1978

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A.S. Series 78-13

Iron supplementation for the nursing pig is a common management practice in confinement rearing of swine. A newborn pig has a limited reserve of about 50 mg of iron and a daily requirement of 7 to 10 milligrams. With sow's milk supplying approximately 2.5 mg of iron per pig daily, the baby pig becomes anemic without supplemental iron. Intramuscular injection of iron dextran into baby pigs is the most common form of iron supplementation. However, recently another method, which involves feeding an iron compound to the sow in an attempt to increase placental and mammary iron transfer, has been suggested to be beneficial. These iron compounds are treated so the iron is bound to another compound, such as choline or an amino acid, to improve iron absorption.

The objective of this experiment was to determine the efficacy of certain iron products fed to gestating and lactating sows in preventing baby pig anemia by increasing placental and mammary transfer of iron. Hemoglobin levels and baby pig weights were the criteria for evaluation.

Experimental Procedure

Trial 1. Two weeks prior to breeding, 59 gilts were allotted to two groups on the basis of weight and ancestry. The gilts were bred at approximately 8 months, fed 4 lb. of feed per day in individual stalls and housed on dirt lots. At 93 days of gestation, half of the sows in each group were allotted to a second iron treatment.

The four treatments were as follows:

- Treatment 1 - Basal diet throughout gestation
- Treatment 2 - Basal diet to 93 days, then 10 lb./ton of "Iron Mountain" added (contained 13% iron)
- Treatment 3 - Basal diet + 6.25 lb./ton of "Swinacol 600" throughout gestation (contained 7.5% iron)
- Treatment 4 - Treatment 3 to 93 days, then 10 lb./ton of "Iron Mountain" added

At 110 days of gestation, the gilts were moved to the farrowing house and placed in individual crates. One-half the pigs in each litter were randomly selected and injected with 100 mg of iron dextran on day 1. Lactation diets were fed ad libitum from farrowing to weaning at 21 days.

Sows were wormed prebreeding and 3 to 4 weeks prefarrowing. Sow weights and blood samples, in addition to baby pig weights and blood samples, were collected on day 1, 10 and 21. The blood samples were analyzed for hemoglobin and red cell status.

The composition of the basal diets is shown in table 1. The gestation diet was calculated to contain 12.6% protein and the lactation diet 15.7% protein.

Trial 2. Three weeks prior to the due date of the first animal, 53 gilts and sows were allotted into three groups on the basis of their weight, ancestry and sire of their pigs. At this time, all animals were bled and the blood analyzed for hemoglobin. All groups were hand fed 5 lb. per day of their respective diets in individual stalls during gestation. Management prefarrowing to weaning was similar to trial 1. All baby pigs were injected with iron dextran on day 1.

Sow and gilt hemoglobin, baby pig weights and hemoglobin values were determined at birth, 10 and 21 days with the initial hemoglobin sample collected before the iron dextran injection.

The three treatment groups were:

1. Basal diet
2. Basal diet + 2 lb./ton of "Meth-Iron 65" (contained 14.5% iron)
3. Basal diet + 10 lb./ton of "Iron Mountain"

Water was provided *ad libitum* in both trials.

Results

Trial 1. Tables 2 and 3 summarize the data for trial 1. The treatments had little influence on the hemoglobin or hematocrit values when compared to the controls. However, there was an increase in hemoglobin and hematocrit when pigs received iron injections compared to pigs not receiving injectable iron in all groups. Furthermore, there was a decrease in blood values from birth to 10 and 21 days in pigs that did not receive injectable iron, irregardless of treatment. The iron injected pigs from sows receiving the iron supplemented diets had a higher 21-day weight than injected pigs from the control sows. Hemoglobin and hematocrit of sows at farrowing, 10 and 21 days were higher for those sows receiving extra dietary iron than for the control sows. Table 4 shows the farrowing results for trial 1. With the wide variation in weights and number of pigs born between the groups, little can be attributed to the iron supplements. The high mortality can be attributed more to the incidence of mastitis in all the treatment groups than to the treatments themselves.

Trial 2. Table 5 summarizes blood and weight data obtained for trial 2. From this data one can see that the two iron supplements did not improve baby pig hemoglobin values or weights when compared to the control values. Also, there were no differences in sow hemoglobin values among treatments. The farrowing data from table 6 indicate that there were no significant differences among treatments in pigs farrowed and weaned, birth weight or 21-day weaning weight.

Summary

Fifty-nine gilts and sows were utilized in trial 1 to evaluate iron supplements fed to gestating and lactating sows and their influence on baby pig and sow hematology and weights. Pigs from sows fed the iron supplemented diets and receiving injectable iron had a higher 21-day weight than iron injected pigs from the control sows. There was a definite increase in blood values for all pigs receiving 100 mg injectable iron as compared to noninjected pigs regardless of treatment. Farrowing, 10- and 21-day blood values were greater for the sows and gilts receiving the iron treatments compared to the controls. No conclusions can be drawn from the farrowing results for trial 1 because of the incidence of mastitis and subsequent losses.

Fifty-three gilts and sows were utilized in a second trial to evaluate two iron products fed to the sows during the last 3 to 6 weeks of gestation and during lactation. There were no differences in baby pig or sow hemoglobin values and weights among treatments. The data from the farrowing results also showed no significant improvement due to the iron supplemented diets.

Table 1. Composition of Basal Diets (Percent)

	Gestation	Lactation
Ground yellow corn	77.6	68.5
Alfalfa meal	10.0	--
Soybean meal (44%)	9.0	--
Soybean meal (48%)	--	18.0
Beet pulp	--	10.0
Dicalium phosphate	2.3	2.0
Limestone	.5	.8
Trace mineral salt (high zinc)	.5	.5
Premix[a]	.1	.1

[a] To supply per lb.: vitamin A, 2000 IU; vitamin D, 200 IU; vitamin E, 2.5 mg; riboflavin, 1.25 mg; pantothenic acid, 5 mg; niacin, 8 mg; choline, 25 mg and vitamin B_{12}, 5 micrograms.

Table 2. Effect of Feeding Iron to Gestating and Lactating Sows on the Hematology and Performance of the Baby Pig

	Basal				Basal + Swinacol 600[a]			
	Basal		Basal + Iron Mountain[b]		Basal + Swinacol 600		Basal + Swinacol 600 + Iron Mountain	
	w/iron shot	w/o iron shot	w/iron shot	w/o iron shot	w/iron shot	w/o iron shot	w/iron shot	w/o iron shot
Hemoglobin, g/100 ml								
Birth	7.7 (32)[c]	8.0 (36)	9.0 (26)	9.0 (27)	8.2 (35)	8.0 (41)	7.9 (21)	8.3 (21)
10 days	10.9 (21)	6.8 (21)	9.5 (24)	6.1 (24)	10.4 (20)	6.8 (14)	9.9 (10)	5.1 (10)
21 days	9.3 (20)	7.0 (21)	10.2 (24)	6.6 (22)	10.1 (18)	6.6 (13)	9.9 (10)	5.5 (9)
Hematocrit, %								
Birth	31.5	31.8	32.2	35.2	32.6	31.6	29.7	31.0
10 days	36.6	27.3	36.4	26.5	37.0	27.3	36.6	22.8
21 days	35.3	28.3	36.9	29.7	36.5	27.2	37.1	27.3
Weight, lb.								
Birth	2.9	2.9	3.3	3.5	2.7	2.6	3.1	3.2
10 days	5.0	5.6	6.3	5.6	5.7	5.2	5.8	5.6
21 days	9.2	9.4	11.6	10.4	10.3	8.7	10.1	9.7

[a] Supplied 234 ppm iron, approximately 14 days prebreeding through lactation.
[b] Supplied 650 ppm iron, approximately 28 days prefarrowing through lactation.
[c] Number of animals included in average.

Table 3. Effect of Feeding Iron to Gestating and Lactating Sows on Hematology and Weight Change[a]

	Basal		Basal + Swinacol 600	
	Basal	Basal + Iron Mountain	Basal + Swinacol 600	Basal + Swinacol 600 + Iron Mountain
Hemoglobin, g/100 ml				
Initial	11.8 (8)[b]	12.8 (8)	13.0 (7)	12.2 (6)
At farrowing	9.3	11.4	11.0	10.1
10 days	8.6	10.1	10.9	11.0
21 days	9.2	10.9	10.8	10.2
Hematocrit, %				
Initial	35.6	35.4	35.7	34.7
At farrowing	33.3	35.4	35.7	33.8
10 days	32.7	34.5	36.3	34.0
21 days	32.6	35.9	35.7	35.5
Weight, lb.				
Initial	258	286	276	282
After farrowing	350	378	392	372
10 days	359	392	405	378
21 days	375	390	420	380

[a] See footnotes a and b, table 2.
[b] Number of animals included in average.

Table 4. Farrowing Results, Trial 1

	Basal		Basal + Swinacol	
	Basal	Basal + Iron Mountain	Basal + Swinacol	Basal + Swinacol + Iron Mountain
No. of pigs born alive	8.5	6.9	10.9	7.0
No. of stillbirths	.4	.6	.3	1.2
Avg pig birth weight, lb.	2.9	3.4	2.7	3.1
No. of pigs, 21 days	5.1	5.8	4.4	3.2
Avg pig weight, 21 days, lb.	9.3	11.0	9.6	9.9

Table 5. Effect of Dietary Iron Sources in Gestation and Lactation Diets on Hemoglobin and Pig Performance, Trial 2[a]

	Basal	Iron Mountain	Meth-Iron 65
Baby Pig			
Hemoglobin, g/100 ml			
Birth	8.89 (94)[b]	7.83 (106)	7.90 (122)
10 days	8.80 (68)	9.49 (54)	8.62 (89)
21 days	8.98 (64)	8.79 (52)	8.38 (84)
Weight, lb.			
Birth	3.1	3.0	3.0
10 days	6.6	6.7	6.9
21 days	12.0	11.8	12.1
Sow			
Hemoglobin, g/100 ml			
Initial	14.24 (10)	15.00 (12)	14.18 (13)
At farrowing	11.34	10.05	11.93
10 days	10.4	11.69 (11)	11.53
21 days	12.13	9.19	10.71
Weight, lb.			
After farrowing	464.4	435.42	421.85
10 days	442.9	424.55 (11)	420.31
21 days	451.8	420.1	413.08

[a] Meth-Iron 65 = Basal + 2 lb./ton of Meth-Iron 65 (145 ppm iron) and Iron Mountain = Basal + 10 lb. per ton of Iron Mountain (650 ppm iron).
[b] Number of animals included in average.

Table 6. Farrowing Results, Trial 2

	Basal	Iron Mountain	Meth-Iron 65
Number of pigs born alive	8.6	8.8	9.4
Number of stillbirths	1.4	2.0	1.2
Avg pig birth weight, lb.	3.1	3.0	3.0
Number of pigs, 21 days	5.8	4.3	6.5
Avg pig weight, 21 days, lb.	12.0	11.8	12.1