

Feed efficiency and productivity in sows

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Evaluating the productivity in sows is often limited to only include the key figure expressing the number of piglets weaned per sow per year. However, evaluating the overall lifetime performance of the sow, would lead to a more representative and real evaluation of sow productivity.

Assessing the lifetime performance of a sow requires a closer look at nutritional and management practices to be implemented in pig production in order to meet the requirements of the modern sow and her genetic potential to be fully expressed.

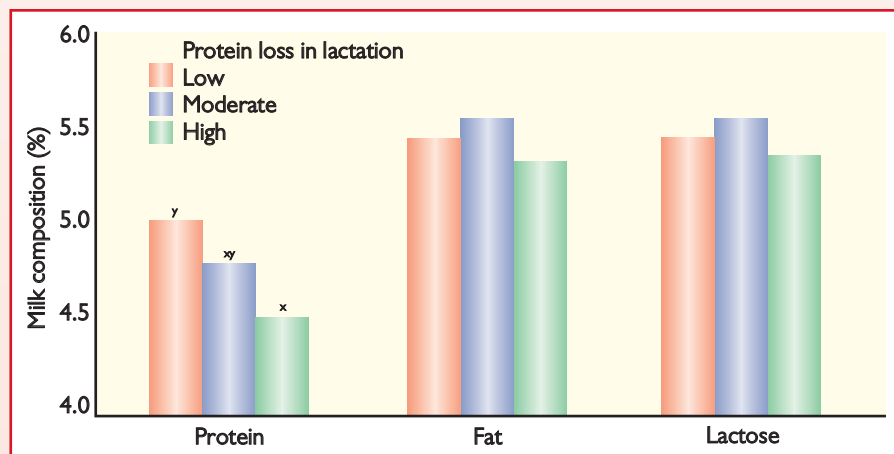
Impact on subsequent litter size per kg reduced weight loss (No. of piglets) 1.28

Impact on the probability of a prolonged weaning to oestrus interval per kg reduced weight loss (%) 61

Table 1. Impact on reduced weight loss during first lactation on productivity in the following reproductive cycle (Eissen et al 2003).

This article aims to study the impact of nutrition and health on sow body condition score and the link to reproductive performances as essential factors influencing the overall cost of pig production.

Fig. 1. Milk protein, fat and lactose composition of sow milk at day 20 in lactation in first parity sows with different losses of body protein during lactation. Different superscripts indicate significant $P < 0.05$ differences (Clowes et al 2003).



Measurements	Protein loss in lactation			
	Low	Medium	High	P-values
Body weight loss in lactation (kg)	12.9±2.3 ^x	16.9±2.4 ^x	28.4±2.1 ^y	0.001
Backfat thickness (mm)	14.5	13.6	14.7	
Calculated loss in lactation ^b				
Body protein (kg)	2.1±0.47 ^x	2.9±0.49 ^x	5.0±0.49 ^y	0.002
Body protein (% of parturition mass)	6.9±1.55 ^x	9.2±1.62 ^x	15.8±1.44 ^y	0.003
Body fat (kg)	3.9±0.86 ^x	5.7±0.89 ^x	8.3±0.82 ^y	0.010
Body fat (% of parturition mass)	9.4±2.09 ^x	12.9±2.19 ^x	18.0±1.95 ^y	0.035

^{x,y} different superscripts indicate significant differences ^b Body protein and fat mass predicted from the equations of Whittemore and Yang (1989)

Table 2. Impact on protein loss in lactation on sow body condition.

Reviewing the literature it is widely accepted that the reproductive performance of the sow in the subsequent reproductive cycle is closely related to the body weight loss during lactation.

In particular, the relation of reduced body weight losses to shorter weaning to oestrus intervals have been studied.

In a study conducted by Eissen et al 2003 on 268 primiparous sows it was concluded that sows with a lower body weight loss during first lactation had a significant ($p < 0.01$) larger litter in the subsequent reproductive cycle (Table 1).

Furthermore, this study showed that the probability of a prolonged weaning to

oestrus interval was reduced significantly ($p < 0.001$) if the body weight loss was reduced.

Body protein or backfat

Literature data are quite consistent regarding the relation of sow weight loss, as a result of the high milk yields, and sow fertility. The sow weight loss is composed of adipose (fat) and protein containing tissues and it is unclear to what degree depletion of maternal fat reserves, protein reserves or both are responsible for the reduction in sow productivity.

Data from several studies show that low backfat levels at weaning (< 14 mm) do compromise subsequent reproductive sow performance.

In a study conducted by Clowes et al (2003) 36 gilts were divided into three groups supplied with lactation diets differing in protein to simulate a low, moderate and high protein loss during lactation.

The data shown in Table 2 describes the impact on sow body weight loss and parturition of this weight loss into adipose and protein tissues in particular.

Data shown in Table 2 demonstrates that significant changes in sow body weight loss do not have a significant impact on backfat thickness. Calculating the losses of adipose and protein tissues do suggest a close relation to overall weight loss.

Analysis of the sow milk composition on day 20 in lactation in first parity, shown in

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Fig. 2, demonstrated that the protein content in the sow milk is significantly reduced in situations of moderate and high protein losses. Under practical conditions this would occur in situations where sows were fed imbalanced diets, diets with low protein digestibility, or feed intake would be limited.

Feed intake in the early lactation period is often limited in modern pig production due to significant changes in feed volumes and composition between gestation and lactation diets and, furthermore, restricted by the overall health conditions.

In order to analyse the impact on maternal protein loss on weaning to oestrus interval (WEI) Clowes et al 2003 analysed data from 16 lactating sow studies.

The results are summarised in Fig. 2 and show that once sows had mobilised more than 16% of their protein mass WEI increased.

Once again these data do highlight that increasing sow weight loss during lactation, and maternal protein loss in particular, are compromising sow fertility.

Compromised sow fertility is amongst the highest culling reasons in modern sow production and is affecting parameters like average parity number, number of liveborn piglets, sow replacement rates influencing the overall sow productivity and profitability in production.

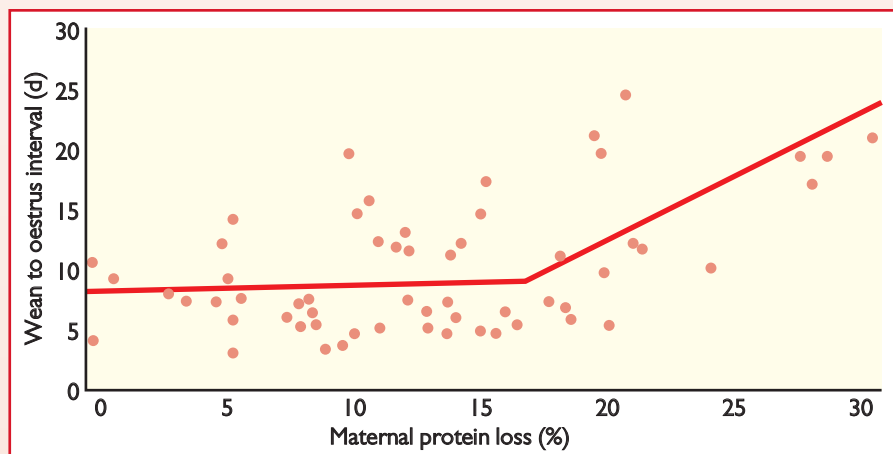
Probiotic support

In order to evaluate the effect of a probiotic (BioPlus 2B) fed to lactating sows from two weeks prior to expected farrowing until weaning a study was initiated including 109 sows and gilts allocated into two experimental groups as follows:

- Untreated control.
- BioPlus 2B with the same feeding as untreated control plus BioPlus 2B at a dose of 400g per ton of feed.

The results of this study are shown in Table 3 and show that feeding the probiotic to lactation sows reduced significantly the body weight loss during lactation.

Fig. 2. Breakpoint analysis of maternal protein loss versus wean to oestrus interval (Clowes et al 2003).



	BioPlus 2B	Untreated control
Body condition		
Body weight loss (kg)	15.3 ^b	18.8 ^a
Backfat (P2) depth (mm)		
Day one post partum	24.98 ^a	25.11 ^a
Day of weaning	23.26 ^b	22.94 ^b
Loss	1.7	2.2
Reproduction parameters		
Weaning to oestrus interval (days)	5.82 ^a	6.44 ^a
Return to oestrus (%)	6.1 ^b	20.0 ^a
MMA frequency (%)	5.7 ^a	13.0 ^a
Sow milk composition (day 14 post partum)		
Fat (%)	6.3 ^a	6.1 ^b
Protein (%)	4.7 ^a	4.5 ^b
Sow performance		
Number of weaned piglets per litter	9.7 ^a	9.0 ^b
Piglet weaning weight (kg)	8.4 ^a	8.0 ^b

Table 3. Results evaluating the impact of feeding a probiotic (BioPlus 2B) in lactating sows on reproductive and sow performance during lactation.

- Reduced weight loss using probiotic (BioPlus 2B) during lactation
Impact = 4kg
- Feed conversion ratio – sows
Impact = 5-7
- Volume of gestation feed to re-feed sow to optimal body condition score, litter
Impact = 4 x 6kg feed/kg gain
- Number of litter per sow per year
Impact = 2.3
- Volume of gestation feed to re-feed sow to optimal body condition score, year
Impact = 24kg feed/litter x 2.3 litter sow per year = 55kg of gestation feed per sow per year

Table 4. The value of reduced weight loss – improved feed efficiency.

The data found by Alexopoulos are fully in line with the findings in the study of Clowes, demonstrating that a reduced weight loss and a better body protein status of the sow is improving the reproductive performances in sows, the composition and nutritional value of sow milk resulting in higher piglet weaning weights.

Conclusion

Reducing the weight loss during lactation is a key parameter to improve the feed efficiency in modern sow production.

Furthermore the reproductive performance of the sow is highly dependent on the body condition score at weaning.

Loss of sow body weight during lactation is prolonging the weaning to oestrus interval as well as the conception rate and return to oestrus frequency. Consequently, the litter size in the subsequent reproductive cycle is affected and already determined by the body condition of the sow at weaning. ■

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