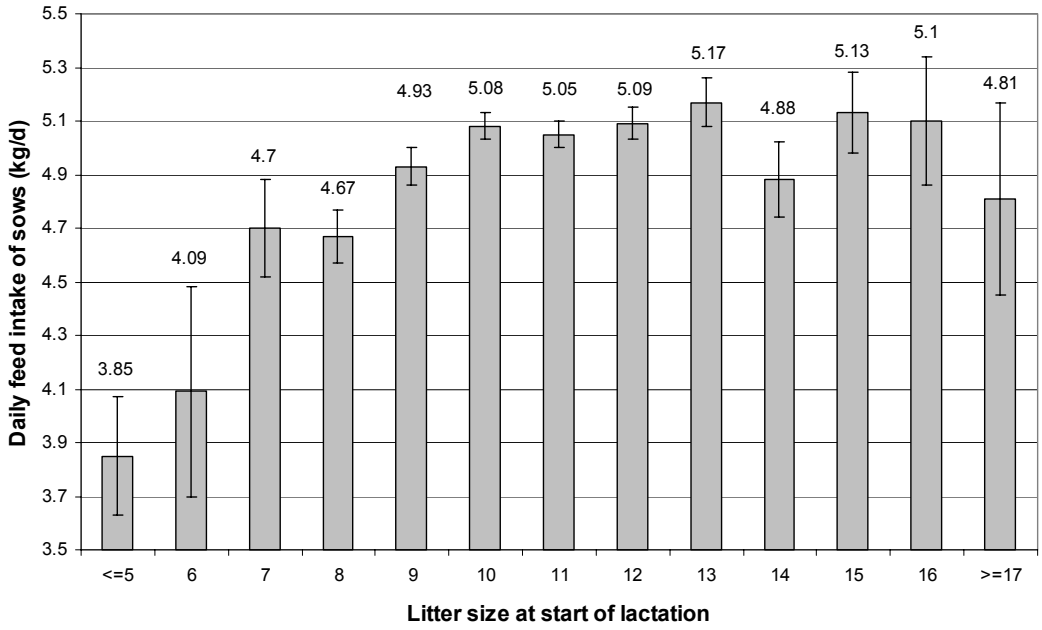

Figure 3. The association between litter size at start of lactation (after cross-fostering) and sow feed intake.

In Large White, sow feed intake decreased continuously from 2002 until 2005 (Figure 4. breed by year interaction). This decrease was not as profound in Landrace sows. Feed intake levels were originally higher for Large White in 2002 but were similar for both breeds in 2005.

The number of piglets weaned increased during the same time period by 0.45 piglets (Figure 4). Therefore, demands on sows have increased while feed intake of sows has decreased. This may have had an effect on rebreeding success or piglet weight. Further analysis will investigate the effect of sow feed intake on rebreeding success and subsequent litter performance. However, the current data set does not provide information on litter weight traits or sow body condition.

Sow feed intake during lactation was 0.51 kg lower in Landrace than Large White (breed effect). However, Landrace were characterised by higher litter size at birth (+0.69 piglets) and weaning (+0.51). Eissen et al. (1999) also reported breed differences

for lactation feed intake and concluded that these breed differences may involve a large number of factors in addition to body weight, body condition and demands for milk production.

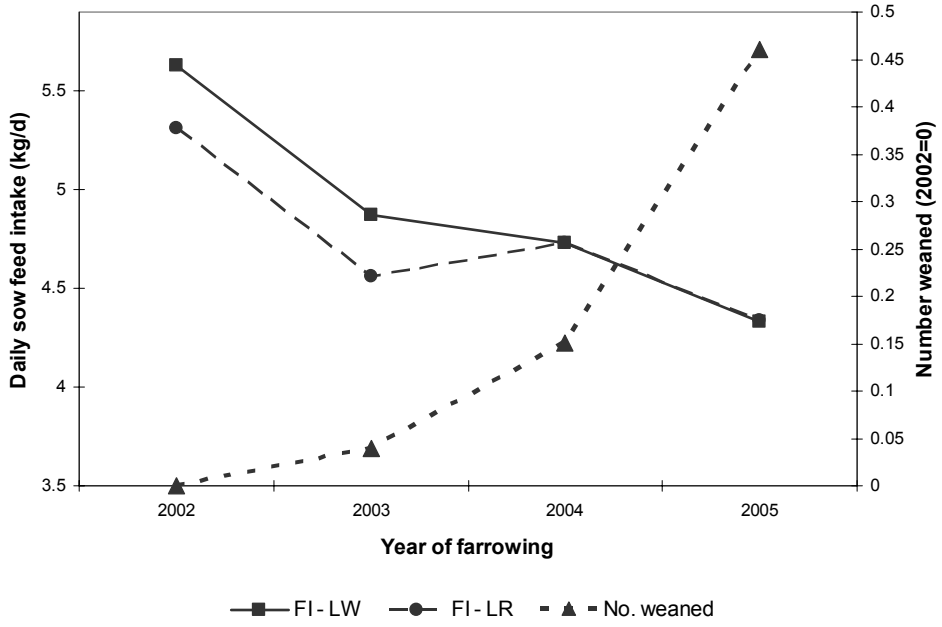

Figure 4. Change in number weaned and sow feed intake during lactation for Large White (FI – LW) and for Landrace (FI – LR) sows from 2002 until 2005.

The association between lactation feed intake and number weaned

There was a linear increase in number of piglets weaned with higher sow feed intake levels (Figure 5). It was shown above that feed intake of sows increased with larger litter size from five to ten piglets per litter at start of lactation and was not affected by litter size for larger litters. This implies that the relationship between number weaned and sow feed intake during lactation is not independent for smaller litters. The majority of litters (76%) had ten or more piglets at start of lactation. Taking piglet mortalities into account, which occur mainly during the first three days after farrowing, it may be expected that half of all litters were affected by this relationship between litter size during lactation and sow feed intake. Therefore, litter size at start of lactation was fitted as an additional effect in a separate analysis. Sow feed intake during lactation was still a significant effect for number weaned and least squares means did not differ significantly between both models.

Summary and outlook

A number of effects were identified that influence or are associated with feed intake of sows during lactation. Feed intake of sows was significantly lower in the first parity than later parities. This could be expected because of their lower body weight. In addition, sows ate less feed during hot summer months. It was shown that higher feed intake during lactation was related to a higher number of piglets weaned. Further analysis will investigate the effect of feed intake of sows during lactation on subsequent reproductive performance followed by genetic analyses of sow feed intake.

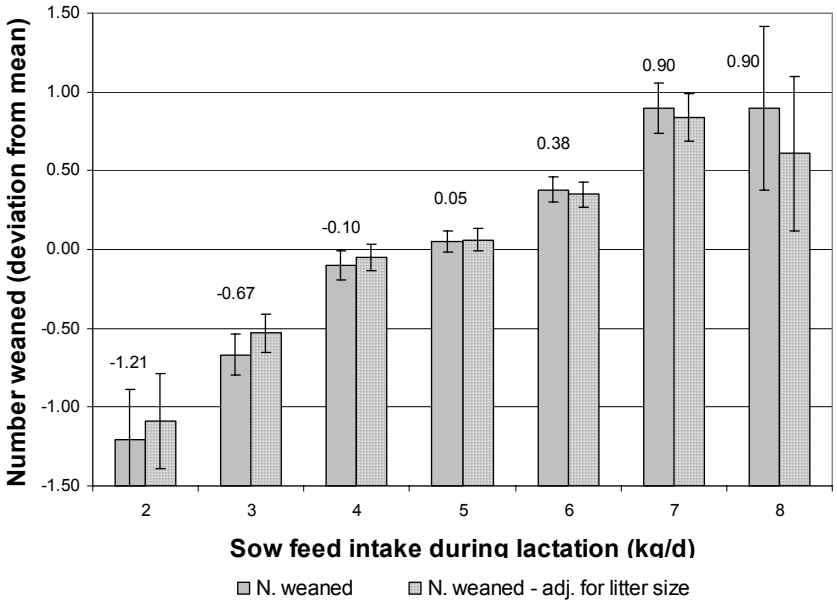

Figure 5. The association between sow feed intake during lactation and number of piglets weaned (expressed as a deviation from the mean).

Acknowledgements

The author thanks Tracey and Stuart Neuendorf for providing data on sow lactation feed intake and general performance data. The analysis of this data was funded by Australian Pork Limited under project 2133.

References

Bunter, K.L., Hermesch, S. and Luxford, B.G. (2006). "Sow feed intake and lifetime reproductive performance." AGBU Pig Genetics Workshop Notes, October 2006, Armidale

Eissen, J.J., Kanis, E. et al. (1999). "Sow factors affecting voluntary feed intake during lactation." *Livestock Production Science* **64**: 147-165.

Revell, D.K., Williams, I.H., Mullan, B.P., Ranford, J.L. and Smits, R.J. (1998). Body composition oat farrowing and nutrition during lactation affect the performance of primiparous sows. II. Milk composition, milk yield, and pig growth. *Journal of Animal Science* **76**: 1738-1743.

SAS Online Doc, V8. http://v8doc.ss.com/sashtml, SAS Institute Inc. Cary, NC. USA

Welch, E.B.M. (2005). Management for health – on-farm issues and cost benefits. In. Manipulating Pig Production, Editor: J. E. Paterson, Proceedings of the Tenths Biennial Conference of the Australasian Pig Science Association. p. 51-59.