EFFECTS OF POTASSIUM CHLORIDE AND FASTING ON BROILER PERFORMANCE UNDER SIMULATED SUMMER CONDITIONS

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Story in Brief

Effects of diet, fasting and heat stress on the performance of broiler were examined. Subjecting birds to heat stress reduced feed intake and daily gain. Addition of potassium chloride to the drinking water partially alleviated this growth rate depression and enhanced feed intake. Periodic fasting during heat episodes did not adversely affect weight gain. Carcass dry matter content and fat were not altered by treatment.

(Key words: Fasting, Potassium Chloride, Broilers, Heat Stress)

Introduction

The ability of broiler chicks to tolerate high temperature insults can be enhanced by restriction of feed (McCormick et al., 1979). Presence of feed in the digestive tract of adult turkey hens during periods of hyperthermia influenced body temperature and decreased survival. Reducing food intake will reduce heat production. Wilson and Edwards (1952) stated that the reduction of deep body temperature noted with heat-stressed chickens probably was the result of reduced food intake and heat production.

Growth rate is depressed when post-brooding temperatures exceed 75F. The decline in growth rate may be a direct result of reduced feed intake. Besides reduced energy intake, reduced intake of protein and other nutrients, independent of fluctuating animal nutrient requirements, could account for the growth rate depression. If fasting increases survival because it reduces body temperature, growth rate of fasted birds will be impaired as a direct result of the food intake reduction.

Studies in swine and poultry have shown that excretion of potassium increases during heat stress. Additionally, Teeter and Smith (1986) reported that weight gain of heat-stressed broilers will improve with potassium chloride supplementation. Supplementing the fasted, heat-stressed bird's drinking water with potassium chloride may prevent the depression in weight gain, which occurs as a result of the reduced food intake. Since previous work (unpublished data) indicates that the deleterious effects of high temperature on broiler survival can be partially alleviated by potassium chloride supplementation in drinking water, the combination of fasting and potassium chloride might be expected to enhance survival and augment growth.

The objective of this study was to examine the effects of periodic fasting and potassium chloride supplementation on survival and weight gain of heat-stressed broiler chickens.

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Materials and Methods

Commerical broiler chickens were raised on rice hull covered floor pens and fed a corn-soybean meal based diet until they reached 4 weeks of age. On the first day of the fourth week following an overnight fast, 960 birds were sexed, weighed and randomly allotted to the designated treatments. Experimental animals were housed in grower batteries in a temperature and humidity controlled environmental chamber. Feed (Table 1) and water were continuously available.

The experiment was a 2x2 factorial arrangement of treatments within a completely randomized design. Each treatment consisted of 40 replicates of 6 birds each (3 males, 3 females). Birds were supplemented with either 0 or .2% potassium (K) as potassium chloride (KCl) in the drinking water and were either fasted or allowed to consume feed during two heat episodes. For carcass composition purposes, a thermoneutral control treatment was maintained, in which birds were maintained a 75F during the 21-day experiment.

For the first five days of the 21-day experiment, room temperature was allowed to cycle between 80F and 95F each 24 hours. In order to simulate normal summer conditions, the ambient tmeperature within the chamber, was allowed to rise by one degree daily for three days, during the time period between 1430 and 1700 hours, until a temperature of 98F was achieved on the third day. Temperature was then dropped to the 80-95F cycle for five days. Over the next 24 hours, a second heat episode was generated in which the upper temperature peaked at 97F. Normal cycling temperature conditions were maintained for the remainder of the experimental period. Birds on the fasting treatment had their feed removed at 0830 and replaced at 1930 hours during each day of the heat episode, thereby providing an 11 hour fast.

Feed and water consumption were monitored daily throughout the 21 day trial. Birds were weighed and processed at the end of the experimental period and carcass characteristics determined.

Results and Discussion

Live weight gain, feed consumption and feed efficiency values are shown in Table 2. Addition of potassium chloride to the drinking water of heat stressed birds enhanced ($P<.05$) growth. Feed removal for 11

Table 1. Composition of basal diet.

Ingredient	%
Ground Corn	56.8
Soybean Meal	36.0
Fat	3.0
Dical. Phosphate	2.35
Calcium Carbonate	.90
Salt	.50
Vitamin Mix	.25
Trace Mineral	.10
DL-Methionine	.10
Total	100.00

Table 2. Live gain, feed intake, feed efficiency, water intake and survival of fasted and non-fasted.

Treatment (g/bird/day)	Live gain (g/bird/day)	Feed Intake (g/bird/day)	Gain/Feed	Water Intake (g/bird/day)	Survival %
0% K, non-fasted	25.4^{c}	95.5^{c}	$.26^{b}$	443	97.3
0% K, fasted	27.0^{c}	99.2^{bc}	$.28^{b}$	393	98.1
.2% K, non-fasted	29.7^{b}	102.3^{b}	$.28^{b}$	423	98.3
.2% K, fasted	29.9^{b}	104.3^{b}	$.28^{b}$	499	98.8
Thermoneutral control	39.5^{a}	123.0^{a}	$.32^{a}$	--	100.0

^{abc}Means in columns with different superscripts differ (P<.05).

Table 3. Carcass gain, dressing percent, dry matter, fat and protein content of thermoneutral and heat stressed birds.

Treatment	Carcass gain (g/bird)	Dressing Percentage	Dry matter (%)	Carcass Fat %	Carcass Protein %
0% K, non-fasted	471^{c}	70.9^{a}	38.1	16.9	17.5
0% K, fasted	488^{c}	70.5^{a}	36.1	14.8	17.8
.2% K, non-fasted	576^{b}	69.5^{bc}	36.5	15.3	17.7
.2% K, fasted	529^{b}	69.6^{bc}	37.1	15.7	17.8
Thermoneutral control	655^{a}	68.9^{c}	38.3	16.9	17.6

^{abc}Means in columns with unlike superscripts differ (P<.05)

hours on each of four days during the experimental period did not affect weight gain. This was probably due in part to the fact that fasted birds compensated for the feed inavailability by consuming more feed after the feed was replaced. There was no difference in the feed efficiency attributed to either potassium supplementation or fasting. There was a tendency for both potassium chloride and feed withdrawal to increase survival of heat stressed birds (Table 3).

Subjecting these broilers to heat stress reduced carcass gain (Table 3). Addition of potassium chloride reduced this difference to 21%. Unsupplemented heat-stressed birds had a higher dressing percent that the potassium-supplemented or thermoneutral controls. This is presumeably because these birds consumed less feed and had less food in their gastrointestinal tracts. Carcass dry matter content was not influenced by heat-stress, fasting or potassium chloride supplementation. Treatments had no effect on fat content of the carcass however addition of potassium chloride to the drinking water of fasted birds tended to increase the protein content of the carcass.

The data reported here indicate that periodic fasting of broiler chickens for up to 11 hours during heat episodes will not adversely affect weight gain response and that potassium effects and periodic fasting have additive effects on survival and weight gain.

Literature Cited

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