**COMPARATIVE PLASMA METABOLOMIC ANALYSIS BETWEEN JAPANESE NATIVE CHICKEN BREED (YAKIDO) AND COMMERCIAL BROILER LINE**

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**Background**

Yakido (YKD), a breed of chicken native to the Mie Prefecture in Japan, has been crossed with some of other breeds, in order to produce high performance chicken demanded by the Japanese market. Compared with normal broilers, YKD crossbred chickens produce higher muscular protein and fat contents, and show differences in the texture of meat. There is, however, little information concerning about YKD metabolic properties so far.

**Objective**

The purpose of the present studies was to elucidate growth parameters of YKD compared with normal modern broilers. Further investigation was also undertaken to explore the metabolic differences by gas chromatography/mass spectrometry (GC/MS)-based non-targeted metabolomic analysis in two types of chicks (YKD and broilers).

**Materials Methods**

The fertilized egg of YKD and broiler (Chunky) were incubated at 37.8℃, 60% RH. After hatching, the birds were reared at 24-h lighting and temperature of 32℃ condition. They were given free access to a commercial starter diets (CP: 22%, ME: 3,050 Kcal/kg) and water during the experimental periods. At the 11 day-old chicks, blood was collected and the plasma was extracted. Liver and pectoralis muscle tissue samples from both type chicks were collected and weighted. Water-soluble low-molecular-weight metabolites in chick plasma were extracted and derivatized. The samples were subjected to GC/MS analysis. Identification and semi-quantification of low-molecular-weight metabolites were determined by MS-DIAL.

**Statistical analysis:** To analyze body weight gain and the weight of liver and pectoralis muscle tissues data, comparison between means were made using Student t-test. Correlations between the levels of growth parameters and plasma metabolites were analyzed using Spearman’s rank correlation coefficient analysis. Differences were considered to significant when P value was less than 0.05.

**Results**

The results clearly show that body weight gain, liver and pectoralis muscle weight of YKD chicks were significantly lower than that of broilers (P<0.05). Metabolomic analysis reveals the identification of 56 plasma metabolites in both type of chicken, and 10 metabolites in YKD chicks were significantly lower than those in broiler chicks (P<0.05). Furthermore, the plasma levels of Krebs cycle intermediates, such as alpha-ketoglutaric acid, fumaric acid and citric acid, were positively correlate with body weight gain (r=0.700-0.867, P<0.05).

**Conclusions**

The present results may indicate that some metabolites in the plasma may be related to metabolic differences between two types in chickens. Furthermore, Krebs cycle metabolites in the plasma may be related to growth in chickens.