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Abstract

A total of 107 first parity gilts was used to determine the effects of 50 ppm of added L-carnitine during lactation on sow and litter performance. At farrowing, gilts were fed a milo-soybean meal diet with or without 50 ppm of added L-carnitine. No differences were observed in litter weaning weight or weight gain or changes in sow weight and last rib fat depth during lactation. Although sows fed additional L-carnitine had lower average daily feed intake the first week of lactation, no differences were observed during the second week or in overall average daily feed intake. These results suggest that feeding 50 ppm of added L-carnitine during lactation to first parity gilts did not improve sow or litter performance.; Swine Day, Manhattan, KS, November 20, 1997

Keywords

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EFFECTS OF ADDITIONAL L-CARNITINE DURING LACTATION ON SOW AND LITTER PERFORMANCE OF FIRST PARITY GILTS[1]

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Summary

A total of 107 first parity gilts was used to determine the effects of 50 ppm of added L-carnitine during lactation on sow and litter performance. At farrowing, gilts were fed a milo-soybean meal diet with or without 50 ppm of added L-carnitine. No differences were observed in litter weaning weight or weight gain or changes in sow weight and last rib fat depth during lactation. Although sows fed additional L-carnitine had lower average daily feed intake the first week of lactation, no differences were observed during the second week or in overall average daily feed intake. These results suggest that feeding 50 ppm of added L-carnitine during lactation to first parity gilts did not improve sow or litter performance.

(Key Words: Sow, L-Carnitine.)

Introduction

The role of carnitine is to transport fatty acids into the mitochondria for energy utilization. Previous research at Kansas State University has shown increased birth weight and sow weight gain during gestation and subsequent increases in pigs born live when 50 ppm L-carnitine was added to the gestation diet. That study observed no significant effect on sow and litter performance with the addition of 50 ppm L-carnitine to the lactation diet of sows (parity 2 or above). Although L-carnitine apparently influenced fetal growth during gestation, we wanted to determine if it might influence lactation performance of first litter gilts. Therefore, the objective of this experiment was to answer that question.

Procedures

At farrowing, 107 parity one sows (PIC C15 × 326) were fed a common milo-soybean meal diet with or without 50 ppm of added L-carnitine. This experiment was conducted from September to December, 1996 on a 1,400-sow commercial swine farm in Northeast Kansas. Sows were weighed and ultrasonically scanned (Renco, Minneapolis, MN) for last rib fat depth on d 110 of gestation when they were moved into the farrowing facility and at weaning (d 15). Once sows were moved into farrowing facility, they were allotted randomly to dietary treatment. The lactation diet was formulated to contain 1.0% lysine, .95% Ca, and .85% P, with or without 50 ppm of added L-carnitine. All other amino acids, vitamins, and minerals were in excess of NRC (1988) requirement estimates (Table 1). At farrowing, numbers of pigs born live, mummies, and stillborns were recorded. All litters were equalized by d 2 of lactation. Litter weights were recorded at equalization and weaning (d 15). At weaning, sows were monitored for

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[2]Northeast Area Extension Office.

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estrus and subsequent farrowing. Sows culled because of failure to return to estrus within 35 d, injury or age were not used in the analysis.

Table 1. Lactation Diet[abc]

Ingredient	%
Milo	62.91
Soybean meal (46.5% CP)	28.41
Soybean oil	4.00
Monocalcium phosphate	2.33
Limestone	1.12
Salt	.50
Sow premix	.25
Vitamin premix	.25
Trace mineral premix	.15
Vitamin E	.05
DL-Methionine	.02
L-Carnitine (97.8%)	—

[a]Sows were provided ad libitum access to feed and water during lactation.
[b]Lactation diets were formulated to contain 1.0% lysine, .95% Ca, and .85% P.
[c]L-carnitine (50 ppm) replaced corn to form experimental diet.

Sow feed intake was measured daily and averaged by week of lactation. At weaning, number of pigs weaned was recorded to determine pig survivability.

The analysis of the data utilized the GLM procedure of SAS (1982). No covariates were used in the analysis of numbers born live, stillborn, and mummies. All weaning and lactational changes were analyzed with length of lactation as a covariate, because sows fed added L-carnitine treatment lactated longer than control sows (16.13 vs 15.65 d; $P<.05$). The analysis of litter weaning weight and litter weight gain during lactation required litter weight at equalization to be a covariate, because sows on the added L-carnitine treatment had heavier litters after equalization on d 2. Sow weight and last rib fat depth during lactation used sow weight and last rib fat depth on d 110 as a covariate.

Results and Discussion

First parity sows fed 50 ppm of added L-carnitine during lactation had performance similar to that of control sows (Table 2). No differences were observed ($P>.10$) in the number of pigs born live, stillborn, or mummified per litter with the additional of L-carnitine. No differences were observed ($P>.10$) in number of pigs weaned per litter or pig survival. Gilts fed added L-carnitine also had no improvement in ($P>.10$) litter weaning weight or litter weight gain during lactation. No differences were observed ($P>.10$) in sow weight and last rib fat depth change during lactation with the additional L-carnitine. Although sows that received 50 ppm L-carnitine had lower (9.50 vs 10.23 lb/d; $P<.05$) average daily feed intake during week 1, no differences were observed ($P>.10$) during week 2 or in overall average daily feed intake.

In the analysis of subsequent farrowing performance, no differences were observed ($P>.10$) with regard to days to estrus, farrowing rate, or number born live per litter.

In conclusion, no benefits were observed with the addition of L-carnitine to the lactation diet for first parity sows. The results from this experiment agree with prior work done at KSU, which observed no benefit from the addition of L-carnitine to the lactation diet.

Table 2. Effects of Dietary L-Carnitine on Lactation Performance

Item	Control	L-Carnitine	SEM	P<
Number of sows	52	55	—	—
Lactation length, d	15.65	16.13	.17	.05
Total born per litter	11.25	11.09	.38	.76
Born live per litter	10.40	10.64	.37	.65
Stillborn per litter	.538	.291	.11	.11
Mummies per litter	.308	.164	.09	.26
Number of pigs per litter				
D 2	9.74	9.84	.15	.63
Weaned[a]	9.69	9.74	.10	.71
Survivability, %[a]	96.84	97.21	.98	.79
Litter weight, lb				
Birth	26.9	30.1	.87	.01
Weaning[a,b]	91.6	94.0	1.65	.31
Gain[a,b]	63.2	65.5	1.65	.31
Sow weight, lb				
D 110	397.9	407.3	7.21	.35
Weaning[c]	391.2	386.1	2.99	.23
Change[c]	-11.9	-17.0	2.99	.23
Sow last rib fat depth, mm				
D 110	17.2	16.9	.52	.66
Weaning[c]	14.9	14.8	.38	.87
Change[c]	-2.2	-2.3	.38	.87
Sow average daily feed intake, lb/d				
Week 1	10.23	9.50	.26	.05
Week 2	9.99	9.47	.30	.21
Overall	11.25	10.93	.26	.37
Return to estrus, d[a]	8.71	6.85	.92	.15
Subsequent farrowing performance				
Farrowing rate, %	91.67	92.00	3.99	.95
Born live	10.27	10.04	.41	.69
Stillborn	.55	.46	.13	.63
Mummified	.02	.09	.04	.27

[a]Utilized length of lactation as a covariate.
[b]Litter weaning weight used litter weight at equalization as a covariate.
[c]Sow weight an LRBF used measurements on d 110 as covariates.