

Impact of Margin of Feed Price Changes on the Production and Income Small-Holding Broiler Farms in Indonesia

*Jolanda K.J Kalangi¹, Sintya J.K. Umboh¹

¹Sam Ratulangi University, Jl. Kampus Unsrat, Bahu Manado-North Sulawesi 95115, Indonesia,
Corresponding Author: Jolanda K.J Kalangi

Abstract: This study aims to analyze the impact of changes in feed prices on household income of broiler farmers. This study aimed to analyze the impact of feed price changes on the income of small-holding broiler farm households. The method employed in this study was the survey method. It used both primary and secondary data. The results of the analysis demonstrated if there were an increased feed price margin between livestock farming companies and small-holding farms, it would be responded by the small-holding farms by decreasing the production of broiler meat. The decreased broiler meat production as a result of increased feed prices would affect the production decisions of small-holding farmers as a multimarket actor and would in turn affect other businesses. On the other hand, the elimination of a margin between livestock farming companies and small-holding farms makes the price to be paid by the small-holding farmers to be lower, responded by the farmers by increasing the production of broiler meat, thus increasing their income.

Keywords: margin, feed, production, income

Date of Submission: 12-09-2017

Date of acceptance: 12-10-2017

I. Introduction

The business of broiler farming in Indonesia was initially developed in small scale by individuals until the government applied foreign investment policies for broiler farming in the 1970s. The purpose of these policies was to accelerate the development of the poultry industry through foreign investment and the transfer of technology from developed countries.

However, in reality the foreign companies expanded their businesses by founding livestock companies which had a negative impact on small-holding farms. The production share which had been dominated by small-holding farms shifted and nowadays production share is dominated by livestock companies. In 2005, the production share of livestock companies was 60 percent and it continued to grow, reaching 85 percent in 2011.

According to Daryanto and Saptana (2010), livestock companies dominate most of the output markets, both in traditional markets and modern markets. Therefore, the broiler meat market structure is flooded by products from livestock companies. Besides dominating the output market, livestock companies also dominate the input market through business agreements with feed companies such as PT. Charoen Phokphan Indonesia, PT. Japfa Comfeed, and PT. Sierad Produce. This causes the input market structure to be less competitive.

In addition, some feed mills are an integrated business with breeding companies, livestock-raising companies, and product processing companies. Even though in their operations these companies do not have any relationships in livestock-farming input and output allocation, they are closely related in the domination of the input and output markets, thus affecting the survival of small-holding farming businesses.

Foreign-owned Breeding Farms (BF) and Feed Mills (FM) sell DOCs and feed to small-holding farms at fairly steep prices. As documented between November 2013 and March 2014, the price of DOC was from IDR 4500 to IDR 4700 per head and the price of feed was from IDR 5000 to IDR 5500 per kg, resulting in a selling price of chicken at small-holding farms to be IDR 13500 to IDR 14000 per kg (the selling price was expensive because of the expensive input prices). On the other hand, the selling price at livestock companies was between IDR 10500 and IDR 11000 per kg.

There was a margin of approximately 20 percent between livestock companies and small-holding broiler farms. This finding was in line with the results of the study by Indarsih *et al.*(2010), namely there was a margin of between 30 and 50 percent between small-holding farms and integrated livestock companies. If all of the broiler production ends up in the traditional markets, the small-holding farms will experience loss. This indicates that the presence of a margin of feed price between livestock companies and small-holding farms are the reason why small-holding farms are unable to compete with livestock companies.

Based on the description above, the structure of the broiler industry in Indonesia has the following characteristics: (1) the feed industry acts as a price-taker in the input market and price-maker in the output market; therefore, the feed industry is not concerned about the changes in the price of feed, but it cares more about the

changes in the price of maize, (2) in the input market, livestock companies are vertically integrated with the feed industry, whereas in the output market, livestock companies dominate and act as price makers, and (3) small-holding farms act as price takers in both input market and output market.

This condition is because in the market, the price of feed is determined by the feed industry, while in the output market livestock companies dominate, leaving small-holding farms helpless in determining the prices. As price-takers, the survival of small-holding farming businesses is prone to changes in input and output prices which are determined by livestock companies. A drop in feed price would create an incentive for farmers to develop their businesses; on the other hand, any rises in feed price would hamper the businesses.

The development of livestock companies has a negative impact on small-holding broiler farms because feed price is determined by livestock companies. The difference in their positions causes a difference in the reactions of the two business actors to changes in feed price due to changes in government policies. To this day, there are no empirical studies about the effect of changes in feed price on the performance of livestock companies and small-holding farms and the effect of the income of small-holding farm households, making this study pertinent and interesting to conduct.

II. Methodology

This study employs primary and secondary data, namely data of (1) prices, (2) production, input use, consumption, and income, and (3) elasticity. Data for prices, production, input use, consumption, and income were obtained from the Central Bureau of Statistics, the Directorate General of Animal Husbandry and Animal Health, and the Ministry of Agriculture's Food Security Agency, whereas elasticity used data from previous studies: Sayaka *et al.*(2007) and Sugema and Roy (2010). The data were analyzed using the General Algebraic Modeling System (GAMS) software (Umboh *et al.*, 2014).

Feed demand was proxied from the demand for maize. This is possible based on the fact that the ingredients for feed are 65 percent and the cost for feed in the cost structure of the broiler business is 70 percent. In addition, the results of the studies by Kariyasa and Sinaga (2007), Fitriani (2006), and Edward (2008), stated that the feed mills' main consideration in determining the amount of feed to be produced is the price of maize. The demand for maize is also determined by the price of maize itself and not the price of feed. Related to these data, the trend for broiler-feed demand tends to be similar to the trend for the demand for maize for the production of feed (Swastika *et al.* 2011).

Price Block

1. Consumer prices of maize by broiler companies is determined by import maize prices (PM_{mz}) and domestic marketing margin (IMARG).

$$CP_{fd,ls} = IP_{fd} * (1+IMARG) \dots \dots \dots (1)$$

where :

- $CP_{fd,ls}$ = consumer prices of maize by broiler companies
- IMARG = domestic marketing margin

2. Consumer prices of maize by small-holding broiler farms is different from the consumer prices by the broiler companies because of the margin.

$$CP_{fd,ss} = CP_{fd,ls} * (1+INTMARG) \dots \dots \dots (2)$$

where :

- $CP_{fd,ss}$ = consumer prices of maize by small-holding broiler farms
- INTMARG = domestic marketing margin by 25 percent

Input Demand Block

1. Demand maize for broiler feed by broiler companies

$$\text{Log}(FED_{ls,fd}) = \alpha_{ls} + \beta_{ls,fd} \text{log}(PP_{ls}) + \gamma_{ls} \text{log}(PC_{ls,fd}) \dots \dots \dots (3)$$

where:

- $FD_{ls,fd}$ = demand maize for feed by broiler companies
- $\beta_{ls,fd}$ = percentage change in maize demand for feed broiler because of changes in chicken meat prices in the broiler companies
- γ_{ls} = percentage change in maize demand for feed broiler because of changes in maize prices in the broiler companies

2. Demand maize for broiler feed by small-holding broiler farms

$$\text{Log}(FED_{ss,fd}) = \alpha_{ss} + \beta_{ss,fd} \text{log}(PP_{ss,fd}) + \gamma_{ss} \text{log}(PC_{ss,fd}) \dots \dots \dots (4)$$

where :

- $FD_{ss,fd}$ = demand maize for feed by small-holding broiler farms
- $\beta_{ss,fd}$ = percentage change in maize demand for feed broiler because of changes in chicken meat prices in the small-holding broiler farms

γ_{ss} = percentage change in maize demand for feed broiler because of changes in maize prices in small-holding broiler farms

Production Block

1. Production of chicken meat by broiler companies

$$\text{Log}(\text{PRD}_{ls,br}) = \alpha_{ls} + \beta_{ls,br} \log(\text{PP}_{ls,br}) + \gamma_{ls,br} \log(\text{PC}_{ls,br}) \dots \dots \dots (5)$$

where:

- $\text{PRD}_{ls,br}$ = production of chicken meat by broiler companies
- $\text{PP}_{ls,br}$ = producer prices of chicken meat by broiler companies
- $\text{PC}_{ls,br}$ = consumer prices of maize by broiler companies
- $\beta_{ls,br}$ = percentage change in chicken meat prices because of changes in chicken meat prices by broiler companies
- $\gamma_{ls,br}$ = percentage change in chicken meat production because of changes in maize prices by broiler companies

2. Production of chicken meat by small-holding broiler farms

$$\text{Log}(\text{PRD}_{ss,br}) = \alpha_{ss} + \beta_{ss,br} \log(\text{PP}_{ss,br}) + \gamma_{ss,br} \log(\text{PC}_{ss,br}) \dots \dots \dots (6)$$

where:

- $\text{PRD}_{ss,br}$ = production of chicken meat by small-holding broiler farms
- $\text{PP}_{ss,br}$ = producer prices of chicken meat by small-holding broiler farms
- $\text{PC}_{ss,br}$ = consumer prices of maize by small-holding broiler farms
- $\beta_{ss,br}$ = percentage change in chicken meat prices because of changes in chicken meat price by small-holding broiler farms
- $\gamma_{ss,br}$ = percentage change in chicken meat production because of changes in maize prices by small-holding broiler farms

Income Block

1. Income of broiler companies

$$\text{INC}_{ls} = (\text{PP}_{br} * \text{PRC}_{br} - (\text{PC}_{fd} * \text{FED}_{fd})) \dots \dots \dots (7)$$

2. Income of small-holding broiler farms

$$\text{INC}_{ss} = (\text{PP}_{rc} * \text{PRC}_{rc}) + (\text{PP}_{mz} * \text{PRC}_{mz}) + (\text{PP}_{br} * \text{PRD}_{br}) + (\text{PP}_{eg} * \text{PRD}_{eg}) - (\text{PC}_{in} * \text{INP}_{in}) - (\text{PC}_{fd} * \text{FED}_{fd}) (8)$$

III. Results and Discussion

The Impact of the Margin of Feed Price on the Broiler Farming Business

The simulation is done to answer the problem in the broiler industry. The model developed in this study explains the imperfect-market structure phenomenon due to the presence of a margin in feed price between livestock companies and small-holding broiler farms. The size of the margin which is the base value is obtained from previous studies (Indarsih *et al.* 2010 and Pulungan 2011) which analyzed the feed price margin between integrated livestock companies and small-holding farms.

This simulation is focused on analyzing the effect of changes in feed price on the business performance of small-holding broiler farms as a multimarket actor. Therefore, feed price in livestock companies is assumed to be constant.

This is because there is a behavioral difference between livestock companies and small-holding broiler farms in reacting to changes in feed price. Small-holding farms as consumers (price takers) in purchasing feed from livestock companies are especially prone to changes in feed price.

On the other hand, integrated livestock companies which have business lines from DOC breeding, feed mills, and chicken processing factories act as price makers, giving them freedom to determine feed price at the profit level they wish. Fitriani (2006) stated that vertical integrated causes an increased concentration and market power which have an impact on the increased difference in the prices paid by the consumers (small-holding farms) and the ones paid by the producers (livestock companies). This condition indicates that the more integrated a company, the better its position in business is.

As stated before, the broiler-farming industry in Indonesia is dominated by livestock companies with approximately 70-85 percent market share. The presence of small-holding farms which initially dominated the market is slowly being annihilated. This is because small-holding farms do not yet use modern technology which requires sizable investments. In addition, the system of the broiler-farming industry which is developing is assumed to be the cause of the steep production cost in the broiler industry. Livestock companies control all the links in the broiler-raising chain, from feed to chicken processing.

Foreign investors such as Charoen Pokphand, Japfa Comfeed, Sierad Produce, and CJ Feed are livestock companies which are integrated with feed mills and processing plants. For example, PT. Charoen Pokphand and PT Japfa Comfeed which dominate the broiler market, controlling 30 and 20 percent respectively, are both

integrated industries that own feed mills, broiler farms, and processing plants which churn out chicken frankfurters marketed under Prima Food and So Good brands.

This condition demonstrates that in the vertical integration concept changes in feed price are not a problem in the continuation of cultivation activities. Livestock companies are only interested in the changes in input price (maize) and output price (broiler meat). However, because integrated livestock companies control the market, changes in output price are rendered unimportant. Livestock companies act as price makers in the broiler meat market. The broiler industry livestock companies are able to control prices because they dominate the market. This condition has an impact on the equilibrium of the broiler-meat market.

The results of the simulation demonstrate that if the feed price margin between livestock companies and small-holding farms increased to 30 percent, this would be responded by small-holding farms by decreasing their demand for feed by 0.344 percent (Table 1). The decrease in feed demand would decrease the production of broiler meat by 0.4005 percent.

The simulation where the feed price margin became 30 percent or had a 10 percent increase from the base value was done to explain the phenomenon found in the broiler industry which tends to have increases in the margin of feed prices up to the said value. The study results by Indarsih *et al* (2010) showed that the margin of feed price could reach 50 percent. This is possible because the vertical integration in the broiler industry is an illusory integration. The illusory integration creates a monopoly as in Thailand, which is a country well-developed in the broiler industry.

The rise in feed price in reality is not immediately responded by small-holding farms by decreasing their production or closing down their businesses because this business requires a lot of capital. Nevertheless, the demands that the business stay open and produce cause small-holding farms to sustain loss. Quite the opposite is true for livestock companies; the rise in feed price would not hinder production activities.

Vertically integrated with breeding farms, feed mills, and processing plants, these companies would have a steady supply of DOC, feed, and a market so that production activities could continue. The different behaviors exhibited by the two actors of the broiler business demonstrate that if this condition persists, small-holding farms will experience loss and would opt to close down their businesses. Therefore, an inclusive development in the broiler industry would not be achieved. The current issue is if partnership is the answer offered to show the government's partiality to small-holding farms, would the implementation of the contract system create an incentive for small-holding farms to develop their businesses?

Daryanto and Saptana (2010) stated that the issue that should be the focus of all the stakeholders in the implementation of the contract system is the empowerment of small-holding farms. So far, livestock companies are more interested in the larger-scaled small-holding farms, not involving the small-scale small-holding farms in their growth. In addition, the partner farmers are the ones who bear most of the risks (the risks of input price increase, especially the price of DOC and feed) and when there is a rise in output price, the largest profit is still reaped by livestock companies.

This indicates that the vertical integration created is not yet a coordinated approach which is mutually profitable and supporting. Vertical integration could create an inclusive growth if a mutually beneficial and supportive relationship between the business actors could be built in a commodity system.

Some studies that compared the presence of independent small-holding farms and partnerships stated that small-holding farms are the aggrieved in the partnership pattern because livestock companies (the nucleus) are not concerned with the presence of the small-holding farms (the plasma). The lack of transparency and guidance from livestock companies (the nucleus) to the farmers who are their partners is the cause of the failure of the partnership pattern. The government policies are also not operating as they should and instead lead the small-holding farms (the plasma) to become mere farmhands on their own farms.

This condition indicates that the government's intervention in the broiler industry has had a negative impact on the presence of independent small-holding farms and partnerships. Independent small-holding farms, which are hindered by classic problems such as the lack of capital, no market access, the inability to predict the market, and technological obstacles, are dying out. Partnership small-holding farms persist with partnership patterns that are limited to coop renting and management. Therefore, small-holding farms, both independent and partners, have weak bargaining positions.

The basic difference in performance between the two actors in the broiler business is that livestock companies move from upstream sub-systems, off-farm, on-farm, to downstream sub-systems, product processing, whereas small-holding farms move in the on-farm sub-system and rely on the inputs produced by livestock companies. Livestock companies, with their strong financial backing, modern technology and market control, implement an integrated system from upstream to downstream.

This integrated business causes a greater domination of production input and the market, giving them a strong bargaining position in the broiler business. Livestock companies could determine prices, either single-handedly or collectively. The position of livestock companies as the price makers in the broiler industry affects the survival of small-holding farms which act as the price takers in both the input market and the output market.

Pertaining to the presence of partnership farmers, these small-holding farms are part of the livestock companies because all the decisions, from upstream to downstream, are one with the management's. The partnership pattern as a business development effort based on vertical collaboration between livestock companies and small-holding farms explicitly position partner small-holding farms as an extension of the livestock companies in cultivation.

Partner small-holding farms perform their businesses based on the contracts they had agreed upon, including the prices of output and input which follow the prices set by the livestock companies. In this case, small-holding farms which become partners only need to provide the chicken coops, labor, electricity, and water, whereas the DOC, feed, medicines, technical guidance, and marketing are all provided by the livestock companies (the nucleus). Through partnership, it is hoped that an equality and harmony between livestock companies and small-holding farms would emerge.

In the ideal case, livestock companies are able to accommodate the economic interests of the small-holding farms, both in business-risk taking and market certainty, thus strengthening the small-holding farms' bargaining position. If the ideal condition expected from the partnership pattern could be enjoyed by the small-holding farms, the broiler industry would become an industrial-cultured business.

The shift would happen if the broiler business actors position knowledge and technology as the basis for making decisions in developing the business, utilizing the market mechanism as the main medium in trade, performing business efficiently and productively, and oriented to the market demands.

In light of the condition of the broiler industry nowadays, the condition of the current broiler industry is still a far cry from the ideal condition mentioned above. This is indicated by the presence of independent small-holding farms which refuse to join the partnership pattern. Their reluctance is based on the results of the financial analysis which compared the profits reaped by independent farms and those reaped by farms in partnerships. The profits of independent farms are still larger than those of partnership farms (Yunus 2009 and Purnomo 2011).

Independent farmers have the freedom to choose and make decisions about the management of their farms on their own and can sell their products directly to wholesalers or retailers in traditional markets. This is the opposite of the partnership pattern that dictates that the farms sell their products to the livestock companies at the price set by the livestock companies in the contract. However, independent farmers must face all business risks by themselves, including the risks of fluctuations in prices.

All the profits and losses would be their own. The fluctuations in input (feed) and output (broiler meat) prices cause the farmers' to be weak in capital. The prices of input continue to rise, while the price of output during harvest is low, resulting in shrinking capital. If this condition persists, the business scale will continue to shrink and at a certain point the business becomes inefficient.

As for the government's current policies pertaining to the broiler industry, they do not favor the development of small-holding farms. Both Keppres (President's Decision) No. 50/1981 and Keppres No. 22/1990 which were meant to facilitate the transfer of technology from livestock companies to small-holding farms have not been as successful as expected. The policies have instead hastened the development of the broiler industry through foreign investment and local investment, having a negative impact on the business growth of small-holding farms.

Even though they have a positive impact on the national economic growth due to the increase in broiler production, the foreign and local investment policies have caused the business decline in small-holding farms because they are unable to compete with livestock companies that have strong capital and are integrated (Yusdja 2004). The survival of small-holding broiler farms are now even more threatened due to the No. 18/2009 Law pertaining to Animal Husbandry and Animal Health was passed. This law strengthens the position of integrated livestock companies because it allows broiler farming businesses to be integrated from upstream to downstream and allows them to sell their products to traditional markets in Indonesia.

The description above explains how the government policies above are not favorable to the achievement of equality of treatment to the actors in the broiler industry. Even though the broiler industry is growing rapidly, there are negative effects on the small-holding farms. In other words, the development of the broiler industry only benefits the integrated livestock companies. Therefore, there needs to be a new set of policies which can create a better business climate for small-holding farms.

There is still room for the government to improve the business performance of small-holding farms because the production of partnership small-holding farms is the main contributor to livestock companies' production. Besides, there are still some independent small-holding farms that persist in their businesses because of the sizable investments made for the broiler industry.

One of the alternatives the government could try is to strengthen the small-holding farms' bargaining position through the founding of co-operations. Through co-operations, small-holding farms could be facilitated in feed providing a feed supply so that they no longer have to purchase feed from livestock companies. Co-operations could also buy the products of small-holding farms. If this could be realized, the small-holding farms could be competition for livestock companies in the broiler industry.

Furthermore, the government could also intervene by passing regulations that control market segmentation for the products of livestock companies and small-holding farms. The output of small-holding farms would be directed to the domestic market, whereas the livestock companies' products would be export-oriented. These alternatives need to be considered because failure to do so would lead to a greater input (feed) and output (broiler meat) price margin between livestock companies and small-holding farms.

The results of the simulation demonstrate that if the government implements policies that could eliminate the feed price margin between livestock companies and small-holding farms, the small-holding farms would increase their demand for feed by 0.973 percent, increasing the broiler meat production by 0.914 percent. An increase in broiler meat production would cause an increase in the small-holding farm household's income and the total income by 1.385 and 1.259 percent. The increased income would become an incentive for small-holding farms to develop their businesses.

In addition to the effect on broiler farm business performance as presented above, another important finding in this study is that the changes in feed price margin between livestock companies and small-holding farms have an effect on other businesses run by small-holding farm households as a multimarket actor. In this study, it is assumed that small-holding broiler farm households also have maize, rice, and layer businesses.

The Impact of Changes in Feed Price Margin on The Income

The results of the simulation demonstrate that if there is an increase in feed price margin to 30 percent, it is responded by small-holding farms by decreasing their broiler meat production. The decrease in broiler meat production as a result of a rise in feed price affects the production decisions made by small-holding farms as the multimarket actors for their other businesses (Table 2). If the price of feed that must be paid by small-holding farm is more expensive than that of the livestock companies, the small-holding farm households respond by increasing the production of maize by 4.501 percent and by decreasing the production of rice and eggs by 1.154 and 0.3 percent, respectively.

This will cause the income of the small-holding farm households from the rice, broiler, and layer agribusinesses to decrease by 1.193, 2.487 and 3.734, respectively, and conversely, increases the income from the maize agribusiness to increase by 4.503 percent. This condition would cause small-holding farm household's income from broilers and the total income to decrease by 0.583 and 0.520 percent, respectively.

On the other hand, if there is a decrease in feed price where the price paid by small-holding farms is equal to that of the livestock companies, the small-holding farm households respond by decreasing maize production through decreasing the size of land allocated for maize plants, planting rice instead due to the competition for land between maize and rice. The larger the land for rice, the more rice produced and the less maize produced.

The results of the simulation demonstrate that there would be a decrease in maize production by 2.772 percent and an increase in rice production by 9.541 percent. In addition, the decreased feed price would also have a positive impact on the layer business. This condition would have a positive impact on the income of small-holding broiler farm households as a result of the increased income from the broiler, rice, and layer agribusinesses.

IV. Conclusion

The elimination of the feed price margin that currently exists between livestock companies and small-holding farms will make the feed price paid by small-holding farms to be lower than it is today. This would be responded by the small-holding farms by increasing the production of broiler meat, increasing their income.

The elimination of the feed price margin that currently exists between livestock companies and small-holding farms will make the feed price paid by small-holding farms to be lower than it is today. This would be responded by the small-holding farms by increasing the production of broiler meat, increasing their income. However, if the elimination of the feed price margin causes the decrease in maize price, the maize farmers would respond by decreasing their maize production by reducing the use of production input and the size of land planted with maize, resulting in a lower production. In this condition, farmers prefer to replace their maize plants with rice.

V. Policy Implications

To improve the income of small-holding broiler farm households' income, co-operations could be founded. Through co-operations, small-holding broiler farms would have a stronger bargaining position both in the input market and the output market. From the input point of view, co-operations provide input (feed) for the farmers at a lower price. From the output point of view, co-operations purchase the output of small-holding broiler farms at a competitive price. In addition, to avoid rivalry between livestock companies and small-holding farms, there needs to be market segmentation for broiler meat produced by livestock companies and small-holding farms. For example, the broiler meat produced by livestock companies could be allocated to the export market, whereas the production of small-holding farms allocated to the domestic market.

References

- [1]. Daryanto, A., Saptana. 2010. Impact of DKI Government Policy in Poultry Sector on the Chicken Meat Availability in Jakarta: Cooperation Management and Business IPB and Indonesian Center for Agricultural Socio Economics, Bogor.
- [2]. Edward, A. 2008. Market Model of Corn, Feed and Chicken Meat in Indonesia. A Simulation Analysis [thesis]. IPB. Bogor.
- [3]. Fitriani, A. 2006. Analysis of Structure, Conduct, and Performance of Poultry Feed Industry in Lampung and West Java [thesis]. IPB. Bogor.
- [4]. Indarsih, B., M.H. Tamsil, M.P., Nugroho. 2010. A Study of Contract Broiler Production in Lombok, NTB: An Opportunity of Introducing Syariah Partnership. Med. Pet. 33:124-130.
- [5]. Kariyasa, I. & B.M. Sinaga. 2007. Feed and Chicken Meat Markets Behaviour Analysis in Indonesia: Simultaneous Econometric Model Approach. Journal on Socio-Economics of Agriculture and Agribusiness (SOCA) 7:158-166.
- [6]. Purnomo, S. 2011. Technology Model on Broiler Agroindustry Partnership System [disertasi]. IPB. Bogor.
- [7]. Sayaka, B., S. Sumaryanto, A. Croppenstedt, & S DiGiuseppe. 2007. Impact Assessment of Marketing Margin and Yield Changes for Maize, Soybean and Cassava in Indonesia: A Multi-market Model Approach. ESA Working Paper Series, Agricultural Development Economics Division, Food and Agriculture Organization, Rome.
- [8]. Sugema, I. & D. Roy. 2010. The Impact of Avian Influenza (AI) on Indonesian Economy: A Multi-market Model Analysis, Bogor.
- [9]. Swastika, D.K.S, A. Agustian, T. Sudaryanto. 2011. Gap Analysis of Supply and Demand of Corn Forage Production Approach Sync Center, Feed Plant, Animal and Population in Indonesia. *Informatika Pertanian* 20(2):65-75.
- [10]. Umboh, S.J.K, D.B. Hakim, B.M. Sinaga, & I.K. Kariyasa. 2014. Impact of Maize Import Tariff Policy Changes on Production and Consumption in Indonesia: A Multimarket Model Analysis. *IJFAEC* 2(2):113-126.
- [11]. Yunus, R. 2009. Production Efficiency Analysis of Broiler Poultry Partnership and Independent Model in Palu Central Sulawesi [thesis]. Diponegoro University. Semarang.

Table 1 The Results of Simulation of Feed Price Margin Changes on Price, Demand Input, and Production

Variable	Base Value Margin by 20 %	Alternative Simulation			
		Simulation 1*		Simulation 2**	
		Unit	%	Unit	%
CP _{1s} (Maize Price of Companies)	4628.80	0	0	0	0
CP _{1s} (Maize Price of Small-holding)	5786.00	481.97	8.33	-963.95	-16.66
FED _{1s} (Demand Maize of Companies)	1234.11	0	0	0	0
FED _{1s} (Demand Maize of Small-holding)	260.81	-0.8950	-0.344	2.53	0.973
PRD _{1s} (Broiler Meat Production of Companies)	1315.99	0	0	0	0
PRD _{1s} (Broiler Meat Production of Small-holding)	208.91	-0.8367	-0.4005	1.91	0.914
PRD _{1g} (Egg Production of Small-holding)	0.10	-0.0003	-0.3	0.0017	1.7
PRD _{1mz} (Maize Production of Small-holding)	8874.00	399.42	4.501	-246.06	-2.7728
PRD _{1r} (Rice Production of Small-holding)	7792.00	-89.99	-1.1549	1743.43	9.5410

Note: *) increasing feed price margin to 30 percent
 **) eliminating feed price margin

Tabel 2 The Results of Simulation of Feed Price Margin Changes on Household Income of Small-holding Broiler Farmer in Indonesia

Variable	Base Value Margin 20 % (Miliion Rupiahs)	Alternative Simulation			
		Simulation 1		Simulation 2	
		Unit	%	Unit	%
1. INC _{1s} (Income of Companies)	38132100	0	0	0	0
2. INC _{1ss} (Income of Small-holding)					
a. Maize	51345000	2312065.35	4.503	-4901393.70	-9.546
b. Rice	69520200	-829375.99	-1.193	1927795.15	2.773
c. Broiler	38132126	-948345.97	-2.487	1944738.43	5.100
d. Laying hens	2006	-74.90	-3.734	186.69	9.307
Total (a+b+c+d)	158999332	-926966.11	-0.583	612147428	385

Note: *) increasing feed price margin to 30 percent
 **) eliminating feed price margin