Effect of Feeding Choline and Dichlorvos to Gestating Gilts

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Story in Brief

Two trials involving 170 crossbred gilts were conducted to study the effect of feeding choline and dichlorvos during gestation on subsequent reproductive performance. Gilts receiving choline farrowed pigs with significantly larger birth weights. No significant response from feeding choline and/or dichlorvos to gestating gilts was noted for number of live pigs born, number alive at both 21 and 42 days, percent survival rate, litter birth weight, individual pig and litter weights at 21 and 42 days and the incidence of spraddle leg pigs. There was no evidence of any interactive effect for choline and dichlorvos in this study.

Introduction

Reproductive efficiency, the number of pigs marketed per sow kept for breeding, is the most important economic factor in swine production. Therefore, it is essential that all breeding females conceive promptly, farrow large litters and wean a high percentage of pigs farrowed. The feeding of nutritional supplements is one plausible method of improving reproductive efficiency.

Previous research at the Oklahoma Agricultural Experiment Station and other institutions has shown that supplementing the sow gestation diet with approximately 350 mg of choline per pound of diet to sows throughout the gestation period may result in increased litter size at birth and weaning and heavier litter weights at weaning (Maxwell *et. al.*, 1978 and N.R.C.-42, 1976). Research at other institutions has also shown that feeding of the anthelmintic, dichlorvos (2,2 dichlorvinyl dimethyl phosphate) at approximately 250 mg per pound of diet during the last 30 days of gestation may result in similar improved reproductive performance that is not the result of its anthelmintic effect (Siers *et. al.*, 1974 and Young *et. al.*, 1979).

There appeared to be no previous research conducted that presented any information as to whether an interactive effect would occur on reproductive performance if both choline and dichlorvos were fed to gestating females. Thus an experiment was conducted to determine if there was an interactive effect on litter size at birth, litter size at weaning, birth weights and weaning weights when supplementing diets for gestating gilts with choline and/or dichlorvos.

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Experimental Procedure

This study was conducted at the Southwestern Livestock and Forage Research Station, El Reno, Oklahoma in the 1981 spring and fall farrowing seasons. A total of 170 crossbred gilts bred to purebred Duroc boars were randomly allotted to four treatments. Treatments were: (1) a 14 percent crude protein sorghum — grain soybean meal diet, (Table 1) (2) diet 1 + 350 mg of choline per pound of diet fed throughout gestation, (3) diet 1 + 250 mg of dichlorvos per pound of diet fed the last 30 days of gestation and (4) diet 1 + 350 mg of choline per pound of diet fed throughout gestation and 250 mg of dichlorvos fed during the last 30 days of gestation. All diets were started at the initiation of the breeding season.

All gilts were housed in outside dirt lots during gestation and group fed five pounds of feed per head per day. At day 110 of pregnancy, gilts were moved to individual farrowing crates, and litters were penned separately until weaned at 42 days. Beginning at day 110, all gilts were fed a 16 percent crude protein lactation ration (Table 1). They were self-fed the lactation ration after day three of the lactation period.

An examination of feces of all sows for gastrointestinal parasites was made approximately 30 days before farrowing prior to the sows on treatments three and four receiving dichlorvos. Fecal examination was also conducted on each sow and two randomly selected pigs from her litter when the pigs were 42 days of age.

Results and Discussion

The effect of feeding choline and/or dichlorvos to gestating gilts on the number of live pigs born, number at 21 and 42 days and percent survival rate is shown in Table 2. No significant differences ($P < .05$) were noted in these

Table 1. Composition of basal diets.

Ingredient	Gestation	Lactation
Sorghum grain	76.95	71.30
Soybean meal, 44%	14.50	20.20
Ground alfalfa hay	5.00	5.00
Calcium carbonate	1.00	1.05
Dicalcium phosphate	1.60	1.50
Salt	.50	.50
Vitamin trace mineral mix[a]	.25	.25
Tylan 10	.20	.20
Total	100.00	100.00
Protein, %	14.00	16.00
Lysine, %	.62	.77
Calcium, %	.85	.85
Phosphorus, %	.61	.60

[a]Supplied 800,000 IU vitamin A, 80,000 IU vitamin D, 3,400 IU Vitamin E, 800 mg riboflavin, 4,000 mg pantothenic acid, 5,400 mg niacin, 4 mg vitamin B12, 660 mg menadione sodium bisulfite, .8% manganese, 3.0% iron, .004% selenium, .008% iodine, .4% copper and 4.0% zinc per lb. of premix.

traits. Gilts on treatments receiving choline and/or dichlorvos (2, 3 and 4) did tend to farrow more live pigs than those on the control diet (treatment 1). The difference in litter size disappeared by the time the pigs were 21 days of age. This is in contrast to previous work reported here and other research stations.

The effect of feeding both choline and dichlorvos upon pig birth weight and gain is shown in Table 3. Gilts on treatments receiving choline (2 and 4) farrowed pigs with significantly higher birth weights ($P < .01$) than the other two treatments. Pigs from gilts on treatments 2 and 4 had average birth weight of 2.92 and 2.98 pound respectively vs 2.88 and 2.85 pound for treatments 1 and 3. No significant differences were noted for litter birth weight and pig and litter weights at 21 or 42 days. However, the litter birth weight of pigs farrowed for gilts receiving choline and/or dichlorvos (treatments 2, 3 and 4) tended to be heavier than those farrowed by the gilts on the control diet (treatment 1).

The lack of improvement in all the reproductive traits measured by feeding choline to the gestating gilts except for birth weight is in contrast to previous research reported by Maxwell *et al*, 1978, N.R.C., 1976 and others. Likewise the lack of improvement in all the reproductive traits measured by feeding

Table 2. The effect of feeding choline and dichlorvos to gestating gilts upon litter size and survival rate.

	Treatments[a]			
	1	2	3	4
Choline	0	+	0	+
Dichlorvos	0	0	+	+
Avg. No. of live pigs at birth	9.7	10.2	10.3	9.9
Avg. no. of live pigs at 21 days	8.1	7.8	7.9	7.4
Survival rate, %	84.5	78.4	78.1	76.3
Avg. no. at 42 days	7.8	7.7	7.7	7.1
Survival rate, %	82.0	77.2	76.4	73.7

[a]No significant differences ($P < .05$) were noted among treatments

Table 3. The effect of feeding choline and dichlorvos to gestating gilts upon pig birth weight and gain

	Treatments			
	1	2	3	4
Choline	0	+	0	+
Dichlorvos	0	0	+	+
Pig birth wt., lb.	2.88	2.92[a]	2.85	2.98[a]
Litter birth wt., lb.	27.75	29.95	29.33	29.58
Pig 21 day wt., lb.	11.30	11.53	11.21	11.05
Litter 21 day wt., lb.	91.26	89.85	88.29	82.18
Pig 42 day wt., lb.	24.04	24.18	23.76	23.93
Litter 42 day, lb.	188.05	185.68	182.00	172.77

[a]Treatments containing choline had significantly higher birth weights ($P < .01$).

dichlorvos is in contrast to several research studies previously conducted such as Siers *et al*, 1974 and Young *et al*, 1979. There was no evidence of any interactive effect for choline and dichlorvos in this study.

It has been reported in the popular press based on field observations that the feeding of supplemental choline to bred gilts would decrease the incidence of spraddle leg pigs. A low incidence of spraddle leg pigs (6.6 to 9.0 percent) was noted in this study as shown in Table 4 with no significant differences among treatments. This is in agreement with research previously reported by Maxwell *et al*, 1978, N.R.C., 1976 and others.

Prevalence of parasite eggs were extremely low in the feces of both the gilts and their respective offspring in all treatments as shown in Tables 5 and 6. Only Ascarid and Trichuris eggs were recovered in the feces of both gilts and weanling pigs. Coccidia was not demonstrated in the gilts examined but a few of the offspring were passing eggs as is shown in Table 6.

Table 4. The effect of feeding choline and dichlorvos to gestating gilts on the spraddle leg condition in newborn pigs.[a]

	Treatments			
	1	2	3	4
Choline	0	+	0	+
Dichlorvos	0	0	+	+
No. of gilts	42	49	37	42
No. gilts with one or more spraddle leg pigs	15	15	13	21
No. of live pigs	402	484	376	408
No. farrowed with spraddle legs	29	43	25	37
%	7.2	8.9	6.6	9.0

[a]No significant differences ($P < .05$) were noted among treatments

Table 5. The effect of feeding choline and dichlorvos to gestating gilts on the prevalence of fecal parasite eggs.

	Treatments			
	1	2	3	4
Choline	0	+	0	+
Dichlorvos	0	0	+	+
No. of gilts	42	49	37	42
No. with Ascarids (roundworm)	1	2	0	0
No. with Trichuris (whipworm)	0	3	0	0
No. with Coccidia	0	0	0	0
No. with Spiruids	0	0	0	0
No. with Strongyles (nodular worm)	0	0	0	0
No. with Stongyloides (threadworm)	0	0	0	0

Table 6. Effect of feeding choline and dichlorvos to gestating gilts on prevalence of fecal parasite eggs from the offspring.

	Treatments			
	1	2	3	4
Choline	0	+	0	+
Dichlorvos	0	0	+	+
No. of pigs sampled	84	98	74	84
No. with Ascarids (roundworms)	2	0	0	0
No. with Trichuris (whipworm)	0	2	0	0
No. with Coccidia	4	1	5	0
No. with Spiruids	0	0	0	0
No. with Strongyles (nodular worm)	0	0	0	0
No. with Strongyloides (threadworm)	0	0	0	0

Literature Cited

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