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Introduction

Lactation is a metabolic challenge to the sow. Some high-producing sows can produce as much as 30 lb of milk/day during peak lactation. Unfortunately, most sows are unable to consume sufficient dietary energy to fuel the processes of milk synthesis and must mobilize body stores of fat and protein. This problem is accentuated as the number of pigs nursed increases (milk production is increased). Therefore, nutritional programs for lactating sows must incorporate strategies to maximize energy intake and avoid excessive weight loss that may contribute to longer rebreeding intervals or increased culling from the sow herd.

Research conducted at the University of Nebraska in the late 1970s and early 1980s examined the relationship between dietary energy intake and sow productivity. These experiments used high fat (tallow; 8 to 10%) additions to create diets that when limit fed would result in different daily energy intakes. Subsequently, the benefits of maximizing energy intake during lactation observed in these studies have been attributed to fat itself. However, because of practical and economic considerations, additions of fat in commercial sow lactation diets are considerably lower than 8% (i.e., 1 to 4%). Therefore, the objective of this study was to examine the effects of practical additions of fat (tallow) on sow energy intake and litter performance during lactation.

Methods

One hundred twenty-two first parity sows raised and bred at the University of Nebraska Swine Research Center at Mead were used in this study. Three dietary treatments (Table 1) were formulated to contain either 0, 2, or 4% added tallow. The corn:soybean meal ratio was adjusted between the three dietary treatments to maintain a constant lysine:metabolizable energy (ME) ratio. Concentrations of other nutrients were formulated to meet or exceed recommendations provided in the

Table 1. Composition of experimental diets[a]

	Dietary tallow, %		
Ingredient, %	0	2	4
Corn	65.90	62.90	59.90
Soybean meal, 44% CP	19.75	20.75	21.75
Beet pulp, dried	10.00	10.00	10.00
Dicalcium phosphate	2.75	2.75	2.75
Salt	.50	.50	.50
Trace mineral premix	.10	.10	.10
Vitamin premix	1.00	1.00	1.00
Tallow	0.00	2.00	4.00
Analyses, calculated (%)			
ME, Mcal/lb	1.43	1.47	1.51
Crude protein	15.2	15.4	15.5
Lysine	.80	.82	.84
Calcium	1.01	1.02	1.02
Phosphorus	.83	.83	.83

[a] As-fed basis

University of Nebraska Swine Diet Suggestions (revised 1992).

All sows were fed a standard gestation diet without fat before entering the farrowing facility at day 109 of gestation. Sows were randomly allotted to treatments and allowed to consume 4 lb of the respective experimental treatment from day 109 of gestation until farrowing. Treatments were replicated four times in each farrowing room. Farrowing crates were equipped with a drip cooling system activated when the ambient temperature reached 80°F. All sows were allowed *ad libitum* access to feed and water during the lactation period. Sows were weighed at day 109 of gestation, 24 hours after parturition, and at weaning. Pigs were processed within 24 hours of birth and cross-fostered if necessary within one day of birth irrespective of treatment. Sow feed intake was monitored weekly for the 28-day lactation period.

Results and Discussion

There was a trend ($P < .10$) for daily feed intake to decrease as energy density of the diet increased (Table 2). Sows that consumed the 4% tallow diet consumed 7.5% less feed than sows that consumed diet with no added fat. No differences ($P \geq .50$) were observed between treatments for daily ME or lysine intake. For the 28-day period, sows consumed 18.6 Mcal ME and 47 grams of lysine daily.

Production criteria (Table 3) were not affected ($P > .15$) by adding tallow to the diet. Sows lost an average of only 4.6 lb during lactation. Production criteria and pig survival observed in this study were good. Averaged across the three treatment groups, sows weaned 8.8 pigs with a total weight of 142 lb. After day 3 postfarrowing, pig survival was 96.6%.

Results from this experiment do not support an advantage to incorporating 2 to 4% of fat to lactation diets for primiparous sows. However, other advantages such as dust reduction and odor control may warrant low-level additions of fat. Also, fat additions may be justified during chronic periods of elevated environmental temperatures that reduce feed intake. For the feed intakes observed in this study, it seems that sows maintained a constant energy intake as dietary energy density increased by reducing daily feed consumption. Therefore, care should be taken when formulating diets with added fat to ensure that the intake of key nutrients (e.g., lysine) is maintained.

Table 2. Daily feed, metabolizable energy, and lysine intakes of lactating sows fed diets containing either 0, 2, or 4% added tallow[a]

Item	Dietary tallow, %				
	0	2	4	SEM[b]	P <
Number of sows	42	40	40	—	—
Daily feed intake, lb	13.08	12.70	12.10	.67	.07
Daily ME intake, Mcal	18.7	18.7	18.3	.38	.60
Daily lysine intake, g	47.5	47.2	46.2	.04	.50

[a]Twenty-eight day lactation
[b]Standard error of the mean

Table 3.Litter performance of pigs nursing sows fed diets containing 0, 2, or 4% added tallow[a]

Item	Dietary tallow, %				
	0	2	4	SEM[b]	P <
Number of sows	42	40	40	—	—
Pre-farrowing wt., lb	405.2	405.5	403.0	2.83	.95
Post-farrowing wt., lb	371.2	367.3	370.3	2.74	.75
Weaning wt., lb (sow)	365.7	364.8	364.6	3.01	.99
Total pigs born[c]	11.1	10.3	10.2	.80	.19
Pigs nursed[d]	9.1	9.2	9.1	.47	.75
Pigs weaned	8.8	8.9	8.7	.52	.64
Birth wt. of pigs weaned, lb	27.8	28.6	27.2	1.07	.44
Weaning wt., lb (litter)	140.7	144.4	141.0	2.31	.39
Pig survival, %	97.1	96.7	96.1	1.32	.54

[a]Twenty-eight day lactation
[b]Standard error of the mean
[c]Includes stillborns, but not mummified pigs
[d]Includes all pigs nursed from day 3 to day 28
[e]Calculated from day 3 to day 28 of lactation

Conclusions

Although previous research has documented a positive response of lactating sows to fat additions of 8 to 10%, results from this experiment documenting performance criteria from sows consuming up to 4% tallow, showed no production response. Moreover, sows fed diets with added fat usually consume less feed. Thus, it may be necessary to increase the density of other nutrients in the diet to maintain an adequate daily intake of those nutrients.

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