

Effect of Feeding Far Infrared Irradiated Rice on Rate of Laying Eggs and Vitamin of Egg

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Introduction

Infrared ray, a kind of electromagnetic waves, having wavelength longer than a visible ray was called heat ray because this ray give off strong heat. The infrared ray have energy be in proportion to vibration because it have characteristics both wave motion and particle. This ray was provided to near, middle, and far infrared ray according to a magnitude of wavelength. Among them, the research in which growth of cell, growth of cell was provided by the absorption of far infrared ray to an living organisms was reported and various products were having appeared in market⁽¹⁾.

Yeo⁽²⁾ and Yeo et al.⁽³⁾ reported that isokinetic shoulder muscle strength, cardiopulmonart, blood lactate, and excess postexercise oxygen consumption during maximal exercise in college male students were significantly increased by wearing far infrared radiation sportswear in relation of research related to far infrared ray. An et al.⁽⁴⁾ and Chang et al.⁽⁵⁾ reported that wear sensation of far infrared radiated textile was significantly comport able compared to that of general textile.

In biological view, Infrared ray was utilized with industrial purpose for dryness of farm products and maintenance of foods freshness like ginseng⁽⁶⁾, rice⁽⁷⁾ and pepper⁽⁸⁾ and characteristics of water quality of tap water compared to far-infrared rays mineral water was reported. Unfortunately, the trial to preserve infrared ray in food and the research related to effect of infrared ray preserved food for living organisms were not reported. As a part of biological effect of far infrared preservation in food and agricultural products, we investigated effect of feeding far infrared-irradiated rice on rate of laying eggs vitamin A, D and E of egg against drowning was investigated, and utilizes as ability food additive to laying hens fed.

Materials and Methods

Test diet

- ① normal diet + normal rice: Dried to become equal with moisture content of general history fare after mix general rice that crush after crush general history fare 10%.
- ② normal diet + far infrared-irradiated rice: Dried to become equal with moisture content of general history fare after mix far infrared-irradiated rice that crush after crush general history fare 10%. Far infrared preserved rice was purchased from TM Bio-Tech Co., Ltd.(Korea) of which radiation ratio was 0.908 at 37°C compared to black body and radiation energy was $3.50 \times 10^2 \text{ W/m}^2 \cdot \mu\text{m}$ according to method of Kwon et al.⁽⁹⁾.

Rate of laying eggs

The laying eggs rate marked by value(Hen day egg production) that divide number of egg and number of breeding, and average weight calculated except deformity.

Vitamin A, D and E content analysis of egg

Vitamin A, D and E content analysis of egg carried out by following method. First, put together ethanol of 40 mL and sodium sulphide solution(that melt sodium sulphide 12 g in distilled water and makes by 100 mL) of 50% potassium hydroxide solution 10 mL, hydroquinone 100 mg that is antioxidant, and 2 mL adopting 10 g to flask of 250 mL egg solution to homogenize (5,000 rpm, 1 min) and evaporate for 25 minutes under 90°C condition in chamber. Moved to 500 mL separation funnel after cool by about 40°C after analysis ends. This time, wash analysis solution remaining to flask for return current in distilled water of about 50 mL and analysis put diethyl ether of 120 mL to 500 mL separation funnel that done solution is included and extracts for 20 minutes in horizontal shaker. This time, speed of revolution of horizontal shaker was 180 rpm. Unite the first and the second abstracted ether after extraction ends after execute the second extraction because pours analysis solution to the second separation funnel after the first extraction ends and washed ether solution sequentially as <50 mL 10% NaCl solution → 50 mL distilled water → 50 mL 10% ethanol solution → 50 mL distilled water>. Then, poured to HPLC after filter using filter(Acrodise LC13 PVDF, Gelman Sci.) melting to methanol of 5 mL after moves ether layer to 250 mL fixed quantity flask and assemble correctly pilot wire by ether again after puts antioxidant BHT 100 mg and adopts correctly 50 mL among 250 mL ether solution and evaporates vacuum under gaseous nitrogen. Peak's confirmation and HPLC analysis work are comparison and chromatography of TR(retention time), confirmed peak from specification solvent to method of spectrum observation etc. and repeated measurement correctness enforced examination⁽¹⁰⁾, recovery factor examination⁽¹¹⁾ by HPLC's pre-standardization work.

Results and Discussion

Animal observation

Particular symptoms that is some by difference of food in this examination(EX) were not observed and death animal by allowance of food was not observed in the all examination militaries.

Body weight and Rate of laying eggs

Weight of laying hens by difference of food that general rice is added a little than laying hens which receive allowance far infrared-irradiated rice laying hens which receive allowance a little rate of increment be but was confirmed that big difference is not seen for testing period. Laying eggs rate of laying hens which general history fare receives allowance increased a little according as raising term passes was 72.9%(0%) in breeding 0 day and appears by each 73.8%(1.2%), 74.1%(1.6%) and 74.1%(1.6%) in breeding 10 day, breeding 15 day and breeding 20 day. Far infrared-irradiated rice add food laying eggs rate of laying hens which receive allowance was 72.8%(0%) in breeding 0 day but raising term displays sudden augmentation by passing and is 76.7%(5.4%) in breeding 10 day and breeding 20 day since.

Vitamin content of egg

Result that analyze vitamin A content change of egg by laying hens. In occasion of laying hens which general food receives allowance, 778.89 μg was detected in breeding 0 day and inclination that increase a little by each 802.17 μg , 811.24 μg and 822.97 μg in breeding 10 day, breeding 15 day and breeding 20 day was seen. Far infrared-irradiated rice added food in occasion of laying hens which receive allowance, 778.63 μg was detected in breeding 0 day but sudden decrease appeared by 401.97 μg in breeding 10 day. Soar according as after this raising term passes and 2049.45 μg detects in breeding 15 day, and breeding 20 day was detected by 2121.95 μg . Result that analyze vitamin D content change of egg by laying hens. In occasion of laying hens which general history fare receives allowance, 77.51 μg in breeding 0 day was detected and did non significance by each 77.52 μg , 77.52 μg and 77.60 μg in breeding 10 day, breeding 15 day and breeding 20 day. Far infrared-irradiated rice added food in occasion of laying hens which receive allowance, 77.48 μg Test in breeding 0 day and 61.61 μg Test in breeding 10 day. Increase according as after this raising term passes and 99.27 μg detects in breeding 15 day, and breeding 20 day was detected by 101.00 μg . Result that analyze vitamin E content change of egg by laying hens. In occasion of laying hens which general history fare receives allowance, 3.49 mg in breeding 0 day was detected and did non significance by each 3.51 mg, 3.50 mg and 3.51 mg in breeding 10 day, breeding 15 day and breeding 20 day. Far infrared-irradiated rice added food in occasion of laying hens which receive allowance, 3.50 mg Test in breeding 0 day and decrease a little in breeding 10 day and 2.60 mg Test. Soar according as after this raising term passes and 4.91 mg detects in breeding 15 day, and breeding 20 day was detected by 5.81 mg.

Summary

This study was conducted to investigate change of rate of laying eggs and vitamin according to feeding of far infrared-irradiated rice. The feeding of rice irradiated by far infrared rays did not affect the body weight of laying hens, but the rate of laying eggs were 14% positively increased than normal rice. Especially, the levels of vitamin A(150~200%), D(28~30%) and E(40~67%) were much higher in the group of laying hens fed with rice irradiated by far infrared rays.

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