RESEARCH REPORT
ANIMAL SCIENCE

Title: Using high-fiber diets to limit energy intake in developing gilts: effects on puberty, reproduction, culling rates, lifetime productivity, and progeny health and growth – **NPB #10-164**

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Industry Summary

The effects of developing gilts limiting energy intake, using a high-fiber diet, compared to a corn-soybean meal based diet were evaluated. The high-fiber diet used contained 40% soybean hulls. During development, growth and ultrasound data were collected at 2-week intervals. Boar exposure was used daily to determine age at 1st detectable estrus. After breeding at 230 days of age, gilts were managed similarly and received the same diets. Females were culled only for reproductive failure, ruptures, or severe lameness. Reproductive traits were measured for a maximum of parity 4 (785 days of age). Gilts developed on the high-fiber diets expressed puberty 11 days later, weighed 18.6 kg less and had 9 mm less backfat at breeding. There were no detrimental effects of reduced energy intake on reproductive measurements or progeny performance. Developing gilts with the lower energy diet decreased feed input costs by 14.3% compared to the corn-soybean meal based diet, based on Spring 2013 feed prices. This study validates results from previous experiments investigating the effects of reducing energy intake during development. These results suggest a lower-cost management strategy that reduces energy intake without restricting access to feed and that does not decrease sow productivity.

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Scientific Abstract

A total of 182 gilts were used to evaluate the effects of limiting energy intake during development compared to traditional corn-soybean meal based diets using the addition of soybean hulls to reduce caloric intake with ad libitum access to feed. The gilt developmental period consisted of 110 days, from 120 to 230 days of age. Data collected during development included body weight, backfat, longissimus muscle area, and feed intake, every 2 weeks. Estrus detection was conducted on a daily basis until breeding. Females were maintained in the breeding groups for 4 parities (785 days of age), at which time data collection ceased. Animals were only removed from the experiment for reproductive failure, ruptures, or severe lameness. Reproductive measurements included pre- and post-farrowing body weight and backfat, lactation length, lactation feed intake, number born alive, stillborns, mummified fetuses, weaned, litter birth and weaning body weights. Gilts fed the diets with 40% soybean hull inclusion consumed less feed compared to gilts fed the corn-soybean meal (control) diet ($P < 0.05$; 2.79 vs. 3.11 kg/d, respectively). There was no difference in daily feed intake during the overall developmental period when expressed on a % of body weight basis. Gilts consuming the soybean hulls consumed 33% less metabolizable energy during development. Reduced energy intake resulted in gilts that were 18.6 kg lighter, had 9 mm less backfat, and 5.5 cm^2 less longissimus muscle area at breeding ($P < 0.01$). Gilts with lower energy intake had 30% less backfat, but only 12% less body weight and longissimus muscle area at breeding. Reduced energy intake delayed age at 1st detectable estrus by 11 days. The delay in puberty occurred earlier than the common age at which gilts are bred in commercial conditions. Feed costs during development were reduced by 17.26 U.S. dollars (USD)/hd and were 14.3% less for gilts fed the soybean hull diets compared to control diets. Gilts developed on the lower energy regimen tended to have larger parity 1 litter birth weights ($P < 0.10$). However, there was no difference observed in litter weaning weight during parity 1. Females that were developed on the lower energy regimen had decreased body weight and backfat at farrowing and weaning during parity 1 and 2 ($P < 0.05$). There were no differences in weight or backfat loss during lactation. By parity 3, the previously detected differences in weight and fat thickness were not observed. There were no differences due to energy intake for litter or sow data for parity 3 and 4. No differences were observed between the 2 treatment groups in the total number of litters produced, total number of pigs produced, and total litter weights. No differences were observed in progeny growth rates between the dietary treatments. In conclusion, developing gilts with reduced energy intake by utilizing soybean hulls in the diet reduced feed cost and had no detrimental effects on sow productivity.

Introduction

The number of pigs born per litter has trended upward sharply for several years but increased sow replacement rates have also followed this trend (Johnson and Miller, 2005). Traditionally, gilts are developed with ad libitum intake until a body weight of 135 kg. In previous studies investigating gilt development with reduced energy intake, gilts developed on the ad libitum regimen attained puberty 3.5 d earlier and more of them expressed puberty by 230 d of age. However, this management strategy increased feed costs of developing gilts and increased culling rates, especially after parity 1 compared to reducing energy intake during development (2010 Nebraska Swine Report).

Reproductive failure is the most frequent cause of culling. Because of greater numbers of litters per replacement gilt and reduced costs of developing gilts, our previous research showed that restricting feed intake during gilt development decreases breakeven selling prices for market pigs (Cech et al., 2010). This study validates previous results and identifies management strategies in order to accomplish energy restriction while gilts are fed in a conventional method with ad libitum access to feed. This was a multidisciplinary study, involving the entire UNL swine group and will provide data for future research focused on the understanding of reproductive efficiency.

We previously evaluated the effects of restricting energy intake during gilt development on lifetime productivity of sows. Gilts from 2 different maternal lines (LW × LR and L45X; n = 661) were developed with either ad libitum access to feed or were restricted to 75% of ad libitum energy intake from 120 days of age until breeding (Johnson et al., 2010 Nebraska Swine Report). Although not significant, measures of productivity through 4 parities were 8 to 11% greater for females developed with energy restriction. Progeny of energy-restricted females generated greater profits than progeny from gilts developed on the ad libitum regimen. Breakeven selling price for progeny from energy restricted LW × LR females was $0.48 per cwt less than progeny of females on the ad libitum regimen (Cech et al., 2010).

In previous experiments, gilts were housed in partially-slatted pens with 10 gilts/pen. Restricted gilts were fed a daily allotment of feed on the solid surface. Restricting feed intake is a labor intensive, expensive system that cannot be replicated in commercial units in which pens are totally slatted. An alternative method to restrict daily energy intake is to allow ad libitum access to a lower-energy dense diet. This project evaluated such a management system. This project also evaluated energy restriction effects on progeny.

The current research validated previous results and identified a management strategy to accomplish energy restriction while gilts are given ad libitum access to feed. This project introduces a novel management strategy to swine producers that decreased feed costs and had no detrimental effects on reproduction and progeny growth rate.

Objectives

The objectives were: 1) to assess reproductive traits through 4 parities of gilts developed with ad libitum or reduced energy intake from 120 days of age to breeding, and 2) to evaluate growth and health of the offspring produced by these dams.

Materials and Methods

Feedstuff experiment

A total of 63 gilts (initial BW = 80 kg) were used to evaluate the effects of different high-fiber feedstuffs on feed intake and growth characteristics. Each pig was randomly assigned to 1 of 7 dietary treatments. The dietary treatments consisted of 1 corn-soybean meal control and 6 other diets. Each of the 6 experimental diets contained different low-caloric feedstuffs included at concentrations that reduced the metabolizable energy values of the feed to approximately 80% of the corn-soybean meal control. The feedstuffs evaluated included: alfalfa, beet pulp, corn bran, corn cobs, rice hulls, and soybean hulls (Table 1). Animals and feeders were weighed weekly. The data collected was used to estimate ADG, ADFI, and G:F (Table 2). The feedstuff experimental data were used to identify soybean hulls as the low-energy feedstuff that would result in restricted caloric intake of pigs with ad libitum access to feed. Additionally, fecal samples were collected during this study for microbial analysis (UNL Undergraduate Research Experience).

Gilt development experiments

All gilts were produced from a cross between females of the NE Line 45 and Danbred Line 400. Gilts received the same diet and management until 120 days of age when they were allocated to 1 of 2 experimental dietary treatments that were fed in 3 phases until breeding. Gilts were randomly assigned to treatments within litter so that litter mates were on each developmental regimen. The dietary treatments included: a control, traditional corn-soybean meal based diet; and a caloric restricted treatment, corn-soybean meal-soybean hull diet formulated to contain 40% soybean hulls (Table 3). It was anticipated that metabolizable energy intake would be reduced compared to the control treatment group.

The initial sets of gilts selected to be developed using an ad libitum approach to energy restriction was the 7th and 8th set developed under caloric restriction at UNL (Rep 7 and 8). During the developmental period data collected included: feed intake, body weight (BW), backfat (BF), longissimus muscle area (LMA), and daily estrus detection. Body weight (BW) was recorded at 2-week intervals beginning when gilts started the different dietary treatments (120 days of age) and discontinued when moved to the breeding barn (230 days of age). Backfat (BF) and Longissimus muscle area (LMA) were also measured at 2-week intervals from 120 to 230 days of age. Estrus detection was initiated at 140 days of age by moving gilts once daily from their pen to an adjacent room and exposed to a boar for 15 minutes. This continued until gilts were moved to the breeding barn or until all gilts from a pen were observed in estrus at least twice.

Data collected after the initial breeding included: pre-farrowing sow BW and BF, weaning sow BW and BF, lactation length, and lactation feed intake for up to parity 4. Backfat and LMA of sows were recorded ultrasonically within 3 days of farrowing and at weaning. After farrowing, number born live (NBA), mummified, stillborn and weaned pigs in each litter, and weight of live pigs at birth and weaning were recorded. Date and cause of sow removal was also recorded. Sows were maintained in the breeding group for a maximum of 4 parities. Failure to breed after weaning resulted in removal from the experiment. The sets of gilts used in this report have already farrowed 4 parities and data collection ended. Tissue samples of the gilts have also been used to isolate DNA for genotyping. Data from genotyping has been used in a Genome Wide Association Study (Tart et al., 2013).

Data from the 2 previously mentioned sets of gilts (n = 182) were combined and analyzed together to determine the effects of energy restriction during the developmental period on puberty and lifetime productivity up to 4 parities. A group of terminal sired progeny from parity 1 were followed through 150 days during the growing period to determine if there were effects between progeny from sows that were developed on traditional corn-soybean meal diets or reduced energy intake regimens.

Results

Objective 1

Gilt development

In the initial feedstuff evaluation experiment, there were differences observed in feed intake and growth among dietary treatments (Table 2). Although with further investigation, other high-fiber feedstuffs could be used to limit energy intake below traditional corn-soybean meal diets, soybean hulls were selected as the feedstuff that would be used in further experiments. Soybean hulls were selected because of a less dramatic change in feed intake on a weight basis and the availability of soybean hulls in Nebraska.

Data analyzed from the developmental period are summarized in Table 3. During the developmental period (110 days), gilts fed the diets with 40% soybean hull inclusion consumed less feed on a weight basis compared to gilts fed the control (corn-soybean meal) diets ($P < 0.05$; 2.79 vs. 3.11 kg/d, respectively). There was no difference in daily feed intake during the overall developmental period when expressed on a % of BW basis. Gilts consuming the soybean hull diet consumed 33% less Mcal/d during development. The reduced energy intake resulted in gilts that weighed 18.6 kg less, had 0.9 cm less BF, and 5.5 cm^2 less LMA at breeding ($P < 0.01$). The gilts with lower energy intake had 12% less BW and LMA. The gilts consuming the soybean hull diets had 30% less BF at breeding. A more dramatic reduction in BF compared to BW and LM area is the result of reduced caloric intake having a greater impact on fat accretion and a decreased impact on lean growth. The reduction in energy intake delayed age at 1st detectable estrus (age of puberty) by 11 d. It is important to note that the delay in puberty occurred prior to the common age gilts are bred in commercial conditions. Feed costs during the experimental period (120 to 230 days of age) were reduced 17.26 USD/head and 14.3% less for gilts fed the soybean hull diets compared to traditional corn-soybean meal diets.

Reproduction

Data collected during the production of up to 4 parities are represented in Tables 5 to 10. There was no difference in the number of pigs born or weaned in 1st parity females. There was a tendency for the gilts developed on the lower energy regimen to have a larger parity 1 litter birth weight ($P < 0.10$). However, there was no difference observed in litter weaning weight during the first parity. Females that were developed on the lower energy regimen had lower BW and BF at farrowing and weaning during parity 1. There were no differences in BW or BF loss during lactation. There was a slight tendency for the low-energy developed sows to have greater feed intake during the 1st lactation period.

No statistical differences were observed in 2nd litter data. Differences in BW and BF at farrowing and weaning were still observed at parity 2. During the 2nd lactation period, there were no differences observed in

BW or BF loss. By day 110 of gestation for parity 3, previously detected differences in BW and BF were not maintained. There were no differences in litter or sow data for parities 3 and 4. There were no differences between the 2 treatment groups in the total number of litters produced, total number of pigs produced, and total litter weights (Table 9 and 10).

Objective 2

Data collected following a group of terminal sired progeny are summarized in Table 11. No differences were observed in growth rate and feed intake during the 150 day growth period. These results indicate that there were no differences in progeny growth rate between dams developed with either traditional corn-soybean meal diets or diets that are less energy dense with the inclusion of 40% soybean hulls.

Discussion

The results from gilts developed with reduced energy intake with ad libitum access to feed are similar to previous studies conducted which restricted energy intake by restricting access to feed. The use of high fiber feedstuffs will be more practical to implement in commercial conditions than restricting access to feed. Feed costs were reduced by 14.3%, based on Spring 2013 feed ingredient prices. There were no detrimental effects of developing gilts on a restricted energy regimen.

Table 1. Dietary treatments used for feedstuff evaluation to achieve ad libitum energy restriction.

	Control	**Beet pulp**	**Soybean hulls**	**Alfalfa**	**Corn cobs**	**Rice hulls**	**Corn bran**
Ingredient, %							
Corn	76.98	21.88	46.91	50.85	60.74	62.33	52.97
Soybean meal, 47% CP	17.00	15.67	13.90	14.23	18.74	18.59	19.47
Experimental ingredient	0.00	60.00	36.50	33.00	17.50	16.00	24.50
Tallow	3.00	0.00	0.00	0.00	0.00	0.00	0.00
DL-Methionine	0.00	0.08	0.00	0.00	0.00	0.00	0.00
L-Threonine	0.00	0.06	0.00	0.00	0.00	0.00	0.00
Dicalcium phosphate	1.48	0.72	1.77	0.32	1.61	1.63	1.61
Monosodium phosphate	0.00	0.98	0.00	0.90	0.00	0.00	0.00
Limestone	0.65	0.00	0.03	0.00	0.51	0.55	0.55
Salt	0.50	0.20	0.50	0.30	0.50	0.50	0.50
Vitamin premix	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Trace mineral premix	0.15	0.15	0.15	0.15	0.15	0.15	0.15
Calculated analysis							
Crude protein, %	14.21	14.23	14.65	16.36	14.04	13.71	16.11
Lysine, %	0.69	0.81	0.69	0.78	0.69	0.69	0.69
[1]SID Lysine, %	0.62	0.60	0.60	0.60	0.60	0.60	0.60
Calcium, %	0.64	0.64	0.64	0.64	0.64	0.64	0.64
Phosphorus, %	0.61	0.61	0.61	0.61	0.60	0.60	0.60
[2]ME, Mcal/kg	3.45	2.78	2.76	2.77	2.76	2.76	2.76
Lys:ME	1.98	2.93	2.81	2.82	2.50	2.50	2.50

[1]SID = standardized ileal digestible.
[2]ME = metabolizable energy; Mcal = megacalorie, 1,000 kilocalories.

Table 2. Results from feedstuff evaluation.

	Control	Beet pulp	Soybean hulls	Alfalfa	Corn cobs	Rice hulls	Corn bran	*P*-value
[1]Initial BW, kg	83.47	83.47	83.19	82.99	83.29	83.43	83.72	0.999
[2]ADFI, kg	3.24[cd]	2.11[a]	3.36[cd]	3.06[bc]	2.87[b]	3.65[d]	3.35[cd]	< 0.0001
[3]ME intake, Mcal/d	11.48[e]	5.87[a]	9.28[cd]	8.46[bc]	7.91[b]	10.07[d]	9.24[cd]	< 0.0001
[4]ADG, kg	1.18[d]	0.66[a]	1.06[cd]	0.95[bc]	0.82[b]	1.12[d]	1.05[cd]	< 0.0001
[5]G:F, kg/kg	0.36[b]	0.31[a]	0.31[a]	0.31[a]	0.29[a]	0.31[a]	0.31[a]	0.018
Final BW, kg	116.52[c]	101.78[a]	112.77[bc]	109.47[bc]	106.24[ab]	114.79[c]	113.07[bc]	0.003

[abcde]Means within row without a common superscript are statistically different ($P < 0.05$).
[1]BW = body weight.
[2]ADFI = average daily feed intake
[3]ME = metabolizable energy; Mcal = megacalorie, 1,000 kilocalories.
[4]ADG = average daily gain.
[5]G:F = gain to feed ratio; feed efficiency.

Table 3. Gilt development diets (NPB Project #10-164).

	Phase 1		***Phase 2***		***Phase 3***	
Dietary treatment	**Control**	**Low Energy**	**Control**	**Low Energy**	**Control**	**Low Energy**
Ingredient, %						
Corn	72.52	39.95	76.32	43.73	80.13	47.50
Soybean meal, 47% CP	21.53	17.43	17.66	13.57	13.79	9.71
Soybean hulls	0.00	40.00	0.00	40.00	0.00	40.00
Tallow	3.00	0.00	3.00	0.00	3.00	0.00
Dicalcium phosphate	1.37	1.72	1.46	1.80	1.54	1.89
Limestone	0.68	0.00	0.66	0.00	0.64	0.00
Salt	0.50	0.50	0.50	0.50	0.50	0.50
Vitamin premix	0.25	0.25	0.25	0.25	0.25	0.25
Trace mineral premix	0.15	0.15	0.15	0.15	0.15	0.15
Calculated analysis						
Crude protein, %	15.90	16.12	14.44	14.66	12.98	13.20
Lysine, %	0.80	0.88	0.70	0.78	0.60	0.68
[1]SID Lys, %	0.69	0.69	0.60	0.60	0.51	0.51
Calcium, %	0.64	0.65	0.64	0.65	0.64	0.66
Phosphorus, %	0.61	0.61	0.61	0.61	0.60	0.61
[2]ME, Mcal/kg	3.45	2.70	3.45	2.70	3.45	2.70
[3]NE, Mcal/kg	2.32	1.71	2.34	1.72	2.35	1.73
Lys:ME	2.32	3.27	2.03	2.90	1.74	2.53
Feed cost						
[4]Spring 2013, USD/ton	326.25	292.09	318.02	283.80	309.76	275.55

[1]SID = standardized ileal digestible.
[2]ME = metabolizable energy; Mcal = megacalorie, 1,000 thousand kilocalories.
[3]NE = net energy.
[4]USD = United States dollar.

Table 4. Gilt development data (NPB Project #10-164).

	Treatment			
	Control	**Low Energy**	**[1]SED**	***P*-value**
Rep 7 and 8				
Feed intake, kg/d	3.11	2.79	0.099	0.004
[2]Feed intake, % BW	2.69	2.64	0.062	0.392
[3]ME intake, Mcal/d	10.72	7.18	0.321	< 0.0001
Initial BW, kg	68.35	68.11	3.514	0.945
Initial backfat, cm	9.72	9.36	0.450	0.434
[4]Initial LM area, cm^2	22.40	22.32	0.865	0.931
Final BW, kg	156.47	137.89	3.338	< 0.0001
Final backfat, cm	25.86	16.51	1.292	< 0.0001
Final LM area, cm^2	44.47	39.00	0.810	< 0.0001
Daily gain, kg	0.95	0.77	0.018	< 0.0001
Feed efficiency, g/g	0.31	0.28	0.009	0.003
[5]Feed cost, USD/hd	120.44	103.18		
Age of puberty, d	159.75	170.72	2.686	< 0.0001
Gilts bred, n	80	79		
Anestrus at 230 d, n	7	10		
Death/cull loss, n	4	2		

[1]SED = standard error of the difference, a measure of variability.
[2]BW = body weight.
[3]ME = metabolizable energy; Mcal = megacalorie, 1,000 kilocalories.
[4]LM = longissimus muscle
[5]USD = United States dollar.

Table 5. Rep 7 and 8 parity 1 info for all that had a 1st parity.

	Treatment			
Parity 1	**Control**	**Low Energy**	[1]**SED**	***P*-value**
Females, n	73	72		
Litter data				
Born live, n	13.72	14.12	0.546	0.469
Stillborns, n	0.67	0.76	0.193	0.661
Mummies, n	0.29	0.24	0.096	0.602
Nursed, n	14.44	14.42	0.398	0.967
Weaned, n	11.48	11.67	0.320	0.552
Litter birth weight, kg	15.96	17.02	0.631	0.093
Litter wean weight, kg	57.32	58.40	2.031	0.595
Sow data				
[2]Farrow BW, kg	222.23	205.52	2.538	< 0.0001
[3]Farrow BF, mm	24.35	20.76	0.734	< 0.0001
Wean BW, kg	190.46	177.52	3.203	< 0.0001
Wean BF, mm	20.18	16.67	0.663	< 0.0001
Lactation length, d	19.46	19.35	0.303	0.719
[4]Lactation ADFI, kg	4.14	4.40	0.159	0.108
BW loss, kg	31.77	31.00	2.179	0.727
BF loss, mm	4.17	4.09	0.475	0.868
BW loss, %	14.27	14.82	0.996	0.583
BF loss, %	22.01	26.24	2.968	0.156

[1]SED = standard error of the difference, a measure of variability.
[2]BW = body weight.
[3]BF = backfat thickness.
[4]ADFI = average daily feed intake.

Table 6. Rep 7 and 8 parity 2 info for all that had a 2nd parity.

	Treatment			
Parity 2	**Control**	**Low Energy**	[1]**SED**	***P*-value**
Females, n	57	57		
Litter data				
Born live, n	13.02	13.27	0.639	0.696
Stillborns, n	0.91	0.89	0.239	0.934
Mummies, n	0.62	0.53	0.215	0.676
Nursed, n	13.80	14.19	0.458	0.400
Weaned, n	11.18	11.10	0.414	0.858
Litter birth weight, kg	20.01	20.09	0.821	0.927
Litter wean weight, kg	70.76	68.59	2.689	0.422
Sow data				
[2]Farrow BW, kg	237.44	230.52	2.990	0.022
[3]Farrow BF, mm	20.22	17.85	0.770	0.003
Wean BW, kg	216.21	209.18	3.326	0.037
Wean BF, mm	17.83	15.85	0.679	0.004
Lactation length, d	19.97	19.89	0.304	0.797
[4]Lactation ADFI, kg	5.51	5.52	0.163	0.952
BW loss, kg	21.23	21.61	2.158	0.860
BF loss, mm	2.39	1.85	0.450	0.233
BW loss, %	8.93	9.32	0.918	0.672
BF loss, %	11.08	9.51	2.167	0.470

[1]SED = standard error of the difference, a measure of variability.
[2]BW = body weight.
[3]BF = backfat thickness.
[4]ADFI = average daily feed intake.

Table 7. Rep 7 and 8 parity 3 info for all that had a 3rd parity.

	Treatment			
Parity 3	**Control**	**Low Energy**	[1]**SED**	***P*-value**
Females, n	50	47		
Litter data				
Born live, n	12.91	13.19	0.701	0.691
Stillborns, n	1.24	1.18	0.309	0.827
Mummies, n	0.33	0.65	0.319	0.327
Nursed, n	13.98	14.15	0.526	0.746
Weaned, n	10.72	10.92	0.488	0.686
Litter birth weight, kg	19.86	20.35	0.930	0.600
Litter wean weight, kg	67.19	71.24	3.394	0.236
Sow data				
[2]Farrow BW, kg	256.93	254.87	3.542	0.562
[3]Farrow BF, mm	19.08	18.24	0.841	0.318
Wean BW, kg	233.22	230.30	3.694	0.431
Wean BF, cm	1.76	1.67	0.086	0.326
Lactation length, d	20.48	20.64	0.346	0.641
[4]Lactation ADFI, kg	5.55	5.55	0.197	0.996
BW loss, kg	23.64	24.57	3.967	0.814
BF loss, cm	0.15	0.15	0.054	0.920
BW loss, %	8.93	9.53	1.438	0.674
BF loss, %	6.45	7.98	3.047	0.616

[1]SED = standard error of the difference, a measure of variability.
[2]BW = body weight.
[3]BF = backfat thickness.
[4]ADFI = average daily feed intake.

Table 8. Rep 7 and 8 parity 4 info for all that had a 4th parity.

	Treatment			
Parity 4	**Control**	**Low Energy**	[1]**SED**	***P*-value**
Females, n	37	41		
Litter data				
Born live, n	12.51	11.70	0.866	0.354
Stillborns, n	1.38	1.11	0.348	0.447
Mummies, n	0.37	0.17	0.128	0.112
Nursed, n	13.01	12.78	0.711	0.741
Weaned, n	9.23	9.69	0.537	0.385
Litter birth weight, kg	19.31	18.50	1.109	0.466
Litter wean weight, kg	61.27	64.69	3.539	0.337
Sow data				
[2]Farrow BW, kg	273.63	274.17	3.603	0.882
[3]Farrow BF, cm	1.96	1.96	0.105	0.950
Wean BW, kg	257.15	249.62	7.623	0.327
Wean BF, cm	1.88	1.88	0.106	0.995
Lactation length, d	23.40	23.47	0.986	0.944
[4]Lactation ADFI, kg	4.85	5.19	0.290	0.244
BW loss, kg	16.49	24.55	7.437	0.282
BF loss, cm	0.08	0.09	0.056	0.898
BW loss, %	5.95	8.81	2.690	0.290
BF loss, %	4.09	3.19	2.900	0.758

[1]SED = standard error of the difference, a measure of variability.
[2]BW = body weight.
[3]BF = backfat thickness.
[4]ADFI = average daily feed intake.

Table 9. Rep 7 and 8 total 4 parity production info for all that had a 1st parity.

	Treatment			
Parity 1 to 4	**Control**	**Low Energy**	[1]**SED**	***P*-value**
Females, n	73	72		
Litters	2.95	3.03	0.204	0.679
Born live, n	39.01	40.04	2.868	0.719
Nursed, n	41.09	42.11	2.898	0.725
Weaned, n	32.25	33.21	2.296	0.676
Litter birth weight, kg	54.99	56.87	4.282	0.661
Litter wean weight, kg	189.50	196.79	15.150	0.631

[1]SED = standard error of the difference, a measure of variability.

Table 10. Rep 7 and 8 number of parities produced by all developed gilts.

	Treatment			
Parity 1 to 4	**Control**	**Low Energy**	[1]**SED**	***P*-value**
Females, n	91	91		
Litters produced, n	2.21	2.25	0.243	0.854

[1]SED = standard error of the difference, a measure of variability.

Table 11. Rep 8 progeny growth data.

	Treatment			
	Control	**Low energy**	[1]**SED**	***P*-value**
[2]Initial BW, kg	16.24	15.81	1.582	0.789
[3]ADFI, kg	2.10	2.11	0.082	0.944
[4]ADG, kg	0.92	0.91	0.025	0.583
Final BW, kg	94.14	92.37	1.761	0.571

[1]SED = standard error of the difference, a measure of variability.
[2]BW = body weight.
[3]ADFI = average daily feed intake.
[4]ADG = average daily gain.