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Sunflowers are fast becoming a major agricultural crop in South Dakota and research on their usefulness as a feed ingredient in swine diets has been limited. The high fat content of some sunflowers (approximately 40%) lends itself as a possible source of fat in the diets of late gestating and early lactating sows. Recent research at other universities has indicated that fat addition to the diet of sows during late gestation will increase piglet survivability by increasing the amount of energy stored in the piglet body at birth, thus making them less vulnerable to starvation and sow overlay. This fat addition may also increase the fat content of the colostrum milk serving as an additional energy source to the young pig.

The objective of this experiment was to determine the value of whole sunflower seeds as a part of the sow diet in late gestation and early lactation and its effect on piglet survivability.

Experimental Procedure

Three trials were conducted using a total of 44 sows and 55 gilts of Hampshire x Yorkshire x Duroc breeding. Sows and gilts were allotted on the basis of weight and sire breed to three treatment groups fed diets of 0, 25 and 50% whole sunflower seeds. Diets were fed at a level of 5 pounds per day beginning on day 100 of gestation until farrowing. Feed was provided ad libitum during lactation. On day 110 of gestation, sows and gilts were moved to the farrowing house and allotted into individual crates or conventional farrowing pens. Table 1 shows the composition of the diets.

In trial 1, one male and one female piglet were selected from each litter at the time of farrowing and, in trials 2 and 3, four piglets were selected at random, disregarding sex, and bled within 1 minute following birth. These pigs were then rebled at 24 hours of age. The blood samples were analyzed for plasma glucose level.

Following birth, all baby pigs were weighed, needle teeth clipped, tails docked, iodine placed on naval cords, ears notched and they received an injection of iron and an antibiotic. Piglets were reweighed at 14 days of age. Survival was calculated as a percent of those pigs born alive surviving to 14 days.

Sows were weighed at day 110 of gestation, after farrowing and on day 14 of lactation. Daily feed consumption of sows during lactation was recorded. Milk samples were taken from each sow during farrowing and at 1 week and 2 weeks following farrowing for fat analysis.

TABLE 1. COMPOSITION OF DIETS (%)

Ingredients	Sunflower seeds, %		
	0	25	50
Ground yellow corn	84.50	65.58	46.51
Ground sunflower seeds	0	25.0	50.0
Soybean meal, 44%	11.85	5.85	0
Dicalcium phosphate	2.27	1.89	1.54
Ground limestone	.75	.87	.97
Lysine	.03	.21	.38
Trace mineral salt[a]	.40	.40	.40
Vitamin-antibiotic mix[b]	.2	.2	.2
Chemical analysis[c]			
Fat	3.1	13.0	21.2
Protein	14.3	13.9	13.8
Fiber	2.6	6.0	8.6
Lysine	.59	.52	.51

[a] .8% zinc.

[b] Supplied per pound of diet: vitamin A, 2000 IU; vitamin D, 200 IU; vitamin E, 2.5 mg; riboflavin, 1.25 mg; pantothenic acid, 5 mg; niacin, 8 mg; choline, 25 mg; vitamin B_{12}, 5 mcg and aureomycin, 50 mg (trial 1); neomycin, 75 mg, and oxytetracycline, 75 mg (trials 2 and 3).

[c] Average of three separate samples of all diets.

Results

The results of this experiment are summarized in tables 2 and 3. Table 2 shows the results obtained from the prefarrowing and lactation treatments. Nine sows experienced severe mastitis and were not included in the 14-day data. Three sows allotted to the 50% diet refused to eat this diet and were removed from the experiment prior to farrowing.

Significant differences were observed for percent milk fat in the 25 and 50% sunflower groups at 1 week and 2 weeks of lactation as compared to the control group. Higher milk fat observed for these two groups reflects the higher percent fat in those diets. The higher energy present in the milk did not result in higher piglet gain to 14 days or heavier 14-day weights. One hundred ten-day gestation, post-farrowing and 14-day lactation sow weights and litter birth weights were all significantly higher for sows than gilts, but no dietary differences were observed for these values. There were no significant differences observed in any of the other criteria measured. Similar survival rates were observed between treatment groups.

Table 3 shows the effects of the sunflower addition to the gestation diet on the pigs born from these sows. No significant differences were observed for birth and 24-hour plasma glucose. Any differences in birth weight reflect only the random choice of pigs bled.

TABLE 2. EFFECT OF SUNFLOWER SEEDS IN GESTATION AND LACTATION DIETS ON SOW AND PIG PERFORMANCE[a]

	Sunflower seeds, %		
	0	25	50
Number farrowing[b]	35	31	30
Avg sow gestation wt. (110 days), lb	503	497	489
Avg sow post-farrowing wt., lb	464	461	451
Avg sow lactation wt. (14 days), lb	463	448	440
Avg sow lactation wt. gain (14 days), lb	49	42	46
Avg sow lactation feed consumed per day, lb	8.80	8.55	8.54
Avg number live pigs born	9.77	10.09	9.33
Avg number pigs, 14 days	7.09	7.36	6.49
Percent survival	72.57	72.94	69.60
Avg number stillborn pigs	1.00	.85	.85
Avg litter birth wt., lb	30.85	31.15	29.87
Avg pig birth wt., lb	3.21	3.11	3.25
Avg litter wt. (14 days), lb	56.78	59.61	51.19
Avg pig wt. (14 days), lb	8.03	8.00	8.30
Avg litter gain (14 days), lb	33.12	35.91	29.48
Avg pig gain (14 days), lb	4.71	4.80	4.75
Avg colostrum milk fat, %	5.38	6.41	6.61
Avg milk fat (1 week), %[c]	7.83	10.09	11.42
Avg milk fat (2 weeks), %[c]	7.61	9.42	11.72

[a] Three trials with farrowings in March-April, June-July and August-September, respectively.
[b] Nine sows were removed after farrowing due to illness.
[c] Significant difference due to sunflower addition (P<.05).

TABLE 3. EFFECT OF SUNFLOWER DIET ON BLOOD GLUCOSE

	Sunflower seeds, %		
	0	25	50
Number of piglets[a]	115	96	106
Avg birth wt., lb	3.25	3.32	3.34
Avg birth plasma glucose, mg/100 ml	93.5	93.1	90.2
Avg 24-hour plasma glucose, mg/100 ml[b]	83.6	84.6	78.9
Avg 14-day wt., lb	8.03	8.29	7.54

[a] Trial 1 - 2 pigs per sow, Trial 2 - an attempt was made to get 4 pigs per sow and Trial 3 - 4 pigs per sow.
[b] Not all pigs bled at birth survived to 24 hours.

In this experiment, no advantage was seen from the addition of sunflower seeds to the diet of late gestating and early lactating swine, with the possible exception of the additional fat found in the milk. Although not proving beneficial in this experiment, this needs to be investigated further. It should be noted that no disadvantage was seen to adding sunflower seeds to the diet of sows to replace part of the protein and energy of the feed. This may be a method by which swine producers are able to feed out sunflower seeds they are unable to sell that may have been damaged or are immature. A chemical analysis should be performed on these seeds before using. The diet of 50% sunflowers was unpalatable to some sows in this study. Thus, the maximum level of sunflowers used in sow diets appears to be somewhere between 25 and 50% of the diet.

Summary

Three trials involving a total of 96 sows and gilts were conducted to study the effects of 25 and 50% sunflower diets during late gestation and early lactation. The sunflower addition resulted in a significant increase in fat content of the milk at 1 week and 2 weeks of lactation. No other significant differences were seen. Birth weight, 14-day weight and 14-day weight gain of pigs, lactation weight gain and lactation feed consumption of sows and piglet survival were all similar among treatments.

Three hundred seventeen pigs from these sows that were bled at birth and 24 hours of age showed similar plasma glucose levels. Addition of up to 50% sunflower seeds had no advantage or disadvantage to the diet of late gestating or early lactating swine.