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The effect of a combination of products on the performance of pigs during chronic heat stress[1]

Abstract

A study was conducted evaluating the effect of feeding KemTRACE® Chromium, KemTRACE® Zinc and ENDOX® Dry antioxidant in combination to finishing pigs in both a thermoneutral and a heat stress environment. In this study, the pigs fed the combination of products showed a numerical difference in total gain of 5.7 and 3.1 lbs (Table 2). The high level of response in a short period of time provides indication that the combination of products was an effective intervention to reduce the overall effect associated with heat stress.

Introduction

Reduced feed intake and weight gain are common effects associated with heat stress. Multiple feed additives have biological functionality that suggests a benefit if fed during heat stress. Assessing the ability of the combination of these feed additives to increase feed intake during heat stress could determine a value-added feeding program strategy. A combination of the products KemTRACE® Chromium, KemTRACE® Zinc, and ENDOX® Dry antioxidant was formulated to support metabolic function, energy metabolism, and reduce feed ingredient oxidation.

Chromium supplementation has been shown to improve glucose metabolism via higher insulin sensitivity (Matthews et al., 2001) and the chromium propionate molecule is highly soluble, leading to more rapid absorption (Vincent, 2000). Improved growth performance of animals when chromium propionate was supplied supports this effect. Greiner et al. (2010) demonstrated that by feeding chromium propionate at a rate of 200 ppb there was improved growth rate in barrows from 46 days after weaning through slaughter. Hinson et al. (2009) observed that gilts fed chromium during the last 4 weeks prior to slaughter had improved growth performance. James (2009) reported that chromium fed from weaning through 42 days after weaning increased the growth rate of weaned pigs. These improvements primarily resulted from feed intake when diets contained 200 ppb chromium from chromium propionate. During heat stress, feed intake is lower, resulting in lower gains; chromium may help address this reduction in feed intake and weight gain.

Zinc is associated with improved energy metabolism as an enzyme cofactor involved in converting glucose into ATP. The supplementation of pigs with zinc has increased macrophage activity (Van Heugten et al., 2003). This helps the body support growth and immune responses during higher stress events.

ENDOX Dry antioxidant was included to help reduce potential feed ingredient oxidation. Summer diets generally include higher levels of fat, with a higher oxidation potential. Oxidation affects palatability and nutritional value of ingredients. Heat within the storage bin also increases oxidative potential.

The objective of this trial was to evaluate the effect of these products in combination on growth performance of finishing pigs during heat stress.

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Materials and Methods

Forty (40) gilts (10 pigs/treatment; 200 lbs initial weight) were allocated to one of the six treatments. Pigs had a 5 day acclimation period in a thermoneutral environment (70-74 ºF) in two rooms. After 5 days, the temperature in the heat stress room was increased to 95 ºF for 21 days. All pigs were fed one of two dietary treatments (see Table 1. below). Then pigs were placed back in a commercial finisher until marketed. The combination of products included chromium propionate at a rate of 200 ppb, zinc propionate at a rate of 50 ppm, and ENDOX Dry antioxidant at the inclusion rate of 2 lbs/ton.

Table 1. Experimental design for determining the effect of combination of products

Diet × Temperature	Number of Pigs
Control feed + heat stress	10
Control feed + thermoneutral	10
Product combination + heat stress	10
Product combination + thermoneutral	10

Body weight and feed disappearance were measured on days 0, 7, 14, and 21. Mortality was recorded as it occurred. Rectal temperature and respiration rate were monitored at 0, 12, 24, 48, and 72 hours and also at days 7, 14, and 21.

Results and Discussion

Although this trial did not observe any statistically significant treatment differences, the numerical trends were encouraging. The investigators decided to reduce the number of replicates to increase the number of treatments. The lack of replication likely reduced the ability to detect statistical differences because of normal variation between pigs within treatment.

During the 21 day experimental period, the pigs fed the combination of products had substantially higher numerical growth performance as shown in Table 2. When the combination of products was fed, there was a numerical difference in total gain of 5.7 and 3.1 lbs between the treatment and control groups, respectively. Additionally, slightly lower rectal temperatures were observed in the heat stress room when pigs were fed the combination of chromium propionate, zinc propionate, and ENDOX Dry antioxidant. The high level of response in a short period of time provides some indication that the combination of product tended to reduce the overall effect associated with heat stress.

Table 2. Effect of temperature and diet on gilt performance

	Thermoneutral		Heat Stress			Room	Diet	Room x Diet
	Control	Combo	Control	Combo	SE	P-value	P-value	P-value
Total ADI, lb/day	7.3	7.8	4.1	4.1	0.25	<0.001	0.466	0.074
Total Gain, lb	55.8	61.5	27	30.1	2.82	<0.001	0.297	0.218
Total ADG, lb/day	2.7	2.9	1.29	1.43	0.13	<0.001	0.297	0.218

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