

THE RESPONSE OF THE GASTROINTESTINAL TRACT OF BROILER CHICKENS TO DIFFERENT DIETARY LEVELS AND SOURCES OF SODIUM

Zenon Zduńczyk¹, Jan Jankowski², Jerzy Juśkiewicz¹, Piotr Kwieciński²

¹*Institute of Animal Reproduction and Food Research of Polish Academy of Sciences*

Tuwima 10, 10-747 Olsztyn, Poland, Tel +48 89 5234671, Fax +48 89 5240124, e-mail: zez@pan.olsztyn.pl

²*Department of Poultry Science, University of Warmia and Mazury in Olsztyn*

Oczapowskiego 5, 10-718 Olsztyn, Poland, Tel +48 89 5233286, Fax +48 89 5233323, e-mail: jajn@uwm.edu.pl

Abstract. The experiment was performed on 48 male meat-type Ross 308 chickens divided into six experimental groups, each of eight birds. Over a period of five weeks, the birds were fed diets containing sodium at two inclusion levels (0.15% or 0.25%) and from three sources (sodium chloride, sodium bicarbonate or sodium sulfate). The growth performance of chickens and gastrointestinal tract (GIT) parameters were studied. Different inclusion levels and sources of sodium had no effect on the final body weights of broilers and feed conversion. An increase in the sodium content of diets decreased the dry matter content of small intestinal digesta (from 17.1% to 16.1%, $p = 0.038$) and digesta viscosity (from 2.09 to 1.83 mPas, $p = 0.046$), but it had no influence on the hydration of the cecal contents. The higher dietary level of sodium enhanced the activity levels of aminopeptidase in the small intestinal mucosa (from 66.8 to 72.6 $\mu\text{mol}/\text{min}/\text{g}$ of protein, $p = 0.030$) and microbial α -glucosidase (from 29.7 to 34.4 $\text{mol}/\text{h}/\text{g}$, $p = 0.050$), whereas it had no effect on the concentrations of short-chain fatty acids (SCFAs) in the cecal digesta. In comparison with sodium bicarbonate, sodium sulfate reduced the pH of gizzard contents (4.36 vs. 3.80, $p = 0.030$). Sodium sources had no effect on pH levels in the small intestine and the cecum. Compared with sodium chloride and sodium sulfate, sodium bicarbonate significantly decreased the activity levels of saccharase in the small intestinal mucosa (from 21.1 - 22.5 to 14.4 $\mu\text{mol}/\text{min}/\text{g}$ of protein, $p < 0.001$) and aminopeptidase (from 71 - 73.6 to 64.5 $\mu\text{mol}/\text{min}/\text{g}$ of protein, $p = 0.021$). Different sodium sources had no influence on the activities of the analyzed glycolytic enzymes and the production of SCFAs.

Keywords: broiler chickens, Na supplementation, sodium source, gastrointestinal tract.