p-ISSN 1410-5659 e-ISSN 2621-5144 **Jurnal Ilmu Ternak Universitas Padjadjaran, December 2024, 24(2):144-148**
Published by: DOI: 10.24198/jit.v24i2.52822
Unpad Press Available online at http://jurnal.unpad.ac.id/jurnalilmuternak

THE EFFECT OF STOCKING DENSITY ON CARCASS WEIGHT, CARCASS PARTS, AND CARCASS PERCENTAGE OF BROILER CHICKENS IN CLOSED-HOUSE

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Abstract
This research examined the effect of different densities on carcass weight, carcass parts, and carcass percentage. The material used in this research was 200 broiler chickens aged three weeks, reared for 14 days until they were 35 days old. The experimental design used was a Completely Randomized Design (CRD) consisting of 5 treatments and four replications. If the analysis of variance showed a significant effect of the treatment (P<0,05), Duncan's Multiple Range Test was carried out to determine the effect between treatments. The treatments used were P1 = density of 13 birds/m², P2 = density of 14 birds/m², P3 = density of 15 birds/m², P4 = density of 16 birds/m², and P5 = density of 17 birds/m². The study found that density had no significant effect (P>0,05) but all densities give a good carcass quality.
Keywords: Broiler Chicken, Stocking Density, Carcass Weight, Carcass Parts, Carcass Percentage

PENGARUH KEPADATAN KANDANG TERHADAP BOBOT KARKAS, BAGIAN KARKAS, DAN PERSENTASE KARKAS AYAM BROILER YANG DIPELIHARA PADA KANDANG CLOSED HOUSE

Abstrak
Penelitian ini bertujuan untuk menguji pengaruh kepadatan kandang yang berbeda terhadap bobot karkas, bagian karkas, dan persentase karkas pada ayam broiler yang dipeliharan di kandang closed house. Materi yang digunakan pada penelitian ini adalah ayam broiler 200 ekor berumur 3 minggu yang dipelihara selama 14 hari sampai umur 35 hari. Rancangan percobaan yang digunakan adalah Rancangan Acak Lengkap (RAL) terdiri atas 5 perlakuan dan 4 ulangan. Apabila hasil analisis sidik ragam menunjukkan adanya pengaruh perlakuan (P<0,05) maka untuk mengetahui pengaruh antar perlakuan dilakukan Uji Jarak Berganda Duncan. Adapun perlakuan yang digunakan yaitu P1 = kepadatan kandang 13 ekor/m², P2 = kepadatan kandang 14 ekor/m², P3 = kepadatan kandang 15 ekor/m², P4 = kepadatan kandang 16 ekor/m², dan P5 = kepadatan kandang 17 ekor/m². Hasil penelitian menunjukan bahwa kepadatan tidak berpengaruh nyata (P>0,05) tetapi semua kepadatan memberikan hasil kualitas karkas yang baik.
Kata kunci: ayam broiler, kepadatan kandang, bobot karkas, bagian karkas, persentase karkas

INTRODUCTION

Broiler chicken is the main source of animal protein in Indonesia. Broiler chicken is one of the most popular sources of animal protein. The success of livestock business results must be balanced with of maintenance with appropriate density. The closed-house system has some advantages, including ease of monitoring, temperature and humidity regulation, lighting settings, and good ventilation, which helps control the spread of disease (Barruni, et al., 2020). In a closed house, it is important to pay attention to its animal density because the density greatly influences the performance and quality of the chicken broiler.

Animal density on a farm can affect body weight uniformity. High-density farms may prevent the chickens from accessing food and water evenly. High-density farms can also cause discomfort to the chickens and increase stress in the chickens (Setiaji, et al., 2021). In addition, farm density, including carcass parts, and the percentage and intensity of carcass

coloration can affect carcass quality. The carcass is part of the slaughtered body of a livestock animal, cleaned of feathers, legs, head, neck, and internal organs or innards. A good-quality carcass has a higher percentage of flesh than bone (Patriani and Hafid, 2019). Therefore, it is necessary to have the appropriate farm density to ensure the chickens' comfort and a good quality of carcass production.

MATERIALS AND METHODS

The research was conducted at a Broiler Chicken Farm that uses a closed-house system at Kampung Kudang, Wanajaya Village, Wanaraja District, Garut Regency. The research was experimented with a Completely Randomized Design (CRD). The livestock used in this research were 200 Cobb strain broiler chickens, divided into five treatments; each treatment was repeated four times, totaling 20 experimental cage units of different sizes, each filled with ten chickens. The cage used was a postal closed house system. Each experimental cage unit was equipped with a feeder and drinker.

The research was carried out from June to July 2023. The research procedure was as follows: (1) making partitions for 20 units of experimental cages at the inlet of the closed house with sizes according to the set density level; (2) preparing the cages before chick-in during the first week; (3) DOC chick-in process for 23,000 birds in the main closed house pen, followed by rearing until 21 days of age; (4) starting from the 22nd days of age, a total of 200 chickens with uniform body weights (coefficient of variation 4,96%) were put into 20 experimental cage units according to the treatment and replication; (5) chickens in the experimental cage units were kept until harvest age of 35 days, according to the determined harvest age by the farm, and; (6) after the chickens reached 40 days of age, 20 chicken samples from 20 experimental cage units were slaughtered as material for carcass weight and carcass percentage.

During the rearing period, feed consumption, weight gain, depletion rate and harvest age were measured. After the chicken reached 35 days, its body weight was weighed, which was recorded as the final body weight or harvest weight. The data obtained was analyzed for variance, and if the results of the variance analysis showed a significant effect (P<0,05), then the Duncan Multiple Range Test was conducted to determine the effect between each treatments.

Tabel 1. Standard Feed Consumption, Increase Body Weight and Feed Conversion

Age	Feed Consumption gr/head	Average Body Weight kg/head	Feed Conversion Ratio (FCR)
1 week	16	0,16	0,856
2 weeks	33	0,43	1,059
3 weeks	66	0,84	1,261
4 weeks	88	1,40	1,446
5 weeks	110	2,02	1,611
6 weeks	132	2,63	1,760

Statistical Analysis

The mathematical model used was according to the following equation:

$$\sum Yij = \mu + \alpha i + \sum ij$$

Description:

$\sum Yij$ = Variable being measured
μ = General average
αi = Effect of treatment - i
$\sum ij$ = Experimental error from treatment - i, replication - j
i = Treatment - 1, 2, 3, 4, 5
j = Replication - 1, 2, 3, 4

To determine the differences between treatments, the Duncan's Multiple Range Test was performed with the following formula:

$$LSR = SSR \times Sx \; ; \; Sx = \sqrt{\frac{MS\ Error}{r}}$$

Description:

Sx = Standard error
MSE = Middle Square Error
r = Repeat period
LSR = Least Significant Range
SSR = Student Significant Range

When the difference between treatments was compared with the LSR, the decision rule was as follows:

1. If the difference between treatments is < LSR value, then it is considered as non-significant
2. If the difference between treatments > LSR value, then it is considered as significan

RESULTS AND DISCUSSION

The research results on the effect of stocking density on the carcass weight, carcass parts, and carcass percentage of broiler chickens kept in closed houses are presented in Table 1. Based on Table 1, stocking density did not significantly affect (P>0,05) on carcass weight, carcass parts, and carcass percentage of broiler chickens kept in a closed house.

The average slaughter weight of 35-day-old broiler chickens ranges from 1,9 to 2,1 kg, with carcass weight between 1,81 to 1,85 kg. The analysis showed that stocking density had no significant effect (P>0,05) on carcass weight. This result is due to the close relationship between carcass weight and the cut weight. Research by Makrina (2017) showed a difference in stocking density's impact on carcass weight and cut weight in a 35 days rearing period. Heavier cut weights corresponded to greater carcass weight, and vice versa (Dewi et al., 2018).

According to Nasr et al. (2021), there is an increase in internal organ weight in broiler farm with high stocking density. Good carcass quality is characterized by a higher meat component proportion compared to bones (Hutasuhut, et al., 2023). Sufficient protein intake is required for carcass formation (Kastani et al., 2021). The findings also illustrated that a stocking density of up to 17 birds/m² still maintained carcass quality comparable to that of lower densities. The carcass is a very important part of broiler chickens because it compromises the largest and most edible portion. Carcass is the chicken's body without feathers, blood, legs, neck, head, and internal organs, including the digestive tract (Dominggus et al., 2019).

Based on the analysis results in Table 1, density had no significant effect (P>0,05) on all carcass parts. This result was caused by cut weight and carcass weight having no significant effect (P>0,05). Apart from that, the back and wings are parts dominated by bones and therefore have less potential to produce meat (Putu et al., 2019).

The effect of stocking density on carcass percentage also had no significant effect (P>0,05), with an average of 73-74%. This percentage was considered high, as according to Salam et al. (2013), the normal carcass percentage ranges from 65-75% of live weight. Meanwhile, according to Sufriyanto and Indradji (2007), the average broiler carcass at 35 days of age is 59-63% of live weight. Carcass percentage is influenced by cut weight and live weight (Dewanti et al., 2013).

Table 2. Effect of Stocking Density on Broiler Chicken Carcass Weight, Carcass Parts, and Carcass Percentage in Close House.

Parameter	Treatment				
	P1	P2	P3	P4	P5
Cutting Weight (kg)	2101	1994	1993	1986	2028
Carcass Weight (kg)	1851	1823	1825	1813	1853
Thigh (g)	553	506	504	494	501
Breast (g)	795	708	715	733	724
Wing (g)	185	179	183	176	183
Back (g)	386	423	424	408	443
Thigh Meat (g)	348	346	329	322	303
Breast Meat (g)	548	525	530	540	515
Carcass Weight Percentage (%)	74,4	74,4	74,3	74,4	73,7
Thigh Weight Percentage (%)	18,8	19,0	18,0	17,8	16,4
Percentage Breast Weight (%)	29,6	28,8	29,0	29,8	27,8

Note: P1: density 13 birds/m²; P2: density 14 birds/m²; P3: density 15 birds/m²; P4: density 16 birds/m²; P5: density 17 birds/m².

The higher the carcass weight, the higher the percentage. According to Subekti et al. (2012), carcass percentage is also influenced by breed, feed consumption, age, sex, and abdominal weight.

Apart from carcass percentages, breast, and thigh percentages were also analyzed. Statistical analysis of the effect of treatment on thigh percentage showed no significant effect (P>0,05), with averages between treatments ranging from 16,4-19%. Thigh percentage is influenced by chicken activity levels. In this study, based on the activity observation three times a day during feeding, the broiler chicken activity was low. According to Muiz's (2016), the thighs are primarily used for activity and growth, and their proportions follow the overall body growth. However, this contrasts with the findings of Pajri et al. (2019), who found that the percentage of broiler chicken thighs ranged from 30,76 to 31,97%.

Similarly, the treatments had no significant effect on breast percentage (P>0,05), with an average between treatments ranging from 27,8-29,6%. This result is lower than the findings of Tatli et al. (2007), who reported that under normal circumstances and good environmental conditions, the breast percentage can reach 35%. A higher breast percentage has good economic value because the breast contains more meat than other carcass components (Ramdani, et al., 2016). Breast growth, primarily composed of most muscle tissue, is influenced by protein intake, especially amino acids (Pajri et al. 2019). As carcass percentage is closely related to cut weight and carcass weight, the lack of significant results relates to this relationship.

CONCLUSION

Stocking density was the main factor influencing broiler chickens' carcass quality, as were carcass weight, carcass parts, and carcass percentage. It was concluded that density had no significant effect (P>0,05) but all densities give a good carcass quality.

ACKNOWLEDGMENT

The author would like to thank Mr. Wawan Gunawan, S.E., the owner of the closed-house broiler farm, for allowing and facilitating research activities so that they ran well.

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