วารสารวิทยาการสิ่งแวดล้อมไทย ปีที่ 5(3), 2565 : 27 – 33
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การเสริมยีสต์มีชีวิตในอาหารต่อสมรรถนะการผลิต และคุณภาพไข่ในไก่ไข่อารมณ์ดี

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บทคัดย่อ

การศึกษาครั้งนี้มีวัตถุประสงค์เพื่อการเสริมยีสมีชีวิตในอาหารไก่ไข่อารมย์ดี (happy chick) ต่อสมรรถนะการผลิตไข่ไก่ ได้แก่ Feed intake, อัตราการเปลี่ยนอาหารเป็นน้ำหนักไข่ (FCR), ผลผลิตไข่ และ น้ำหนักไข่เฉลี่ยต่อฟอง และเพิ่มประสิทธิภาพด้านคุณภาพของไข่ไก่ ได้แก่ ความหนาเปลือกไข่, น้ำหนักเปลือกไข่, สีไข่แดง, น้ำหนักไข่แดง, น้ำหนักไข่ขาว, ความสูงไข่ขาว และ ฮอกยูนิต (HU). ผลการศึกษาพบว่าผลผลิตของไข่ไก่ที่เลี้ยงด้วยการเสริมยีสมีชีวิตในอาหารไก่ที่ระดับความเข้มข้น 0.2 % ไม่มีความแตกต่างทางสถิติจากชุดอาหารควบคุม ($p > 0.05$) คุณสมบัติภายในของไข่ไก่ที่เลี้ยงด้วยการเสริมยีสมีชีวิตในอาหารไก่ที่ระดับความเข้มข้น 0.2 % ส่วนใหญ่ไม่มีความแตกต่างทางสถิติจากชุดอาหารควบคุม ($p > 0.05$) แต่ค่าเฉลี่ยของสีของไข่แดงที่เลี้ยงด้วยอาหารเสริมยีสมีชีวิตสูงกว่าสูตรอาหารควบคุม โดยมีค่าเฉลี่ย 10.35 และ 9.70 ตามลำดับ และน้ำหนักของไข่แดงไก่ที่เลี้ยงด้วยอาหารเสริมยีสมีชีวิตสูงกว่าสูตรอาหารควบคุมเช่นกัน โดยมีค่าเฉลี่ย 15.156 และ 14.626 ตามลำดับ และปริมาณอาหารที่กินได้ (Feed intake) และอัตราการเปลี่ยนอาหารเป็นน้ำหนักไข่ (FCR) ระหว่างไก่ที่เลี้ยงด้วยการเสริมยีสและชุดอาหารควบคุม ไม่มีความแตกต่างกันอย่างมีนัยสำคัญทางสถิติ ($p > 0.05$)

คำสำคัญ : ไก่ไข่อารมณ์ดี, ยีส, การผลิตไข่ไก่

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Effect of adding prebiotic-yeast in diet on production performance and egg quality from free-range hens

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Abstract

This research aims to investigate the effect of adding prebiotic-yeast in diet for free-range hens on production performance such as feed intake, feed conversion ratio, egg production, egg weight, and egg quality such as shell thickness, shell weight, egg yolk color, egg yolk weight, albumen weight, albumen height and heugh unit. The result found that egg production from hens feeding with 0.2% prebiotic-yeast and hens feeding with control diet had no differences ($p > 0.05$). In addition, egg quality from both types of food showed no statistical differences ($p > 0.05$). However, an average of egg yolk color from diet with prebiotic-yeast was higher than control diet. The average was 10.35 and 9.70 respectively. Moreover, egg yolk weight from diet with prebiotic-yeast was also higher than control diet with the average 15.156 and 14.626 respectively. Feed intake and feed conversion ratio between hens feeding with prebiotic-yeast and hens feeding with control food showed no statistical differences ($p > 0.05$).

Keywords : diet, egg, hen, prebiotic-yeast, production

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1. Introduction

Laying hen industry in Thailand has grown rapidly and continuously because of applying knowledge and modern technology to increase the quality of its production to support higher demand and economic recovery. The successful points in running this business are raising hens to lay huge eggs, short period of laying, low rate of decease and low rate of culling. Even though there are many researchers give advice on effective management to get high productivity, they emphasize on rearing system and seasonal diet management. Another factor related to the rearing process is using antibiotic which caused chemical residue in meat. This effects consumers' health and export business if meats are contaminated. A solution to reduce antibiotic is adding natural substances or microorganism in chicken's diet. There are many useful microorganisms used in animal diet such as Lactobacillus acidophilus, Enterococus faecalis, Streptococus thermmphilus and yeast (*Saccharomyces cerevisiae*). Yeast grows and increase its cells inside animal's stomach and digestive tract. Yeast consumes carbohydrate and fiber then excretes protein, vitamins and minerals. These nutrients are useful for animals and when yeast cells in animal's stomach are digested, they change into protein too.

Using antibiotic to increase an effectiveness of egg production is prohibited in many countries since this is dangerous for consumers. Therefore, the farmers have to avoid antibiotic and try to replace it by others substances. Yeast is considered to be an effective way of replacement. This research studies about using prebiotic-yeast which is useful and safe for the consumer's health and also increase the potential of egg exporting of Thailand.

2. Methodology

2.1 Laboratory animals

A total 40, 19-wk-old C.P. Brown laying hens were used in this experiment. The chicks were adjusted to the environment and diet by keeping them in cages, and they were vaccinated before starting the experiment. The chicks were divided into 2 groups and each group had 20 chicks. The chicks from both groups stayed in cages with water and were fed as diet treatment.

2.2 Experiment plan and grouping

t-test method was employed for this research by divided 40 hens into 2 groups and each group contained 20 chicks. They were fed by diet treatment as following; 1. Control diet and 2. Diet with 0.2% of prebiotic yeast.

2.3 Feeding and animal management

The chicks were housed in evaporative cooling house located in the department of Animal Production Technology, Faculty of Agriculture Technology, Rajamangala University of Technology Tawan-Ok Chantaburi Campus. The experiment used 40, 19-wk-old C.P. Brown laying hens which an average weight 1.56 kilograms per chick. They were housed in 40 wire battery cages. The unit size of cage was 30 x 40 x 37 cm.

Two formulas of diet were contained 17% of protein which giving energy 2,700 kcal per kilogram, 4% of calcium and 0.4% of phosphorus. Diet also contained other nutrients according to the suggestion of NRC (1994). Feed and water were made available ad libitum to chicks. They were fed 2 times a day and gotten light averaging 16 hours throughout the experiment.

2.4 Data collection and Data Analysis

2.4.1 Data collection

1. Weight of the animals were recorded before the experiment.

2. Egg production and egg quality were recorded daily.

3. Egg production of hens from two groups (1. diet which served as control and 2. diet which served as adding 0.2% of prebiotic-yeast) were recorded. the data of egg production was feed intake, feed conversion ratio, laying capacity and weight per egg.

4. Egg quality of hens from two groups (1. diet which served as control and 2. diet which served as adding 0.2% of prebiotic-yeast) were recorded. the data was shell thickness, shell weight, egg yolk color, egg yolk weight, albumen weight, albumen height and heugh unit.

2.4.2 Data analysis

Analyzed statistical data according to two representative comparison trial plans using analysis of variance using Proc. GLM (SAS, 1985) and compared the average of each treatment by employing Duncan's new multiple range test.

3. Results

3.1 Egg production from hens served with control diet and hens served with adding 0.2% prebiotic-yeast diet

The comparison of egg production between two formulas of diet showed that body weight of chicks, quantity of eggs, egg weight and egg production had no significantly improved ($p > 0.05$). However, an average of egg weight from diet with adding 0.2% of prebiotic-yeast was higher than egg from control diet even there was no statistical difference. In conclusion, egg production from different diets showed no significantly improve ($p > 0.05$).

Table 1: Comparison of egg production between control diet and adding 0.2% of prebiotic-yeast diet

Factor	Control diet	0.2 % of prebiotic-yeast diet	P-value
Body weight of chicken (kg.)	1.75	1.795	0.196
Feed intake	107.78	107.72	0.432
Feed conversion ratio	2.33	2.46	0.861
Egg production (%)	80.18	74.91	0.218
Average egg weight (gram /egg)	58.19	59.02	0.965

3.2 Egg quality from hens served with control diet and hens served with adding 0.2% prebiotic-yeast diet

The comparison of egg quality such as shell thickness, shell weight, egg yolk color, egg yolk weight, albumen weight, albumen height and haugh unit between two types of diet showed no significantly improved ($p > 0.05$). When consider egg yolk color, the result showed that an average color of yolk from diet with 0.2% prebiotic-yeast was higher than control diet. The average was 15.156 and 14.626 respectively. In conclusion, there was no significantly improve ($p > 0.05$) between two diets

Table 2: Comparison of egg quality between control diet and adding 0.2% of prebiotic-yeast diet

Factor	Control diet	0.2 % of prebiotic-yeast diet	P-value
Shell thickness (mm.)	0.338	0.336	0.482
Shell weight (gram)	7.133	6.999	0.319
Egg yolk color	9.70	10.35	0.242
Egg yolk weight (gram)	14.626	15.156	0.197
Albumen weight (gram)	35.114	34.914	0.500
Albumen height (mm.)	7.989	7.738	0.677
Haugh unit (HU)	89.838	88.195	0.743

3.3 Feed intake and Feed conversion ration from hens served with control diet and hens served with adding 0.2% prebiotic-yeast diet

The comparison of feed intake and feed conversion ratio between chicks served with adding 0.2% of prebiotic-yeast diet and chicks served with control diet showed an average as 15,081 grams and 15,089 grams respectively. Feed intake had an average as 107.72 and 107.78 respectively. Feed conversion ratio showed an average as 2.46 and 2.33 respectively. In conclusion, feed intake and feed conversion ration of chicks from two different diets had no significantly improved ($p > 0.05$).

4. Discussion

The result of adding 0.2% of probiotic-yeast in chicken's food showed that there was no any difference of feed intake between food with yeast and control food when feeding laying hens ($p > 0.05$). According to the study of Yalcm et al. (2008), he studied about adding yeast, soybean meal and sunflower seeds in chicken's food for 180 Lohmann Brown laying hens which aged 21 weeks, and he found that average daily feed intake showed no statistic difference ($p > 0.05$). Nursoy et al. (2004) who studied about adding probiotic-yeast in laying hens' food also found the same result that there was no statistic difference in daily feed intake ($p > 0.05$) According to the report of Yildiz et al. (2004) and Parlet et al. (2001), they added 1 gram of probiotic-yeast per 1 kilogram of quail's food and found that the quantity of daily feed intake increased when compared with control food. From collecting data in meta-analysis about adding probiotic-yeast in laying hens' food, 164 of related research showed no differences of feed intake ($p > 0.05$) between food with prebiotic-yeast and control food.

However, if compare weight of the hens, the hens that consumed food with prebiotic-yeast, soybean meal and sunflower seeds were statistically significant heavier than the hens that consumed control food ($p < 0.05$). This might be the result from adding soybean meal and sunflower seeds (Yalcm et al., 2008). From the study, average weight of hens feeding with probiotic-yeast were higher than hens feeding with control food and the rate were 1.80 kilograms and 1.75 kilograms respectively. However, there was no any statistic difference ($p > 0.05$). The percentage of egg production from this research showed an average between control food and food with 0.2% of probiotic-yeast as 74.91% and 80.18% respectively, but it was not showed statistic difference ($p > 0.05$). Park et al. (2020) studied about adding probiotic-yeast (BYH, *Saccharomyces cerevisiae*) at level of 0, 0.05, 0.1, 0.5, 1.0 and 3.0 % in food for 288 Hy-line Brown laying hens and found that adding yeast in food could increase the percentage of egg production with statistical significance ($p < 0.05$).

The best level of yeast adding was 3.0% ($p < 0.05$). According to the report from Araujo et al. (2017), adding hydrolyzed yeast in laying hens' food could increase 2.14% of egg production. However, Ozsoy et al. (2018) stated that adding dried yeast and fermentation yeast in food could not increase the percentage of egg production. From this study, when comparing egg quality between hens feeding with 0.2% probiotic-yeast and hens feeding with control food, the result showed that shell thickness, shell weight, yolk color, yolk weight, albumin weight, albumin height and heugh unit had no any statistic difference ($p < 0.05$). According to data collection in meta-analysis on the topic of adding probiotic-yeast in laying hens' food by Ogbuewu and Mbajiorgu (2020), they found that shell thickness and heugh unit of the eggs from food with probiotic-yeast and control food showed no statistic difference ($p > 0.05$). this could also refer to the study of Yalcin et al. (2015) about adding yeast in food for 96 Hyline Brown laying hens.

The researchers added 3 types of yeast which were 1) inactive yeast with the ratio at 1 gram of yeast / 1 kilogram of food 2) live yeast with the ratio 0.5 gram of yeast / 1 kilogram of food and 3) 1 gram of inactive yeast and 0.5-gram live yeast / 1 kilogram of food. They compared these 3 formulas with control food and found that the outer qualification of eggs such as shape index, breaking strength, shell thickness, albumen height, albumen index, yolk index and haugh unit showed no statistic difference ($p > 0.05$). But adding 1 gram of inactive yeast / 1 kilogram of food could help to reduce cholesterol in egg yolk with statistical significance ($p < 0.05$). Therefore, adding inactive yeast in food could produce low cholesterol eggs which were good to the health of customers. Yalcin et al. (2012) stated that adding live yeast in laying hens' food did not have effect on outer and inner qualification of the eggs, but Chumpawadee et al. (2009) reported that adding cassava yeast could statistically significantly increase shell thickness ($p < 0.05$) which might be the result of the increasing of absorbing calcium of the shells.

Liu et al. (2021) studied about yeast and various metabolites. The researcher did the experiment by adding 2 grams of yeast and various metabolites per 1 kilogram of food of 224 Hyline brown laying hens and found that feeding the hens with yeast and various metabolites could statistically significantly increase egg quality such as shell thickness, albumen height, yolk color and haugh unit ($p < 0.05$). Moreover, yeast and various metabolites also helped to increase blood biochemical parameters of the hens such as lysozyme and total anioxidation capacity with statistical significance as $p < 0.05$. According to Hameed et al. (2019), the researcher examined about adding baker's yeast (Gropro) at the level of 0.1, 0.15 and 0.2 % in food for Novogen white light laying hens and found that adding 0.2% of yeast could effectively help the hens to increase digestibility of crude protein ($p < 0.05$). Also, it could increase egg quality such as yolk weight, albumin weight and heugh unit with statistical significance as $p < 0.05$. However, adding baker's yeast in food reduced shell thickness ($p < 0.05$). El-Kaiaty et al. (2019) stated that adding 0.6% of yeast in food for Isa brown laying hens could help to increase egg quality such as breaking strength, shell thickness and shell weight ($p < 0.05$). At the same time yeast could help to reduce cholesterol in egg yolk with statistical significance as ($p < 0.05$) and this was good to the health of customers.

References

Araujo, L. F., Bonato, M., Barbalho, R., Araujo, C. S. S., Zorzetto, P. S., Granghelli, C. A., Pereira, R. J. G., & Kawaoku, A. J. T. (2018). Evaluating hydrolyzed yeast in the diet of broiler breeder hens. *Journal of Applied Poultry Research*, *27*(1), 65-70.

Chumpawadee, S., Chantiratikul, A. and S. Sataweesuk. (2009). Effect of dietary inclusion of cassava yeast as probiotic source on egg production and egg quality of laying hens. *International Journal of Poultry Science, 8*(2), 195-199.

El-kaiaty, A.M., Badranorcid, A.M., Bayoumi, A.A., Eshera, A.A. and O. A. El-Sayed. 2019. Effect of dietary yeast supplementation on productive performance, eggshell quality and lipid profile of laying hens. *Egyptian Poultry Science Journal, 39*(2), 567-578.

Hameed, R., Tahir, M., Khan, S. H., & Iqbal, A. J. (2019). Effect of yeast supplementation on production parameters, egg quality characteristics and crude protein digestibility in hens. *Advancements in Life Sciences*, *6*(4), 147-151.

Liu, Y., Cheng, X., Zhen, W., Zeng, D., Qu, L., Wang, Z., & Ning, Z. (2021). Yeast culture improves egg quality and reproductive performance of aged breeder layers by regulating gut microbes. *Frontiers in Microbiology*, *12*, 439.

Nursoy, H., Kaplan, O., OGUZ, M., & Yilmaz, O. (2004). Effects of varying levels of live yeast culture on yield and some parameters in laying hen diets. *Indian Veterinary Journal*, *81*(1), 59-62.

Ogbuewu, I. P., & Mbajiorgu, C. A. (2020). Meta-analysis of the effect of probiotic-yeast (*Saccharomyces cerevisiae*) intervention on feed intake, feed efficiency and egg-production indices in laying hens. *Animal Production Science*. 60, 1-8.

Özsoy, B., Karadağoğlu, Ö., Yakan, A., Önk, K., Çelik, E., & Şahin, T. (2018). The role of yeast culture (Saccharomyces cerevisiae) on performance, egg yolk fatty acid composition, and fecal microflora of laying hens. *Revista Brasileira de Zootecnia*, *47*, 1-6.

Park, J. H., Sureshkumar, S., & Kim, I. H. (2020). Egg production, egg quality, nutrient digestibility, and excreta microflora of laying hens fed with a diet containing brewer's yeast hydrolysate. *Journal of Applied Animal Research*, *48*(1), 492-498.

Parlat, S. S., & Oguz, H. (2001). Biological suppression of aflatoxicosis in Japanese quail (*Coturnix coturnix japonica*) by dietary addition of yeast (*Saccharomyces cerevisiae*). *Research in Veterinary Science*, *71*(3), 207-211.

Yalçin, S., Özsoy, B., & Erol, H. (2008). Yeast culture supplementation to laying hen diets containing soybean meal or sunflower seed meal and its effect on performance, egg quality traits, and blood chemistry. *Journal of Applied Poultry Research*, *17*(2), 229-236.

Yalcin, S., Yalcin, S., Şahin, A., Duyum, H., Calik, A., & GümüŞ, H. (2015). Effects of dietary inactive yeast and live yeast on performance, egg quality traits, some blood parameters and antibody production to SRBC of laying hens. *Kafkas Üniversitesi Veteriner Fakültesi Dergisi*, *21*(3), 345-350.

Yalçın, S., Uzunoğlu, K., Duyum, H. M., & Eltan, Ö. (2012). Effects of dietary yeast autolysate (*Saccharomyces cerevisiae*) and black cumin seed (*Nigella sativa* L.) on performance, egg traits, some blood characteristics and antibody production of laying hens. *Livestock Science*, *145*(1-3), 13-20.

Yıldız, A. O., Parlat, S. S. and I. Yıldırım. 2004. Effect of dietary addition of live yeast (*Saccharomyces cerevisiae*) on some performance parameters of adult Japanese quail (*Coturnix coturnix Japonica*) induced by alflatoxicosis. *Revue de Médecine Vétérinaire*, 155, 38–41.