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Energy Levels of Gestation Rations for Sows

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Cover Photo. These sows on winter grazing at the Lower Coastal Plain Substation are typical of the experimental animals used in the study to determine effects of energy levels during gestation on subsequent performance of the sows and their pigs.

Energy Levels of Gestation Rations for Sows

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SALE OF LIVESTOCK and livestock products currently accounts for more than half of all agricultural income in Alabama. As a part of this livestock industry, swine production is important to the State's agricultural economy. However, efficient management is necessary for swine operations to return a profit and contribute to this economy.

Research has provided information necessary for formulating least-cost, high performance rations for market hog production. In the case of the breeding female, nutritional requirements are less well defined. The importance of adequate vitamins, protein, and minerals in maintaining a normal pregnancy is generally recognized. Requirements for these nutrients are related to (1) body maintenance, (2) body growth of the immature sow, and (3) nourishment of the developing litter.

The National Research Council recommended daily intake of crude protein is 0.90 pound for a 300-pound gilt and 1.05 pounds for a 500-pound sow. The recommended daily allowance of 6 pounds of feed for a 300-pound gilt and 7.5 pounds for a 500-pound sow should result in weight gain of 100-125 pounds for the gilt and 75-100 pounds for the sow during gestation. While amounts of these nutrients stored in the litter and in other products of conception are not large, an inadequate level of quality protein in the diet of pregnant sows can result in weak pigs at birth and high pig mortality. Likewise, it has been well established that adequate vitamin and mineral nutrition of the pregnant sow is necessary for development of normal, healthy pigs.

It is known that sows become thin and pigs are weak at birth if sufficient energy is not provided in the ration during gestation. In

addition to maintenance needs, energy is required by the sow to utilize the proteins, minerals, and vitamins needed to produce a large, healthy litter. On the other hand, overfeeding the sow during gestation causes her to become too fat, awkward, and lazy, and to have difficulty at farrowing. Thus, energy content of the gestation ration is important because of its possible effect on sow performance and on production costs.

ENERGY LEVELS COMPARED

A study was done at the Lower Coastal Plain Substation to determine effects of three energy levels during gestation on reproductive performance of sows and on livability and performance of the pigs. In the fall of 1962, 30 Hampshire and Landrace gilts were assigned to three treatments 22 days after breeding. Groups were equalized as to breeding, weight, mating, and general appearance. Productive sows were retained for second and third litters. Sows that failed to conceive when bred during two heat periods were removed from the test. In the spring of 1963 comparable gilts were added to replace sows that were culled for failing to rebreed.

Each sow treatment group grazed 1 acre of oats-crimson clover during the cool season and 1 acre of Starr millet during summer. All sows were fed 1 pound of supplement per head daily plus the following amounts of shelled corn: Group 1 – 1 pound, Group 2 – 3 pounds, and Group 3 – 5 pounds. The supplement was mixed as follows:

Ingredient	*Pounds*
Soybean oil meal (44 per cent)	75
Meat and bone meal (50 per cent)	60
Dicalcium phosphate	5
Trace mineralized salt, swine formula	5

When grazing was inadequate, corn silage was fed free choice and 2½ pounds of the following vitamin premix[1] was added to the supplement mixture:

Ingredient	*Amount per pound*
Vitamin A, USP units	20,000
Vitamin D, USP units	40,000
Riboflavin, mg.	100
Pantothenic acid, mg.	200
Niacin, mg.	500
Choline chloride, mg.	5,000
Vitamin B_{12} (LL assay), mg.	0.6
Oxytetracycline, gm.	1

[1] Furnished through courtesy of Chas. Pfizer and Co.

All sows were provided shade and wallows during summer and a bedded shelter in winter.

Sows were weighed 110 days after breeding and moved to the farrowing house where they received 5 to 6 pounds of the following bulky ration daily to farrowing:

Ingredient	*Pounds*
Corn	420
Soybean oil meal (44 per cent)	60
Meat and bone meal (50 per cent)	60
Oats	200
Alfalfa meal (17 per cent)	150
Wheat bran	100
Salt, swine formula	5
Calcium phosphate	5

After farrowing the ration was increased 1 pound per day for 7 days. On the eighth day the sows were changed to a 16 per cent protein, high energy lactation ration. This was increased gradually to full feed by 18-21 days after farrowing. The following creep ration was provided all pigs beginning at 10 days of age:

Ingredient	*Pounds*
Corn	448
Soybean oil meal (44 per cent)	120
Meat and bone meal (50 per cent)	90
Fish meal	30
Dried whey	50
Dried skim milk	150
Sugar, sucrose	100
Salt, swine formula	5
Antibiotics	50 gm.
Vitamins—riboflavin, 2 gm.; calcium pantothenate, 4 gm; niacin, 9 gm; vitamin A, 300,000 USP units; and vitamin B_{12}, 9 mg.	

Pigs were weaned at 42 days of age, and the creep ration was continued to 56 days old. When pigs were weaned the sows were removed to a permanent pasture and fed the following ration until 22 days after breeding:

Ingredient	*Pounds*
Corn	520
Soybean oil meal (44 per cent)	60
Meat and bone meal (50 per cent)	60
Oats	200
Alfalfa meal (17 per cent)	150
Salt, swine formula	5
Calcium phosphate	5

FINDINGS OF THE STUDY

Performance of sows and their litters is summarized in Table 1. Group 1 sows gained less weight than Group 2 and Group 3 sows

TABLE 1. EFFECTS OF ENERGY LEVELS OF GESTATION RATIONS ON PERFORMANCE OF SOWS AND LITTERS

Performance measure	Results, by group and trial								
	Group 1			Group 2			Group 3		
	Trial 1	Trial 2	Trial 3	Trial 1	Trial 2	Trial 3	Trial 1	Trial 2	Trial 3
Sows, no.[1]	10	11	10	9	12	9	10	10	9
Av. wt. 22 days post-breeding, lb.	292.6	351.0	395.6	284.4	350.0	417.1	293.8	350.9	415.0
Av. wt. 110 days post-breeding, lb.	339.4	390.0	417.3	373.2	433.0	483.2	430.5	475.6	511.0
Av. gain, lb.	46.8	39.0	21.7	88.8	83.0	66.1	136.7	124.7	95.9
Pigs farrowed per litter, no.	9.0	7.0	10.0	9.2	8.9	10.1	9.0	9.3	9.1
Av. birth wt., lb.	2.53	2.71	2.88	2.55	2.86	3.16	3.00	2.74	2.95
Pigs weaned per litter, no.	8.1	6.5	8.9	8.5	8.1	9.1	8.1	8.1	8.1
Av. 42-day weaning wt., lb.	26.3	23.3	25.7	26.9	24.4	25.3	27.8	22.1	26.9
Av. pig wt. 56 days, lb.	39.0	29.6	42.5	40.5	32.2	40.4	40.9	29.8	44.5
Av. sow wt., 42 days post-partum, lb.	328.6	345.0	370.1	331.6	373.0	442.8	328.0	373.0	439.2

[1] Thirty gilts were equally allotted to the three treatments for Trial 1. Four additional gilts were added to each treatment for Trial 2. Sows having satisfactory performance records within each treatment were retained for Trial 3. Within each trial some sows were removed for reasons not related to feeding treatment, resulting in unequal animal numbers among treatments.

during gestation (averaging 36, 79, and 110 pounds, respectively) and were 70 pounds lighter at the end of the third farrowing season. This difference in mature weight occurred even though feed intakes were essentially the same during farrowing, lactation, and breeding periods, as shown below:

Ration	*Feed consumption per sow, 110 days post-breeding through lactation, lb.*		
	Group 1	*Group 2*	*Group 3*
Farrowing	201	198	183
Lactation	418	408	399

Litter size at birth and weaning was essentially the same in all sow groups during the two fall trials. In the spring of 1963, however, Group 1 litter size was about 2 pigs smaller at birth and 1.5 smaller at weaning than litters in the other two groups. No obvious reason for this relatively poor reproductive performance can be offered. There appears to be no direct relationship with gestation treatment. Seven of the litters were normal in numbers at birth and weaning, whereas four litters had only 4 to 5 pigs.

Restricting corn to 1 pound per sow per day during gestation had only slight effect on birth weight and no effect on growth rate of pigs, Table 1.

The creep ration was consumed at essentially the same rate by all groups of pigs, with average intakes of 29.2, 29.5, and 28.8 pounds per pig in Groups 1, 2, and 3, respectively.

Feed costs per pig weaned provide a valid evaluation of the economic merit of the three ration treatments, as reported in Table 2.

TABLE 2. FEED COSTS PER PIG WEANED, AVERAGE OF THREE TRIALS[1]

Sow feed	Average cost per pig		
	Group 1	Group 2	Group 3
Ration from weaning to 22 days post-breeding	$0.92	$0.85	$0.86
Corn, gestation test period	.28	.77	1.36
Supplement, gestation test period	.65	.65	.65
Farrowing ration	.83	.75	.73
Lactation ration	1.74	1.55	1.60
Creep ration for pig to 56 days of age	2.04	2.06	2.02
TOTAL	$6.46	$6.63	$7.22

[1] The following prices were charged per hundredweight of feed: Breeding ration, $3.00; corn, $2.50; supplement, $5.75; farrowing ration, $3.25; lactation ration, $3.25; and creep ration, $7.00.

There were substantial differences among treatment groups in total feed costs per pig weaned, amounting to 76¢ per pig between Groups 1 and 3. Reduced intake of corn by the Group 1 sows during gestation accounted for most of the savings in feed costs.

One acre did not provide adequate cool season grazing for groups of 9 to 12 sows during periods of unfavorable weather. It was necessary to supplement this grazing with corn silage, which was consumed at a rate of approximately 8 to 10 pounds daily. Starr millet at the same stocking rate provided sufficient forage throughout the summer grazing period.

SUMMARY OF RESULTS AND CONCLUSIONS

How three levels of energy in the ration during gestation affected sow performance was determined by trials with three groups of females of similar genetic and environmental background, allotted 22 days after breeding. All sows received 1 pound of supplement daily, with ground shelled corn levels fed as follows: Group 1 — 1 pound, Group 2 — 3 pounds, and Group 3 — 5 pounds.

Average weight gains per sow were 36, 79, and 119 pounds for Groups 1, 2, and 3, respectively. Pigs farrowed per sow averaged 8.7, 9.4, and 9.1 pigs, respectively, and numbers of pigs weaned per sow were 7.8, 8.6, and 8.1 for the treatment groups. Average birth weights were 2.7, 2.9, and 2.9 pounds, respectively, for Groups 1, 2, and 3, and 42-day weaning weights averaged 25.1, 25.5, and 25.6 pounds.

The only major differences attributable to test treatments were weight gains of sows during gestation and body weight differences of sows at the end of three gestations. Sow performance and pig livability and growth were not adversely affected by restricting energy intake of sows during gestation.

On the basis of these results, it is economically advantageous to limit-feed the corn portion of a gestation ration. Such feed limiting is considered advisable provided other essential nutrient requirements are met (protein, mineral, and vitamin) and sows are in strong, thrifty condition at time of breeding.