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A STUDY OF CLOSED-HOUSE SYSTEMS IN BROILER PRODUCTION

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ABSTRACT

This study aims to determine broiler chickens' production performance in a closed-house system. The research was conducted in a closed-house system with a capacity of 22,000 CP 707 strains at plasma breeders of PT. Prosperous Star Together. The variables used in this study include harvested body weight, body weight gain, Feed Conversion Ratio (FCR), Performance Index (IP) and percentage of depletion. The research technique used is direct observation in the field. Sampling uses simple random sampling, where the sample is randomly selected from a specified number. Analysis tools used descriptive method. The measurement data will be compared with the performance standards of broiler chickens according to PT. Charoen Pokphand. The results showed that the average body weight at 25 days was 1.614 kg/head, increased body weight was 1.564 kg/head, FCR was 1.36, IP was 465.45 and depletion percentage was 1.95%. The conclusion that can be drawn from the results of this study is that the production performance of broiler chickens kept in a closed-house system reaches the standards of PT. Charoen Pokphand.

Keywords: broiler chickens; closed houses; productivity.

INTRODUCTION

The livestock sector in poultry farming is a promising business because it has a complete component from upstream to downstream. Poultry livestock that are quite popular in the community are layers and broilers. Broiler chickens have a strategic role in providing a source of animal protein because they have a short production cycle which is generally harvested at the age of 4-6 weeks to produce meat with a live weight of 1.5-1.6 kg/head (Yemima, 2014). The increase in the need for chicken meat every year is because chicken meat is a type of food that is consumed almost every day by many people in Indonesia, and the price is affordable by the community (Umam et al ., 2014). The business of raising chickens, in general, has the goal of making profits and minimizing losses. One of the ways for breeders to reduce the risk of losses is by using a partnership system between large companies and smallholder breeders as the plasma nucleus. In the concept of cooperation through partnerships, according to Laili et al . (2022), the core company is obliged to provide *sapronak* (feed, DOC, and OVK), experts (PPL, veterinarians), and guaranteed marketing. At the same time, the plasma acts as a partner and is obliged to provide cages, equipment, operations, and labor.

The sustainability of the broiler farming business is influenced by several factors, including the availability of *sapronak*, the price of *sapronak* and the success rate of broiler cultivation as indicated by the production Performance Index (IP) and broiler market prices. According to (Pakage et al ., 2020), successful broiler production is demonstrated by the performance or appearance of broilers through mortality, feed consumption, final body weight, Feed Conversion Ratio (FCR), and Performance Index (IP). Optimum broiler performance is influenced by seeds, feed, and management or housing management. In the intensive maintenance of broiler livestock, the cage has an important role as a determinant of the business's success. Broiler cages, based on the type of wall (ventilation), can be divided into closed houses and open houses (Respati, 2018). The closed-house system for broiler maintenance aims to achieve a comfortable environment, healthy air, and minimal stress conditions (Pakage et al ., 2020). Closed House system cages have closed walls made of permanent materials with the use of high technology so that they have good ventilation to reduce the impact of

high humidity with the help of an automatic control panel. While the Open House system cage is a cage with open walls and usually uses wood or bamboo.

Based on previous research (Pakage et al., 2020), rearing broilers in closed-house and open-house system cages showed that rearing in closed-house system cages had higher final body weight, FCR, and IP than open-house system cages. However, in this study, the mortality rate for cattle with the Open House system was better than the Closed House system. This is reinforced by Purwanto's research (2015), which states that the failure of the Closed House system cage can be influenced by human resources who do not understand the operation of the Closed House system cage. Based on this, research on broiler livestock business with closed house systems at PT. Bintang Sejahtera Bersama, Takalar Regency, with a partnership pattern that has been developed a lot, was carried out to analyze the performance of broiler chickens, including feed consumption, harvest weight, body weight gain, Feed Conversion Ratio (FCR), Performance Index (IP) and depletion percentage of broiler chickens.

MATERIALS AND METHODS

Closed house broiler chicken coops with a population of 22,000 CP 707 strains per harvest season for broiler chickens at PT. Bintang Sejahtera Bersama, Bila-bilaya Hamlet, Cikoang Village, Mangarabombang District, Takalar Regency.

The research material used in this study was a population of 22,000 broiler chickens of the CP 707 strain per harvest. Chicken rearing in the closed house system uses a ground floor of the cage made of cement and a roof of the cage with a light steel canopy. Cage equipment includes; a fan (exhaust fan), cooling fan, brooder, place to feed Day Old Chicks (DOC), a place to feed adult chickens, a place to drink automatically (nipple drinker) and a generator set (genset). While the tools used are scales to weigh the body weight of chickens, ration weight scales and a thermometer to measure the air temperature inside and outside the cage. The ration provided is a commercial ration from Pokphand which consists of three types of rations, namely pre-starter ration with code S-10 (age 1-14 days), starter ration code S-11 (age 14-21 days), and finisher ration code S-12 (21 days-harvest). Variables in this study included feed consumption, harvested body weight, weight gain, FCR, IP and depletion percentage.

This study uses a direct observation method (observation) with data collection techniques that are more natural, real, and correct (Hardani et al ., 2020). The data used are primary data and secondary data. Primary data is direct observation data in the field, while secondary data is obtained from existing sources. The data is to support primary information that has been obtained from literature and library materials. The data obtained were processed in the form of tabulations, analyzed descriptively in the form of pictures and tables and then compared with broiler performance standards according to standards from Charoen Pokphand so that it becomes complete information, namely feed consumption and body weight gain, which are closely related to feed conversion. Feed conversion is used to assess the efficiency of using feed obtained by comparing the amount of feed consumed and body weight gain in a certain period (Dharmawan et al ., 2005). In addition to the production performance observed in this study, IP and depletion. The formula calculates production performance variables:

The formula calculates body weight:

$$\text{Body Weight} = \frac{\text{Weighing Weight (kg) - Basket Weight (kg)}}{\text{Number of Chickens (kg)}} \quad (1)$$

Body Weight Gain (PBB) is calculated by the formula:

$$\text{PBB} = \text{Harvest weight (kg/head)} - \text{DOC weight (kg/head)} \quad (2)$$

The value of the Feed Conversion Ratio (FCR) is calculated mathematically by the formula:

$$\text{FCR} = \frac{\text{Rations consumed (kg)}}{\text{Body weight produced (kg)}} \quad (3)$$

FCR or ration conversion value is defined as a unit of comparison between the number of kilograms (kg) of ration consumed by chickens to produce 1 kg of body weight. The greater the quotient of the number of rations consumed means the efficiency of rations is worsening. Conversely,

the smaller the quotient of the number of rations consumed, the more efficient it is in producing the expected body weight to achieve the PT standard. Charoen Pokphand.

Performance Index (IP) or broiler performance index numbers are calculated by the formula:

$$IP=\frac{(100-D)xBB \times 100}{FCR \times (A/U)} \quad (4)$$

Description: IP : Performance Index; D : percentage of depletion or death (%); BW : average body weight at harvest (kg); FCR : Feed Conversion Ratio ; A/U : average age of harvest

The IP used consisted of body weight, feed conversion, depletion and harvesting age, which were production performance. A good IP value standard is above 300 (Table 1). A high IP value indicates that the broiler livestock business is successful.

Table 1. Broiler IP value criteria

Performance Index (IP)	Mark
<300	Not enough
301-325	Enough
326-350	Good
351-400	Very good
>400	Special

Source: Arum, Cahyadi, & Basith (2017)

Depletion is calculated using the following formula:

$$Depletion=\frac{\text{Number of dead chickens + Culling (tails)}}{\text{Initial population (tail)}} \times 100\% \quad (5)$$

Depletion is the rate of death and culling in one-time maintenance of production which is calculated as a percentage.

RESULTS AND DISCUSSION

Closed House System Broiler Chicken Business PT. Bintang Prosperous Together (BSB)

PT. BSB is a broiler livestock company becoming a partner for breeders, where the company provides the needs of breeders, including livestock production facilities which include seeds (DOC), feed, and medicines (vaccines and vitamins). The chicken seeds used by the company and plasma breeders are the CP 707 strain. The feed consists of 3 types given to the chickens according to the rearing phase, namely feed from Pokphand with codes S-10 and S-11 (complete grain feed for early chickens). broiler) and S-12 (complete granular final feed for broilers), which have different nutritional content with a feed weight of 50 kg per sack. At the age of 1-15 days, they are given feed with code S-10. At the age of 16-26 days, they are given feed with code S-11, and at the age of 27 days until harvest, they are given feed with S-12. At the age of 15-16 days, the feed S-10 and S-11 must be mixed to avoid stress on the chickens, as well as at the age of 26-27 days, the feed S-11 and S-12 must be mixed. The housing system used is the Closed House system.

The partnership pattern is carried out by companies and breeders with the nucleus-plasma system, namely cooperation between the company as the core party and the breeders as the plasma party. This pattern helps small to large farmers provide production facilities and guarantees the marketing of broiler products. The collaboration begins with a written contract that binds breeders and companies. The nucleus-plasma system is carried out because it has the same role and goal: interdependence and mutual benefit for both parties. The farmers who join this company come from various regions in South Sulawesi, starting from Pare-Pare, Polman, Barru, Bone, Bulukumba, Jeneponto, Luwu, Palopo, Makassar, as well as Kendari and Palu in different divisions.

The business partnership conducted by PT. BSB and breeders is a business relationship development with a bond of responsibility from each party to realize a mutually beneficial, strengthened and profitable business partnership. PT. BSB, as the main party, provides *sapronak* to plasma farmers, namely DOC, feed and medicines. The partnership pattern that has been established is to use a credit payment system for the procurement and distribution of *sapronak* to plasma farmers to help farmers speed up or follow the schedule for the start of cultivation activities and overcome cash difficulties. The main party marketing broiler products by paying the plasma breeders according

to the guaranteed price to ensure that the plasma breeders are not harmed. The guaranteed price is the agreed price between the main party and the breeder to continue to pay according to the agreement, even though the price of chickens on the market fluctuates. So, breeders do not need to worry about marketing their products because PT. BSB will directly bear the marketing.

Closed House System Broiler Chickens

Closed house broiler farming includes feed consumption, harvest weight, body weight gain, feed conversion ratio (FCR), performance index (IP) and depletion percentage of broiler chickens.

1. Body Weight

The average initial body weight of one-day-old broilers (DOC) was 0.050 kg/head, while the average final Weight of broilers reared for 25 days with the Closed House system was 1.614 kg/head (Table 2). Thus the increase in broiler body weight for 25 days was 1.564 kg/head or an average of 0.063 kg/head/day. The weight gain of the chickens met the CP 707 strain broiler growth standards from PT. Charoen Pokphand.

Table 2. Development of broiler chickens reared in a closed-house cage system for 25 days

Age (day)	Body weight [1)] (kg/head)	Standard body weight [2)] (kg/head)	Increase in body weight (kg/head)	Feed consumption [1)] (kg/head)	Feed Consumption Standard [2)] (kg/head)
1	0.050	-	0	-	-
7	0.198	0.175	0.148	0.190	0.150
14	0.514	0.486	0.464	0.590	0.512
21	1.058	0.932	1.008	1,250	1.167
25	1,614	1,467	1,564	2.020	2.105

Remarks: 1) based on PT. Bintang Prosperous Together; 2) based on PT. Charoen Pokphand

Table 2 shows that broiler maintenance management with the closed-house system follows maintenance standards. The results of Pakage et al. 's research. (2020) achieved live broiler body weight in the Closed House breeder group, which was 1.99 kg/head compared to the Open House system breeders, which reached 1.97 kg/head. The achievement of body weight for broiler chickens with the Closed House system is higher than the Open House system is also supported by the research of Respati et al . (2018), which resulted in the average body weight of broiler chickens in the Open House system of 2.06 kg/head while the Closed House system was 2.07 kg/head. The results of this study showed that the average body weight of broiler chickens with the Closed House system was 0.01 kg/head larger than the Open House system. Results The curve showing the body weight of broiler chickens for 25 days in the study is shown in Figure 1.

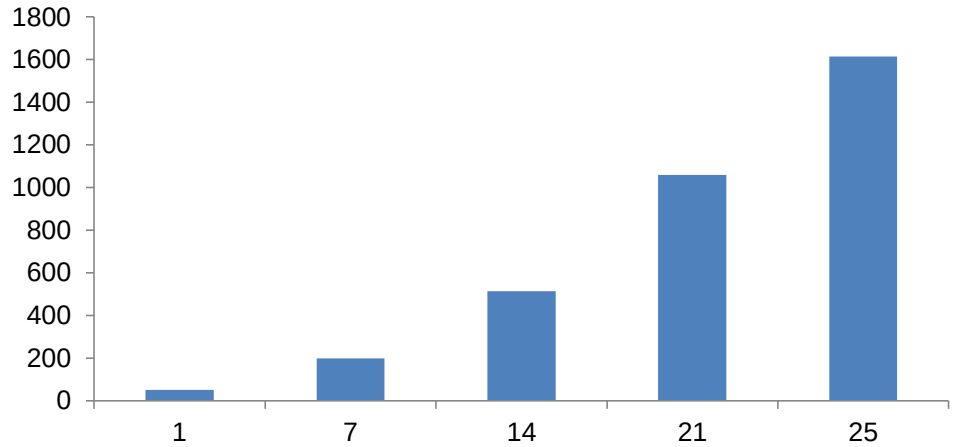

Figure 1. Body weight development of broiler chickens reared in a closed-house cage system for 25 days

This study's average broiler feed consumption for 25 days was 2.020 kg/head. These results follow broiler maintenance standards, namely 2.105 kg/bird. Table 2 shows the development of broiler maintenance for 25 days with the Closed House system.

2. Feed Conversion Ratio (FCR)

FCR shows the efficiency level of the feed consumed by chickens during rearing. If the FCR value is lower, the more efficient the feed consumed by chickens becomes optimal meat (. The amount of broiler feed consumption obtained for 25 days (Table 3) has an FCR of 1.36. These results indicate that the maintenance of broiler chickens with the Closed House system provides good production performance compared to the standard, indicating the use of feed at PT. BSB is more efficient, as revealed in the research by Respati et al. (2018), that the feed conversion ratio is used as an indicator of the success of a livestock business which is the amount of feed spent to produce chicken weight per kg.

Table 3. Development of broilers with closed-house system cages for 25 days

Age (days)	FCR [1)]	FCR standard [2)]	Depletion [1)] (%)	IP [1)]
1	-	-	-	-
7	0.95	0.857	0.33	296.76
14	1.17	1.052	0.75	311.44
21	1.19	1,252	1.35	417.65
25	1.36	1.435	1.95	465.45

Remarks: 1) based on PT. Bintang Prosperous Together; 2) based on PT. Charoen Pokphand

The feed conversion ratio produced by PT. BSB with Closed House system cages is lower than the standard from PT. Charoen Pokphand means that the lower the feed conversion value, the better the feed quality. Vice versa, the higher the feed conversion ratio value, the more feed is needed to increase the body weight of the chickens. Ulfa & Djunaidi's research (2019) added that the yardstick for evaluating feed efficiency was using feed conversion. If the feed conversion value is low, the efficiency of using feed is good, and vice versa.

3. Performance Index (IP)

The performance index (IP) describes the success measure of broiler chicken production. The results of this study indicate the performance index of broiler chicken maintenance with a 25-day harvest time with the Closed House system of 465.45 (Table 3). The IP value is included in the special category because it exceeds the standard in Table 1. (Arum et al., 2017). Ulfa & Djunaidi (2019) stated that a good IP for raising broiler chickens is above 300, while the good category is above 350. The higher the IP value, the better the success of broiler chicken production. The IP results in this study were higher than those of Widana et al . (2020), with IP 301-325 results classified as sufficient. Many factors affect IP values in broiler chickens: the average body weight of broiler chickens at harvest, the percentage of livestock mortality and feed conversion. Important factors are mortality and reject rates in livestock or the percentage of mortality and depletion.

4. Depletion (%)

The results of research on broiler maintenance depletion rates at PT. BSB for 25 days of 1.95% (Table 3). These results indicate the level of depletion at PT. BSB is lower than the standard of death determined by the company. A lower depletion rate than the standard in the Closed House system was also obtained in the study by Widana et al. (2020), which shows that the average depletion rate at Farm Tuwed is 3.64% lower than company standards. These results are because the company implements good biosecurity management by limiting living things and vehicles going in and out, as well as sanitizing people and vehicles, cleaning cages and equipment before chickens are reared every one period, and always controlling the health of livestock by separating sick chickens. Giving vitamins, throwing dead chickens into a well, and performing surgery on the internal organs of the livestock once a week to see what type of disease the livestock has contracted.

CONCLUSION

Based on the discussion results, it can be concluded that broiler livestock businesses are kept in closed-house cage systems PT. BSB Takalar Regency is included in the good category because it reaches the standards of PT. Charoen Pokphand indicated that the average body weight at 25 days

was 1.614 kg/head, weight gain was 1.564 kg/head, FCR 1.36, IP was 465.45 and depletion percentage was 1.95%.

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