

Influence of Cage Density on the Growth and Mortality Rate of Broiler Chickens (0 To 2 Weeks)

Pedro de Deus¹, Celestinho Gonçalves Talo Mali¹, Liborio Ximenes¹, José Mendes¹, Carlito de², Araújo Mali Code² and Graciano Soares Gomes²

¹Department of Animal Production, Instituto Politécnico de Betano (IPB), Manufahi, Timor-Leste

²Department of animal Husbandry, Faculty of Agriculture, National University of Timor Lorosa'e (UNTL), Dili, Timor-Leste

Corresponding Author: Graciano Soares Gomes, Department of animal Husbandry, Faculty of Agriculture, National University of Timor Lorosa'e (UNTL), Dili, Timor-Leste, Tel.: 77325700, E-mail: graciano_gomes@yahoo.com

Citation: Pedro de Deus, Celestinho Gonçalves Talo Mali, Liborio Ximenes, José Mendes, Carlito de, Araújo Mali Code et al. (2024) Influence of Cage Density on the Growth and Mortality Rate of Broiler Chickens (0 To 2 Weeks, SAJ Biotechnol 9: 102

Abstract

Broiler chicken products make a great contribution to meeting the needs of protein of animal origin. Annual chicken meat requirement increased because the price is accessible to all levels of society. The objective of this study is to find out the influence of cage density on the performance of broiler chicks in the initial phase with the same type of food. The investigation was carried out in the village of Betano, Administrative Post of Same, Municipality of Manufahi, located in the south of Timor Island, approximately 94 km from the city of Dili. Around 160 broiler chickens were used, divided into four groups, each consisting of 40 chickens, and placed in cages of different sizes. The sizes of the cages are as follows: D1 (1m²), D2 (1.2m²), D3 (1.4m²), D4 (1.6m²). The feed provided was commercial feed with code BR1 during the observation period. The method used was the observation method with the same intensive treatment and measurement of indicators that determine the productive performance of chickens. The variables observed are feed consumption, conversion rate, and average daily weight gain and mortality rate. The results showed that there was no significant difference in the variables observed between cages with different sizes. However, descriptively, the results show that the cage with 1m² of sizes is even better, especially in relation to feed conversion and average daily weight gain of the chickens. This means that the ideal cage size for raising 40 broiler chickens is 1m², and when using a larger cage can harm the productive performance of the chickens.

Keywords: Density; cage, broiler chickens; initial phase; performance

Introduction

Broiler chickens are the type of chicken that grows the fastest, due to, which the broiler chickens are the result of breeding with advanced technology, which is why they have profitable economic characteristics. The benefits can be in the form of good chicken growth, good carcass production and ideal meat with by-products that can also be utilized. Broiler chicken farming consists of three phases, namely the initial phase of 0-2 weeks, the growth phase of 2-6 weeks and the final phase of 6-8 weeks. According to Rasyaf [1] broiler chicken is a type of chicken that was designed by humans has undergone genetic selection for several years, and therefore requires only approximately 21 to 40 days it will be ready to sell and when the chicken reaches 8 weeks of age, chickens must be sold with a certain body weight and have a wide chest with a large pile of meat.

The initial phase of chickens requires about 23% protein with a metabolic energy of 3,200 Kcal/kg, and the growing phase requires 20% protein with a metabolic energy of 3,200 Kcal/kg. The final phase requires about 18% protein with metabolic energy of 3,200 Kcal/kg (NRC, 1984), due to which the protein requirement in the initial phase is greater than in the growth and final phases. Feeding with high protein content in the initial phase is expected to optimize the growth of broiler chicks, thus increasing body weight at the beginning of feeding.

According to Yohani [2], the most critical phase in raising broiler chickens is during the initial phase of the first 1 to 10 days, due to this phase really determines the subsequent performance of the chicken. In addition to the influence of the quality of the feed provided, the cage's stocking density is also one of the determining factors in the growth of broiler chicks. When chickens are in high density, it can cause slow performance due to high competition and stress.

The size of the cage is very important to guarantee a dignified life and not hinder the growth of broiler chicks. A cage that is too narrow will certainly stress the chickens due to the limited space to move around and consume the diets offered as much as possible. Meanwhile, a cage that is too large is very ineffective. Therefore, the first thing to do is pay attention to determining the size of the chicken coop. The objective of this study is to find out the effect of cage density on the performance of broiler chicks in the initial phase with the same type of diet.

Research Methodology

Research Site

The study was carried out in the village of Betano, Municipality of Manufahi, Timor-Leste. The municipality of Manufahi located in the south of Timor Island, approximately 94 km from the city of Dili. The average temperature at the research site is 25°C and in the afternoon it is always cloudy.

Chickens and Cage

Around 160 broiler chickens were used, divided into four groups, each consisting of 40 chickens, and placed in cages of different sizes. The sizes of the cages are as follows: D1 (1m²), D2 (1.2m²), D3 (1.4m²), D4 (1.6m²). The feed provided was commercial feed with code BR1 during the observation period.

Research Method

The method used was an experimental method to obtain the research data. The chickens receive the same intensive treatment and measurement of indicators that determine the productive performance. The variables observed are feed consumption, conversion rate, and average daily weight gain and mortality rate. The data obtained was analyzed descriptively to determine the best performance among the four groups based on cage density according to the recommendation of Sampurna and Nindhya [3].

Results

The result of the descriptive statistical analysis on the variables observed in the study as described in table 1 and figure 1 and figure 2 below.

Table 1: The average value of the variables observed in the Study

Cage & Size	N observed	ADI (g)	FCR	ADWG (g)	DCE (%)	Mortality rate (%)
D1 (1 m ²)	40	49,36	1,19	41,36	83,79	0
D2 (1,2m ²)	40	50,00	1,21	41,29	82,57	0
D3 (1,4m ²)	40	50,00	1,23	40,79	81,57	0
D4 (1,6m ²)	40	49,36	1,24	39,93	80,90	0

Obs.: D1-D4: Cage; ARC: average dietary intake; FCR: Feed rasion rate' ADWG: Average daily weight gain; DCE.: diet consumption efficien-
cy.

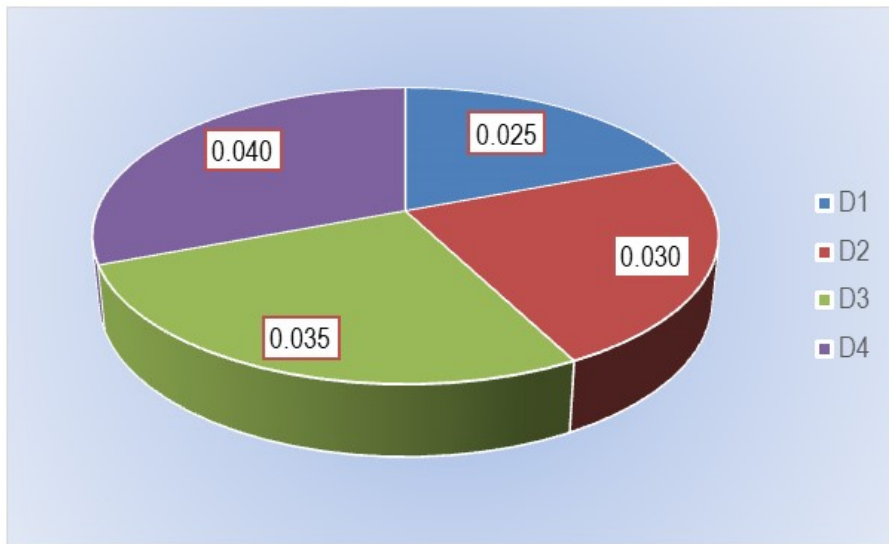


Figure 1: The average stocking density (m²/ chick) in each cage

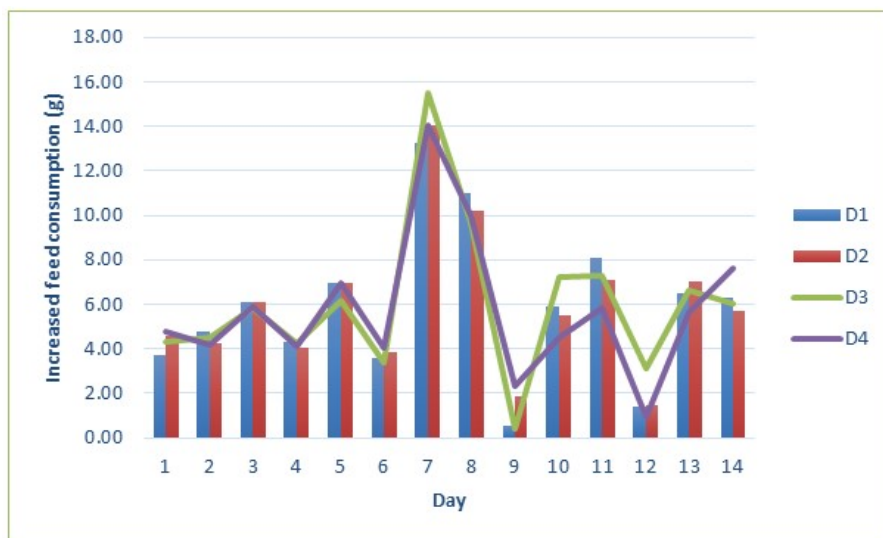


Figure 2: Increased of feed consumption per day per chick in each cage

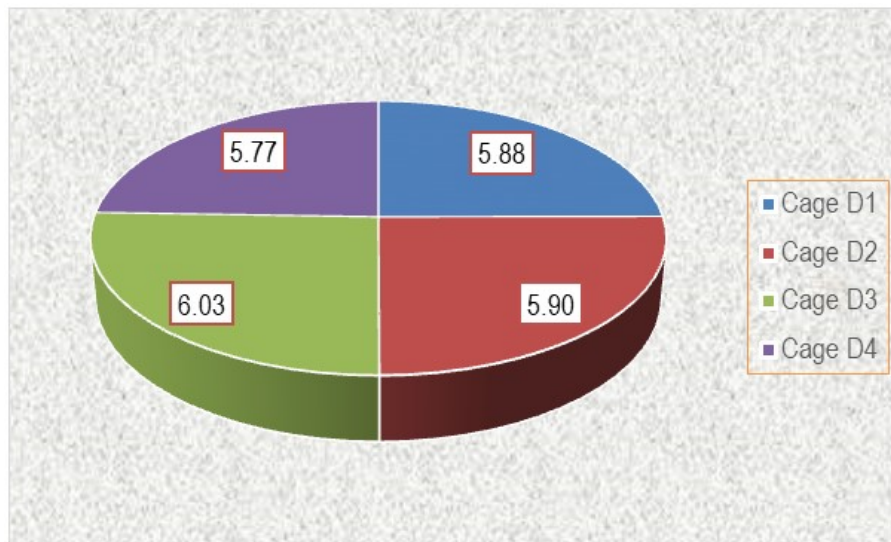


Figure 3: General average increase feed consumption per day (g) in each cage

The results in Table 1 showed that there was no greater effect of difference in feed consumption, feed conversion rate and average daily weight gain of chickens between cages with different sizes. However, the cage with code D1 is even better, especially regarding feed conversion and the average daily weight gain of the chickens. This means that the ideal cage size for raising 40 broiler chickens is cage D1 (1m^2) or $0,025\text{m}^2$ / chick (Figure 1), and when using a larger cage, it will hinder the productive performance of the chickens. Figure 2 shows that there is an increase in feed consumption per day in each cage and the greatest increase occurred on the 7th and 8th day of age of the chickens (Figure 3).

Discussion

Several important factors need to be considered to improve broiler growth, among others including cage stocking density. The research results show that a cage with code D1 with a size of 1m^2 ($0,025\text{m}^2/\text{chick}$) is even the better one cage for housing 40 chickens aged 0 to 2 weeks. The chicks allocated to the cage D1 showed a little higher performance in feed consumption, feed conversion, daily weight gain and percentage of feed consumption efficiency. The high feed consumption occurs due to the density of chicks in cage D1, which is neither too much nor too little, because there is not much space to move around in the cage, thus, the feed fed to broiler chickens is consumed efficiently at a comfortable cage environment. There was an increase in feed consumption each day, but the biggest increase occurred when the chicks reached the age of 7 to 8 days and returned to normal when the chicks reached 10 days of age or more as shown in Figure 2. On the other hand, in general, the increase in daily diet consumption an approximately equal average in the four cages (Figure 3). According to Wahju [4] the factors that can influence the level of feed consumption are not only influenced by the body weight of the chicken, but also by activity, temperature, cage environment, environmental conditions, chick health, and the comfortable cage conditions. The more the chick grows, it needs more the amount of feed consumed, and the amount consumed each week will increase compared to the previous week Fadilah [5].

According to Nuriyasa and Astiningsih [6], the higher the density in the cage, the higher the temperature and water vapor released into the cage environment. Feed consumption is the amount of feed consumed in a given period which will be used by the animals to provide vital needs and other nutrients to promote growth. A high level of density in the cage will hinder less uniform growth of chicks due to internal competition in the consumption of feed and drinking water, so many chickens will be discarded. According to Gustira [7], cage that is too dense will increase competition for food and drinking water as well as oxygen. The large number of chickens in the cage is one of the factors that cause stress with dietary changes and various behavioral changes in chickens [8]. Bell and Weaver [9] stated that increasing cage density causing reduced feed intake, decreased growth and feed efficiency, increasing mortality, and cannibalism. According to Cooper and Washburn [10] that high environmental temperatures cause an increase in

body temperature in broiler chickens which is characterized by a decrease in body weight gain and consumption rations.

Conclusion

The results showed that there was no significant difference in the variables observed between cages with different sizes. However, descriptively, the results show that the cage with 1m² of sizes is even better, especially in relation to feed conversion and average daily weight gain of the chickens. This means that the ideal cage size for raising 40 broiler chickens is 1m² (0.025m²/chick), and using a larger cage can harm the productive performance of the chickens.

Acknowledgements

The work was funded by the Institute of Politenic Betno (IPB), Timor-Leste. Therefore, the authors would like to thank you for all the support, guidance, and funding of the research.

Conflicts of Interest

The authors declare that there are no conflicts of interest regarding the publication of this article.

References

1. Rasyaf M (2006) Raising Broiler Chickens. Jakarta: Penebar Swadaya, Jakarta, Indonesia.
2. Yohani (2013) Starter Phase Maintenance Management. References /eprints.Undip.ac.id>Bab_II. Indonesia.
3. Sampurna IP and Nindhia TS (2008) Data Analysis with SPSS in Experimental Design. Publisher Udayana Press.40: 7. Indonesia.
4. Wahyu J (2004) Poultry Nutrition Science. Gajah Mada University Press, Yogyakarta, Indonesia.
5. Fadilah R (2004) Commercial Broiler Chickens. Jakarta: Agromedia Pustaka. Indonesia.
6. Nuriyasa IM and Astiningsih, NK (2002). The influence of cage density and wind speed in the cage on the eating habits of broiler chickens. Animal Husbandry Scientific Magazine, Faculty of Animal Husbandry, Unud, Bali, Indonesia, 3: 99-103.
7. E Dwi Riyanti and T Kurtini (2015) The Effect of Cage Density on the Production Performance of Laying Hens in the Early Grower Phase. Integrated Animal Husbandry Scientific Journal. 3: 87-92.
8. Iskandar S, Setyaningrum Y Amanda and I Rahayu (2009) The Effect of Cage Density on the Growth and Behavior of Tangerang Wareng Chickens. Livestock Research Institute, Ciawi. Indonesia, 14: 19-24.
9. Bell DD and WD Weaver Jr (2002) Commercial Chicken Meat and Egg Production. 5 th Ed. Springer Science and Business Media, Inc. Spring Street. New York.
10. Cooper MA and KW Washburn (1998) The Relationship of Body Temperature to Weight Gain, Feed Consumption, and Feed Utilization in Broiler Under Heat Stress. Poultry Sci. 77: 237-42.
11. National Research Council (1984) Nutrient Requirements of Poultry, Eighth Revised Edition. Washington, D.C.: National Academy Press.