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Comparison of antioxidant dipeptides and reducing sugar between native chicken and broiler (#399)

Ki-Chang Nam[1], Mahabbat Ali[1], Samooel Jung[2], Cheorun Jo[3]

[1] Sunchon National University, Department of Animal Science and Technology, Suncheonro, South Korea; [2] Chungnam National University, Department of Animal Science and Biotechnology, Daejeon, South Korea; [3] Seoul National University, Department of Agricultural Biotechnology, Center for Food and Bioconvergence, and Research Institute of Agriculture and Life Science, Seoul, South Korea

Introduction

Now a day's chicken meat has been considered superior to red meat as it has many health benefits with less fat and cholesterol [1]. Some bioactive endogenous compounds such as carnosine (-alanyl histidine), anserine (1-methyl carnosine) in the skeletal muscle of vertebrate animals are considered as strategy for poultry production [2]. Carnosine and anserine have been known as excellent anti-oxidant dipeptides, preventing of diseases resulting from lipid oxidation in skeletal muscle and as an activator of several enzymes including calpain II, myofibrillar ATPase, and phosphorylase [1]. The main carbohydrates with flavour-forming potential include ribose, ribose-5-phosphate, glucose and glucose-6-phosphate [3]. The aim of this study was to determine the concentration of antioxidant dipeptides (carnosine, and anserine) and reducing sugar between the native chicken (a commercial breed and 3 breeds in a breeding program) and the broiler.

Methods

In total, 500 chicks of native chicken (HH: commercially available Korean native chicken; 2A, 2C, 2D: three different newly developed native chicken under breeding) and broiler were reared at experimental farm of corporation Harim (Gimje, Republic of Korea) and fed ad libitum similar commercially formulated feed containing 18% concentrated protein and 2800 kcal/kg of ME. Native chicken and broiler were reared up to 12 weeks. After slaughter, then carcass were vacuum-packed after chilling at 4 for 24 h and stored in a freezer at -20 until analysis. The contents of carnosine and anserine were determined by Hydrophilic chromatographic determination technique using HPLC (1580R, GYROZEN Co., Ltd), and reducing sugar was measured by dinitrosalicylic acid method. Statistical analysis was done by GLM procedure using SAS (version 9.4, SAS institute inc, Cary, NC, USA.). A significance test between the results was used by Turkey's multiple range test ($p<0.05$). The results of the analysis are presented as standard errors of the mean and the least-squares means.

Results

After investigation we found that, the carnosine content of HH breast meat was 511.05 (mg/100 g) which was significantly higher ($p<0.05$) than that of broiler (Fig. 1). The carnosine contents of other new native chickens in breast meat were also higher than the broiler. But in thigh meat, HH contained 131.67 (mg/100 g) of carnosine and observed higher among all treatments but did not show any significant ($p>0.05$) difference between broiler and new native chickens (Fig. 1). In terms of anserine content, HH (1525.81 mg/100 g) and new native chicken breeds had significantly higher than broiler in the breast meat, but in thigh meat HH contained 356.542 (mg/100 g) of anserine and observed no significant differences ($p<0.05$) among the treatments (Fig. 1). And, between of native chicken and broiler, new developed native chickens (2A, 2C, and 2D) particularly 2C contained 93.35 (mg/100 g) of reducing sugar in breast meat and differed significantly ($p<0.05$) from other native chicken and broiler but in case of thigh meat 2A contained 30.87 (mg/100 g) of reducing sugar that was higher among all treatments but no significant difference ($p<0.05$) was observed (Fig. 1). Thus, the new developed native chickens may be incorporated in poultry meat production stratagem along with HH which are superior than broiler meat in terms of antioxidant dipeptides and reducing sugar content.

Conclusion

A commercial native chicken breed and newly developed native chicken breeds (2A, 2C, and 2D) are better than broiler in terms of carnosine and anserine content. Native chicken breeds had higher content of reducing sugar than broiler. The differences of the antioxidant dipeptides and reducing sugar between native chicken breeds and broiler were more distinct in breast meat compared with thigh meat. So, this work may be regarded as benchmark for poultry breeder to take into consideration on breeding policy to get more functional compounds as well as desirable quality.

Notes

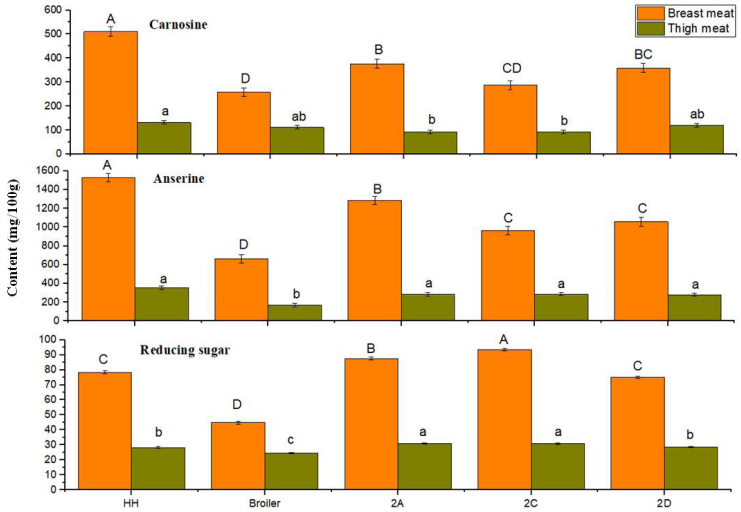

Fig. 1: Carnosine, anserine, and reducing sugar content (mg/100g) of chicken breast meat between nat

HH: commercial native chicken breed; 2A, 2C, 2D: newly developed native chicken breeds under a breeding condition. Different capital letters indicate the statistically significant ($p<0.05$) in breast meat. Different small letter indicate the statistically significant ($p<0.05$) in thigh meat.

Notes