Effects of feeding increasing levels of iron from either iron sulfate or novel source of dietary iron on growth performance and iron status of nursery pigs

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Introduction

- Iron sulfate is the most common source of dietary iron used in swine trace mineral premixes for swine.
- A novel source of dietary iron, $FeCO_3$, is available; however its efficacy compared to iron sulfate has not previously been tested in diets for pigs.

Objective

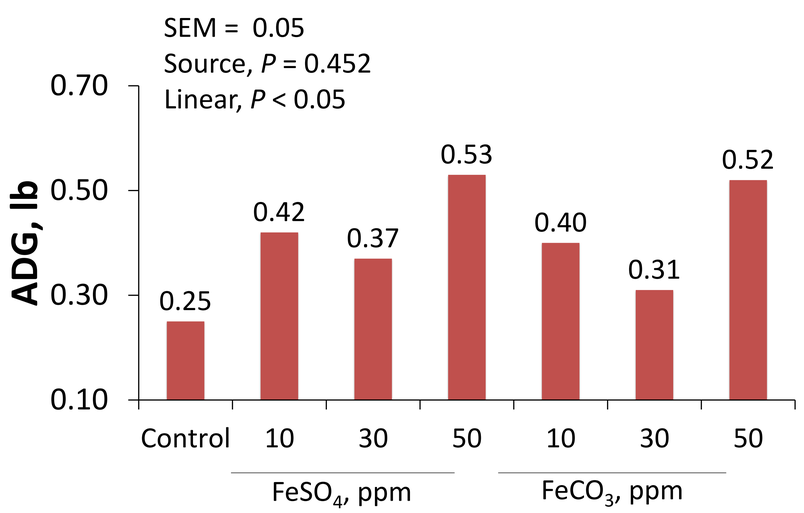
To evaluate the effects of increasing added dietary iron from either iron sulfate or micronized ferrous carbonate (Micronutrients Inc., Indianapolis, IN) on growth performance and blood iron status of nursery pigs.

Experimental Procedures

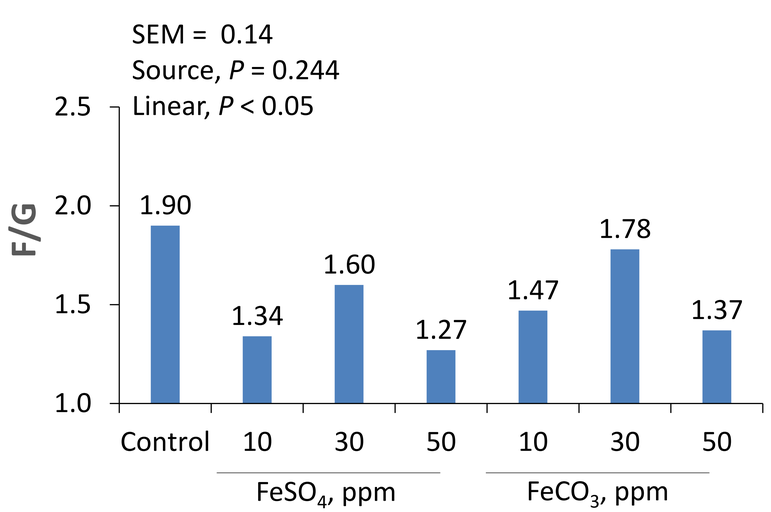
- A total of 140 gilts and barrows (DNA 241 x 600, initially 12.2 lb BW) were assigned to 1 of 7 dietary treatments in a 32-day study.
- There were 5 to 6 pigs per pen with 4 replicate pens per treatment. Pigs were allotted by BW in a completely randomized design.
- Pigs had ad-libitum access to feed and water throughout the study.
- Pigs were weighed and feed disappearance was measured on day 0, 7, 14, 21, and 32.
- An iron-free trace mineral premix was used in place of normal trace mineral premix to decrease iron content of diet.
- Treatments were arraigned in a 2×3+1 design with the 7 dietary treatments as:
  - a) Control diet: 0 ppm added Fe (40 ppm added iron from ingredients)
  - b) Control diet + 10 ppm of Fe from iron sulfate
  - c) Control diet + 30 ppm of Fe from iron sulfate
  - d) Control diet + 50 ppm of Fe from iron sulfate
  - e) Control diet + 10 ppm of Fe from ferrous carbonate
  - f) Control diet + 30 ppm of Fe from ferrous carbonate
  - g) Control diet + 50 ppm of Fe from ferrous carbonate

Experimental Period Results

Average Daily Gain



Feed/Gain



Hematological Performance[1]

Item	Control[2]	$FeSO_4$, ppm			$FeCO_3$, ppm			SEM	Probability, P <			
									Source x Level	Source	Linear $FeSO_4$	Linear $FeCO_3$
		10	30	50	10	30	50					
Hgb, g/dl												
d 0	4.6	4.5	4.4	4.7	4.4	4.3	4.7	0.21	0.863	0.604	0.662	0.757
d 14	5.1	5.5	5.3	6.1	5.3	5.5	5.7	0.23	0.446	0.437	0.007	0.039
d 32	6.9	7.3	7.6	8.5	7.1	7.4	8.2	0.55	0.592	0.403	0.003	0.009
Hct, %												
d 0	16.6	16.2	15.6	16.9	15.7	15.3	16.4	0.62	0.647	0.383	0.775	0.893
d 14	18.5	20.3	19.1	22.3	19.6	20.0	20.8	0.85	0.454	0.494	0.008	0.043
d 32	24.8	26.6	26.9	29.8	26.0	26.5	29.5	1.69	0.903	0.600	0.004	0.005

[1]All pigs on trial were bled on d 0, 7, 14, 21, and 32 and blood was analyzed for hemoglobin and hematocrit (Kansas State University Veterinary Diagnostic Lab, Manhattan, KS).

[2]Negative control that contained 40 ppm total iron content of the diet

Conclusions

- Feeding increasing $FeSO_4$ or $FeCO_3$ improved growth performance and hematological criteria compared to the negative control.
- There was no evidence of difference for iron sources evaluated based on both growth or blood criteria measured.
- It can be assumed that the bioavailability of the micronized source of $FeCO_3$ is similar to that of $FeSO_4$.