

Supplementary effects of silicate on the level of functional ingredients and taste in broiler chickens

(Received October 12, 2017)

(Accepted December 4, 2017)

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Abstract

We investigated the effect of continuous supplementation of drinking water with silicate for 7 weeks to broilers on the level of functional ingredients and taste in chickens. The functional ingredients and taste components were measured using HPLC, and the taste was evaluated by sensory evaluation of the breast, thigh, and tenderloin, respectively. Analysis of functional ingredients revealed that the level of anserine in the breast and tenderloin as well as the level of carnosine in the tenderloin in the high-dose silicate solution-supplemented group were higher than those of the control group. Analysis of ATP-related compounds revealed that the inosinic acid level decreased in the breast and thigh but did not decrease in the tenderloin. In addition, analysis of free amino acids indicated that the level of glutamic acid exhibiting umami taste increased in the tenderloin. Furthermore, sensory evaluation revealed that the umami taste of tenderloin in the high-dose silicate solution-supplemented group was significantly higher than that of the control group. In conclusion, our findings suggested that the supply of drinking water containing silicate increased the level of functional ingredients in the breast and tenderloin in broilers and improved the umami taste of chicken tenderloin. Therefore, supplementation with silicate may be beneficial as a feed additive for better rearing of broilers.

Keywords : silicate, broilers, anserine, umami, sensory evaluation

I Introduction

Chicken is a source of high-quality animal protein and is consumed by people worldwide. It is well known that the taste of chicken depends on many factors including color, flavor, and texture. However, the most essential taste components associated with palatability are free amino acids and ATP-related compounds. Moreover, chicken comprises high levels of imidazole dipeptides, anserine (Ans) and carnosine (Car), which exhibit antioxidative activity¹⁻³⁾; thus, chicken has gained substantial attention as a source of functional ingredients. Several studies have recently demonstrated that the added value of chicken could be increased by improving the taste and increasing functional ingredients in chicken under controlled feeding with nourishment. Watanabe *et al.* demonstrated that the level of glutamic acid (Glu), which exhibits umami taste that is one of the main taste components in chicken, was enhanced

by the level of lysine in the feed^{4, 5)}. Furthermore, Tomonaga *et al.* reported that feed supplemented with β -alanine increased the levels of Ans and Car in chicken^{6, 7)}. Altogether, these studies suggested that the supplementation of particular types of ingredients in feed while rearing broilers may contribute to the added value of chicken. However, most studies to date have focused on supplementation with amino acids rather than other nutritional components. We previously suggested that supplementation with silicate, which is one of the functional ingredients including minerals, to broilers reduced fecal odor and increased free amino acids related to umami and sweetness in the breast and tenderloin⁸⁾. Based on the previous study, we further quantified free amino acids promoting bitterness and imidazole dipeptides (Ans and Car) and then analyzed ATP-related compounds in the three parts of chicken. In addition, sensory evaluation of chicken soup was performed by 28 panelists.

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