

# Analysis of Income on the Partnership Program-based Broiler Business in Regency of North Minahasa, North Sulawesi, Indonesia

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## Analysis of Income on the Partnership Program-based Broiler Business in Regency of North Minahasa, North Sulawesi, Indonesia

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### ABSTRACT

The partnership program-based broiler farming business (main-plasma), located in Regency of North, Province of North Sulawesi, Indonesia is performed due to the limit of capital, skill, market access and lack of ability in projecting fluctuated market demand. In addition, Covid-19 pandemic has provenly affected broiler farming business, showed by declining broiler's demand and production, particularly on the decreasing income of farmers. Hence, the objective of this research is to examine if it is there is a difference among total of DOC (Day-Old Chick) input, feed conversion ratio (FCR), mortality rate, weight of harvest, raising period, and harvest time, pre- and during Covid-19 pandemic, and analyze some impacts of the existing Covid-19 pandemic and some different variables on the income of the partnership program-based broiler farming business. Technically, the purposive sampling was employed as the sampling method in selecting districts, villages, and farmers. Then, data was analyzed by the paired t-test sample using SPSS 22 and multiple-regression analysis by E-views 11 program. As the result, the paired t-test sample shows that variable of income, total of DOC (Day-Old Chick), FCR, mortality rate, rate of broiler's weight, raising period, and harvest time in pre- and during Covid-19 pandemic was significantly different, where the value of Sig. (2-tailed) was  $< 0.05$ , while, the variable of total of DOC and raising period had significantly positive impact on income, variable of FCR and harvest time had significantly negative impact on farmer's income. Variable of dummy pandemic could decrease farmer's income in the partnership program-based broiler farming business; however, it was unimportant.

**Keywords:** Covid-19 pandemic, DOC, Eviews, FCR, Income, Mortality Rate, Multiple-Regression

### INTRODUCTION

The partnership program-based broiler farming business between farmers (plasma) and company (the main entity) has been long conducted in Indonesia. The purpose of Partnership is as referred to Decree of Minister of Agriculture Number 940/Kpts/Ot.210/10/1997, stating that to improve income, business balance, quality of partner group's resources, and business scale in terms of nurturing and developing business ability of independent partner group. Saptana and Daryanto (2015) argued that some positive impacts of partnership or farming contract in broiler farming is opening a wider job opportunity in rural area, improving business scale and efficiency and productivity, expanding market target, deepening agroindustry, and improving marketing insurance and price assurance, particularly in the price contract system.

The contract system is also confirmed by Bahari, et. al. (2012) that the application of contracted farming provides advantages for farmers, running broiler farming business, and, technically, gives efficiency for their broiler business. The income of indentured farmers is relatively higher with a lower production cost, so that the program of contracted farming still becomes the best option for farmers in improving their income.

In the context of Regency of North Minahasa, Province of North Sulawesi, Indonesia, the partnership program-based broiler farming business (main-plasma) is performed due to the limit of capital, skill, market access and lack of ability in projecting fluctuated market demand. Specifically, there are two large companies acting as the main entity cooperated with broiler's farmers in North Sulawesi. Sumarno, et. al (2013) mentioned that partnership program is mostly chosen by farmers, since farmers can predict their received income and it has a relatively smaller business risk.

Initially, some researches concerning on the income of broiler farming business have been conducted. Majid and Hassan (2013) had analyzed the performance of broiler's farmers under the partnership program. They used regression-equation model, where the dependent variables were price/broiler, total of Day-Old Chick (DOC), feed conversion rate (FCR), rate of broiler's weight, mortality rate, rate of marketing's age, and its independent variable was cage system. According to their findings, they concluded that the increasing of price or broiler is mainly caused by the improving weight of broilers. Further, all variables, excluding total of Day-Old Chick (DOC), has significantly impacted on the performance of broiler farmers, which its significance is 5%.

Meanwhile, research conducted by Lestari, et. al. (2016)<sup>36</sup> found that the income of broiler farmers is only affected by purchasing cost of Day-Old Chick (DOC), but purchasing of feed, medicines and vaccine, wage of labor, and electricity cost have not affected on total of income from broiler farmers. Otherwise, Nurjana, et. al. (2015) conducted the predicting model using some free variables as assumedly determining factors of income, which was total of Day-Old Chick (DOC), vaccine, labor, feed, and price. Pambudi, et. al. (2013) examined the impact of total of broilers, feed cost, medicines and vaccine cost, education, age, experience, and working hour of broiler farmers to profit and rentability. Likewise, Alfa, et al. (2016)<sup>39</sup> conducted similar research, which the free variable was labor's wage, feed price, price of Day-Old Chick (DOC), vitamin and medicines price, husk price, and total of sold broilers.

Concerning on the business risk, Covid-19 pandemic has affected and resulted business risk to all sectors, including broiler farming business. Decreasing of broiler's demand influences business production, such as causing long-term raising period. This happens because of social distancing, physical distancing regulations, and appeals to stay at home reduce purchasing activities and almost non-existent (Yuliasuti, 2020). As a result, the required feed also increases and income received by farmers declines. Some findings of other researchers conducted by Alfa, et. al. (2016), Ramadhany (2018), Murti and Santoso (2017) have also discussed on influencing factors of the income of broiler farmers,<sup>41</sup> comprising of total of broilers, Day-Old Chick (DOC) purchasing, total of labors, cost of feed, vitamin and medicines, electricity, mortality rate, production cost, and total of family's members. However, none of them use Covid 19 pandemic as variable. Therefore, this research specifically concerns on impact of Covid-19 pandemic on the income of broiler farming business.

There is an income gap of farmers experienced pre-and during Covid-19 pandemic. Presumably, it is influenced by a dispute of total of production input, total of feed, mortality rate, broiler's weight rate, and harvest period. Thus, this research is aimed to (1) examine if there is a difference among total of DOC (Day-Old Chick) input, feed conversion ratio (FCR), mortality rate, weight of harvested broiler, raising period, pre- and during Covid-19 pandemic harvest time, and (2) analyze impacts of the existing Covid-19 pandemic, total of DOC (Day-Old Chick) input, feed conversion ratio (FCR), mortality rate, raising period, weight of raising period and other factors on the income of the partnership program-based broiler farming business in Regency of North Minahasa, Province of North Sulawesi, Indonesia.

### RESEARCH METHOD

The research was conducted in Regency of North Minahasa, the most populated broiler industry in Province of North Sulawesi and directly bordered with Manado City which has a potential market of broiler. The data used in this research was primary data. Primary data was obtained from the result of guided-questionnaire interview, previously designed, toward selected farmers as respondent. The collected data was taken before Covid-19 pandemic and during Covid-19 pandemic, data was obtained while working from home. The sample of farmers was purposively designed by considering minimally raising 3000 broilers and farming experience was minimally 5 raising periods. The total of respondents was 50 farmers.

#### <sup>25</sup> Analysis Method

The data analysis used in this research was quantitative method. Data collected from 50 farmers was raising data for 2 (two) different raising periods. For the analysis purpose, data panel was utilized and there were 100 of analyzed data. The analyzed income was total of income from broiler farmers and total of costs, using the following formulation (Soekartawi, 2006), as follows:

$$\pi = TR - TC$$

Where, total of farmers' income was derived from the result of broiler selling added by carcass selling, but it had not included FCR bonus and other bonuses from the main company. Total of costs expensed was for Day-Old Chick (DOC), feed, medicines, disinfectant, husk, gas, and labor. The cost calculation in this analysis did not include depreciation cost of cage, drinking and feeding equipment, labor cost of internal family, and cost of land and building tax and electricity.

To answer the first purpose whether or not there was significant gap between income, total of DOC input, feed conversion ratio (FCR), mortality rate, weight of harvested broiler, mortality rate, raising period, and harvest time pre- and during Covid-19 pandemic, the paired t-test sample was conducted using SPSS 22 program.

The second purpose is analyzing impacts of Covid-19 pandemic and other factors on the income of broiler farming business, performed a formulation of multiple-regression model, as follows:

$$Y_i = \alpha_0 + \alpha_1 X_1 + \alpha_2 X_2 + \alpha_3 X_3 + \alpha_4 X_4 + \alpha_5 X_5 + \alpha_6 X_6 + \alpha_7 D + u$$

Where:  $Y_i$  = Farmers' income (Rp/period)

$X_1$  = Total of DOC (broiler)

$X_2$  = FCR (period)

$X_3$  = Mortality rate (%)

$X_4$  = Weight rate of harvested broilers (kg/period)

$X_5$  = Raising period (day)

$X_6$  = Harvest time (day)

$D$  = Dummy pandemic (1=before; 0=during Covid-19 pandemic)

$\alpha$  = Regression coefficient

## RESULTS AND DISCUSSION

### Characteristics of Respondent

Farmers selected as respondent were farmers of productive age ranging from 27-55 years old. The largest percentage of age was 31-40 years old (42%). Subsequently, farmers aged 40 years old were 30% and farmers who are less than 30 years old were 28% (Table 1). In his research, Mahendra (2014) analyzed the impact of education, wage, sex, age, and working experience on labor productivity, the result showed that productive age will improve working motivation to provide a better life and stable mental. In addition, the education level of farmers can influence their way of thinking and impact on their running business because education has a significant role on business productivity. Particularly, the lowest education background from all respondents was Senior High School amount of 58% and Undergraduate amount of 42%.

**Table 1. Socioeconomic Characteristics of The Broiler Producers**

32 tails	Number of respondents	Percentage
<b>Age of Farmers (Years)</b>		
21 – 30	14	28
31 – 40	21	42
41 – 50	8	16
51 - 60	7	14
<b>Level of Education</b>		
Senior High School	29	58
Undergraduate	21	42
<b>Farming Experience (Years)</b>		
1 - 5	35	70
6 – 10	5	10
> 10	10	20
<b>Type of profession</b>		
Full-time farmers	31	62
Civil servants	5	10
Other	14	28

The finding above is supported research conducted by Aikaeli (2010) whose stated that the education level of respondent has significant role in improving household income. According to Nina (2013), higher education and knowledge level of farmers will be faster and more accurate in accepting and applying an innovation. An experience also becomes a factor in improving household income. Respondents' experience in broiler farming located in Regency of North Minahasa is dominated by both less than 5 years

of farming (70%) and more than 5 years of farming (30%). The main living of respondents is mostly broiler farmer (62%), and broiler farming as side-job is 38%.

In addition, Ike and Ugwumba (2011) argued that the primary living as broiler farmer has significantly positive impact to output and income. This describes that the more time the farmers spend, the bigger output the farmer will obtain. Therefore, in the future, the full-time farmers hopefully are expectedly more experienced and specialized than those part-time farmers, dividing their time with other activities.

#### Partnership Program

Yulianti (2012) argued that advancing factors of farmers in joining the partnership program is the availability of production infrastructure, expert, work capital derived from the main entity, and guaranteed marketing. Those assistances, mostly, are endeavored by company in order to support smooth implementation of broiler farming business and achieve satisfied target for both parties. Broiler farming business in Province of North Sulawesi, basically, is to improve and support income of household. In the research site, farmers as plasma, only provided cages, equipment and labor, while the company as main entity, procured production infrastructures, such as DOC (Day-Old Chick), feed, vaccine, supplement and medicines.

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Then, farmers are obliged to sell broiler to the company based on determined price under a contract. This kind of condition makes farmers lay their income on the main company. The dependency consisted of procurement of DOC (Day-Old Chick), feed, and other production inputs. As consequence, farmers had a lower bargaining power on price of DOC (Day-Old Chick), feed, and harvested broiler, such bargaining power it is likely more determined by the main company.

However, during Covid-19 pandemic, the company provided opportunity for farmers in marketing their broilers due to the declining demand in market. Mostly, farmers did not utilize such opportunity to market their broilers. It was due to difficulty in finding buyer. Besides, the contract-based price was renewed every raising period.

#### Variable Gap of Pre- and During Covid-19 Pandemic

Table 2 demonstrates below the result of paired t-test sample using SPSS 22. The finding shows that there was rate difference from pre- and during Covid-19 pandemic among income, total of DOC, FCR, mortality rate, weight rate of harvested broilers, raising period, and harvest time. The significant difference was based on value of Sig. (2-tailed) < 0.05 for all tested variables.

**Table 2. Statistic Result of Dependent and Independent Variables Pre- and During Covid-19 Pandemic**

Details	Pre-Covid-19 pandemic	During Covid-19 pandemic	Value of Sig. (2-tailed)
Income	16564927.8	5719406.6	.002
Total of DOC (broiler)	5799.386	5867.229	.013
FCR	1.610	1.805	.000
Mortality rate (%)	4.483	7.125	.041
Weight rate of harvested broiler (kg)	2.072	2.524	.000
Raising period (day)	35.209	41.413	.000

Harvest time (day)	7.943	13.171	.005
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### Determining Factors of Farmer's Income

The statistic-F test based on multiple-regression analysis using Eviews 11 program (Table 3) demonstrates that variable of total of DOC, FCR, mortality rate, rate of weight of harvested broiler, raising period, harvest time, and dummy pandemic had collectively substantial impacted on income of broiler farming business, where the Prob value was 0.00. Meanwhile, the value of adjusted R-Square obtained was 0.8448, describing that fluctuated variation of income derived from broiler business (84.48 percent) was due to fluctuated variation of total of DOC, FCR, mortality rate, weight rate of harvested broiler, raising period, harvest time, and dummy pandemic, the rest amount of 15.52% was determined by other variables, excluding this model.

Thus, many researchers suggest to use the value of adjusted R-Square in determining the best regression model, such as value which can be fluctuated if the independent variable is added into the model (Ghozali, 2013). The selected model is also dependent from violation of classical assumption, which is there are no multi-collinearity among independent variables, no auto-correlation shown by the value of Durbin-Watson of 1.95 (Table2), and no heteroscedastic, so that the value of regression coefficient can be precisely estimated.

### DOC (Day-Old Chick)

The result of paired t-test sample derived from the impact of total of DOC (Day-Old Chick) (X1) on income had significantly positive value by the Prob of 0.0000 (Table 2). On the contrary, it is different with research conducted by Ratnasari, et. al. (2015) and Pakage, et. al. (2015), Pambudi et al. (2013), Ramadhany (2018), Ike and Ugwumba (2011) and Hermanto, et. al. (2017), which stated that total of Day-Old Chick (DOC) has a vital impact on the income level of broiler farmers. This condition is due to the addition of 1 (one) DOC (Day Old Chick) effects on the income of broiler farmers. This impact is resulted from Day-Old Chick (DOC) purchasing, depending on the capacity of available cages (area of cages). The increasing of total of Day-Old Chick (DOC) in the beginning of raising period will improve total of harvest by the end of raising period. The more the total of harvest is produced, the more income the formers received. In addition, the amount of business scales can determine both income and profit level of actors involved in farming (Fuad, 1997).

**Table 3. Result of Regression Analysis on The Income of Broiler Farming Business**

Variables	Coefficient	Std. Error	t-Statistic	Prob.
C	1.72E+08	20516271	8.361029	0.0000
X1	2614.907	553.3734	4.725393	0.0000
X2	-1.48E+08	19831202	-7.487226	0.0000
X3	-135665.5	421157.2	-0.322126	0.6212
X4	6600570.	5506380.	1.198713	0.2072
X5	1708269.	663153.2	2.575980	0.0032
X6	-400979.7	214218.0	-1.871830	0.0169
D01	-1016562.	1912020.	-0.531669	0.6214

R-squared	0.855802	Mean dependent var	11142167
Adjusted R-squared	0.844831	S.D. dependent var	20400237
S.E. of regression	8035967.	Akaike info criterion	34.71337
Sum squared residue	5.94E+15	Schwarz criterion	34.92178
Log likelihood	-1727.669	Hannan-Quinn criter.	34.79772
F-statistic	78.00181	Durbin-Watson stat	1.949326
Prob(F-statistic)	0.000000		

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### FCR (Feed Conversion Ratio)

Feed conversion ratio (FCR) is a comparison between  $\frac{\text{kg of feed utilized}}{\text{kg of broiler weight}}$  until it is sold (Rohmad, 2013). FCR can be used to measure the productivity of broiler farming business. According to Allama et al. (2012), the efficiency of feed usage is shown by the low value of feed conversion ratio (FCR), because broiler consumes feed efficiently in producing meat. The smaller value of FCR shows a better business condition (other factors are similar). It displays that additional feed can result more proportional weight of broiler. Input supplementary, such as feed, and other additions can be said having a better impact on FCR, because such additions of certain input and proportion cause broiler in transferring several feeds on broiler's additional weight with a great amount of proportion. Further, Samarakoon and Samarasinghe (2012) argued that FCR is the important factor in contributing the profitability of broiler production.

This research found that the impact of FCR (X2) on farmer's income was based on the result of linear multiple-regression analysis (Table 2) has significantly negative, where the Prob value was 0.00. This negative impact was due to condition during Covid-19 pandemic, total of over-consumed and inefficient feed, resulting the increasing cost of feed and the declining income of broiler farmers. On the other hand, this finding is different from the result of study conducted by Ratnasari, et. al (2015) that FCR has positive and insignificant impact on the income of broiler farmers.

However, the result of this study is similar with the research conducted by Majid and Hassan (2013) that the improving of FCR or living weight resulted is not in line with the feed usage, resulting the decreasing price per broiler and income.

### Mortality Rate

The mortality rate of broiler can affect income obtained by farmers since it will reduce the total of population and volume of broiler selling (Santoso et al., 2018). This rate is total of dead and deformed broilers divided by total of initially cultivated broilers. Total of dead and deformed broilers is gained from the deducing result of total of cultivated broilers with total of sold broilers. In fact, mortality is unavoidable situation due to either disease or other factors. Broiler farming business usually determines maximal limit of tolerable mortality as of  $\pm 5\%$ . The more deceased broilers, the more loss suffered by farmers. The percentage of mortality is one of successfully determining factors in the broiler farming. Bell and Weaver (2002) described that the percentage of mortality during raising period cannot exceed more than 4%.

The analysis result shows that the level of mortality (X3) had insignificantly negative impact on income ( $P > 0.05$ ). The finding of this research did not support the result found by Majid and Hassan (2016), that there is significant correlation between the mortality rate and economic condition of farmers that can be seen from income obtained from



each broiler. In detail, the rate of mortality during Covid-19 pandemic has increased due to long-term harvest time, causing improving broiler's weight and population in the cages were dense.

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This result is similar with the study's findings of Ratnasari et al., (2015), describing that mortality will impact on the level of cage population. A better and optimal improvement of broiler's weight will be achieved if population of broiler in the cages is in under control. Yunus et, al (2007) stated that a better cage determines whether maintenance is succeeded or not, considering broiler's healthy depends on living comfortability within the cage. Suwarta, et. al., (2012) explained, hence, if there is extension of cage's area (business volume), it can result on increasing income of broiler industry.

#### **Weight of Harvested Broiler**

The impact on weight rate of harvested broiler (X4) to income had insignificantly positive value ( $P > 0.05$ ), since the weight rate of harvested broiler in every broiler farming business was different. This condition resulted on different prevailing price for farmers, depending on broiler's price as previously stipulated by the main company. According to Respati et al. (2020), the average weight of broiler is closely related to feed consumption. A higher consumption is expected to raise broiler's average weight. A longer harvest time of broiler increased broiler's weight, but this improvement of broiler's weight had not certainly followed by the increasing price received by farmers. The main company had already a list of different prices for variedly achieved weight of broiler. This result is in line with the research performed by Ramadhany (2018), showing that harvest weight impacts on the income of broiler farming business under the partnership program in CV. Indahnya Maju Bersama (IMB) in Regency of Pasuruan.

#### **Raising Period**

The effect of raising period (X5) on income showed significantly positive ( $P < 0.05$ ). In contrast, this finding did not confirm the research's result conducted by Ratnasari et al., (2015), that raising period on income is insignificant. Raising period (harvest age) in the research's site was different in each farmer. Nevertheless, the rate of harvest age during Covid-19 pandemic was longer due to declining market demand. The raising period of broiler impacted on the final weight, resulting on the increasing income of farmers.

The raising period, hence, was depended on whether or not the main company was ready to take broilers from farmers, as plasma. Averagely, the rate of raising period conducted by farmers was around 32-37 days within one production period. However, during Covid-19 pandemic, the raising period took a time, about 36-48 days. According to Yemima (2014), the superiority of broiler is a short-term cycle of production, such as 4-6 weeks, where broilers are ready to be harvested with the weight rate of 1.5-1.56 kg per broiler. Therefore, broiler is a relatively faster meat producer than other cattle (Fitrah, 2013).

#### **Harvest Time**

The result of regression analysis as seen in Table 2 above displays that harvest time (X6) had significantly negative impact on farmer's income ( $P < 0.05$ ). Furthermore, harvest time is a required period in marketing broiler. During this Covid-19 pandemic, the harvest time became longer, such as averagely 13 days, so that broiler's death risk improved as well. This situation is also decreased annually total of raising period. A

longer schedule of harvesting would give adverse effect to farmers since operational cost, such as labor and feed cost are increased. Farmers were freed to sell their own broiler individually due to the flagging market demand. Its selling price was determined by the main company and not based on broiler's weight. The selling price was under normal price prevailing in market. This step was taken by the main company to avoid a bigger loss for both farmers and the company. Nugraha et al. (2017), additionally, argued that some leading factors resulting loss in the broiler industry are caused by a longer harvest time, overweight broiler, and higher mortality.

#### **Covid-19 Pandemic**

Covid-19 pandemic had insignificantly negative impact on income ( $P > 0.05$ ). This was because farmer's loss was collectively charged with the main company. The existing Covid-19 pandemic made broiler industry technically inefficient viewed from feed usage. The decreasing market demand caused longer harvest time, so that broiler's need on feed continuously improved. Meanwhile, the proportion of feeding supplementary was greater than proportion of broiler's weight addition. The increasing rate of broiler's weight caused dense population in the cage. This made warming temperature in the cage, stressful broiler, outbreak, and increasing mortality rate such condition also impacted on farmer's income and their broiler farming business turned economically inefficient.

#### **CONCLUSIONS**

Based on result analysis above, it can be concluded that total of DOC, FCR, mortality rate, weight rate of harvested broiler, raising period and harvest time in pre- and during Covid-19 pandemic are significantly different. In detail, total of DOC, weight of harvested broiler, and raising period have positive impact on farmer's income, but total of DOC and raising period have the most significant impact. Some variables which have negative impact on farmer's income are FCR, mortality, harvest time, and dummy pandemic, but FCR and harvest time have the most significant impact.

In this research, respondents did not differentiate the type of cages used in raising and cultivating broiler and the main company performing the partnership program. The different company was related to type of Day-Old Chick (DOC) used by farmers as plasma. Therefore, it is strongly suggested for the following research to add type of cage as variable jointly used with dummy variables (open and closed cage system) or separately analyze that farmers using the closed cage system have largely performed.

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