North Dakota State University * Dickinson Research Extension Center
1133 State Avenue, Dickinson, ND 58601 Voice: (701) 483-2348 FAX: (701) 483-2005

EFFECT OF WINTER GESTATION ENERGY LEVEL ON SOW PRODUCTIVITY

Doug Landblom, William Slanger, "Chip" Poland, and Kris Ringwall

RESEARCH SUMMARY8

The effects of dietary energy level during gestation on sow lactation performance has been evaluated at the Dickinson Research Extension Center. Pig Improvement Company (PIC) C-15 sows were allotted at the end of a two week breeding period to three gestation energy levels: 6,681, 7,868, and 8,682 kcal metabolizable energy/day, respectively. At the end of gestation, the sows were farrowed and fed a common barley/soy lactation diet with 5.5% added fat and 1.0% lysine. There were 39, 38, and 36 sows, respectively, in the low, medium and high energy groups. Sow parity, number of pigs born, and lactation length averaged 3.15, 11.4, 19.9 days, respectively. Average daily lactation feed intake per day for the three gestation energy levels was 13.3, 13.5, and 13.5 lbs/d, thus, calculated lactation energy intake was 19.6, 19.9, and 19.9 Mcal/d.

Gestation start weight (459, 454, and 453), pre-farrowing weight (520, 521, and 528), post-farrow weight (478, 477, and 479), sow weaning weight (467, 472, and 471), lactation weight change (-11, -5, and -8), and estrus return days (15.2, 21.9, and 20.8) did not differ between treatment groups. Pigs born (11.7, 11.0, and 11.4), pigs weaned (9.5, 9.05, 9.66) and percent survival (81.2, 82.3, and 84.7%) also did not differ.

Results from this investigation suggest that when condition score 3 PIC sows are housed outdoors in discarded oilfield tank shelters there is no advantage for feeding energy levels greater than 6,681 kcal/d of a barley-based gestation diet (equivalent to 5.75 to 6.0 pounds of feed).

INTRODUCTION

High producing, genetically lean sows farrow and nurse more pigs, produce more milk and, consequently, have higher nutritional requirements than less prolific sows. Accessing energy requirements for lactation are difficult due to the confounding effects of one reproductive cycle on another.

Energy consumption during gestation affects voluntary energy consumption during lactation and, ultimately, the rebreeding period following lactation. Maintaining a proper gestational energy balance that keeps sows in desirable body condition is essential. Overfeeding energy during gestation causes sows to have reduced appetites during lactation resulting in weight loss. Insufficient energy during gestation does not prepare sows adequately for lactation. Sows that enter the farrowing room thin are unable to nurse litters larger than seven pigs and gain weight simultaneously. Inability of thin sows to gain weight during lactation results in extended weaning to rebreeding intervals.

The objective of this investigation is to determine winter gestation energy levels that will optimize sow farrowing body condition, minimize lactation weight loss, and improve rebreeding performance of sows gestated in outdoor facilities and managed in an All In/All Out management system.

MATERIALS AND METHODS

Pig Improvement Company (PIC) C-15 sows have been managed in an All In/All Out continuous group farrowing management system over a period that encompasses four winters. Each winter, two farrowing groups that have been previously assigned to receive one of three gestation energy levels (6,681, 7,868, and 8,682 kcal, ME/d) are being gestated, farrowed and rebred. When culled for management reasons , sows were replaced with primiparous gilts of similar genetic background.

Pregnant sows were housed in outdoor gestation pens (32' x 150') equipped with automatic frost-free waterers, portable steel shelters constructed from discarded 400 barrel oilfield tanks, and bedded with straw. The respective energy levels were fed once daily in individual feeding stalls. Due to the seasonal nature of the investigation, the time period of evaluation is from November through March. During non-recording seasons, the test groups received 7,868 kcal ME/d. Equivalent to that fed to the moderate energy control group. Body condition scores (using a 5 point system) were taken visually at the beginning and end of gestation, within 12 hours post-farrowing and at weaning.

Within 2 to 3 days of farrowing, and based on breeding date, sows from the test groups were moved to farrowing crates and continued to receive the same gestation energy levels offered outside until farrowing. At farrowing, the respective levels of gestation energy were discontinued, and the barley-based lactation diet shown in Table 1 was fed. Feed was withheld for the first 24 hours after farrowing, and then beginning with an initial offering of 6 pounds (3 lbs. morning and evening), the sows are brought up to full feed using incremental increases of 1 pound at each feeding until the feed offered was not completely consumed. Calculated nutrient analysis of the lactation diet is also shown in Table 1.

Pigs in the study were weaned at approximately 20 days of age without access to creep feed, however, the pigs did have access to sow feed, but consumption was anticipated to be negligible. At weaning, sows were weighed, condition scored, and placed in a common breeding pen with access to a self-fed breeding diet, and hand-mated using multiple sire breeding in a 14-d breeding period. sows were mated morning and evening, in attended matings, until they will no longer stand for service.

Gestation data recorded includes: beginning and ending gestation weight and condition score. Farrowing data includes: parity, sow weight and condition score, lactation days, feed/head and condition score at weaning. Farrowing performance measurements include: pigs born alive, pigs weaned, litter birth weight, and litter wean weight. Rebreeding performance is monitored based on recorded days to effective service.

Data has been analyzed using a model that includes treatment, year, treatment x year interaction and error (SAS, 1988).

RESULTS AND DISCUSSION

Parity and gestation energy level for the three treatments averaged, respectively: 3.17, 3.25, and 3.03, and 6,681, 7,868, and 8,682 kcal ME/d. There were 39, 38, and 36 sows, respectively, in the low, moderate, and high energy groups.

Sow Weight Change

Sow gestation weight change varied numerically between treatments, however, sow weight within 24 hours post-

farrowing was similar and non-significant for the three energy levels fed during gestation. During lactation, sows receiving the lowest level of gestation energy (6,681 kcal ME/d) lost a numerical, but non-significant greater amount of weight than the moderate and high energy test groups. The number of days for sows to return to estrus following weaning was 15.2, 21.9, and 20.8 for the low, moderate and high energy treatments, respectively. The trend toward less days to estrus for the low gestation energy group did not differ from the moderate and high energy groups.

Sow Lactation Feed Intake

Sow lactation days were similar measuring 19.6, 19.6, and 20.5d for the low, moderate, and high energy groups, respectively. Feed intake per head (266, 269, and 278 lbs.), feed/head/ day (13.3, 13.5, and 13.5 lbs.), and metabolizable energy consumption per day (19.6, 19.9, and 19.9 kcal/d) did not differ between the energy levels tested.

Litter Performance

The number of pigs born (11.7, 11.0, and 11.4), litter weight d-2 (37.8, 35.7, and 38.7 lbs.), number of pigs weaned (9.5, 9.05, and 9.66 pigs), litter weaning weight (120.9, 124.4, and 134.6 lbs.), and litter gain (83, 88.7, and 95.9 lbs.) did not differ between test groups. There was a trend toward greater pig gain following gestation at the highest level of energy, but the 12.9 pound difference was not significant. Pig survival during lactation following gestation at the three selected energy levels was also unremarkable.

IMPLICATIONS

Results of this study suggest that there is no advantage for feeding, condition score 3, PIC sows housed outdoors during the winter months in discarded 400 barrel oilfield tank housing energy levels greater than 6,681 kcal ME/d. This is equivalent to 5.75 to 6.0 lbs. of a barley-based diet.

Table 1. Barley-based Gestation and Lactation Diets and Nutrient Composition

	Gestation	**Lactation**
Ingredient, %		

Barley	97.05	69.75
Soybean Meal	0.0	20.0
Sunflower Oil	0.0	5.5
Limestone	.9	1.8
Dical Phosphate	.9	1.2
Monosodium Phosphate	.5	1.0
Salt	.5	.4
Lysine	0.0	.2
Vitamin/Mineral Premix	.15	.15
Calculated Analysis, %		
Crude Protein	12.5	18.0
Lysine	.4	1.0
Tryptophan	.15	.24
Calcium	.64	1.1
Total Phos.	.62	.82
Avail. Phos.	.39	.57
Energy, kcal ME/lb.	1386	1471

Table 2. Effects of Winter Gestation Energy Level on Sow and Litter Performance							
Diet:	**1**	**2**	**3**				
Energy Level:	**6,681**	**7,868**	**8,682**	**SE**	**Treat.**	**Year**	**T x Y**
Sows and Parity							
No. Sows	39	38	36	-	-	-	-
Parity	3.17	3.25	3.03	.14	NS	.0009	NS

Sow Weight Change							
Gestation Start Wt., lb.	459	454	453	5.7	NS	.012	NS
Pre-Farrow Wt., lb.	520	521	528	4.7	NS	.046	NS
Post-Farrow Wt., lb.	478	477	479	5.7	NS	.032	NS
Weaning Wt., lb.	467	472	471	6.1	NS	.0025	NS
Lactation Wt. Change, lb.	-11	-5	-8	3.5	NS	NS	NS
Return-To-Estrus, Days	15.2	21.9	20.8	4.4	NS	NS	NS
Sow Lactation Performance							
Lactation Days	19.6	19.6	20.5	.84	NS	NS	NS
Feed Intake/Hd., lb.	266	269	278	13.5	NS	.081	NS
Feed Intake/Head/Day, lb.	13.3	13.5	13.5	.23	NS	NS	NS
Metab. Energy/Day, Mcal.	19.6	19.9	19.9	-	-	-	-
Litter Performance							
No. Pigs Born	11.7	11.0	11.4	.45	NS	NS	NS
Litter Wt. d-1, lb.	37.8	35.7	38.7	1.3	NS	NS	NS
No. Weaned	9.5	9.05	9.66	.3	NS	NS	NS
Litter Weaning Wt., lb.	120.9	124.4	134.6	7.7	NS	NS	NS
Litter Gain, lb.	83	88.7	95.9	7.1	NS	NS	NS
ADG/Pig, lb.	.46	.51	.50	.23	NS	.02	NS
Percent Survival	81.3	82.3	84.7	-	-	-	-

[Back to 1999 Research Reports Table of Contents]
[Back to Research Reports]
[Back to Dickinson Research Extension Center (http://www.ag.ndsu.nodak.edu/dickinso/)]
[Email: drec@ndsuext.nodak.edu]