
Effect of Lighting Control on Productive Performance and Carcass Quality of Broilers

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The objective of research project was to evaluate the lighting control on productive performance and carcass quality of broilers. The experimental design was t – Test Two Sample Assuming Unequal Variance. Treatment were separated in two groups, group 1 natural lighting control, group 2 natural light, in each group was 4 houses (replications). Breed of broilers mixed gender were Cobb and Arbor Acres amount 118,422 heads, age birth 0 – 42 days. Results found that the natural lighting control not affected for increased body weight, feed intake, FCR, culling rate and mortality rate in the age of 0 – 7 days (starter diet), 8 – 35 days (grower diet) and 36 – 42 days (finisher diet). With this, the age of 1 – 42 days the average body weight were increased 2,811.32 and 2,819.20 g/head, the accumulated feed intake 3,420.24 and 3,514.31 g/head, feed conversion ratio (FCR) 1.4 and 1.52, the average of culling rate and mortality rate 3.87% and 4.00% in natural lighting control group and natural light respectively ($P < 0.05$). The evaluated effect of lighting control on characteristic of broilers carcass disqualified from slaughter house was not significantly difference in broilers carcass disqualified between natural lighting control group and natural light group, the muscular dystrophy 0.53% and 0.93%, the breast blisters 4.86% and 5.42%, the skin scratch 0.80% and 0.85%, yellow skin 0.01% and 0.01% and the hock bruise 1.2% and 0.91% respectively ($P > 0.05$).

Keywords : lighting control, natural light, carcass quality, productive performance, Broiler

Introduction

Broiler industrial are important of economically in Thailand. The export volume are exceeds 85 percent of livestock. There were broilers production 1,374 million heads/year and the volume of fresh and processed chicken export to foreign countries 620,000 tons/year, the value 83,000 million baht (Office of Agricultural Economic, 2016). Which this there will be more expansion an increased value added 100,000 million baht. Because, the main export markets

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of Thailand are Japan and the European Union allow to import frozen chicken from Thailand after banning more than 10 years, because of avian influenza. This has led to continuous capacity expansion. Broilers chicken commonly raise in Thailand include Arbor Acres and Cobb from USA. This has a growth rate and survival rate including high yields. The Body weight at age 42 days was average 2,857 g/head. There are accumulate feed intake 4,786 g/head, Feed conversion ratio 1.67 and dressing percentage 74.25% (Cobb 500, 2015).

Materials and methods

1. The experimental design was t – Test Two Sample Assuming Unequal Variance. Treatment was separated in two groups, group 1 natural lighting control, group 2 natural lights. Each experimental group had 4 houses (replication). Breed of broilers were male Arbor Acres and female Cobb total 118,422 heads, use a feeder period 42 days.

2. The chicken experimental raise in controlled environment house litter floor size 12x105x2.4 m. Chicks were brooded with heater 28 – 35°C for 7 days. Make a vaccine to prevent infectious bronchitis and Newcastle diseases at the age of 7 days with spray method, for Gumbaro disease at the age of 14 days with mixed water. Give the water vitamins to drink as appropriate.

3. Chicken were fed ad libitum by complete feed pellets 3 level of protein 21%, 19% and 17% in period 1 – 7 days, 8 – 35 days and 36 – 42 days respectively.

4. Lighting program for chicken were 23, 18 and 23 hours/day in period of 1 – 7 days, 8 – 35 days and 36 – 42 days respectively by light intensity of 30 Lux.

5. At the age of 42 days fasting is time for 10 – 12 hours before the slaughterhouse. During the broiler chickens raising are recorded on productive performance every weeks in term of weight gain, feed intake, feed conversion ratio and survival rate, including broilers carcass disqualified from slaughterhouse. Statistical analysis used t – Test Two Sample Assuming Unequal Variance and standard deviation by SAS statistical software (Statistical Analysis System, 2001).

Results and Discussions

The evaluation of lighting control on productive performance and carcass quality of broilers at the age of 42 days as shown in table 1 – 2. Results showed that the natural lighting control were not significantly difference in weight gain, feed intake, feed conversion ratio, culling rate and mortality rate both 0 – 7 days (starter diet), 8 – 35 days (grower diet), and 36 – 42 days (finisher diet). The

productive performance ages 0 – 42 days the average weight gain 2,811.32 and 2,819.20 g/head, the accumulative feed intake 3,420.24 and 3,514.31 g/head, the average feed conversion ratio 1.49 and 1.52 and culling rate and mortality rate 3.87% and 4.00% in natural lighting control and natural light respectively ($P>0.05$). Which this may have channel of natural light space 0.30x105 m. (Fig. 1). This is not large when compare with the space of broiler house side wall and it have only one light channel under the eaves, so it was not directly exposed to the sun. In addition, in broiler house the lighting was provided by the lighting system according to the lighting program during broiler chicken raising. It was not affected the performance of broiler production in any way. By the lighting program is in accordance with regulations of the Department of livestock on the protection of poultry welfare, which requires that the chicken house must have brightness more than 20 lux and have a darker period of more than 6 hours/day (Pennapa, 2011). The evaluation of lighting control on the characteristics of broiler carcasses from slaughterhouse found that the experimental group had an average of disqualified broiler carcasses not significantly difference between natural lighting control and natural light with an average of 7.40% and 6.12% respectively ($P>0.05$).



Figure 1. The natural light broiler house with channel of natural light space



Figure 2. The natural lighting control house

The evaluation of lighting control on the characteristics of broiler carcasses from slaughter house found that the experimental group had an average of disqualified broiler carcasses not significantly difference between natural lighting control and natural light with an average of 7.40% and 6.12% respectively ($P>0.05$).



Figure 3. The muscular dystrophy

There were the muscular dystrophy (fig. 3) 0.53% and 0.93%, the breast blisters 4.86% and 5.42%, the skin scratch 0.80% and 0.85%, yellow skin 0.01% and 0.01% and the hock bruise 1.2% and 0.91% respectively ($P>0.05$). The natural light receiving group was characterized by muscular dystrophy and breast blisters, rather than the natural lighting control group. The condition of

the muscular dystrophy is caused by excessive use of the trapezius muscle to spread the wings to cool of the body, which can be prevented by controlling the ventilation system in the house property (Achiraya, 2013). The breast blister (Fig.3) are mainly caused by bacteria infection and unsuitable litter floor handling, resulting in the wetting and lapping causes skin inflammation, infection (Ritz *et al.*, 2014).



Figure 4. The breast blisters (Source: Pennapa, 2011)

The characteristic of broiler carcass skin scratch and skin yellow were similar in percentages of natural lighting control and natural light, the mainly caused by unsuitable litter floor handling. The foot – pad dermatitis (Fig 5.) had several caused such as density in chicken raising, ventilation system of housing and design of drinking water pipes affected the husk ground and increased the intensity of inflammation at the foot – pad dermatitis.



Figure 5. The foot – pad dermatitis (Source: Pennapa, 2011)

Moreover, The hock bruise (Fig 6.) average 1.2% in natural lighting control the main cause for this was due to the incorreceted handling of chickens for transportation to the slaughterhouse (Kiepper, 2012). It did not have any effected on receiving or not receiving light during the process.



Figure 6. The hock bruise

Table 1. Productive performance of broiler in difference ages^{1/}

Productive performance	Natural lighting control	Natural light
age 0 - 7 days		
Weight gain (g/head)	137.57±5.96	136.45±5.75
Feed intake (g/head)	135.46±68.31	136.45±60.73
FCR	1.00±0.11	1.02±0.11
mortality rate and culling rate	0.76±0.08	0.77±0.071
age 8 - 35 days		
Weight gain (g/head)	1,989.5±135.00	1,92±155.88
Feed intake (g/head)	2,805.8±433.01	2,837.2±422.01
FCR	1.715±0.30	1.81±0.34
mortality rate and culling rate	1.64±0.28	1.72±0.31
Age 36 - 42 days		
Weight gain (g/head)	684.25±73.50	751.75±173.90
Feed intake (g/head)	509.06±92.31	573.58±200.93
FCR	0.91±0.21	0.95±0.48
mortality rate and culling rate	1.47±0.26	1.51±0.30
Age 0 - 42 days		
Weight gain (g/head)	2,811.32±210.42	2,819.20±218.06
Feed intake (g/head)	3,420.00±496.03	3,514.31±574.59
FCR	1.49±0.26	1.52±0.32
mortality rate and culling rate	3.87±0.60	4.00±0.65

^{1/}Mean are not significantly difference (P>0.05)

Table 2. The characteristics of broiler carcasses disqualified from slaughterhouse (%)¹

Carcass characteristic	Natural lighting control	Natural light
Muscular dystrophy	0.53±0.48	0.93±1.18
Breast blisters	4.86±1.66	5.42±1.02
Skin scratch	0.80±0.15	0.85±0.16
Yellow skin	0.01±0.02	0.01±0.01
Hock bruise	1.2±0.47	0.91±0.16

¹/Mean are not significantly difference (P>0.05)

Conclusion

The Natural lighting control in broiler house closed system did not affected to production performance including weight gain, feed intake, feed conversion ratio, mortality rate and culling rate. In addition, it have not effected to characteristics of broiler carcasses disqualified from slaughterhouse, muscular dystrophy, breast blisters, skin scratch, skin yellow and hock bruise.

References

- Agricultural Economics Research Division. (2016). Important Agricultural Product Situation and Year Trends 2016 .Office of Agricultural Economics ,Ministry of Agriculture and Cooperatives ,Bangkok 241 .P.
- Achiraya Satityuenyong. “comp.” (2013). Carcass Quality Improvement. Project : minimizing condemnation of broiler in Batagro group. 8 P.
- Cobb 500. (2015). Broiler Performance & Nutrition Supplement. Cobb – vantress.com 14 P.
- Kiepper B. (2012). Reference Guide for Solving Poultry Processing Problems. VGA Extension Bulletin 1156. 4 P.
- Pennapa Matayompong (2011). Animal Well Fair and Notification of Department of Livestock Development That The Protection of Animal Welfare. Department of Livestock Development .Ministry of Agriculture and cooperatives Bangkok 43 .P.
- Ritz C.W., B.D. Fairchild, and M.P. Lacy. (2014). Litter Quality and Broilers Performance. VGA Extension Bulletin 1267. 6 P.

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