



Effect of KemTRACE® Chromium Propionate Supplementation on Growth Performance of Weaned Pigs

A study was conducted starting November of 2009 in a commercial research facility located in North Central Iowa to evaluate the effect of KemTRACE® Chromium Propionate on growth performance of weaned pigs. This study was performed on pigs obtained from a commercial system utilizing modern high lean growth genetics for their animals. A total of 484 pigs, weighing approximately 12-14 pounds, were weaned at 21 +/- 2 days of age and placed into a wean-to-finish barn. Pigs were assigned, based on weight, to a control diet or control diet plus 200 ppb chromium (supplied by KemTRACE® Chromium Propionate). Pigs were fed commercially available, standard diets, which are utilized by over a quarter of the U.S. swine industry. Feed intake and pig weights were the response criteria monitored in this study. Pigs fed supplemental chromium ate more feed and gained more weight ($P < 0.05$). Pigs fed chromium weighed an additional 0.79 lbs over control 42 days after nursery placement. All animal husbandry was performed at the standard US commercial levels.

Introduction

Chromium supplementation of swine diets has been investigated for at least 30 years with organic forms being more bioavailable than inorganic sources. According to a National Research Council review of chromium research in growing-finishing pigs (NRC 1997), only about 30 – 40% of experiments with chromium have resulted in a positive response in economically important criteria such as gain or feed conversion. Chromium propionate was first permitted as a chromium source in swine diets by the U.S. Food and Drug Administration (FDA) in a letter of non-objection in August 2000. Chromium propionate has also been permitted as a supplement for growing and finishing swine intended to improve average daily gain by the Canadian Food Inspection Agency. Research conducted at Louisiana State University (Matthews et al., 2001) clearly demonstrated that chromium propionate is a more bioavailable form of chromium than inorganic sources in the market². Chromium has been shown to increase growth in both nursery and grow/finish pigs^{3,4}.

This study was conducted to determine the effect of feeding chromium propionate to pigs in the nursery phase. The study was also conducted utilizing standard nursery diets from a feeding program designed for large commercial production systems. All production, husbandry, and conditions were of a standard associated with large scale production practices in the United States. Additionally, the pigs were monitored by a licensed veterinarian throughout the trial period.

Materials and Methods

A study was conducted in November in a commercial research facility located in North Central Iowa. A total of 484 mixed sex market animals were placed in wean to finish facilities. The pigs were weaned at 21±2 days and placed into pens according to weights and gender with 22 pigs assigned to each pen. The pigs were maintained in the same pens throughout the study (42 days). Pigs were fed commercially available, standard diets, which are utilized by over a quarter of the U.S. swine industry. Pigs were either fed a control diet or control diet plus 200 ppb chromium from KemTRACE® Chromium Propionate. KemTRACE® Chromium Propionate 0.04% Dry Mineral Supplement was added to nursery and grow-finishing feeds at an inclusion rate of 0.5 kg/tonne (1 lb/ton) to achieve a concentration of 200 ppb Cr in the finished diet. Feed disappearance and weights were recorded at day 0, 7, 14, 21, 28 and 42 after placement. Data for average daily gain (ADG) and average feed/gain were analyzed as a repeated measures design using Proc GLM procedure of SAS. The model consisted of treatment and period and all interactions.

Results

The data from this trial indicated that the inclusion of chromium from KemTRACE® Chromium Propionate in the starter program of pigs was effective at increasing growth by increasing average daily feed intake (ADFI). Chromium has been demonstrated to increase glucose clearance⁵, and therefore drive feed intake of the pig at this stage of growth. Table 1 demonstrates an increase in ADFI throughout the nursery phase.



Table 1. Pig Average daily feed intake (lbs/day)

Days	Control	Chromium Propionate
0-7*	0.418	0.463
0-14	0.572	0.594
0-21*	0.730	0.772
0-28	0.917	0.933
0-42	1.332	1.379

* P < 0.05

Energy intake is one of the main factors determining the growth of the weaned pig. Pigs in the nursery phase are in an energy dependent stage of growth, meaning that as feed intake increases, pigs will efficiently gain more weight. Data in Table 2 clearly demonstrates that when pigs fed chromium propionate consumed more feed, they increased daily gain within the same time frame. The increases in ADG are similar to gain differences seen in previous research^{3,4} utilizing KemTRACE® Chromium Propionate as a dietary chromium supplement.

Table 2. Pig Average daily gain for pigs (lbs/day)

Days	Control	Chromium Propionate
0-7*	0.414	0.470
0-14	0.546	0.572
0-21*	0.656	0.701
0-28	0.787	0.797
0-42	1.033	1.063

* P < 0.05

Increased body weights in weaned pigs are important to producers, as it is generally regarded by producers that bigger pigs are healthier and perform better as the growth period extends through the growing and finishing phases of production. The cumulative effect of the average daily gain response is demonstrated in the body weights of the pigs in Table 3. The supplementation of chromium from chromium propionate provided a 0.79 lb response over control at day 42.

Table 3. Pig body weights (lbs)

Day	Control	Chromium Propionate	Difference
0	14.35	13.87	-0.48
7	17.25	17.15	-0.10
14	22.00	21.88	-0.12
21	28.13	28.52	0.39
28	36.39	36.17	-0.22
42	57.72	58.51	0.79

Conclusions

This trial, along with previous reported trials^{3,4} utilizing KemTRACE® Chromium Propionate, demonstrates that supplementation with a highly bioavailable source of chromium in the nursery and/or grow-finish phases of production can increase the growth rate of pigs by driving higher feed intake. The responses vary by gender, time period, environment, and feedstuffs, but chromium supplemented pigs consume more and grow faster at some point in the production cycle.

In this trial, supplementation of KemTRACE® Chromium Propionate resulted in better growth performance in weaned pigs fed commercially relevant diets. Pigs supplemented with 200 ppb of chromium, from chromium propionate, provided a 0.79 lb advantage over pigs that did not receive chromium supplementation.



References

1. L. Greiner, R. Hinson, G. Allee, A. Yersin, A. Lamptey and B. Kremer 2010. Effect of Chromium Propionate supplementation on Growth Performance and Carcass Traits from Wean to Finish Pigs. Proceedings of the Midwest ASAS ADSA Meetings 2010.
2. Matthews, J.O., L. L. Southern, J. M. Fernandez, J. E. Pontif, T. D. Bidner, and R. L. Odgaard 2001. Effect of chromium picolinate and chromium propionate on glucose and insulin kinetics of growing barrows and on growth and carcass traits of growing-finishing, barrows. *J. Anim. Sci.* 79: 2172-2178.
3. Kemin Internal Document 06-00048.
4. Kemin Internal Document 09-00081.
5. National Research Council. 1997. The role of chromium in animal nutrition. National Academy Press, 80.