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Effect of Dexamethasone injection at birth on growth performance of pigs from birth to weaning

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EFFECT OF DEXAMETHASONE INJECTION AT BIRTH ON GROWTH PERFORMANCE OF PIGS FROM BIRTH TO WEANING

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Summary

A total of 82 litters were used in a 21-day study to evaluate the effect of injecting litters of pigs with dexamethasone within 24 hours of birth on growth rate from birth to weaning. Experimental treatments consisted of an injection of 1 mg dexamethasone solution (2 mg/mL, Prolab Ltd, St. Joseph, MO) to all pigs within a litter, while pigs in control litters did not receive a dexamethasone injection. There was no difference in growth rate from birth to weaning between pigs injected with dexamethasone and control pigs. Number of pigs weaned per litter and preweaning mortality were not different. In this study no benefit was observed in growth rate from birth to weaning from injecting whole litters of pigs with 1 mg/pig of dexamethasone within 24 hours of birth.

(Key Words: Dexamethasone, Pigs, Growth Rate.)

Introduction

Researchers from the University of Missouri have found that the early neonatal period may be an opportune time to alter physiological factors that influence growth. In swine, there is an increase in maternal circulating cortisol, as well as a final fetal cortisol surge during labor. This elevation in fetal cortisol may trigger the adjustments to the endocrine

system necessary for maintaining life and optimal growth in the extra uterine environment. The prepartum surges in glucocorticoids in swine have been shown to be an important mediator of intestinal maturation and function. They also suggested that the glucocorticoid role in intestinal maturation and function is most likely limited to the immediate perinatal period.

In previous research conducted by the USDA's Agricultural Research Service and the University of Missouri, pigs were injected intramuscularly with either sterile saline (Control; n=10 males and 10 females) or a dexamethasone solution (dexamethasone, Phoenix Pharmaceuticals, Inc., St. Joseph, MO, 0.5 mg/lb body weight; n=10 males and 10 females) within one hour of birth. Pigs injected with dexamethasone grew 12% (0.63 vs 0.56 lb/day) faster during the 18-day lactation period. Pig weights at weaning averaged 15.5 lb for the dexamethasone and 14.1 lb for the controls. Therefore, the objective of the present study was to determine if the benefits in growth performance obtained in the USDA study could be replicated in a more commercial production environment. This environment includes injecting whole litters of pigs at the time of processing within 24 hours of birth. Also, since pigs are rarely weighed at birth a more practical dosing scheme of 1 mg/pig was examined.

¹Food Animal Health and Management Center.

Procedures

This study was conducted in the KSU Swine Teaching and Research Center's farrowing facilities. A total of 82 litters were used in the study, with approximately 41 litters per treatment. The sows used in the study were PIC Line 42 and were farrowed in three groups of approximately 30 sows per group. All sows were weighed entering the farrowing house and again at weaning. Sows were randomized to treatments based on parity and weight entering the farrowing house on day 110 of gestation. Sows were provided ad libitum access to feed and water and feed intake was recorded. All sows were fed a standard lactation diet formulated to contain 0.90% lysine, 0.90% calcium, and 0.80% P (Table 1). No sows were treated with dexamethasone during the trial.

Table 1. Lactation Diet^a

Ingredient	%
Corn	68.55
Soybean meal, 46.5%	24.20
Soybean oil	3.00
Monocalcium phosphate, 21% P	2.15
Limestone	0.95
Salt	0.50
Sow vitamin premix	0.25
Vitamin premix	0.25
Trace mineral premix	0.15
Total	100.00

^aDiets were formulated to contain 0.90% lysine, 0.90% calcium and 0.80% P.

There were two experimental treatments. In treatment one, all pigs within a litter were injected with 1 mg/pig of dexamethasone when the litter was processed, which was within the first 24 hours after birth. The dexamethasone used was a 2 mg/mL solution

(Prolab Ltd, St. Joseph, MO). In the second treatment, pigs were processed according to standard practice and did not receive dexamethasone injection. The standard pig processing practice was that pigs had their needle teeth clipped, tails docked, ears notched and were injected with 1 ml/pig iron. All fostering that took place did so after processing and within the first 24 hours after birth. Pigs were only fostered across litters within treatment. At fostering, gilts and sows were standardized with 10 pigs. Pigs were weighed individually at birth and again at weaning. Any pigs removed from the trial were recorded along with their date of removal and weight. Data were analyzed using the mixed procedure of SAS.

Results and Discussion

As expected, pig birth weight was similar for the dexamethasone and control treatments (Table 2). From birth to weaning, neither ADG nor weaning weight differed between the two treatments. The number of pigs on day 1 of the trial, at weaning, and removed from the trial was also similar for the dexamethasone and control treatments. Preweaning mortality averaged 8.3% for the dexamethasone and 8.5% for the control treatments. Sow weight entering the farrowing house, at weaning, and weight loss in the farrowing house, lactation length and backfat at farrowing did not differ between treatments.

In conclusion, we observed no benefit in growth rate from birth to weaning for pigs injected with 1 mg/pig dexamethasone compared with the control pigs. The results do not agree with those of the recent USDA study where half the litter of pigs was injected with 0.5 mg/lb body weight within one hour of birth. In that study pigs injected with dexamethasone grew 12% (0.63 vs 0.56 lb/day) faster during the 18-day lactation period. Pig weights at weaning averaged 15.5 lb for the dexamethasone injected pigs and 14.1 lb for

the control pigs. There were a number of differences between the two studies. First, we injected whole litters of pigs with dexamethasone whereas in the USDA study, they injected half the litter with dexamethasone and the other half of the litter with sterile saline solution, which served as the control. Secondly, in the USDA study they injected pigs with 0.5 mg/lb of body weight of dexamethasone, whereas in our study we injected piglets with approximately 0.3 mg/lb of body weight. Thirdly, the source of dexamethasone used in the USDA study was supplied by Phoenix Pharmaceuticals, Inc., St. Joseph, MO, whereas the dexamethasone solution used in our study was supplied by Prolab Ltd, St. Joseph, MO. Finally, in the USDA study, they injected pigs within the first hour of birth whereas in our study we injected pigs within the first 24 hours of birth. In our study we attempted to simulate the growth performance

obtained in the USDA study, but we modified some techniques in order to make our study more commercially applicable.

Other research by University of Missouri demonstrated that a 0.9 mg/lb body weight of dexamethasone given within 24 hours of birth significantly improved pre- and postweaning performance of barrows with no beneficial effect on gilts. Similar to our experiment, two other experiments carried out by the University of Missouri in commercial production conditions failed to detect improvements in preweaning performance. We failed to obtain a benefit in growth rate from birth to weaning by injecting litters of pigs with dexamethasone within the first 24 hours of birth. Therefore, it appears that the benefits of injecting pigs with dexamethasone within the first hour of birth are inconsistent, with no benefit observed in majority of the commercial trials.

Table 2. Effect of Dexamethazone Injection at Birth on Performance in the Farrowing House

Item	Treatment		SEM	P<
	Dexamethazone ¹	Control ²		
Number of sows	42	40		
Parity	2.1	2.2	0.17	0.76
Lactation length, days	20.8	21.0	0.71	0.60
Sow weight, lb				
Entry farrowing	522	543	9.45	0.26
Weaning	501	509	9.03	0.55
Loss	21	34	5.88	0.28
Backfat at farrowing, mm	14.1	13.9	0.74	0.91
ADFI, lb lactation	12.77	13.19	0.40	0.46
Number of pigs				
Day 1	10.04	10.02	0.40	0.95
Weaning	9.16	9.14	0.31	0.97
Died	0.93	0.85	0.17	0.75
Preweaning mortality, %	8.70	8.28	1.56	0.85
Piglet weight, lb				
Birth	3.31	3.33	0.15	0.93
Weaning	14.69	14.72	0.48	0.95
Piglet ADG, lb	0.52	0.51	0.12	0.67

¹All pigs within a litter were injected with 1 mg of Dexamethasone within 24 hours of birth.

²Pigs were not injected within Dexamethasone.