
SOW BODYWEIGHT CHANGES IN GESTATION

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Summary

Defining nutrient requirements and feeding strategies for the modern high-producing sow is a step leading to greater efficiency in the breeding herd. Results demonstrated that setting target weight gains in gestation and feeding to meet these targets might not always provide predictable results.

Introduction

There are two steps in the design of a feeding strategy. The first is to set reproductive targets including the amount of maternal weight gain for sows of differing parities and the amount of reserves a sow can use for milk production in lactation. The second step is to set nutrient requirements to meet these specified targets. Models have been developed for sow nutrient requirements in gestation. These models attempt to partition nutrient requirements into three components (maintenance, growth of conceptus and reproductive tissues and maternal growth). By attempting to partition requirements, factors are added up, thus accounting for the factorial approach to determining nutrient requirements. The object of this experiment was to evaluate the factorial approach to defining energy requirements in pregnant sows.

Experimental Procedures

Daily feed allowance in gestation was determined using the maintenance requirement for energy of 110 kcal DE/kg BW^{0.75} and total target sow BW gains, including maternal gain and growth of the conceptus, of 55, 50, 40, 30 and 20 kg for parities 1, 2, 3, 4 and 5 and higher, respectively. Feed allowances were calculated using BW at mating and the target BW gains set for each parity. Example calculations are demonstrated in Table 1.

Daily feed allowance of sows in gestation was closely monitored. Sows were fed their daily allowance as one meal in the morning. Sow BW was measured at mating, d 35, 75 and 110 gestation. The experiment was conducted over three replicates. After the first replicate, it was apparent that first and second parity sows gained an average of 9.6 and 13.3 kg more than targeted, respectively. In replicates 2 and 3, the daily energy allowances of these two parities was adjusted downward based on the energy required for

protein and lipid gain to achieve the prescribed gestation BW gain. The calculation resulted in decreasing the average daily feed allowance by 100 g/d.

Results and Discussion

Sows gained an average of 10.6 kg above the target total gestation BW gain. It was clear that this model over-predicted DE allowance for sows in gestation, therefore, performance data for the sows was entered into the NRC (1998) model (Table 2). The actual number of piglets farrowed was put into the NRC (1998) model, a component not entered into the original model that was used. Comparisons between the predicted BW gain and the actual BW gain were then made. The deviation between the predicted and actual BW gains was then organized by parity, BW at breeding, total number of piglets born and the total weight of the litter born (Figures 1 and 2). The deviations between predicted and actual gains (NRC prediction – Actual BW gains) decreased with increased parity and initial BW at breeding until the 5th parity and a BW range of 210-240 kg, where it then increased. NRC (1998) obtained the closest estimate of BW gain in gestation for sows with litters larger than 11 piglets and litters weighing between 14-17 kg at birth.

Implications

Predicting daily DE allowances that will maximize sow and litter performance is possible with sows between parity 3 and 5. There is too much variation in younger parity sows and older parity sows to predict sow performance with any accuracy; therefore, there is a need for further research into this area. The size and weight of the litter at farrowing is important in determining the BW gain of the sow in gestation. Therefore, using the actual litter size and weight within a sow herd is desirable when using a factorial approach to determine daily feed allowance.

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Actual litter size and weight are the best indicators of feed needs.

**Table 1. Estimated daily DE requirements in gestation using original model estimates.
Based on target weight gains in gestation.**

Parity	No. sows	Ave. initial BW, kg	Target Wt. gain, kg ^a	DE _{Maint.} ^b	DE _{Matgain} ^c	Actual DE intake (kcal/d)		Daily feed allowance, kg/de
						DE _{Conceptus} ^d	DE _{Total}	
1	99	142	55	5161	1697	411	7269	2.3
2	102	168	50	5700	1662	411	7773	2.5
3	43	193	40	6129	1114	411	7654	2.5
4	54	208	30	6348	611	411	7370	2.4
5	44	220	20	6488	249	411	7148	2.3
6	23	230	20	6703	249	411	7363	2.4
7	23	233	20	6770	249	411	7430	2.4
8	12	236	20	6829	249	411	7489	2.4

^a Including both maternal and conceptus gain.

^b Maintenance requirement of 110 kcal DE/kg BW 0.75). Body weight is average of initial BW and final BW based on target weight gain in gestation.

^c Maternal BW gain requirement is sum of requirement for protein gain (12.78 kcal/g) and lipid gain (13.05 kcal/g). Assumes that maternal gain is 12.5% protein, resulting in a lipid:protein ratio in maternal gain of about 2:1.

^d Assuming 20 kg conceptus and reproductive tissue gain over 115 days (174 g/d), assuming 18.5% protein (32.2 g/d) and an energetic cost of 12.78 kcal/g.

^e Assuming DE of diet was 3100 kcal/kg. Subsequent digestibility trial showed actual DE content of 3150 kcal/kg.

Table 2. NRC (1998) estimate of maternal body weight gain using actual daily DE intakes in gestation

Parity	No. sows	Net maternal BW gain, kg ^a	Litter size ^b	DE _{maint} ^c	DE _{conceptus} ^d	Actual daily DE intake, kcal/d ^e	DE for maternal gain, kcal/d ^f	NRC estimate of total BW gain, kg ^g	Actual total BW gain, kg
1	99	36	11.2	5607	419	7269	1234	57	61
2	102	33	11.9	5829	445	7773	1499	58	60
3	43	22	12.4	6261	463	7654	930	50	50
4	54	14	12.6	6501	471	7370	398	44	42
5	44	3	13.2	6650	494	7148	4	37	33
6	23	7	12.3	6884	457	7363	22	37	35
7	23	0	13.7	6905	511	7430	14	41	31
8	12	1	11.5	6924	427	7489	138	37	27

^a Maternal weight gain (kg) = Gestation weight gain (kg) – (2.28 x No. of pigs).

^b Total piglets born.

^c Maintenance requirement of 110 kcal DE/kg BW 0.75. Body weight is the average of the initial weight and final weight based on actual weight gains of the sows in the experiment.

^d DE required for daily gain of the products of conception is 37.3 kcal/pig.

^e Actual daily DE intake (kcal/d) based on original model.

^f DE (kcal/d) remaining after estimates for maintenance and conceptus gain (based on NRC, 1998 model) are subtracted from the actual intake of the sow in gestation.

^g Estimate of BW gain from NRC (1998) model using actual daily DE intakes obtained from original model.

Figure 1: Deviation between predicted and actual BW gain by parity

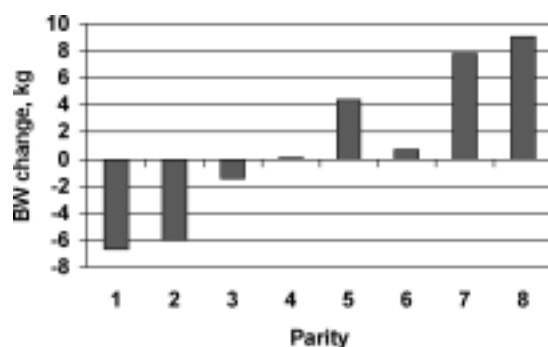


Figure 2: Deviation between predicted and actual BW gain by number of piglets born

