



The effect of KemTRACE® Chromium on turkey performance and animal safety ¹

Abstract

Two hundred eighty-eight male Nicholas Large White turkey poults were used to determine the effect of supplementing turkeys with chromium propionate (Cr Prop) from 1 to 84 d of age on performance and animal safety. Treatments consisted of Cr prop supplemented to provide 0, 0.2, or 1.0 mg Cr/kg diet (8 reps/treatment; 12 poults/pen), with 1 mg Cr/kg diet being 5x the recommend dose. Weight gain, feed intake, etc, were taken at the end of the starter 1 (d 21), starter 2 (d 42), grower 1 (d 63), and grower 2 phase (d 84). Turkey performance was not affected by treatment during the starter 1 phase. Gain was greater ($P = 0.024$) and feed/gain lower ($P = 0.030$) for turkeys supplemented with Cr compared with controls during the starter 2 phase. Over the entire 84-d study turkeys supplemented with Cr had greater ($P = 0.005$) ADG and tended ($P = 0.074$) to gain more efficiently than controls. Gain ($P = 0.180$) and feed/gain ($P = 0.511$) of turkeys supplemented with 0.2 mg Cr/kg did not differ from those receiving 1.0 mg Cr/kg over the entire 84-d study. Feed intake was not affected by treatment. Body weights of turkeys supplemented with Cr were heavier ($P = 0.005$) than controls by d 84. Results of this study indicate that Cr Prop supplementation can improve turkey performance and is safe when supplemented to turkey diets at 5x the recommended dose.

Introduction

Turkey studies evaluating Cr supplementation on performance and/or safety are limited. Previous studies indicated inorganic Cr supplementation at a relatively high level (20 mg Cr/kg diet) increased BW gain in turkeys from 1 to 21d of age^{2,3}. And Cr nicotinate from 9 to 22 weeks of age increased BW gain and breast and thigh weights⁴. In January 2024, Food and Drug Administration (FDA) Center for Veterinary Medicine (CVM) approved the food additive petition (FAP) for chromium propionate supplementation in turkey diets, thereby allowing for chromium propionate to be fed to turkeys⁵. As part of the FAP, Kemin conducted multiple chromium studies in turkeys addressing performance, animal safety, human food safety and environmental assessment^{1,6}. The objective of this study was to evaluate the effect of KemTRACE® Chromium on turkey performance and animal safety when raised from 0 to 84d of age.

Materials and Methods

Two hundred eighty-eight (288) male 1-day-old turkey poults (Nicholas Large White;) were used in this study. The poults were randomly assigned to treatments: 1) control (no supplemental Cr), 2) 0.20 mg of supplemental Cr (from KemTRACE Cr Prop) per kg of diet and 3) 1.0 mg of supplemental Cr (from Cr Prop) per kg of diet (5 times the recommended dose).

Each treatment consisted of 8 replicate floor pens, and 12 poults were housed per pen. Floor pens were covered with fresh Pine wood shavings. Turkeys were fed experimental diets for 84 d with starter 1 diet fed from 1 to 21 d; the starter 2 diet for 21 to 42 d; the grower 1 diet from 42 to 63 d, and the grower 2 diet fed from 63 to 84 d.



Performance data were analyzed statistically as a completely randomized design by analysis of variance using the Proc Mixed procedure of SAS (2016).

Results

Turkey BW was greater ($P = 0.005$) in Cr-supplemented turkeys compared to controls by d 63 and remained heavier ($P = 0.005$) on d 84 (Table 1). Final BW did not differ ($P = 0.179$) amongst turkeys supplemented with 0.20 and 1.0 mg Cr/kg diet.

Table 1: The effect of KemTRACE Chromium on turkey body weight

	Supplemental Cr, mg/kg diet ²				P-value		
	0	0.2	1	SEM	Treatment	0 vs. Cr	0.2 vs. 1.0
BW, g							
Day 1	59.5	59.6	59.8	0.46	0.854	0.643	0.759
Day 21	616	617	616	16.9	0.999	0.996	0.966
Day 42	2,144	2,249	2,250	45.7	0.194	0.073	0.997
Day 63	4,883	5,152	5,379	98.4	0.007	0.005	0.117
Day 84	8,623	9,026	9,304	141.7	0.01	0.005	0.179

¹Means represent the average of 8 pens. ²Provided from KemTRACE® Chromium.

Intake, ADG, and feed/gain were similar across treatments during the starter 1 period (d 1–21). During the starter 2 period (d 21–42) ADG was greater ($P = 0.024$) and FCR lower ($P = 0.030$) for turkeys supplemented with Cr compared with controls (Table 2). Turkeys supplemented with Cr had higher ADG than controls ($P = 0.006$) during the grower 1 period (d 42–63; Table 2). Turkeys supplemented with Cr had greater ($P = 0.005$) ADG and tended ($P = 0.074$) to gain more efficiently than controls (7 points better FCR compared to control; Table 2). FCR ($P = 0.511$) and ADG ($P = 0.180$) did not differ between Cr supplemented at 0.2 mg/kg and 1 mg/kg ($P > 0.05$; Table 2). Chromium supplementation did not affect gain until after 21 d in the present study (Table 2).



Table 2: The Effect of KemTRACE Chromium on Turkey Performance by Period

Item ¹	Supplemental Cr, mg/kg diet ²				P-value		
	0	0.2	1	SEM	Treatment	0 vs. Cr	0.2 vs. 1.0
Starter 1 (d 1-21)							
ADFI, g/d	52.6	49.7	49.6	1.54	0.324	0.138	0.959
ADG, g/d	26.5	26.5	26.5	0.8	0.999	0.995	0.958
Feed/gain	1.99	1.88	1.9	0.08	0.607	0.337	0.815
Starter 2 (d 21-42)							
ADFI, g/d	145	144.8	137.7	5.4	0.56	0.579	0.361
ADG, g/d	72.8	77.8	77.8	1.7	0.074	0.024	0.98
Feed/gain	1.99	1.87	1.77	0.06	0.053	0.03	0.258
Grower 1 (d 42-63)							
ADFI, g/d	269.1	276.3	284	7.4	0.383	0.237	0.476
ADG, g/d	130.4	138.2	149	3.5	0.004	0.006	0.04
Feed/gain	2.06	2.01	1.91	0.05	0.1	0.098	0.158
Grower 2 (d 63-84)							
ADFI, g/d	425.1	428.8	441.6	10.6	0.523	0.443	0.404
ADG, g/d	178.1	184.5	186.9	3.3	0.173	0.074	0.61
Feed/gain	2.38	2.33	2.36	0.05	0.761	0.58	0.632
Overall (d 1-84)							
ADFI, g/d	222.9	224.9	228.2	5.5	0.794	0.596	0.679
ADG, g/d	101.9	106.7	110.1	1.6	0.01	0.005	0.18
Feed/gain	2.18	2.11	2.08	0.04	0.162	0.074	0.511

¹Means represent the average of 8 pens. ²Provided from KemTRACE® Chromium.

The present results agree with previous chromium studies where supplementing male turkeys, 8 wk of age, with 1.0 mg Cr/kg diet, from Cr nicotinate, increased gain from 9 to 22 wk of age and numerically reduced feed/gain by 4 points⁴. Feeding KemTRACE Chromium from 0-84 days significantly improved BW and BWG and numerically improved FCR by 7 points.

The present study indicates that Cr Prop is safe when supplemented to turkey diets at 5x the recommended dose. Supplementation of 0.20 or 1 mg Cr/kg diet, from Cr Prop, for 12 wk increased ($P = 0.005$) ADG compared with controls. The concentration of Cr Prop (1.0 mg Cr/kg) supplemented in the present study was well below the maximum tolerable level for poultry that has been estimated, based on broiler data, at 500 mg Cr/kg⁷. The highest concentration of Cr previously supplemented to turkeys was 200 mg Cr/kg, from CrCl₃, to turkey hen diets⁸. No adverse effects were reported in this study following 5x of Cr supplementation.

References

1. J.W. Spears, K.E. Lloyd, K. Krafka, J. Hyda, J.L. Grimes, Research Note: Chromium propionate for turkeys: effect on tissue chromium concentrations and human food safety, Poultry Science, Volume 103, Issue 1, 2024.
2. Steele, N. C., and R. W. Rosebrough. 1981. Effect of trivalent chromium on hepatic lipogenesis by the turkey poult. Poul. Sci. 60:617–622.
3. Steele, N. C., and R. W. Rosebrough. 1979. Trivalent chromium and nicotinic acid supplementation for the turkey poult. Poul. Sci. 58:983–984.
4. Chen, K. L., J. J. Lu, T. F. Lien, and P. W. S. Chiou. 2001. Effects of chromium nicotinate on performance, carcass characteristics and blood chemistry of growing turkeys. Br. Poul. Sci. 42:399–404.
5. 21 CFR 573.304, Chromium Propionate. Need to make sure this is the correct number
6. NRC. 1994. Nutrient Requirements of Poultry. 9th. Rev. ed. National Academic Press, Washington, DC.
7. Anderson, R. A., N. A. Bryden, M. M. Polansky, and M. P. Richards. 1989. Chromium supplementation of turkeys: effects on tissue chromium. J. Agric. Food Chem. 37:131–134.