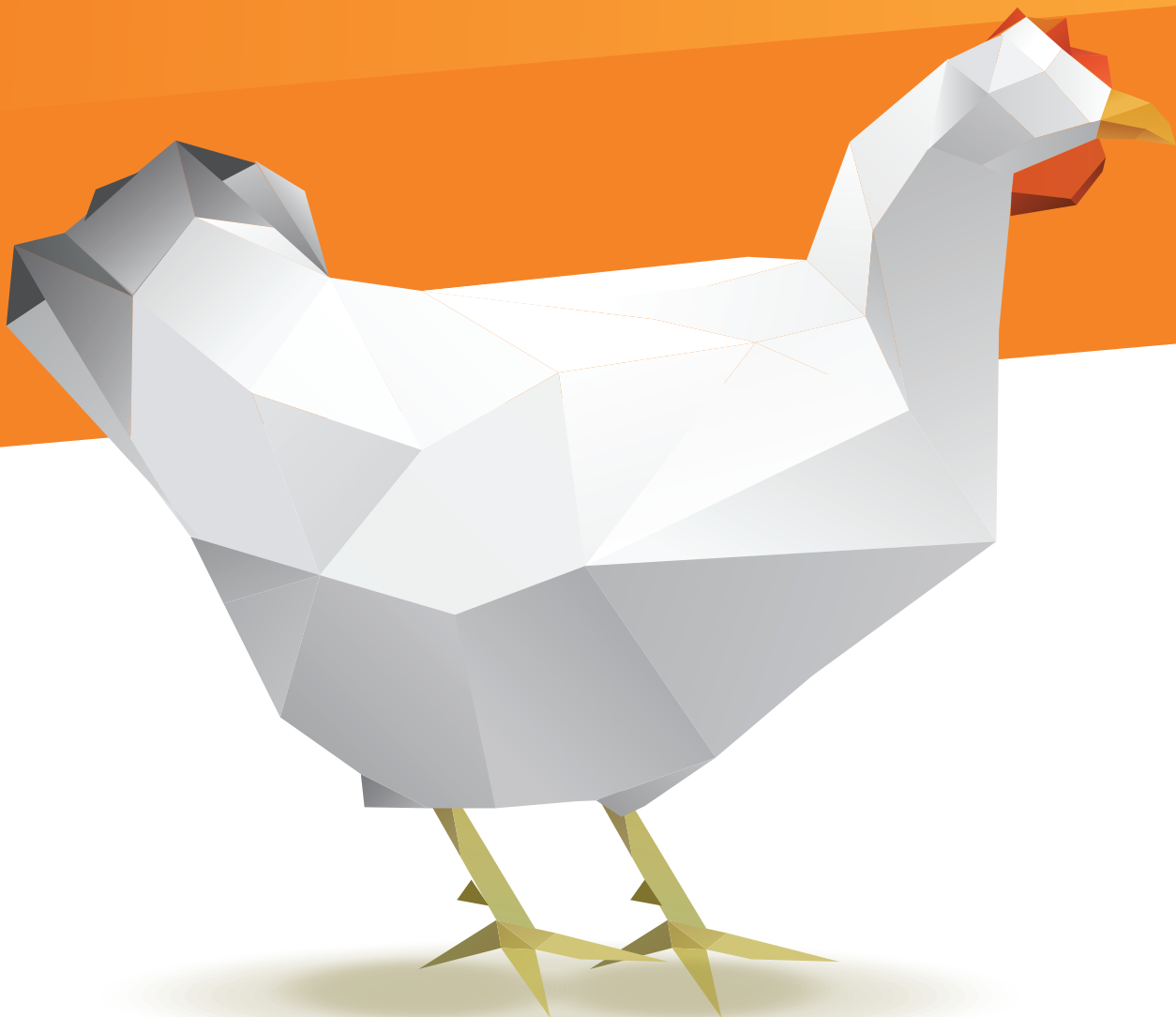


KemTRACE[®]
CHROMIUM
Essential to you and your operation.

KEMIN

DESIGNED FOR OPTIMAL
BROILER PERFORMANCE



kemin.com/chromium

KemTRACE[®] CHROMIUM

Essential to you and your operation.

KemTRACE[®] Chromium — the first product of its kind on the market — is a safe, proven trace mineral for use in broiler, swine, dairy, beef and horse diets.

FEATURES AND BENEFITS:

- KemTRACE[®] Chromium-OR — an OMRI Listed, organic-compliant form of chromium propionate — is also available in the U.S. for use in organic diets.
- KemTRACE Chromium and KemTRACE Chromium-OR are manufactured in the U.S., sourced from U.S.-based raw materials and are available in two product concentrations:
 - 0.04% (for use in complete diets)
 - 0.4% (for use in a premix)
- The first organic trace mineral approved in the U.S. for broiler diets in more than 40 years¹
- Highly bioavailable, organic source of chromium
- Designed for optimal absorption to maximize performance
- Reduces the negative biological impacts of stress in birds by reducing the levels of corticosterone^{2,5} — allowing each bird to reach its full genetic potential
- Improves both performance and processing parameters, such as feed conversion ratio, livability and breast meat yield³

WHAT IS KemTRACE[®] CHROMIUM?

This highly bioavailable, organic source of chromium propionate helps to reduce the negative effects of stress — leading to increased production and profitability.

Backed by decades and millions of dollars of research — including more than 50 peer-reviewed chromium research trials — KemTRACE Chromium is manufactured by Kemin with an established chain of custody and traceability. Kemin manufactures according to strict safety standards set by the U.S. Food and Drug Administration (FDA) with materials sourced entirely from the United States.

FEEDING INSTRUCTIONS: BROILERS

Delivers 0.2 parts per million (200 parts per billion) chromium (from chromium propionate) when added and thoroughly mixed at the rate of 1 pound (0.5 kg) per ton of complete broiler feed.

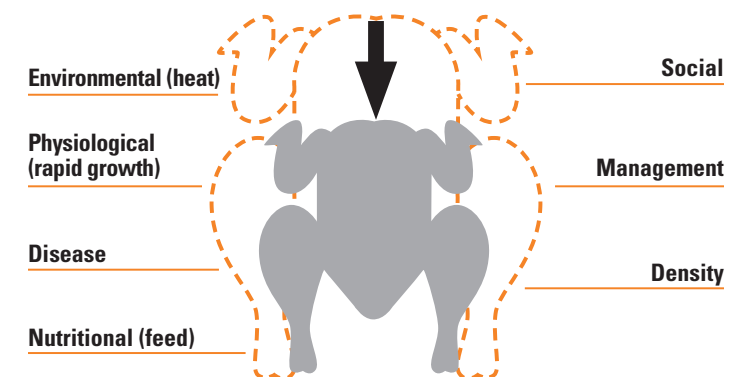
Broiler feeding rate not to exceed 200 parts per billion.

1. 21 CFR 573.304, Chromium Propionate.
2. Toghiani et al. 2006. International Journal of Poultry Science 5 (1):65-69.
3. Lester, T., K. Brown, C. Eagleson, V. Iseni, J. Lee. 2017. Evaluation of chromium propionate on broiler growth performance and processing yields. Journal of Poultry Science 96 (E-suppl. 1): 188.
4. Puvaldipired S., J. P. Thaxton. 2000. Model of physiological stress in chickens 1. Response parameters. Poul. Sci. 79:363-369.
5. Alejandro, C.-I., et al. 2014. Environmental Stress Effect on Animal Reproduction. Open Journal of Animal Sciences, 4, 79-84.
6. Miller, D.B., et al. 2002. Neuroendocrine Aspects of the Response to Stress. Metabolism. Vol 51:5-10.
7. Mirfendereski, E., R. Jahanian. 2015. Effects of dietary organic chromium and vitamin C supplementation on performance, immune responses, blood metabolites, and stress status of laying hens subjected to high stocking density. Poultry Science 94:281-288.

THE FIRST OF ITS KIND. THE FIRST IN ITS CLASS.

MODE OF ACTION

When a bird is exposed to environmental or disease stressors, a stress hormone called corticosterone is released. The release of corticosterone alters how nutrients are utilized by the bird. During periods of stress, nutrients are re-allocated from growth toward minimizing the stress being experienced by the bird. When nutrients are siphoned away from growth in this way, performance can be negatively impacted.



Chromium supplementation has been shown to decrease the levels of corticosterone in the blood, thereby alleviating the negative effects of stress on growth and performance to allow the bird to reach its full genetic potential.⁴⁻⁷

STRESSORS

ACTIVATE THE HYPOTHALAMIC-PITUITARY-ADRENAL (HPA) SYSTEM

ACTIVATES THE ADRENAL GLAND

RELEASES CORTICOSTERONE

RESEARCH TRIALS DEMONSTRATE ACTUAL RESULTS

A research trial in broilers conducted by a land-grant university evaluated the effect of KemTRACE Chromium on growth, performance and carcass yield in Ross 708 broilers, raised to 48 days of age.^{3,8}

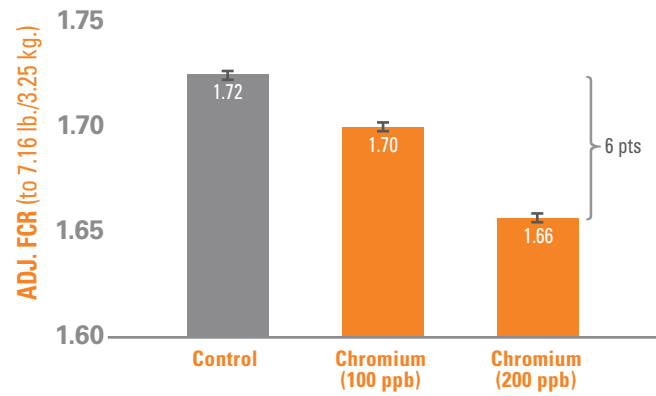


Figure 1: Effects of KemTRACE® Chromium on adjusted feed conversion ratio of broiler Ross 708 chicks from d1-48. $P = 0.057$. Error bars represent pooled SEM.

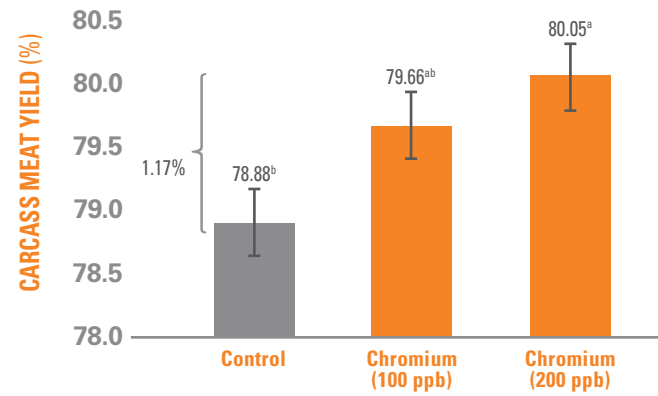


Figure 2: Effects of KemTRACE® Chromium on carcass meat yield of broiler Ross 708 chicks on d48. ^{a,b}Superscripts indicate significant differences. $P < 0.05$. Error bars represent pooled SEM.

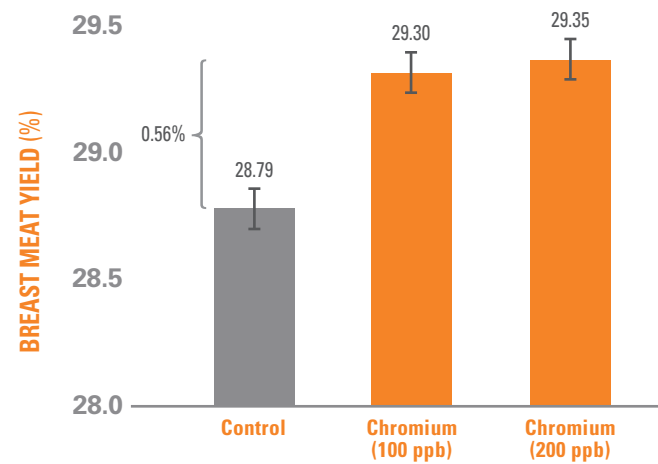


Figure 3: Effects of KemTRACE® Chromium on breast meat yield of broiler Ross 708 chicks on d48. Error bars represent pooled SEM.

8. The Effect of KemTRACE Chromium on Broiler Performance and Carcass Characteristics, TD-17-00208.

Four separate university studies utilizing different genetic strains of birds, ages, body weights and environmental stressors (e.g. heat stress, vaccination, etc.) demonstrated that the addition of chromium propionate in feed resulted in consistent improvements in adjusted feed conversion ratio (FCR), mortality and breast meat yield (Table 1). These university results coincide with the results seen in field evaluations with chromium propionate supplementation.

The results of both university and field evaluations demonstrate that KemTRACE Chromium is a highly bioavailable source of chromium that minimizes the impacts of stress, thus improving both performance and processing parameters.³

Table 1: Summary of key performance parameters for various strains, weights and ages of broilers from university pen trials.

	STRAIN	AGE (d.)	BODY WEIGHT (lbs. / kg.)	ADJUSTED FCR IMPROVEMENT (points of FCR)**	MORTALITY DECREASE (%)*	BREAST YIELD INCREASE (%)*
Study 1	Cobb 500	60	8 / 3.63	2	ND	0.25
Study 2	Ross 708	48	7 / 3.18	6	ND	0.50
Study 3	Cobb 700	52	8 / 3.63	4	1.02	0.31
Study 4	Ross 708	47	7 / 3.18	6	1.98	ND

*Compared to control. ND - No difference from control.

**Adjusted for weights and mortality.

Study 1: Vignale, K., D. Koltes, J. Weil, S. West, S. Weimer, V. Iseri, K. Christensen. 2017. The effect of chromium propionate on performance responses in heat stressed male broiler chickens. 2017 International Poultry Scientific Forum. Atlanta, GA. Abstract T181, page 53.

Study 2: Lester, T., K. Brown, C. Eagleson, V. Iseri, J. Lee. 2017. Evaluation of chromium propionate on broiler growth performance and processing yields. Journal of Poultry Science 96 (E-suppl. 1): 188.

Study 3: The Effect of KemTRACE Chromium on Broiler Performance and Carcass Characteristics, TD-17-00208.

Study 4: Lester, T., K. Brown, K. Vignale, C. Alvarado, J. Lee. 2018. Evaluation of chromium propionate and a butyric acid complex on male growth performance, corticosterone level and meat yield. 2018 International Poultry Scientific Forum. Atlanta, Georgia. Abstract M86, pg. 26.

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CHROMIUM
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QUALITY & SAFETY: IT'S ALL BY DESIGN

Only Kemin has invested more than 20 years and millions of dollars toward scientific research, validating the benefits of chromium propionate while bringing this essential trace mineral to millions of animals around the globe.



COMMITMENT TO QUALITY

KemTRACE Chromium is manufactured from materials sourced entirely from the United States, under strict quality control specifications that meet the food additive standards published in 21 CFR 573.304. Kemin also maintains a Food Safety System Certification (FSSC) 22000 — recognized under the Global Food Safety Initiative — for its manufacturing facility in Des Moines, Iowa.

Kemin is the world's largest producer of chromium propionate and has conducted more than 50 peer-reviewed chromium research trials in order to add further assurances regarding product safety, efficacy and traceability. Our rigorous regulatory approach demonstrates our commitment to safety and science.

CONFIDENCE STARTS IN THE LABORATORY

The quality and safety of our products are paramount at Kemin, and processes are in place for testing not only our final products, but also our raw materials. With our quality control program, customers can have confidence we understand our technology, how our molecules work and that the ingredients are safe and efficacious.

TECHNICAL EXPERTISE AT EVERY TURN

At Kemin, we are devoted to ensuring customers receive trusted nutritional advice when evaluating animal performance. KemTRACE Chromium is supported by our technical service team comprised of respected Ph.D. nutrition and animal health experts with an array of valuable experience in research and production.



DESIGNED FOR YOU

Our commitment to chromium promises to provide you with a high quality, safe and efficacious product to help your animals reach their optimal performance while maintaining profit. Kemin understands your need to raise healthy livestock that give consumers the nutritional and health benefits they are looking for. We focus our products and services to help you achieve optimal nutrition, feed quality, gut health and pathogen control.

Only Kemin has invested more than 20 years and millions of dollars toward scientific research, validating the benefits of chromium propionate while bringing this essential trace mineral to millions of animals around the globe. Kemin has conducted more than 50 peer-reviewed chromium research trials in order to add further assurances regarding product safety, efficacy and traceability. Our rigorous regulatory approach demonstrates our commitment to safety and science.



KemTRACE Chromium is the only FDA-reviewed source of chromium propionate on the market today.



Learn more about how KemTRACE Chromium can optimize sow performance at kemin.com/chromium.

1-800-752-2864