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EFFECT OF CYSTEAMINE ADMINISTRATION ON BODY COMPOSITION IN GROWING TURKEYS

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INTRODUCTION

Elevation of blood concentrations of growth hormone (somatotropin=ST), a polypeptide hormone, markedly increases growth rate, improves feed efficiency, and dramatically increases lean tissue accretion while decreasing adipose tissue (fat) mass in red-meat-producing animals (mammals). Somatostatin, a hypothalamic hormone, inhibits growth hormone secretion by the anterior pituitary. Szabo and Reichlin (1981) reported that the oral administration of the thiol agent cysteamine, rapidly depleted immuno-reactive somatostatin in the gut, plasma and hypothalamus of the rat. Millard *et al.* (1983) demonstrated that cysteamine administration to rats increased growth hormone secretion from the anterior pituitary and reduced somatostatin secretion through the central nervous system. The increase in growth hormone concentration and decrease in somatostatin secretion should improvee growth rate and feed efficiency and result in more muscle and less fat accretion. This experiment was designed to evaluate the effect of cysteamine administration on carcass composition of growing turkeys.

MATERIALS AND METHODS

Thirty-six eight-week-old turkeys, which had been acclimated for a four-week period were assigned to three treatment groups (diets):

(1) containing 0ppm cysteamine content = control:
(2) 1200ppm cysteamine content = LC; and
(3) 2400ppm cysteamine content = HC.

An additional eight birds (eight weeks of age) were intubated with cysteamine in a phosphate-buffered saline solution at a dose of 30mg/100 g body weight. All birds were fed and had access to water *ad libitum*. Weekly body weights and weekly feed consumptions were recorded. All birds were slaughtered and defeathered following commercial practices as closely as possible, at 16 weeks of age. Birds were electrically stunned prior to exsanguination using 50 volts AC for a duration of 15 seconds. Dressed carcasses were chilled (2°C) for 24 hours and subsequently split in half. The right side of each carcass was ground for total (proximate) composition. The left side of each carcass was physically separated into boneless thigh, drum and breast components. The muscle (lean) portions of these parts were in turn ground individually for subsequent compositional analysis.

Data were analyzed by the analysis of variance technique (SAS, 1985) to determine the significance of variation among cysteamine treatments.

RESULTS AND DISCUSSION

Percentages for fat, moisture and protein for total carcass, thigh, drum and breast components are presented in Table 1. Total carcass fat was reduced 66% in the cysteamine intubated turkeys and 50% in the HC-fed birds compared to

controls. An 8% reduction in total carcass fat was observed for the LC-fed birds compared to controls. These reductions in fat were associated with increases in carcass moisture. However, the increases in moisture (6%) were not of the same magnitude as the reductions in fat. Minimal differences were found for total carcass protein.

A 53% (cysteamine intubated), 41% (HC) and 10% (LC) reduction in intramuscular fat for the thigh lean tissue was observed compared to controls. Moisture content of the thigh lean tissue increased for the intubated, HC- and LC-treated birds compared to controls but were only in the range of a 2% increase. Minimal differences were found for protein content of the thigh lean tissue.

Intramuscular fat content of the drum lean tissue was reduced 45% in the cysteamine intubated birds, 35% in the HC-fed birds and 11% in the LC-fed birds compared to controls. These reductions in fat content were associated with a concomitant increase in moisture content (1%). Minimal differences were observed for protein content of the drum lean tissue.

A 90% (cysteamine intubated), 83% (HC) and 36% (LC) reduction in intramuscular fat content for the lean tissue of the breast muscle was observed compared to controls. Moisture content of the breast muscle increased with the decrease in fat content but was of little practical significance since the magnitude of the increase was quite small (1%). Little differences were observed for protein content of the breast muscle lean tissue.

There appears to be some discrepancy regarding the effects of exogenous chicken somatotropin (cST) administration on the growth and metabolism in broiler chickens. Daily injection of broiler chickens with exogenous cST appears to have little influence on stimulating growth rate or improving feed efficiency. In fact, administration of exogenous cST to broiler chickens was shown to exert a strong lipogenic rather than lipolytic action (Cogburn *et al.*, 1989). In mammals, daily administration of exogenous somatotropin leads to dramatic improvements in growth rate, production efficiency and carcass composition (increase lean and decrease fat content). Thus the response of turkeys in the present study to cysteamine, may not have been a subsequent increase in somatotropin, concentrations. Somatotropin concentrations are being evaluated in the present study but were not available at the time this paper was composed.

CONCLUSIONS

The administration of the thiol agent cysteamine, which is recognized as an inhibitor of somatostatin release, dramatically reduced carcass fat content in growing turkeys. Method of administration, as well as dose level, had a significant influence on the degree with which cysteamine decreased fat content. Cysteamine intubation at a dose of 30mg/100g body weight resulted in the greatest reduction in fat. Cysteamine included in the diet at a level of 2400ppm and fed *ad libitum* to growing turkeys also resulted in significant reductions in carcass fat deposition. These results suggest that cysteamine, which has been shown to influence the release of somatostatin had a repartitioning effect which ultimately led to decreased fat accretion.

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Table 1. Proximate Composition of Total Carcass, Thigh, Drum and Breast Muscles by Cysteamine Treatment.

	Cysteamine treatments			
	Control	Intubated	HC	LC
Total carcass				
Fat	9.83[a]	3.31[c]	4.93[b]	9.06[a]
Moisture	66.46[d]	72.81[a]	70.87[b]	67.41[c]
Protein	20.71[ab]	20.83[ab]	21.28[a]	20.61[b]
Thigh (lean tissue)				
Fat	5.56[a]	2.62[b]	3.29[b]	5.00[a]
Moisture	73.89[c]	76.28[a]	75.25[b]	74.20[c]
Protein	21.09[b]	21.78[a]	21.44[ab]	21.11[b]
Drum (lean tissue)				
Fat	2.84[a]	1.56[b]	1.86[b]	2.53[a]
Moisture	75.62[c]	77.52[a]	76.21[b]	75.86[c]
Protein	21.29[b]	21.08[b]	21.92[a]	21.58[a]
Breast (lean tissue)				
Fat	0.86[a]	0.09[c]	0.15[c]	0.55[b]
Moisture	73.40[c]	75.13[a]	74.00[b]	73.53[bc]
Protein	25.86[a]	25.29[b]	25.72[a]	25.75[a]

[a,b,c,d] Means in the same row having different superscripts differ ($P<0.05$).