



Serum and Tissue Copper Concentrations in Meat Goats fed Increasing Levels of Copper

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BOTTOM LINE

● Young male meat goats can tolerate copper concentrations up to 200 ppm in the diet for at least eleven weeks. At these dietary concentrations, no ill-effects were observed regarding rate of weight gain, organ function, or serum copper concentrations.

Introduction

There is little information available regarding the mineral requirements of meat goats. While the sensitivity of sheep to copper toxicity is well known, the levels of intake of copper which cause toxicity in goats is less well defined. As a result of interest by various members of the feed manufacturing industry in Texas, a preliminary study was conducted to investigate the potential toxicity to meat goats of a range of concentrations of copper in pelleted diets.

Experimental Approach

Six month-old intact male Boer cross (75% Boer, 25% Spanish) goats (n=25, BW = 52±2.97 lbs) were randomly assigned to one of four dietary treatments consisting of a commercially available growing ration containing either 25 (Cu25), 50 (Cu50), 100 (Cu100), or 200 (Cu200) ppm copper, or an initial slaughter group (ISG). The goats were placed in groups of 5, but were fed

individually. Feed intake was recorded daily, and animals were weighed weekly. Blood was collected weekly by jugular venipuncture and processed to yield serum. Serum was assayed for aspartate amino transferase (AST) and copper concentration. At the start of the feeding trial, the animals in the initial slaughter group were killed at a local meat processing plant, where livers and kidneys were removed, weighed and a tissue sample taken for copper analysis. The remaining animals were individually fed for 11 weeks, before being killed at a processing plant where the livers and kidneys were removed, weighed, and samples taken for analysis.

Results and Discussion

All animals gained weight (52±2.97 vs 81.4±5.13 lbs, P<.0001) over the course of the experiment, gaining on average 0.4 lbs/day. There was, however, no significant (P>.05) difference between dietary treatments. Liver weights of those animals slaughtered at the start of the trial did not differ (P>.05) from those of animals slaughtered at the conclusion of the study (18.2 vs 20.2 ± 0.82 g/kg BW). Kidney weight was higher (P<.0001) in the ISG animals than those that consumed the diets (ISG 1.6, Cu25 1.2, Cu50 1.4, Cu100 1.3, Cu200 1.1±0.05 g/kg BW), but differences between groups that consumed the diets by the end of the trial were not significant. There were no significant (P>.05) effects of diet

on AST or serum copper concentration. Neither AST or serum copper concentration changed significantly over time. Liver copper concentrations increased (P<.1) from 532.4 : g/g DM in the 25ppm diet to 736.1 : g/g DM in the 200ppm diet. There was no effect (P>.1) of copper consumption on kidney copper concentrations, though kidney copper concentrations were somewhat higher in the animals killed at the start of the trial. It would appear that young male Boer x Spanish goats can tolerate copper concentrations in the diet up to 200 ppm for at least 11 weeks with no apparent ill effects.