



Effects of Increasing Chloride Concentrations for 15 to 25 Pound Nursery Pigs

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Introduction

- Current NRC (2012) recommendations for Na and Cl are 0.35% and 0.45%, respectively
- Chloride is linked to helping young pigs secrete gastric HCl which can result in increased ability to digest protein (Mahan et al. 1996)
- Chloride has a positive impact on ADG and ADFI up to a dietary Cl of 0.50% in dried whey diets with added HCl (Mahan et al. 1996).
- In dried whey diets containing added salt, Shawk et al. (2016) found positive improvement in ADG, ADFI, and F/G up to a calculated dietary Na concentration of 0.37% and dietary Cl concentration of 0.72%
- There is limited data on the effects of increasing Cl on growth performance of nursery pigs weighing approximately 15 to 25 lb

Objective

Evaluate the effects of increasing dietary chloride on the growth performance of 15 to 25 lb

Experimental Design

- 300 barrows and gilts (DNA 240 X 600; initially 15.5 lbs BW)
- After 7 d in the nursery, pens of pigs were allotted to treatment according to BW
- There were 5 pigs per pen with 10 replications per treatment
- Ad libitum access to feed and water was provided at all times
- Treatment diets were fed for 14 d
- Pigs were weighed and feed disappearance was measured on d 0, 7, and 14
- Pigs were fed one of six dietary treatments:
 - Control: 15.5 lb/ton added salt (0.35% Na, 0.72% Cl)
 - Cl concentrations of 0.26, 0.38, 0.49, 0.61, or 0.72%. These diets used potassium chloride to increase Cl concentration and sodium bicarbonate for a dietary Na source.
- Dietary sodium concentration was 0.35% in all diets

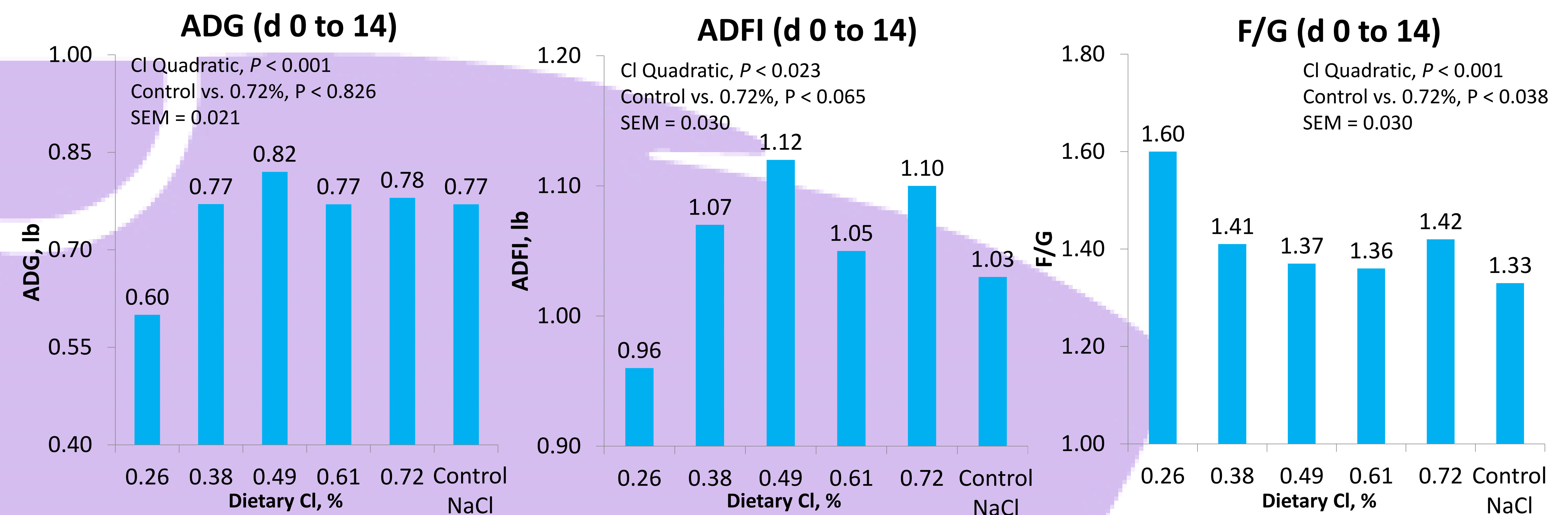
Experimental Diets (as-fed)

Item	Chloride, %					Control
	0.26	0.38	0.49	0.61	0.72	
Corn	47.41	47.41	47.41	47.41	47.41	47.41
Soybean meal (48% CP)	29.82	29.82	29.82	29.82	29.82	29.82
Lactose	7.20	7.20	7.20	7.20	7.20	7.20
HP 300 ¹	7.80	7.80	7.80	7.80	7.80	7.80
Choice white grease	1.95	1.95	1.95	1.95	1.95	1.95
Monocalcium P (21% P)	1.10	1.10	1.10	1.10	1.10	1.10
Limestone	1.30	1.30	1.30	1.30	1.30	1.30
Sand	0.98	0.73	0.49	0.23	-	1.35
Potassium chloride	-	0.25	0.49	0.75	0.98	0.00
Sodium bicarbonate	1.15	1.15	1.15	1.15	1.15	0.00
Salt	-	-	-	-	-	0.78
Zinc oxide	0.25	0.25	0.25	0.25	0.25	0.25
Trace mineral premix	0.15	0.15	0.15	0.15	0.15	0.15
Vitamin premix	0.25	0.25	0.25	0.25	0.25	0.25
Phytase ²	0.02	0.02	0.02	0.02	0.02	0.02
L-Lys-HCL	0.30	0.30	0.30	0.30	0.30	0.30
DL-Met	0.17	0.17	0.17	0.17	0.17	0.17
L-Thr	0.16	0.16	0.16	0.16	0.16	0.16
Total	100.00	100.00	100.00	100.00	100.00	100.00

²Hamlet Protein, Findlay, OH

²HiPhos 2700 (DSM Nutritional Products, Inc., Parsippany, NJ), providing 184.3 phytase units (FTU)/lb and an estimated release of 0.10% available P.

Experimental Results



Calculated Composition

Item	Chloride, %					Control
	0.26	0.38	0.49	0.61	0.72	
NE kcal/lb	1,110	1,110	1,110	1,110	1,110	1,110
SID Lys:ME, g/Mcal	4.06	4.06	4.06	4.06	4.06	4.06
Na, %	0.35	0.35	0.35	0.35	0.35	0.35
Cl, %	0.26	0.38	0.49	0.61	0.72	0.72
K, %	1.01	1.14	1.26	1.40	1.51	1.01

Chemical Analysis of Diets¹

Item, %	Chloride, %					Control
	0.26	0.38	0.49	0.61	0.72	
DM	92.7	91.8	91.4	91.4	91.6	91.8
CP	22.3	23.3	23.6	23.4	22.9	22.9
Na	0.32	0.30	0.31	0.32	0.42	0.27
Cl	0.16	0.26	0.32	0.48	0.46	0.50

¹ Multiple samples were collected from each diet throughout the study, homogenized, and then subsamples for analysis (Ward Laboratories, Inc., Kearney, NE).

Summary and Conclusions

- ADG and ADFI was improved for pigs consuming 0.49% Cl during the 14 d experimental period
- There was little evidence of differences in ADG and ADFI for pigs fed the 0.72% Cl diet as compared to the pigs fed 15.5 lb NaCl
- Pigs fed the control diet (15.5 added NaCl) had improved F/G compared to those on the 0.72% Cl diet
- This data indicate that the source of chloride and sodium ions may have an effect on feed efficiency
- In conclusion, 0.49% dietary Cl was necessary for improved growth and intake for nursery pigs weighing approximately 15 to 25 lb