**AGRISOCIONOMICS**
Jurnal Sosial Ekonomi dan Kebijakan Pertanian

ISSN 2580-0566 EISSN 2621-9778
http://ejournal2.undip.ac.id/index.php/agrisocionomics
5(2): 29-40, November 2021

# THE IMPACT OF BROILER FARMERS' BEHAVIOR USING BROODING PERIOD EQUIPMENT ON PRODUCTIVITY AND INCOME IN SEMARANG REGENCY

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Submitted 15 July 2020; Accepted 03 February 2021

**ABSTRAK**

Periode indukan atau *brooding* sangat penting untuk diperhatikan dan menentukan keberhasilan pada pemeliharaan setelahnya, masa ini terjadi perkembangan semua organ-organ penting seperti sistem kekebalan, saluran pernapasan, saluran pencernaan, kerangka, bulu. Tujuan penelitian ini adalah menganalisis pengaruh perilaku peternak ayam broiler pada periode brooding terhadap produktivitas ayam broiler di kabupaten semarang; mengevaluasi pengaruh penggunaan peralatan pada periode brooding terhadap produktivitas ayam broiler di kabupaten Semarang; mengevaluasi pengaruh produktivitas ayam broiler terhadap pendapatan peternak ayam boiler di kabupaten Semarang; Metode penelitian yang digunakan adalah penelitian survei. Jenis penelitian ini bersifat deskriptif dengan pendekatan kuantitatif. Variabel eksogen yang diteliti meliputi perilaku peternak periode brooding dan peralatan periode brooding, sedangkan variabel endogen meliputi produktivitas dan pendapatan. Populasi dalam penelitian ini adalah peternak ayam broiler di Kabupaten Semarang. Pengambilan sampel menggunakan teknik *purposif sampling* penentuan sampel menggunakan *sample random sampling.* Unit analisis penelitian ini adalah peternak ayam broiler di Kabupaten Semarang. Jumlah responden sebanyak 120 sampel peternak. Teknik analisis data yang digunakan untuk menganalisis pengaruh perilaku peternak pada periode brooding terhadap produktivitas ayam broiler dan pendapatan peternak, serta Pengaruh produktivitas ayam broiler terhadap pendapatan peternak ayam boiler digunakan analisis jalur (*path analysis*). Hasil penelitian menunjukkan Perilaku (Pengetahuan, Sikap, Ketrampilan, Motivasi) peternak dan Peralatan brooding berpengaruh secara signifikan terhadap produktivitas ayam broiler. Pengetahuan peternak periode brooding berpengaruh secara signifikan terhadap pendapatan peternak. Ketrampilan peternak periode brooding berpengaruh signifikan terhadap pendapatan, produktivitas ayam broiler berpengaruh secara signifikan terhadap pendapatan peternak.
***Kata kunci:*** *ayam broiler, brooding, perilaku, peternak, produktivitas*

**ABSTRACT**

*It is crucial to pay great attention to the broodstock or brooding period and determine the maintenance success afterward. All important organs such as the immune system, respiratory tract, digestive tract, skeleton, and fur are experiencing development during the brooding period. This study aimed to: (1) analyze the impact of broiler farmers' behavior in the brooding period on the productivity of broiler chickens in Semarang Regency, (2) evaluate the effect of the use of equipment in the brooding period on the productivity of broiler chickens in Semarang Regency, (3) evaluate the effect of broiler chickens productivity on the broiler farmers' income in Semarang Regency. The research method used was survey research. This research was descriptive with a quantitative approach. Exogenous variables studied include the farmers' behavior and brooding period equipment, while the endogenous variables are productivity and income. The population in this study was broiler farmers in Semarang Regency. Sampling using a purposive sampling technique. Determination of samples using random sampling. The unit of analysis of this research is broiler farmers in Semarang Regency. The number of respondents was 120 people. Path analysis was used to analyze the impact of farmers' behavior in the brooding period on the productivity of broiler chickens and the income of broiler farmers, and the effect of broiler*

*chicken productivity on broiler farmers. The results showed that farmers' behavior (Knowledge, Attitude, Skills, and Motivation) and brooding equipment significantly affect the productivity of broiler chickens. Farmers' knowledge in the brooding period significantly affects farmers' income. Farmers' skills during the brooding period significantly affect the income, and the productivity of broiler chickens significantly affects farmers' income.*
***Keyword:*** *broiler, brooding, behavior, farmer, productivity*

## INTRODUCTION

Livestock products such as eggs, meat, and milk are always increasingly in demand in order to meet the population's increasing consumption every year. In 2018, chicken meat consumption (broilers) per capita was 5.579 kilograms, which experienced an increase of 40.78 percent from 2014 with a total of 3.963 kilograms (Directorate General of Livestock and Animal Health Services, 2019). There was an increase in meat consumption in 2018 compared to 2014. Daily calorie consumption per capita of meat was 59.99 kilocalories (kcal) in 2018, an increase of 38.45 percent compared to 2014, which was 43.33. The consumption of protein per capita per day of meat is 3.73 grams, which experienced an increase of 39.18 percent compared to 2014 with 2.68 grams (Central Bureau of Statistics, 2015). The driving factor of the increased chicken meat consumption (broilers) is the level of purchasing power and public awareness of the importance of nutritious food. The increasing trend of livestock product consumption is one reason for farmers developing broiler farming businesses.

Broiler chicken is one of the poultry that is useful for humans in the context of providing food that contains high-quality animal protein at affordable prices and is accessible. Central Java is the second largest broiler producer of 543,754 tons after West Java. Likewise, the total population of broiler chickens is 500,399,757. The export value of poultry meat has increased by 898.24 thousand USD, or an increase of 838 percent from the export value in 2014 (Directorate General of Livestock and Animal Health Services, 2019).

Broiler chickens have developed in Indonesia since the 1980s. There are problems in the development process of broiler farming that are commonly faced by broiler farmers, especially small farmers, such as capital, knowledge of proper broiler maintenance management, and marketing livestock products. One solution to the limited capital for broiler farming is through a partnership business, namely the livestock business, involving the company (core party) and farmers (plasma) by mutual agreement. The Core Party provides livestock production facilities, technical guidance, marketing the product, and so on. Meanwhile, the farmers (plasma) provide broiler houses, tools and equipment, workers, and operations during the farming period.

The maintenance of broiler chickens is divided into two periods: the starter period and the finisher period. The brooding period is part of the starter phase, the initial period for the development and growth of chickens. The brooding period is a critical phase in broilers' life because, at this stage, the broilers do not yet have a good thermoregulation system to maintain normal body temperature. Thus, a heater is necessary as a substitute for the brooder. At this stage, chickens will experience rapid growth and include all the organs that play a role in the life and productivity of chickens. The broilers need great attention in this brooding period. Therefore, the demand for broilers can be met with sufficient quantity and quality, which will affect the broilers' final performance (Hardianti, 2012).

In actual conditions, broiler productivity is different from one farmer to another despite using factory standards of livestock production facilities and technical guidance from the core. Broiler farmers are predominantly smallholder farmers with a partnership business pattern. The farmers' backgrounds, human resources, education,

knowledge, and experience, are different. Therefore, it has an impact on the broiler farmers' behavior. In addition, the tools, equipment, and infrastructure in the brooding period are also different, which affects the implementation of brooding management.

Based on these problems, this study aimed to (1) analyze the broiler farmers' behavior on the completeness, function, and use of equipment during the brooding period in Semarang Regency, (2) analyze the productivity of broiler chickens in Semarang Regency, (3) analyze the broiler farmers' income in Semarang Regency, (4) analyze the impact of farmers' behavior in the brooding period on broiler chickens productivity in Semarang Regency, (5) analyze the impact of farmers' behavior in the brooding period on the broiler farmers' income in Semarang Regency, (6) analyze the effect of broiler chickens productivity on the broiler farmers' income in Semarang Regency.

## RESEARCH AND METHODS

### Research Methods and Sampling

The research was conducted from July to November 2019 in Semarang Regency. Sampling using a probability sampling technique. Determination of the sample using simple random sampling, which is a method of selecting samples from the population. Therefore, members of the population have the same opportunity to become members of the sample (Masyhuri and Zainuddin, 2011). Semarang Regency was selected as the research site because it is one of the regencies with the largest broiler population in Central Java Province. The research method used the survey method, which is a study that takes samples from a population using questionnaires as the primary data collection tool. This research was descriptive with a quantitative approach. Quantitative research is based on the philosophy of positivism and is used to examine certain populations or samples. Data collection used research instruments. Data analysis is quantitative/statistical aimed to test the predetermined hypotheses (Sugiyono, 2012).

The error tolerance limit is 10%. The population of broiler chickens farmers in Semarang Regency is 625 people. The size number of samples is determined using the Slovin formula proposed by Umar (2005) as follows;

$$n = \frac{N}{1 + N(e)^2}$$

Information;
N= sample size
N= population size
e= tolerable or desired sampling error

So, the number of samples taken is:

$$n = \frac{576}{1 + 576(0.01)^2}$$

n = 85 samples (120 Samples)

Based on the above calculations, the sample of respondents in this study was 120 people or about 19% of the total broiler farmers in Semarang Regency. According to Roscoe in Sekaran (2006), the sample size in multivariate research, including multiple regression analysis, the sample size should be ten times the number of research variables. Hair *et al.* (1995) also stated a similar opinion that in a multivariate study with the maximum likelihood estimation, the number of samples was five to ten times the indicator variable.

## RESULTS AND DISCUSSION

### Characteristics of Respondents

Based on the study results conducted on 120 respondents, the characteristics of farmer respondents in Semarang Regency are age, gender, education, business system, housing system, farming experience, chicken population, and the number of workers shown in table 1 as follows.

**Table 1.** Characteristics of Respondents

| No | Characteristics | Criteria | Total | (%) |
|---|---|---|---|---|
| 1 | Gender | Male | 116 | 96,7 |
| | | Female | 4 | 3,3 |
| 2 | Age | 20 – 35 | 28 | 23,3 |
| | | 36 – 60 | 92 | 76,7 |
| | | >60 | 0 | 0 |
| 3 | Education Levels | Elementary School | 0 | 0 |
| | | Junior High School | 32 | 26,7 |
| | | Senior/Vocational High School | 80 | 66,7 |
| | | Bachelor | 8 | 6,7 |
| 4 | Experience/ Farming period | < 5 years | 24 | 20 |
| | | 5-10 years | 60 | 50 |
| | | >10 years | 36 | 30 |
| 5 | The population of chickens that are kept | < 5.000 chickens | 16 | 13,3 |
| | | 5000-10.000 chickens | 80 | 66,7 |
| | | >10.000 chickens | 24 | 20 |
| 6 | Chicken house workers compared to chickens that are kept | < 5.000 chickens | 52 | 43,3 |
| | | 5000 chickens | 43 | 35,8 |
| | | >5.000 chickens | 25 | 20,8 |
| 7 | Business System | Independent | 0 | 0 |
| | | Partnership | 120 | 100 |
| 8 | Chicken House System | Open | 37 | 30,8 |
| | | Semi Closed | 83 | 69,2 |

Source: Results of data processing, 2020

**Analysis of Factors that Impact Broiler Farmers' Productivity and Income**

The results of the path analysis of the impact of farmers' behavior in the brooding period on the productivity of broilers and the effect of broiler productivity on farmers' income in Semarang Regency is described in figure 1.

The results of path analysis of exogenous variables, namely behavioral factors that affect broiler chicken productivity include Knowledge, Attitude, Skills, and Motivation, the following equation is obtained:

$$\hat{y} = 0{,}74\ X_1 + 0{,}12\ X_2 + 0{,}21\ X_3 + 0{,}116\ X_4 + 0{,}015$$

The constant value of the above equation is 0.015. The positive constant value shows the positive effect of the independent variable behavior (Knowledge, Attitude, Skills, and Motivation). If the independent variable increases by one unit, the productivity of broiler chickens will also increase. These results prove that the hypothesis is accepted, where there is an impact of broiler farmers' behavior in the use of brooding equipment on the productivity of broiler farmers in Semarang Regency.

$$\check{z} = 1{,}49\ Y + 0{,}56$$

The constant value shows a positive value of 0.56. This means that there is a positive effect of exogenous variables, including farmers' knowledge during the brooding period, farmers' skills during the brooding period, and productivity of broilers. While the endogenous variables are farmers' income. If there is an increase in exogenous variables, the endogenous variable, namely the farmers' income, will also increase.

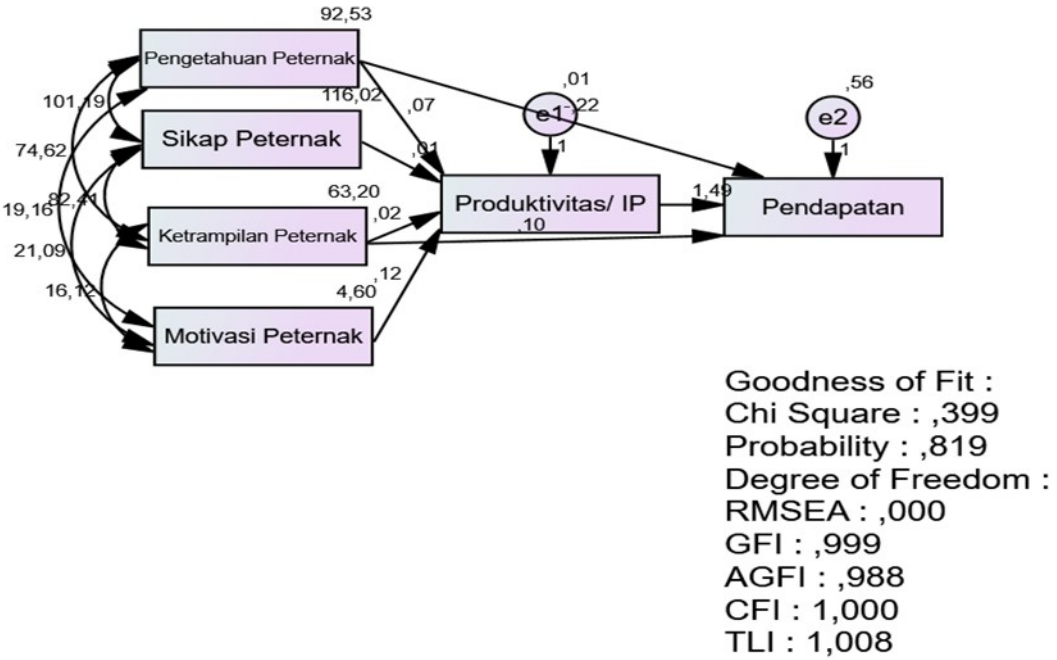


**Figure 1.** Model of Relationship of Factors that Impact Production and Income

**Table 2.** Cross Coefficient of Exogenous Variables to Endogenous Variables

| | | | Estimate | S.E. | C.R. | P | Label |
|---|---|---|---|---|---|---|---|
| PRODUCTIVITY | <--- | KNOWLEDGE | ,074 | ,007 | 10,798 | *** | Par_1 |
| PRODUCTIVITY | <--- | ATTITUDE | ,012 | ,005 | 2,475 | ,013 | Par_2 |
| PRODUCTIVITY | <--- | SKILLS | ,021 | ,007 | 2,802 | ,005 | Par_3 |
| PRODUCTIVITY | <--- | MOTIVATION | ,116 | ,016 | 7,201 | *** | Par_4 |
| INCOME | <--- | PRODUCTIVITY | 1,492 | ,462 | 3,232 | ,001 | Par_5 |

Source: Primary data analysis

The results of the impact of farmers' knowledge in the brooding period ($X_1$) on broiler chicken productivity ($Y_1$) have a positive relationship, shown in table 2 that the p-value is $p < 0.01$ and the regression coefficient is 0.74. The positive relationship at the level of significance of 0.01 shows an effect of farmers' knowledge in the brooding period on broiler chicken productivity. If the farmers' knowledge increases by one unit, the productivity of broiler chickens will increase by 0.74 or 74%. This means **Hypothesis 1** is accepted, that there is an impact of farmers' knowledge in the brooding period on broiler chickens productivity.

Farmers' knowledge of the target of the brooding period, namely target weight, target parameter of Feed Conversion Ratio (FCR), ration consumption, and mortality, determines what farmers will do in the brooding period. Achieving the target weight and feed intake at the age of 7 and 14 days becomes the foundation for growth in the next period. Excess weight gain at the age of 7 days by 10 grams will increase the weight gain at 35 days of harvest by 50-70 grams (*Cobb manual guide*, 2018). If the weight at the age of 7 and 14 days is less than the standard, the target weight is difficult to achieve.

The farmers' knowledge about the brooder (heater) is good. This can be seen from the farmer's selection of the heater. The heater selected can provide stable heat and is easy to use. The heat is easy to adjust according to the expected temperature. In addition, the heater does not emit smoke that disturbs the baby chickens respiratory system, such as firewood and rice husks heaters. The ratio of the brooders (heater) used is adjusted to the number of baby chickens. The ratio is one heater for 750-1,000 baby chickens with the appropriate temperature so that the chicks are comfortable to eat and drink. Therefore, the feed intake is met, the weight growth is achieved, organs digestion, respiration, and immunity are well, and the low mortality rate.

Farmers understand the importance of ventilation for optimal baby chickens' growth. This can be seen from the selection of the broiler house system. The percentage of farmers in the semi-closed house system is 69.2%, and 30.8% still use the open-house system. Andreas (2016) stated that broiler maintenance in closed house and open house systems affect feed consumption, body weight, and FCR. A closed house system, feed consumption, body weight, and FCR are better than an open house. The ambient temperature and humidity that have been set in the closed house system have increased broiler comfort, which affects the increasing feed consumption and metabolic processes (Narita. 2014).

In the brooding period, the farmers have used special tools for the feeder of baby chickens or commonly known as feeder chicks or feeder trays. It is rare to find farmers who still made feeders of baby chickens from used cardboard boxes. The use of feeder chick/try makes it easier for chicks to get feed. In addition, the feeder surface is easy to clean from chick droppings that are usually accidentally mixed with the feed, which clumps up and sticks and causes moldy feed.

The drinking place selected by farmers mostly uses Nipples. The use of nipples makes it easier for the chicks to drink clean water and is always available. Another benefit of using nipples is drinking water remains fresh and free from dirt, husks, or chicken dung. Consuming clean and fresh drinking water makes the chicks comfortable to eat and therefore affects their optimal growth.

Broiler farmer uses brooding/litter mats with good water absorption so that the dirt dries quickly. It is also able to maintain the smell of ammonia, maintains hot/warm temperatures. It is not dusty and moldy and is 5-8 cm thick. This type of litter mat will make the chicks feel comfortable eating and drinking and avoid respiratory diseases, which further optimize the growth of chicks and low mortality due to disease.

Farmers' knowledge is obtained from experience in the livestock business, and technically there is assistance from the core company. The employees from the core company make regular visits at least once a week to the farmer's broiler house. This method is one of the extension methods where there is an effective transfer of knowledge technology. The farmers' experience in broiler farming is a factor of the farmers' knowledge. The success of farming is achieved through a process of learning and experience to gain future progress (Mardikanto, 2009).

The results of the impact of farmers' attitudes ($X_2$) on broiler chickens productivity ($Y_1$) have a positive relationship, shown in table 2 that the p-value is 0.013 or smaller, $p<0.05$, and the regression coefficient is 0.12. The positive relationship at the significance level of 0,05 shows an impact of farmers' attitudes on broiler chicken productivity. If the farmers' attitudes have increased by one unit, the productivity of broiler chickens will increase by 0.12 or 12%. This means that **Hypothesis 2** is accepted, that there is an impact of farmers' attitudes in the brooding period on the productivity of broiler chickens.

Notoatmodjo (2003) states that attitude is a readiness or willingness to act and not implement certain motives. Thus, it can be understood that attitude is a choice or

readiness to act, either negative or positive. Attitude changes include changes in thinking and feeling.

The use of chick feeders and super feeders for chicks will make it easier for chicks to consume feed faster. It is important to maintain the feed intake/the amount of feed consumed by the chicks because by consuming the feed faster, the chicks will have better growth above the standard. Faster feeding of chicks has been shown to affect better growth than usual positively. The first 48 hours of the chicks' life after chick hatching is crucial for chick development. Better gut development in the chicks means better absorption of nutrients, better growth, and better immunity. Epithelial cells grow rapidly in the first 48 hours after hatching, optimum small intestine growth 2-12 days after hatching, diameter, and length develop up to 14 days, depth and number of crypts develop up to 12 days, duodenum villi develop up to 4 days, jejunum villi and ileum villi develop up to 10 days (Noy and Sklan, 2001). Optimal intestinal development will increase the digestibility of livestock, and therefore it affects the FCR. This is in line with Wawan (2010), who stated that the lower the feed conversion rate, the better the efficiency of feed use. If the ratio is small, it means that the weight gain is satisfactory, or the chicken eats less to increase its weight. Factors that affect the size of feed conversion include the digestibility of livestock.

Based on the farmers' formal education levels, 66% of farmers are Senior High School graduates (primary research data), which is relatively high. This will have positive implications for the farmers' attitude in supporting increased production and welfare. The readiness and willingness to take action are based on the farmers' knowledge and long brooding experience. Based on the farmers' length of experience in running a business, it shows that 80% of farmers have more than five years of experience. It will surely increase their knowledge, and therefore it will affect the farmers' attitude in farming. The success of farming is achieved through a process of learning and experience to gain future progress (Mardikanto, 2009). With a high level of education and experience in farming for more than five years, farmers have good attitudes and technical skills in raising broiler chickens.

69.2% of broiler chicken farmers in Semarang Regency use a semi-closed house system. The change in broiler house system technology from an open-house system to a closed-house system is because farmers hope that there is an increase in reproduction and income. Changes in the entrepreneurial attitude of farmers consist of cognitive changes that include all changes that are familiar to farmers, which are from less profitable to profitable. Affective changes involve changes in thinking and feeling. While psychomotor changes include physical skills and thinking skills (Rahadian, 2002). According to Dian (2002), in her research on sheep farmers, changes in attitudes, including cognitive, affective, and psychomotor, are basically to increase the income that comes from farmers' productivity.

The results of the impact of farmers' skills ($X_3$) on broiler chicken productivity ($Y_1$) have a positive relationship, shown in table 2 that the p-value is 0.005 or $p < 0.01$, and the regression coefficient is 0.21. The positive relationship at the level of significance is 0.01 shows an impact of the farmers' skills on the productivity of broiler chickens. If the farmers' skills increase by one unit, the productivity of broiler chickens will increase by 0.21 or 21%. This means that **Hypothesis 3** is accepted, that there is an impact of broiler farmers' skills in the brooding period on broiler chicken productivity. Changes in attitude include changes in thinking and feeling. Whereas changes in skills include physical skills and thinking skills (Rahadian, 2002).

Temperature control is carried out by farmers using a thermometer and by looking at the condition of the distribution of chicks in the brooding area and then followed up by setting the temperature on the heating device. Therefore, the chicks are comfortable eating

and drinking. According to Nuroso (2012), the temperature setting must be in accordance with the chicks' needs. Temperatures that are not optimal according to the needs of chicks will cause physiological disturbances. Thus, chicks' growth is stunted, and their body resistance is low. Maintenance of broilers in the starter period requires a high temperature of about 35 °C and is reduced gradually until the end of the brooder (14 days).

The farmers widen the brooder house by expanding the chick guard, setting the location of the heater, and distributing the ration and drinking places, which makes the chicks comfortable to eat and drink. Chick guard expansion in broiler chickens is carried out at the age of 3-4 days, and at the age of 14 days, the chickens have occupied the entire area of the house. The room area during the brooding period provides comfort for the chickens. Therefore, they can eat, drink, and move more freely. Brooding density will affect the activity and competition of chicks to consume food and drink, and oxygen. Hence, it can inhibit the growth of chicks. This will cause different growth in chicks, and stunting can occur. In addition, with an insufficient brooder area, the chick feces will accumulate at one place, causing the litter to get wet quickly and increase ammonia. Reduced oxygen and increased ammonia affect the chicks' health. This situation will cause the metabolism in the body to be disrupted and cause the chickens to develop respiratory diseases, which leads to the mortality of chicks. In addition, excess density will also stimulate cannibalism in chickens.

The farmers made a ventilation arrangement in the broiler house by opening the curtain lid on the open system house, which can supply fresh air in the henhouse and make the room temperature feels good. Therefore, the chicks are comfortable eating and drinking. Ventilation is a means of air circulation in the brooder house. The air circulation will reduce the smell of ammonia, dust, and smoke from the brooder. Fresh air will enter the brooder house, which ensures constant air circulation. Therefore, the chickens can grow well. Environmental temperatures that exceed the comfort level of broilers have an impact on the decrease of feed consumption and metabolic processes (Swennen et al. 2007) that cause poor and unprofitable performance (Quintero et al. 2010).

In the semi-closed house system, the farmers are responsible for ventilation arrangements in the broiler house by turning on or off the blower, which functions to suck the polluted air in the broiler house and replace it with fresh and clean air. The number of blowers that are turned on or off is adjusted to the needs of the chicks.

The farmers carried out the litter management by adding rice husk to wet litter and replacing clumped rice husk litter which can cause the chicks to develop respiratory diseases. It is important to keep the litter conditions dry because wet litter conditions will cause an increase in ammonia to rise and moldy.

The farmers regularly maintain the cleanliness of the feeding and drinking areas for chicks by cleaning the feeder chick trays every morning and evening. This is important to keep the feed consumed by the chicks free of mold and prevent the chicks from eating feces and causing the chicks to suffer from digestive diseases that can make the chicks grow stunted and even death of the day old chicks (doc). The farmers also routinely separate feed that has been mixed with manure by sifting, and they can give the feed to the chicks. This is important to keep the feed from being wasted, which causes high FCR. The FCR is used to measure livestock productivity. The higher the FCR, the higher rations needed to increase animal body weight per unit weight.

The farmers record the mortality and the amount of feed given every day. The record determines the number of chicken populations and calculates the feed conversion ratio (FCR). The farmers also routinely weigh the chicks once a week. The weighing was conducted at the beginning

when the Broiler DOC (Day Old Chicken) came, the next week, and until harvesting. This is important to control body weight and desired FCR. According to Surajaya et al. (2010), controlling regular weighing every week is necessary to get a good production. If the chicken's weight does not meet the standard, then the amount of feed can be increased by the percentage of underweight from the standard. Furthermore, Kusnadi et al. (2006) state that chickens consume feed to meet their energy needs; before their energy needs are met, they will continue to eat more.

Clean feed conditions will prevent the chicks from eating the dirt and moldy feed, which can cause the chicks to get digestive diseases, stunted growth, and even death of the day-old chicks (doc). The feeder tray was used for two days, and then it was combined with a feeder tube. The standard use is one feeder tray with a diameter of 35 cm for 50 chicks. Feeder tube of 5 kg with a diameter of 12 cm for ten chickens. Feeder tube of 10 kg with a diameter of 16 cm for 20 chickens. According to Nuroso (2015), chicken feed and drinking places should be provided in accordance with the number of chicks. In addition, the distribution of rations should be evenly distributed so that at least 2/3 of the chickens can eat simultaneously. The farmers should not let the chicks have fewer rations and drinks because it can lead to competition that causes different growth of chicks.

The results of the impact of farmers' motivation ($X_4$) on broiler chicken productivity ($Y_1$) have a positive relationship, shown in table 2 that the p-value is 0.005 or $p < 0.01$, and the regression coefficient is 0.116. The positive relationship at the level of significance is 0.01, which shows that there is an impact of farmers' motivation on the productivity of broiler chickens. If the farmers' motivation increase by one unit, the productivity of broiler chickens will increase by 0.116 or 11.6%. This means that Hypothesis 4 is accepted, that there is an impact of farmers' motivation during the brooding period on broiler chicken productivity.

The farmers have the motivation to do a good brooding. They believe that productivity will also have good results by doing a good brooding period, raising livestock, and developing broiler farming business. Intrinsic motivation comes from the farmer's own desire. Raising broiler chickens that can be done multiple times in one year motivates farmers to be even better in broiler productivity and income. They will immediately learn good things from what they did in the previous period and apply it in the next maintenance period by leaving the negative things.

Extrinsic motivation is in the form of stimulation from outside. The farmers are motivated by the results of broiler farms around them. It can come from other farmers in the same period of maintenance, farmers in the same partnership, and farmers from different partnerships. For farmers with a partnership system, the role of technical service (TS) assigned by the core party plays a vital role in motivating farmers, for example, by informing farmers who get a high index of performance (IP) and good income by showing the results of an assessment of production performance. This situation is expected to spur the desire and opportunity of farmers to be able to generate productivity and income for farmers. The assessment results of production performance are useful for evaluation at the end of the period. The results of this evaluation are helpful in making decisions to refill or empty the house (Sinollah, 2011).

Motivation begins with the emergence of stimuli that refer to the recognition of needs. These stimuli can come from the inside (internal) or outside (external). A need will arise if the stimulus causes a difference between a person's desired state and the person's actual state. In other words, a need will occur when a person feels that there is a discrepancy between the actual state and the desired state. This need directed impulses to alleviate one's situation (Mowen and Minor, 2002). Isbandi (2005) states that motivation is a determinant rather than the occurrence of

the behavior. In other words, this motivation is a theoretical construct of behavior.

Broiler chicken productivity (Y) has a significant positive effect on farmer's income (Z), which is indicated by the p-value (0.001) < 0.01, meaning that it is positively related at the significance level of 0.01 and the regression coefficient value is 1.49. This positive effect shows that broiler chicken productivity affects farmers' income. If the productivity of broiler chickens increases by one unit, then the farmers' income will increase. This means that **Hypothesis 5** is accepted and that broiler chicken productivity affects farmers' income.

The feed cost in broiler maintenance is the highest cost, with a percentage of 80%. According to Sutawi (2007), the cost of feed production is the highest in the livestock business. It is supported by Aryanti (2010) that the feed cost is the highest cost in a livestock business, which ranges from 60%-80%. One of the IP components in broiler productivity is FCR. Feed conversion ratio (FCR) is the feed requirement per unit body weight gain. The higher the FCR value, the more feed costs are incurred and vice versa. The lower the FCR value, the fewer feed costs are incurred. This opinion is consistent with a high feed conversion value, which indicates that the efficiency of feed utilization is not good. While a low feed conversion value indicates that more feed is consumed by livestock (Bently, 2003). According to Risnajati (2012), the FCR value in broiler rearing is closely related to the economic value and more amount of feed.

One component of broiler productivity is the mortality/depletion rate. According to Petrawati (2003), the standard of chicken mortality during the growth period is 5%. Depletion is the rate of death and culling in one rearing period. Meanwhile, the factors that cause mortality are environmental, genetic, and disease. According to Rizki (2012), the mortality rate of broiler chickens can affect fluctuations in FCR levels and affect the broiler farm's level of income. In addition, Pambudi et al. (2013) stated that a low mortality value would indirectly increase income through disease management, both treatment and vaccination.

The income earned by the farmer is the result of the chickens' sales that is raised minus the costs incurred. This is in accordance with the opinion of Pudjosumarto (2004) that farm income is affected by farm income and production costs. In farms with partnership patterns, the income obtained by farmers is the difference from sales minus the cost of day-old chicks (doc), feed, vaccines, medicines, and vitamins (price by mutual agreement), plus a bonus of FCR, Mortality, Index of Performance, and if there is a percentage difference between the market price and the contract price with the amount of bonus and percentage as agreed in the contract agreement. In addition, farmers also get revenue from the sale of feed sacks and sales of manure husks for agricultural fertilizers. Meanwhile, the costs incurred by farmers are in the form of labor costs, electricity costs, heating fuel costs (brooder), husk purchasing costs, broiler house depreciation costs, equipment depreciation costs, land lease, taxes, and other operational costs during maintenance. This is in accordance with the opinion of Suwianggadana et al. (2013), the profits of partnership farmers are obtained from the harvest multiplied by the contract price. The advantage of this system is that the farmers' income is not affected by market prices at harvest. If the market price at the time of harvesting chickens is high, farmers who work well on their farms with low FCR and high IP will get quite a lot of profit because farmers benefit from selling their harvests along with bonuses from the company.

Different partner companies can affect the farmers' income level. In addition, the scale of business also significantly affects the farmers' income. The larger the scale of the business, the greater the income earned. This is in accordance with the opinion of Gusasi dan Saade (2006) that the difference in income at each level of business scale is very

real, and therefore benefits and profits can be obtained on a larger business scale.

## CONCLUSIONS AND SUGGESTIONS

### Conclusion

1. The broiler farmers' behavior on the readiness, completeness, function, and use of equipment during the brooding period in Semarang Regency, on the behavior of the knowledge variable is in the high category. Meanwhile, the attitude, the skills, and the motivation variables are in the medium category.
2. The moderate category dominates the productivity of broiler chickens in Semarang Regency.
3. The broiler farmers' income in Semarang Regency is predominantly in the high category.
4. The role of broiler farmers' behavior (knowledge, attitudes, skills, motivation) in the brooding period significantly affects the productivity of broiler chickens.
5. The role of broiler farmers' knowledge and skills in the brooding period has a significant effect on broiler farmers' income.
6. The role of broiler productivity has a significant effect on broiler farmers' income.

### Suggestion

1. Preparation of brooding period is at least 14 days. A clean and sterile broiler house is important to break the disease cycle and is part of biosecurity.
2. The selection of brooding equipment will determine the success of the brooding period. Therefore, choose equipment that is suitable for its function.
3. Farmers must prepare themselves for technological changes that continue to develop and adopt them in raising broiler chickens, and therefore broiler chickens can achieve maximum performance according to their potential.

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