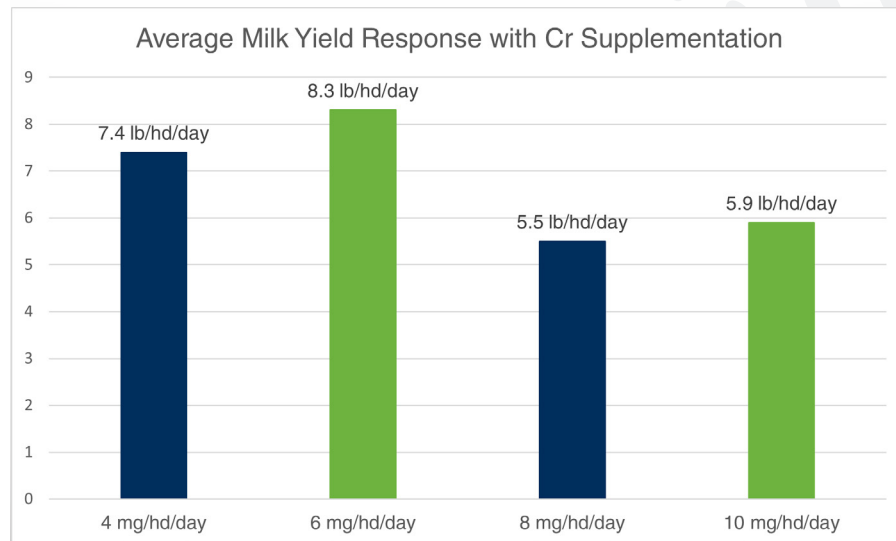


Chromium (Cr), described as a response mineral by the National Research Council (NRC) versus a required mineral, showed improved performance and production characteristics when animals were fed diets supplemented with organic Cr. Managing stress responses associated with dairy cows is critical to maintaining 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 cow.

The impact of supplementing organic Cr in dairy diets has been extensively researched. Research has demonstrated increased milk yield, improved dry matter intake (DMI) and average daily gain (ADG), along with support of glucose metabolism (Perchova et al., 2002; Smith et al., 2005; Sadri et al., 2009; Bernhard et al., 2012), highlighting the impact Cr may have on your herd.

Figure 1 is a summary of peer reviewed research focusing on milk yield response in dairy cows supplemented at various levels with organic Cr (4, 6, 8 and 10 mg/hd/day).

**Figure 1. Milk Yield Response with Cr Supplementation in Lactating Cows**



Numerous studies have been conducted on the impact Cr has on milk yield response. Figure 1 is a compilation of milk yield response data, where the average milk yield response was calculated for the various Cr inclusion rates (4, 6, 8 and 10 mg/hd/day, respectively).

# PHI-CHROME®

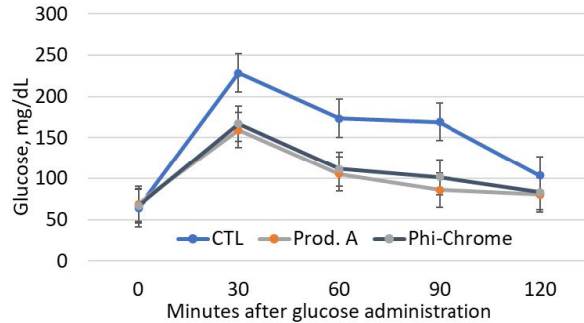


## Understanding the Effects of Chromium Source and Quality in Dairy Applications

Research demonstrates the impact Cr may have on metabolic responses. Chromium propionate is a more bioavailable source of Cr and works to 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 2 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 2. Blood Glucose Concentrations of Sprague-Dawley Rats with Chromium Propionate in their Diet After Intraperitoneal Glucose Injection (2.0 g/kg BW)**



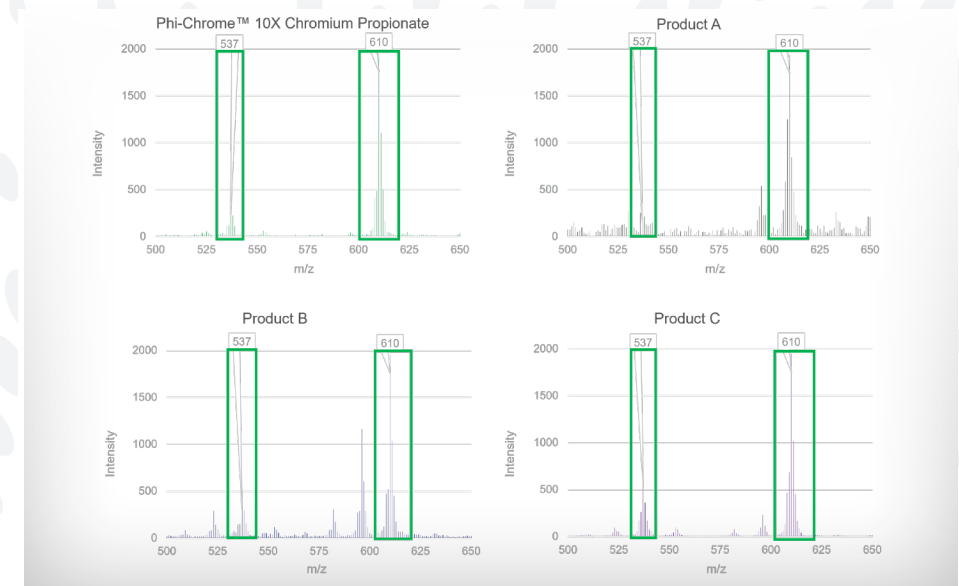
RS100, Corvallis Research Center, 2020

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.

At Phibro, Minerals Matter™, which means 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 3. TOF-SIMS of Different Chromium Propionate Sources for Identification of Compounds and their Components by Mass**



Eurofins EAG, 2020

Peaks outside the chromium propionate peak (identified by the green box) 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.