

Effect of supplementary silicate in drinking water of laying hen on egg taste

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Abstract

We have investigated the effect of the continuous supplementation of silicate in the drinking water of broilers and layers on the taste of meat and eggs. In a follow-up experiment, we here examined the influence of rearing method, hen age, and layer type on the effects of silicate supplementation on the taste and texture of the egg. Free amino acids were analyzed by ODS pre-column high-performance liquid chromatography. Sensory evaluation of egg yolk and egg white of boiled eggs was conducted by panelists. The results showed that many free amino acids related to sweetness, umami-taste, and bitterness were significantly increased in the high dose (0.24 mg/mL)-supplemented group compared to the control, although the specific amino acids that varied between groups differed from those identified in previous experiments. Moreover, the sensory evaluation showed that silicate supplementation decreased the egg smell, and increased the umami and preference for the egg yolk, while the stiffness score of the egg white increased. These findings suggest that silicate supplementation in hen drinking water could have beneficial effects on the egg taste, although further detailed studies are needed to clarify the specific amino acids that are increased according to test conditions.

Keywords : silicate, hen's egg, taste, free amino acids, sensory evaluation

I Introduction

Silicon occurs abundantly on the earth's crust, and is the second most common element on the earth. Since silicon is present in various foods originating from plants, animals, as well as seafood such as fish and clams that feed on plants, we may be considered to be sustaining on silicon¹⁾. In Japan, the effect of silicon on the growth of rice plant has long been investigated, since silicon was initially considered to be an agriculturally essential fertilizer²⁾. In chickens, silicon was reported to be an essential element for growth of young ones³⁾. Nowadays, silicon is known as an essential trace element for animals, including human beings, and is considered to be associated with collagen and amino acid metabolism in connective tissues, thereby attracting attention as an ingredient of functional foods⁴⁾. Since the effect of silicon on food taste has not been studied yet, we investigated the effect of silicate supplementation in the drinking water of broilers and laying hens on the taste of meats and eggs⁵⁻⁷⁾. We found that the levels of serine (Ser) and alanine (Ala) significantly increased

in the breast meat of broilers that received a low dose of silicate supplementation (0.08 mg/mL Na₂SiO₃) compared to those of the control^{8, 9)}. In addition, threonine (Thr), glycine (Gly), and Ala, all of which are related to sweetness^{8, 9)}, and aspartic acid (Asp), contributing to a weak umami taste, significantly increased in the tender breast meat of the high-dose (0.40 mg/mL Na₂SiO₃) group compared with those of the control. Sensory evaluation using the meat extract further revealed that the umami taste of tender breast meat in the high-dose group was significantly higher than that in the control group. Moreover, eggs laid by hens that received a high dose of silicate-supplemented water (0.40 mg/mL Na₂SiO₃) had significantly more Asp, Ala, and Thr in the egg yolk compared to the low-dose (0.08 mg/mL Na₂SiO₃) group⁷⁾. However, no significant difference was observed between the control and either test groups. Thus, the effect of silicate on the meat or egg taste remains uncertain. Accordingly, in the present study, we attempted to examine the effect of silicate supplementation to hen drinking water on the egg taste in relation to the type of hen, hen age, rearing conditions, and silicate dose.