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Effects of Flavolac Top Dress on Sow Body Weight and Litter Performance

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Summary

A total of 271 mixed-parity sows (PIC 1050) were used to evaluate the effect of feeding Flavolac in lactation diets on sow farrowing performance and litter growth performance during summer conditions. Flavolac (Agroceres Multimix; Rio Claro, Sao Paulo, Brazil) is a commercial product containing several compounds, including AAs, antioxidants, botanicals, direct fed-microbials, and vitamin-like compounds that have been shown to improve litter weaning weight or preweaning mortality in previous research. The experiment was conducted at a commercial sow farm located in northwest Texas. A total of four rooms (288 stalls; 144 stalls per treatment) were used. At approximately d 112 to 114 of gestation, sows were moved to the farrowing house and randomly allotted to one of two treatments based on parity and caliper score. Treatments consisted of a control (no Flavolac) or the control with an added Flavolac top-dress (80 g/d in a single feeding). Sows were weighed before entering the farrowing house and at weaning. Sows were provided approximately 4 lb per day of a common lactation diet without Flavolac pre-farrowing. After farrowing, sows were provided ad libitum access to lactation feed. The weaning age averaged approximately 21.3 d. There was no evidence of difference ($P > 0.10$) in sow at entry, weaning, or overall BW change. There was no evidence of differences ($P > 0.10$) for sow entry caliper, weaning caliper score, caliper score change, or average daily lactation feed disappearance. In addition, there was no evidence of difference ($P > 0.10$) in total litter, or piglet birth BW. However, administration of Flavolac tended ($P < 0.10$) to increase litter weaning weight, total litter weight gain, and litter average daily gain. Moreover, inclusion of Flavolac led to a tendency ($P = 0.091$) for a reduction in pre-weaning mortality and therefore an improvement in percentage of pigs weaned. In summary, the inclusion of Flavolac during the lactation period resulted in a tendency for reduced pre-weaning mortality and tended to improve total litter weight gain, and thus weight at weaning.

Introduction

During lactation, maximizing sow feed intake is critical to prevent body reserve mobilization and sustain milk production for litter growth. Recent research has shown various

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feed additives may improve lactation feed intake and litter performance. Spinler et al. (2023)[5] observed that the use of a feed flavor increased lactation feed intake by approximately 6.8% and weaning weight by 6.0% during a period of heat stress. Combination products targeting both feed intake and energy utilization may prove to have added value in improving sow and litter performance, particularly during summer heat stress conditions. Flavolac is a commercial product containing several compounds, including AAs, antioxidants, botanicals, direct fed-microbials, and vitamin-like compounds, that have been shown to improve litter weaning weight or preweaning mortality individually in previous research. However, there is no data available showing the benefit when these compounds are added together. Therefore, the purpose of this study was to determine the effect of feeding Flavolac in lactation diets on sow farrowing performance and litter growth performance during summer conditions.

Materials and Methods

The Kansas State University Animal Care and Use Committee approved the protocol used in this experiment. The experiment was conducted at a commercial sow farm located in northwest Texas.

Animals and treatments

A total of 271 mixed parity sows (PIC 1050) farrowed between July 4 and July 13, 2023, and piglets were weaned between July 27 and August 1, 2023. At approximately d 112 to 114 of gestation, sows were moved to the farrowing house, and randomly allotted to one of two treatments based on parity and caliper score. Treatments consisted of a control (no Flavolac) or the control diet with Flavolac added via top-dress, in which approximately 80 g was provided to sows once daily (PM) beginning approximately 24 h post farrowing (after the occurrence of cross-fostering). Flavolac was placed directly into the feed pan along with approximately 100 g of lactation feed. At this time, all sows were made to get up and encouraged to eat.

The same commercial sow lactation feed was fed to all sows (Table 1). Sows were provided approximately 2 lb in the morning and 2 lb in the afternoon, for a total of 4 lb per day of the lactation diet pre-farrowing. After farrowing, sows were provided ad libitum access to the lactation feed. The hopper of each feeder was topped with lactation feed twice a day throughout the experiment. Each hopper had an approximate capacity of 20 lb. Each feed addition was weighed and recorded. Viable piglets were individually tagged with an RFID tag within 24 h of birth. The average weaning age was 21.3 d.

Data and sample collection

Sow and litter data were recorded and stored using the LeeO system (Prairie Systems, Spencer, IA). For sow BW data, the number of sows used without or with Flavolac was 135 and 119, with an average parity of 1.6 per treatment. Sows not included in the analysis of BW data were because of missing data points for their weaning weight. This was due to either culling, or mortality, prior to weaning. For feed disappearance, the number of sows used for the two treatments was 137 and 124. Sows not included in the analysis of feed disappearance were a result of culling, mortality, or movement

[5] Spinler, M. S., J. T. Gebhardt, M. D. Tokach, R. D. Goodband, J. M. DeRouchey, J. M. Kyle, and J. C. Woodworth. 2023. Effect of lactation and nursery diets supplemented with a feed flavor on sow feed intake and lactation performance and subsequent weaned pig nursery performance. Transl. Anim. Sci. 7:1-11. doi:10.1093/tax/taxad056.

to another stall prior to weaning. For litter performance data, the number of sows used was 136 and 114. Sows not included in the analysis of litter data were a result of missing data points for litter birth weight, weaning weight, culling, or mortality prior to weaning.

Each sow stall was tagged with an RFID tag and identified as a location pen in the LeeO system. For sow data, the information (sow ID, parity, and breeding date) for each sow was exported from the PigChamp system and then imported into the LeeO system. Sow caliper score was taken between days 109 and 111 of gestation, caliper scores were recorded as mm of backfat. Caliper scores 6-12, 12-17, and 17-22 correspond to body condition scores of 1, 2, and 3, respectively. A walk-on platform scale was used to weigh sows before entering the farrowing house and at weaning. When sows were placed in the farrowing stall, they were also registered in the location pens in the LeeO system. Feed carts equipped with scales were used to obtain the weight of each feed addition. Feed addition to each feeder was registered to the stall (location pen) with the data and weight recorded for calculating feed disappearance. For litter performance, piglets were registered under the sow and location pen, and weighed individually at birth for farrowing performance and at weaning for litter performance. Non-viable piglets (low birth weight or dead before tagging), stillborn, and mummies were recorded but not weighed. Any cross-fostering and mortalities throughout the lactation period were recorded.

Statistical analysis

Data were analyzed as a randomized complete block design for one-way ANOVA in R program. The lmer function from the lme4 package was used for lactating sow BW, feed disappearance, and litter growth performance. The glmer function (Poisson distribution) from the lme4 package was used for total born and litter size. The glmmTMB function (beta-binomial distribution) from the glmmTMB package was used for the percentage of mortality and pigs weaned. Sow (litter) was considered as the experimental unit. Farrowing room was the blocking factor for sow and litter data. Flavolac (with or without) was used as the fixed effect. Sow entry weight was used as a covariate for sow weaning weight and weight change data. Parity category (P1, P2, or P3+) was used as a fixed effect for litter weights and growth performance data. A Tukey/Sidak multiple comparison adjustment was used when appropriate. All results were considered significant at $P \leq 0.05$ and marginally significant at $0.05 < P \leq 0.10$.

Results and Discussion

There was no evidence of difference ($P > 0.10$) in sow weight at entry, weaning, or BW change during lactation (Table 2). Sow caliper score at entry, weaning and caliper score change during lactation were not impacted by Flavolac inclusion ($P > 0.10$). Average daily feed disappearance was not affected ($P = 0.830$) by treatment. Added Flavolac resulted in no evidence of difference ($P > 0.10$) in total litter, or piglet birth BW. However, providing approximately 80 g per day Flavolac tended ($P < 0.10$) to increase litter weaning weight, total litter weight gain, and litter average daily gain. Moreover, there was a tendency ($P = 0.091$) for a reduction in pre-weaning mortality and therefore, an increase in percentage of pigs weaned.

In summary, providing a top-dress of approximately 80 g per day of Flavolac during lactation resulted in a tendency for reduced pre-weaning mortality, as well as tended to improve total litter weight gain, and thus weight at weaning.

Table 1. Diet composition (as-fed basis)[1]

Item	Lactation Diet
Ingredients, %	
Sorghum	64.21
Soybean meal	25.50
Corn DDGS	5.00
Corn Oil	1.50
Limestone	1.55
Monocalcium P (21% P)	0.70
Sodium chloride	0.55
Lysine, 60%[2]	0.44
Methionine hydroxy analogue[3]	0.08
L-Thr	0.08
VTM Premix w/ Phytase	0.25
Choline Chloride	0.11
Phytase[4]	0.04
Total	100.00
Calculated analysis	
Standardized ileal digestibility AA, %	
Lys	1.05
Ile:Lys	68
Leu:Lys	148
Met:Lys	30
Met and Cys:Lys	53
Thr:Lys	64
Trp:Lys	20.0
Val:Lys	75
His:Lys	39
Total Lys, %	1.18
NE, kcal/ln	1,162
SID Lys:NE, g/Mcal	4.10
CP, %	19.4
Ca, %	0.80
P, %	0.54
STTD P, %	0.43

[1]Feed was manufactured by a commercial feed mill (JBS, Dalhart, TX).
[2]BioLys (Evonik Industries AG, Essen, Germany).
[3]MHA (Novus International, Inc., Chesterfield, MO).
[4]OptiPhos Plus 2500 G (Huvepharma, Peachtree City, GA) provided 490 phytase units (FTU/lb of diet) for an estimated release of 0.11% STTD P.

Table 2. The effect of Flavolac top dress on sow and litter performance[1]

	Flavolac inclusion			
Item	**No**	**Yes**	**SEM**	***P* =**
Sow body weight, lb				
Entry	506.1	500.7	11.81	0.449
d 1[2]	418.2	424.5	2.22	0.033
Weaning[3]	420.7	423.9	3.48	0.505
Weight change				
Entry-weaning, lb[3]	-82.8	-79.6	3.48	0.505
Weight change, %[3]	-16.2	-15.5	0.70	0.451
d 1 – weaning, kg[2,3]	2.4	0.2	4.09	0.600
Weight change, %[2,3]	1.3	0.9	1.00	0.756
Sow caliper score, mm				
Entry caliper score	14.6	14.7	0.18	0.808
Weaning caliper score	12.8	12.7	0.19	0.949
Caliper score change	-1.9	-2.0	0.18	0.628
Average daily feed disappearance, lb	12.7	12.7	0.38	0.830
Litter performance				
Litter size after cross-fostering, n	14.6	14.6	0.36	0.981
Litter birth weight, lb[4]	47.09	47.60	0.993	0.602
Pig birth weight, lb[4]	3.24	3.28	0.077	0.556
Lactation length, d	21.2	21.4	0.82	0.240
Litter weaning weight, lb[4]	164.5	170.5	2.50	0.078
Pig weaning weight, lb[4]	12.88	13.07	0.157	0.348
Litter weight gain, lb[4]	117.4	122.9	2.45	0.070
Litter average daily gain, lb[4]	5.55	5.78	0.158	0.093
No. weaned	12.8	13.1	0.34	0.550
Weaned, %	87.7	89.8	0.88	0.091
Pre-weaning mortality, %[5]	12.3	10.2	0.88	0.091

[1] A total of 271 mixed-parity sows (average parity 1.6; PIC 1050) that were bred to PIC 337 boars were used with 131 to 140 sows per treatment. Sow caliper score was taken between d 109 and 111 of gestation, and sows allotted to treatment based on parity and caliper score. For sow body weight data, the number of sows used without or with Flavolac was 135 and 119, respectively. For feed disappearance, the number of sows used for the two treatments was 137 and 124, respectively. For litter performance data, the number of sows used was 136 and 114, respectively.

[2] Day 1 weight estimated as: entry weight – (litter birth weight + estimated weight of conceptus). Conceptus weight estimated using the equation proposed in NRC 2012.

[3] Entry BW was used as a covariate.

[4] Parity category (P1, P2, or P3+) was used as a fixed effect.

[5] Pre-weaned mortality, % = [(dead after cross-fostering) ÷ (litter size at 24 h)] × 100%.