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HISTOLOGICAL DEVELOPMENT AND DIGESTIVE ENZYME ACTIVITIES OF THE GASTROINTESTINAL TRACT OF NATIVE AND COMMERCIAL BROILER CHICKS (*Gallus Gallus Domesticus*, LINN)

ABSTRACT

This research aimed to determine and compare the histological development and digestive Enzyme activities of the gastrointestinal tract of native and broiler chicks. Digestive organ growth, histological development of the gastrointestinal tract as well as amylase and lipase activities determined at ages 1, 7, 14 and 21. The experiment was conducted using a Completely Randomized Design (CRD) with nine replicates. Duncan Multiple Range Test (DMRT) and T-test were used in determining the differences among the different ages and between strains at the same ages, respectively.

Body and digestive organ weights of broilers were found to be higher than that of the Native chicks. The weights of small intestine, duodenal chime, proventriculus, gizzard, pancreas and liver relative to the body weight increased in both strains. However, variations on the rate of growth of these organs were observed based on the relative and allometric data.

The muscle and mucosal layers of broilers' proventriculus were thicker than those in the Native chicks' proventriculus. Native chicks' pancreas had less dense acinar cell and wider connective tissue. Broilers' duodenum had thicker muscle layers and higher villi compared to those in the native chicks' duodenum.

The examination of day-old chicks' absorptive surface area showed that the villi of the Small intestine in both strains became bigger and more rounded toward the distal portion. In the broiler, these villi were bigger, have more sulcus and protrusions. In all segments of the small intestine, commercial broiler chicks had more developed villi. At age seven days, the small intestinal villi of both strains were already well developed since the enfolding features are also found as in older birds. However, in native chicks, the intestinal villi were smaller and had lesser folds. Microorganisms were first observed at 7 and 21 days of age in the ileal villi of commercial broiler and native chicks respectively.

Amylase and lipase activities in the pancreas of these two strains increased from day-old up to 21 Days of age. All enzymes measured in the pancreas of broiler showed higher activities than that in the native chicks.

Although native chicks were lighter compared to the commercial broiler chicks, their allometric

Growth showed that the digestive organ growth rates are similar. The relative weight of these organs, however, indicated that only the small intestine and liver in commercial broilers were heavier compared to those of the native chicks at 21 days. The lightness of native chick small intestine compounded with the limited increase in its absorptive surface area as well as the lower activity of the digestive enzymes result to its limited digestion and absorption capability. The study clearly showed that the poor growth in native chicks is due to the physiological constraint of low digestion capability.