

Chromium (Cr), described as a response mineral versus a required mineral by the National Research Council (NRC), has demonstrated improved performance and carcass characteristics of swine fed diets supplemented with organic Cr. Managing stress responses associated with swine in the final growth stage is critical to maintaining peak performance. As various stress events deplete the body's store of Cr (Anderson, 1994), it becomes important to supplement the diet with organic Cr to replenish these depletions, adding an additional layer of support for the pig.

The impact of supplementing organic Cr in swine diets has been extensively researched. Research has demonstrated improved growth performance such as average daily gain (ADG), average daily feed intake (ADFI) and dry matter intake (DMI). Research also reported improved carcass characteristics such as dressing percent and percent carcass lean, along with support of glucose metabolism (J. Sales and F. Jančík, 2011).

Figure 3 is a meta-analysis summarizing peer reviewed research focusing on growth performance and carcass characteristics in swine supplemented with various forms of organic Cr.

**Figure 3. Dietary Cr supplementation vs. No Supplementation: Summary of Effects on swine growth performance and carcass characteristics**

Response Variables	Studies	95% Confidence Interval	P-Value
<b>Growth Performance</b>			
Average Daily Gain (ADG)	31	0.021 to 0.277	0.023
Average Daily Feed Intake (ADFI)	29	-0.126 to 0.137	0.935
Grow:Finish (G:F)	31	0.176 to 0.431	< 0.001
<b>Carcass Characteristics</b>			
Dressing %	23	0.023 to 0.320	0.024
% Carcass (Lean)	22	0.329 to 0.654	< 0.001
% Carcass (fat)	9	-0.065 to -0.093	0.009
Longissimus Muscle Area	29	0.359 to 0.628	< 0.001
10th Rib Fat Thickness	24	-0.565 to -0.267	< 0.001
Average Backfat Thickness	18	-0.292 to 0.060	0.196

Numerous studies have been conducted on the impact Cr has on swine growth performance and carcass characteristics. Figure 3 is a meta-analysis of Cr response versus no Cr response in the diet of grow-finish pigs. (Higgins and Thompson (2002)

# PHI-CHROME®

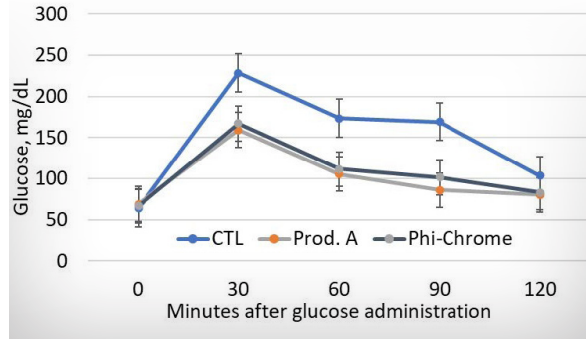


## Understanding the Effects of Chromium Source and Quality in Swine

Research demonstrates the impact chromium (Cr) may have on metabolic responses. Chromium propionate is a more bioavailable source of Cr and works to help improve insulin sensitivity and promote glucose uptake, which is essential in maintaining normal metabolism of carbohydrates, proteins and lipids (Anderson, 2003). Increased sensitivity to insulin may increase the clearance rate of glucose from the blood, allowing more efficient utilization of energy by the various tissues.

Figure 1 illustrates the blood glucose concentrations after administration of a glucose tolerance test (GTT) following 16 hours of overnight fasting. Both sources of chromium propionate evaluated demonstrated improved glucose utilization by animals supplemented with Cr.

**Figure 1. Blood Glucose Concentrations of Sprague-Dawley Rats with Chromium Propionate in their Diet After Intraperitoneal Glucose Injection (2.0 g/kg BW)**



Phibro Animal Health Corporation, Corvallis Research Center, 2020

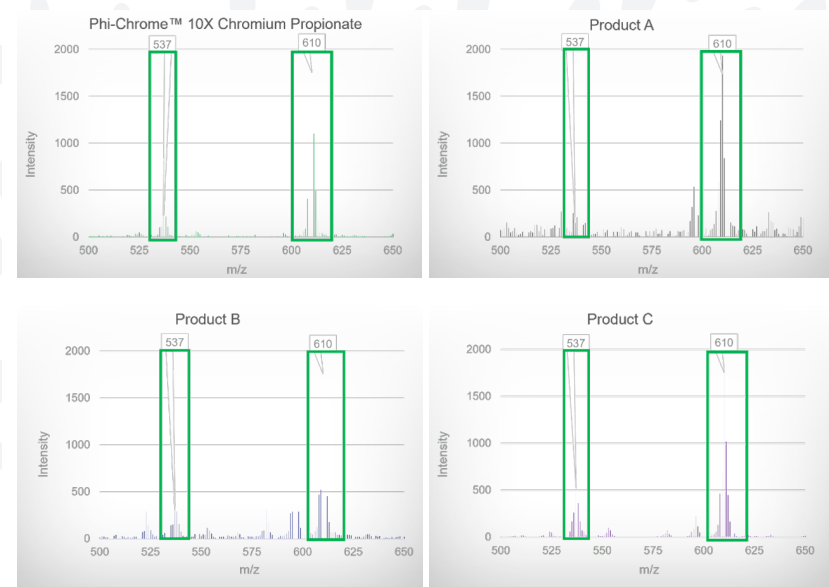
Significance was set at  $P < 0.05$ , with Diet ( $P = 0.03$ ) and Time ( $P < 0.0001$ ) found to be significantly different. The results indicate Phi-Chrome® and the leading competitive chromium propionate product (Product A) performed similarly when glucose metabolism response was tested.

### Minerals Matter™

At Phibro, quality matters at every stage of manufacturing and production. Phi-Chrome® chromium propionate and chromium tripicolinate 0.4 and 0.04% products are all produced in the United States. In combination with decades of manufacturing expertise and our Dynamic Quality Assurance® (DQA®) process, Phibro ensures a high quality, consistent product is delivered to our customers every time.

Time-of-Flight Secondary Ion Mass Spectrometry (TOF-SIMS) data is the primary analysis performed on organic chromium products to identify the target compound using its unique mass. Chromium propionate was confirmed in all samples tested using TOF-SIMS analytical methods.

**Figure 2. TOF-SIMS of Different Chromium Propionate Sources for Identification of Compounds and their Components by Mass**



Eurofins EAG, 2020

Peaks outside the chromium propionate peaks (identified by green boxes) indicate the presence of other compounds. A reduced number of peaks outside the chromium propionate mass were reported in the Phi-Chrome chromium propionate sample. The reduced peaks in Phi-Chrome indicate increased stability and purity of Phibro's chromium propionate product versus the competitive products available in the market.

This information has been prepared for use with industry technical professionals.