PROCEEDINGS

5th SAADC 2015

The 5th International Conference on Sustainable Animal Agriculture for Developing Countries

"CLIMATE SMART SUSTAINABLE ANIMAL AGRICULTURE FOR FOOD SECURITY AND LIVELIHOOD IMPROVEMENT IN THE DEVELOPING COUNTRIES"

October 27-30, 2015, Dusit Thani Pattaya Hotel, THAILAND

Jointly organized by

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Faculty of Sciences and Liberal Arts, Rajamangala University of Technology Isan


Institute of Agricultural Technology, Suranaree University of Technology


Faculty of Technology, Mahasarakham University


Faculty of Veterinary Medicine, Mahanakorn University of Technology


Faculty of Animal Sciences and Agricultural Technology, Silpakorn University Phetchaburi IT Campus


Faculty of Science and Technology, Nakhon Ratchasima Rajabhat University


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Tropical Feed Resources Research and Development Center (TROFREC)


Department of Livestock Development
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Production performance of laying hen housing on litter system with different temperature

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Abstract

High ambient temperature in the cage system during rearing time of laying hens are causing high level of stress and low productivity. So the purpose of this study was to evaluate the response of laying hens with different rearing temperature in the litter system of housing toward the production performance and egg quality. A number of 36 laying hens with 30 weeks old were used. They were placed at 2 pens in small closed house (18°C and 30°C). This study used completely randomized design. Data of production performance was analyzed by t-test, whereas data of egg quality was analyzed descriptively. Performance of production included henday production, egg weight, egg mass and feed conversion ratio (FCR) of laying hens that reared in 18°C and 30°C were not significant different. The 18°C of rearing temperature produced income over feed cost (IOFC) of Rp 376/chicken/day, and it was only Rp 5 higher than 30°C. All of egg had the same value of Haugh unit (HU), thick and egg shell percentage and there was no broken or cracked egg. At 18°C rearing temperature, there was no dirty egg, but at 30°C there were 16.67% of dirty eggs. It can be concluded that the negative impact of high environmental temperature on the rearing of laying hen toward the production performance and eggs quality (except of dirty eggs) can be overcome by using the litter system of housing.

Keywords : egg quality, income over feed cost, litter system, production performance

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Introduction

Badan Pusat Statistik (2014), stated that the needs of people of Indonesia to eggs in 2013 was 1,159,549 tons, and it increased by 5.53% from the previous year. To meet this need, laying chicken population in 2013 was amounted to 147.2 million chickens, and it increased by 6.17% from 2012. Therefore the commercial laying hens were one kind of the poultry that very potential in Indonesia.

Environmental factors which have great impact on the productivity of the chicken is the temperature of rearing. The comfortable temperature (thermoneutral zone) for chicken is 20-24°C (Bell and Weaver, 2002). In this temperature range, chicken is not much to produce body heat, so the use of energy becomes more efficient. The temperature change will be responded quickly by chickens.

The environmental temperature in Indonesia, especially during the daytime (30-34°C), is above the range of comfortable temperatures for chicken. This is a major constraint in rearing of laying hens. Moreover, the majority of laying hens in Indoonesia were reared in cage system. These fact make the laying hens more stress. At high temperatures, the chicken release the body heat through panting. Respiratory rate of chicken can increase by up to 200 times/min (Cunningham and Klein, 2007). The impact of it is a decrease in body resistance, production and

quality of eggs produced. Even at extreme temperature (> 34°C), can lead to death untill 31.7% (Mashaly *et al.*, 2004).

Efforts that could be made to suppress the negative effects of high temperature on productivity of laying hens, among others, is the use housing of litter system with control the rearing temperature. Therefore, the purpose of this study was to find out the response of laying hens toward the difference of rearing temperature in the litter system on production performance and quality of eggs produced.

Materials and methods

Animal Experiments and Rearing

The study was conducted in the Poultry Laboratory, Departement of IPTP, Faculty of Animal Science, IPB. 36 commercial laying hens from Lohmann strains, 30 weeks old were used. The small closed house that be equipped temperature controller was used in this study. It consists of 2 pens, each measuring 2 x 2 m^2.

Each of pen was filled with 18 chickens. Temperature in the first pen was set at 18°C, and 30°C in the second pen. The feed and water were placed in the pen. Every pen was equipped with light bulb (75 Watt). The feed was commercial feed that contain 14-17% of crude protein, and 2850 kcal/kg of metabolizable energy. Feed was given 120 g/chicken/day, but the water was given *ad libitum*.

Rearing was carried out for 6 weeks. Every day was done recording of egg production, then they were weighed. Feed were weighed every week for calculate FCR. Every weekend, all of the eggs produced were analyzed their quality (HU, shell thickness, shell weight, shell integrity and level of dirtiness eggshell).

Data analysis

Data were analyzed with t-test using completely randomized design. The temperature of rearing (18°C and 30°C) were as treatment and observation data were as response. Statistical model was used $Y_{ij} = \mu + P_i + \varepsilon_{ij}$ (Mattjik and Sumertajaya, 2002). Data on egg quality were analyzed descriptively.

Results and discussion

Performance of Production

Production performance of laying hens that reared in housing of litter system with different temperature were presented in Table 1.

Table 1. Henday production, egg weight, egg mass and feed conversion ratio of laying hens for 6 weeks of rearing at different temperature

Performace of production	18°C	30°C
Henday production (%)	89.20 ± 10.50	86.10 ± 14.00
Egg weight (g/egg)	61.40 ± 3.98	63.38 ± 3.14
Egg mass (kg/6 weeks)	41.43 ± 0.75	41.25 ± 0.74
Feed conversion ratio	2.20 ± 0.16	2.21 ± 0.15
Income over feed cost (Rp/chicken/day)*)	376.00	371.00

*) Not analyzed statistically

Production performances (henday production, egg weight, egg mass, and FCR) of laying hens that were reared at temperature of 18°C and 30°C were not statistically different. This is because in this study using the litter system, so the heat stress due to high temperature (30°C) still be overcome. This will be very different if the chickens were reared in individual cages. The chickens will suffer a double stress (from the cage system and high temperature of rearing). This condition significant reduced the performance of laying hens (Yousev, 1985).

These results were consistent with the IOFC value that obtained. Chickens that were reared at 18°C in the litter system, generating value of IOFC Rp 376/chicken/day, and only Rp 5/chicken/day higher than the chickens were reared at high temperature (30°C).

Egg Quality

The quality of eggs produced by chickens that were reared in housing of litter system with different temperature were presented in Table 2.

Table 2. Quality of egg that produced during the 6 weeks at different rearing temperature

Egg quality	18°C	30°C
Haugh Unit	74.20 ± 6.62	73.90 ± 8.30
Thick of eggshell (mm)	0.42 ± 0.04	0.42 ± 0.04
Weight of eggshell (%)	11.25 ± 0.65	11.97 ± 0.80
Shell integrity (%)	100.00 ± 0.00	100.00 ± 0.00
Level of dirtiness eggshell (%)	0.00 ± 0.00	16.67 ± 0.40

Haugh Unit value is reflecting the level of egg white thickness. The higher of the rearing temperature caused the egg whites produced more dilute, and the quality is declining. The chickens that were reared at 18°C, generate eggs with the value of HU slightly higher than at 30°C, but based on the USDA (1964), the quality of them is the same, AA (HU ≥ 72).

All of egg that were produced (at 18°C and 30°C), have ideal eggshell thickness (≥ 0.33 mm). The percentage of eggshell weight that produced were also in the normal range, namely 11% (Stadelman dan Cotterill, 1995).

Although all chickens were reared in litter system, but the egg of cracked or broken was not found. At 18°C was also not found the dirty eggs, but at 30°C was found as much as 16.67%. This is due to the rearing at high temperature (30°C), the metabolic interference was occurs, which in turn produces the excreta that more dilute (Daghir, 2008), and cause the percentage of the dirty eggs increased.

Conclusion

Rearing of laying hens in litter system with different temperatures (18°C and 30°C) resulted in the production performances, value of income over feed cost, and eggs quality were almost the same. At 18°C temperature rearing, was not found the dirty eggs but there was as much as 16.67% at 30°C.

References

Badan Pusat Statistik. 2014. Statistik Indonesia 2004. Jakarta. Indonesia.

Bell, D.D., W.D. Weaver. 2002. *Commercial Chicken Meat and Egg Production*. 5th Ed. New York. USA. Springer Science and Business Media Inc.

Cunningham, J.G., B.G. Klein. 2007. *Textbook of Veterinary Physiology*. 4th Ed. St. Louis Missouri. WB Saunders Company.

Daghir, N.J. 2008. *Poultry Production in Hot Climates*. 2th Ed. CABI Publishing. London, UK.

Mashaly, M.M., G.L. Hendricks, M.A. Kalama, A.E. Gehad, A.O. Abbas, P.H. Patterson. 2004. Effect of heat stress on production parameters and immune responses of commercial laying hens. *J Poult Sci.* 83: 889-894.

Mattjik, A.A., M. Sumertajaya. 2013. *Rancangan Percobaan dengan Aplikasi SAS dan Minitab*. Jilid 1. IPB Press. Bogor.

Stadelmen, W.J., O.J. Cotterill. 1995. *Egg Science and Technology*. 4th Ed. New York. Food Products Press.

USDA. 1964. Egg Grading Manual. Washington DC (US) : Federal Crop Insurance Corporation.

Yousef, M.K. 1985. *Stress Physiology in Livestock*. Vol 3 Poultry. Florida, USA. CRC Press, Inc.