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Market Structure and Price Transmission of Eggs Commodity

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Abstract

Purposes of this research are to determine some characteristics of distribution channel, market structure, and price maker transmission in purebred chicken egg commodity in Banyumas District, Central Java Province. Primary data applied on this research is from all channel distribution levels from producers to final consumers. Meanwhile secondary data is collected from government official sources, such as BPS-Statistic of Banyumas District, Banyumas Department of Industry, Trading and Cooperation, and previous researches which has been made by researcher team. Sample determining is directed by proportional random sampling methods. Some measurements are applied to this research, including the Herfindahl Index (HI), Concentration Ratio (CR), and Minimum Efficiency Scale (MES) to investigate market structure, and Asymmetric Price Transmission (APT) to determine price transmission mechanism model. This research finds that (1) the distribution channel of egg commodity is spotted to different channel, the first channel: egg producer – retail traders – final consumers, and second channel: egg producers – whole seller – retail traders – final consumers; (2) market structure which is created to this farming specific commodity is perfect market; (3) price transmission mechanism analysis statistically shows that there is almost no existence of dominant power in price formation.

Key words : purebred chicken egg, distribution channel, market structure, perfect competition, asymmetric price transmission.

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INTRODUCTION

In the developed countries, the production of chicken eggs has made important contributions to the economy. For example, Otto, Ibarburu and Schultz (2013) outlined that the egg industry supports an important impact on the US economy, particularly in the state of Iowa. The direct effects are a value-added economy in Iowa for $156 million and the labor absorption of 3,700 workers directly in the egg sub-sector industry. Then, the multiplier effects encourage the employments as many as 7,960 jobs, providing the additional labor income of $424 millions to the labors and stimulating the economy up to $567 millions.

While in the developing countries, the contribution of purebred chicken eggs also occupies a strategic position. In Pakistan, for example, this sector provides the employment impact both directly and indirectly in approximately 1.5 million people. Pakistan is able to produce 10,000 million slices of chicken eggs including 1,196 metric tons to feed the laying hens (Memon, et al, 2015).

Globally, the egg production in 2012 was estimated to increase by 350.2% from that in 1962 (Windhorst, 2014). The main contributor in the egg production is China (with a global market share of 36.6%). In the report, Indonesia has a market share of 3.1% in 2012, which is lower than USA (6.0%), India (4.6%), and Brazil (4.4%). The egg production in Indonesia experienced a highly increase of global market share that is 0.8% in 1962 to 2.3% in 1987. The achievement of that egg production that occupies the fifth rank globally indicates that the Indonesian egg industry has good attention and implicitly shows improvement in food consumption patterns of Indonesian community.

Particularly, in the specific area, Banyumas Regency, the purebread chicken egg production is able to fulfill the community demand. The production of eggs in Banyumas is noted more than 7,000 tons in 2013 (BPS, 2013). Kembaran District is the biggest egg producer with the production of more than 2,773 tons (39.5%). The second largest producer of eggs is Sumbang District with the production of more than 2,146 tones (30.5 %), followed by Cilongok District with the production of more than 810 tons (11.5%), followed by the Pakuncen District with the production of more than 534 tones (7.6%), and the rest is produced by Ajibarang, Karanglewas, Baturaden, etc.

Egg producers are the breeders of laying hens in Banyumas Regency. All eggs produced will be sold. There are two distribution channels of the eggs sale. First, the eggs are directly sold to the small traders/retailers then to the final consumers. This distribution channel can be found in the traditional markets in general, such as Manis Market and Wage Market. Second, the eggs are sold to the wholesalers previously then to the small traders and then to the final consumers. This distribution channel can be found in the market area of Ajibarang and its surrounding.

Most breeders sell their eggs to the wholesalers. However, some sell the eggs by 40% of distribution to the wholesalers and by 60% of distribution to the retailers. Some also sell them by 10% of distribution to the wholesalers and by 90% of distribution to the retailers. Some breeders do not sell the eggs to the wholesalers but to the retailers by 98% of distribution and directly to the final consumers by 2% of distribution.

The variety of distribution channels and percentages is based on several things, such as the constraints experienced by the

producers (breeders), distributors, and traders themselves those are the physical condition of the eggs that is not durable (an egg can be in maximum good condition for one to two weeks after hatching). Besides, the transportation cost is relatively unstable, so sometimes it causes a little obstacle in the distribution around Purwokerto and the surrounding areas. The changing weather problems also cause the delaying in the process of egg distributions to the traders in various locations such as the modern and traditional markets, shops, and stalls.

The length of the chain of distribution channels that must be passed by a commodity also impacts the price reflected on the consumer side. The commodity price is expected to be more expensive with the longer chain length distribution channels of this commodity. The behavior of the distribution channels is influenced by the structure of the markets in which the company is operated. Besides, the distribution channels can also be performed by the agent. In the pattern of the agency, the medium and or large business in marketing the goods and services give the agency right only to the small business. In this case, the medium or large business provides the agency of the goods and other services to the small business that is able to implement the cooperation (Rudiyanto, 2014).

The producer behavior may depend on the structural condition of the market whether it is the perfect, oligopoly, or monopoly competition (Samuelson and Nordhaus, 2005). Producers in a perfect competitive market will tend to adjust to the condition of the market price (equilibrium) while the monopolist producer will tend to be free to determine the price of commodities in the absence of the

competitive producer. The less competition in a market is, the greater the profits the producer will gain. Monopoly market with one seller/producer will gain greater profits compared to the market with greater competition, as in perfect competition.

Porter (1990) argued that the market structure itself is influenced by various factors such as the level of technological mastery, the elasticity of demand for a product, location, entry barriers to the market, and the level of efficiency. He said that in relation to the structure of the market and the commodity price formation process in the chain of distribution channels, there is the different price formation behaviors among the producers that become the market leader in a market compared to the other producer that only becomes the market follower (Porter, 1990).

Related to the importance of understanding the distribution channels, the market structure, the chicken egg commodity and transmission, the researchers in various countries have done the research regarding this point. Muiruri and Muturi (2013) who detected the egg production and distribution business in the area of Thika, Kenya, concluded that the drastic rise in the input price of eggs has driven up the price of the final product and reduced the supply of eggs in Kenya in the last 15 years. In another research, Mohammed et al. (2013) in the case of the distribution chain in Abuja, Nigeria, explained that the price of eggs has always fluctuated due to the pattern formation of egg prices affected by the changes in transportation costs. Fluctuations in the price of eggs and the transportation costs are the main obstacles for the traders in every eggs commodity channel. In the case of agricultural commodities in general in

Africa, the weakest distribution actors are farmers as producers of commodities. Due to the lack of access to the agricultural markets, the farmers are highly dependent on the presence of other market players in the next distribution channels (traders, consumers, and brokers) (Magesa et al., 2014).

In contrast to the price mechanism in the African region, some developed countries of Europe and Australia show a relatively balanced profit chain in every distribution channel. The research conducted in eight European countries (Naspetia, et al, 2011) shows the joint planning and supply chain relationships are able to drive the increase in the quality and durability of the distribution chain. Likewise, the research result of Wiedemann and McGahan (2011) that detected the chain of egg production in Australia finds that the adoption of management practices based on environment may develop the egg industry in Australia, which has the characteristics of intensive, modern, and highly efficient in the production system. Besides, this industry is able to encourage the egg production rapidly up to 345 million dozen of eggs per year.

Based on those explanations, the issues built in this research are how the behaviors of the egg commodity prices formation in the chain of distribution channels from the egg breeders to the consumers is, how the market structure is formed on the commodity eggs in Banyumas Regency, and who is the sub-producer that becomes the market leader in the market structure and the chain of egg commodity distribution channel in Banyumas Regency. This research provides the important benefits especially in making the policy of food price stabilization, particularly the egg commodity.

RESEARCH METHODS

This research is developed in the fields of industrial economy related to the market structure and the formation of commodity prices. The research is conducted on the producers of purebred chicken egg commodity in Banyumas. The producers form a chain of sub-producers in the distribution channel that shows the movement process of the egg commodity from the breeder as the first sub-producer to the retailer as the last sub-producer who sells the eggs to the consumers.

This research uses the primary and secondary data. The primary data is obtained from the questionnaires and interviews with the sub-producers. Meanwhile, the secondary data is collected from the relevant government institutions, such as the Central Bureau of Statistics (BPS); the Department of Industry, Trade, and Cooperatives; etc. and also the surveys that have been conducted before (Ahmad, Arifin, and Priyono, 2011).

The sample for primary data is determined by the proportional random sampling. It means that the respondents are selected randomly using several stages of sampling and it still pays attention to the contribution of each sub-producer of the purebred chicken egg commodity in each region.

The first stage, the respondent samples are determined from the egg retailers randomly in six traditional markets in Banyumas Regency. The second stage, all information from the first stage can be used to determine the suppliers of the eggs that are sold to the retailers, and the location where the eggs are from. The respondents required in this stage are the wholesalers with the information from the retailers.

The third stage, the selection of respondents of egg producers based on the information from the wholesalers. The

number of samples is proportionally determined by ten retailers, five wholesalers, ten breeders, and five final consumers.

Distribution Channels Analysis

Researches on the distribution channels of food commodities have already been conducted. The detection of businesses throughout the distribution channel aims to understand how the patterns of communication and information are until the formation of prices at the consumer level for each agent integrated in the distribution channel such as producers, manufacturers, distributors, and end final consumers (Fuentes-Pila et al, 2007).

The first objective of this research is to analyze the transmission process of price formation, including the distribution channels, the production costs, and the resale values, and the barriers to the distribution of the egg commodity. Therefore, the research is conducted through the direct surveys on the producers. The survey results are useful to know the behavior of producers, distributors, and retailers in the transmission mechanism of price formation of the egg commodity in Banyumas Regency.

Some general considerations in this survey are (1) whether the identification of the distribution channels follows a simple pattern such as: producers → wholesalers → retailers → final consumers, or there are any other patterns of distribution channels; (2) the costs of distribution depend on several factors, especially the delivery location (mileage), the commodity characteristics, the increase in fuel prices that directly affects the costs of distribution; (3) the constraints of distribution may be the availability of inadequate infrastructure, disruption of nature/weather, and the limited

transportation; (4) it is associated with the behavior of producers, distributors, and retailers in the formation of the goods prices, which will seek the information on the basis of pricing in each of the distribution chain, whether based on the costs of production plus the profit margin, or the market prices, or the price determined by the competitor, or the price in buyer level.

Market Structure Analysis

The market structure is some characteristics of a market organization which strategy affects the nature of competition and price formation in the market (Pritchard, 1969). In this research, the detection of market structure is developed by analyzing the concentration and barriers to entry. This is in accordance with Martin (1994) and Scherer (1996) who stated that the market structure can be detected by the concentration and barriers to entry.

Concentration is performed to measure the size distribution of firms in the industry. It is measured by two tools of analysis, namely the Herfindahl Index (HI) and the Concentration Ratio (CR). HI is one tool to measure market power (Samuelson and Nordhaus, 2005). HI is the sum of squares of the market share of every firm in the industry (N) (Martin, 1994: 115), noted as:

$$H = s_1^2 + s_2^2 + s_3^2 + ... + s_N^2 \quad ....(1)$$

In which H is *Herfindahl Index* (HI) and s is the market share of every firms in the industry.

HI value has a range from 0 to 1. The closer the value to 1 is, the greater the concentration in the industry will be, and therefore the closer it is to the monopoly behavior will be. Conversely, the closer the

value to 0 is, the smaller the concentration in the industry will be, and therefore the closer it is to the perfect competition behavior will be. Based on the US Department of Justice and the Federal Trade Commission, the range of HI is divided into four criteria: highly competitive index (HI<0.01), unconcentrated index (HI<0.1), moderate concentration index (HI=0.1 to 0.18), and high concentration index (HI>0.18).

Concentration Ratio (CR) is used to measure the concentration of the industry by ordering companies that have the largest market share to the smallest one (s1 ≥ s2 ≥ s1 ≥ ... ≥ Sn), which is noted as follows:

$$CR_m = \sum_{i=1}^{m} S_i \quad \text{.......................................(2)}$$

In which CR_m is the concentration ratio of m largest firms. The greater the CR_m value is, the greater the concentration of this industry will be. *CR* used in this study is the four largest firms *(CR₄)*, which is noted as follows (Scherer, 1996:6):

$$CR_m = \frac{\text{sales from m greatest firms}}{\text{sales from industry}} \times 100$$
$$\text{.. (3)}$$

If CR_4 value reaches 100 percents, it can be said that the market is a monopoly. The market with four largest firms having the market share of 60-100 percents is categorized as the type of tight oligopoly. If there are four firms that control the market share of no more than 40%, it is categorized as the loose oligopoly (Stepherd in Jaya, 2001: 7). Oligopoly with eight largest firms dominating the market for less than 33% is usually called the unconcentrated industry (Hani and Turner, 1959, in Kuncoro, 2007: 142).

Meanwhile, to measure the barriers to entry it uses a tool analysis of Minimum Efficiency Scale (MES). MES is the size of the barriers to entry for a firm in the industry. If a firm can easily enter the market then it can be said that the barriers to enter the market is small. MES can be calculated as follows:

$$MES = \frac{\text{output of the largest firm}}{\text{total output}} \quad \text{...............(4)}$$

According to Lubis (1997) in Bank Indonesia study (2011), MES>10% shows the high barriers to entry for a firm in the industry.

These approaches have been experienced in several researches related to the market structure, especially in some industrial sectors to assess the market structure in the banking industries, the great trades, and the small trades.

Price Formation Transmission Analysis

There are several analysis used to detect the changes in prices. Several studies analyze the shock effect of the changes in some variables on the egg price. This is as conducted in the research of Babula and Bessler (1990) that detected the patterns of egg price formation using the econometric approach with the Vector Autoregressive (VAR) model. In that research, the egg price at the farm and retail levels is positively affected by a shock of corn price. This research also shows that the egg price will respond positively with an increase of about 33% when the price of corn increases 100%.

In this research, the pattern of price formation transmission is not conducted through the shock process of exogenous variables. Analysis of price transmission in this case is the price formation vertically, from upstream to downstream along the distribution chain. The price formation pattern vertically has some characteristics of speed, direction, and relative value due to the price disturbances along the distribution

chain that have an impact on the relationship among the agents at every activity level or different distribution channels (Vavra and Goodwin, 2005). Analysis of price transmission is important to detect the pattern of asymmetric price formation among agents along distribution channels (Bor et al., 2014).

To study the behavior of producers, distributors, and retailers in the mechanism of price formation transmission, the empirical method used is Asymmetric Price Transmission (APT). APT method is developed from the basic equation of price transmission. Assumed that the price adjustment process is symmetric and linear, the equation used is the basic equation of price transmission (Peltzman, 2000). However, on progress, the basic equation becomes Asymmetric Price Transmission (APT) by considering the dimensions of inter temporal price changes (time series). APT is based on variable segmentation of moving up and down in price.

$$\Delta P_{rt} = \alpha_0 + \alpha_1 \Delta P_{ft}^+ + \Delta P_{ft}^- + \varepsilon_t$$
....(5)

In which:

ΔP_{rt} : Price first derivative at retail level

ΔP_{ft}^+ : Price moving up at retail level

ΔP_{ft}^- : Price moving down at upstream level

Tweeten and Quance (1969) operated a dummy variable technique to estimate the irreversible supply function. The equation below is a translation of the supply function in the context of price transmission, which is noted as follows:

$$p_t^{out} = \alpha + \beta_1^+ D_t^+ p_t^{in} + \beta_1^- D_t^- p_t^{in} + \varepsilon_t \quad ....(6)$$

In which D_t^+ = dummy variable, values 1 if price at upstream level moves up ($p_t^{in} \geq p_{t-1}^{in}$

); D_t^- = dummy variable, values 1 if price at upstream level moves down ($p_t^{in} \leq p_{t-1}^{in}$).

Thus, in equation 2, there are two coefficients of price adjustment at the upstream level that is β_1^+ is for price phase at upstream level moving up, and β_1^- for price phase at upstream level moving down. Asymmetric adjustment is achieved if β_1^+ and β_1^- are different significantly that can be evaluated by F test standard.

That equation describes the Granger Causality test, which proves that the price movement in upstream level is as a price driver for price movements in downstream level. In this research, the application of that equation faces obstacle in which the researchers find difficulty in obtaining the data over time (time series) and only collect the cross section data with one data series. Therefore, this research applies the Granger Causality method that is operated to the cross section data (Bank Indonesia, 2011). The results of this causality test can be used to detect the most dominant influence in the price formation (Bank Indonesia, 2008).

On the Granger test, the regression equation is used to test whether variable X_1 has more effect on changes in variation of X_2 ($X_1 \rightarrow X_2$) or vice versa, X_2 has more effect on changes in variation of X_1 ($X_1 \rightarrow X_2$). Granger test assumes (Gujarati, 2009): (1) all information is relevant for predicting objective variable, (2) the error term in the causal relationships among variables is not correlated with the variables studied, (3) each variable studied is stationary, (4) because of its causality testing, the coefficient estimation result is not important, (5) F-test is needed to determine the effects of causality. The significant F test

results on $X_1 \rightarrow X_2$ is interpreted that X_1 effect on X_2 significantly.

Granger Causality is applied in the cross section case by comparing the value of the F-test of four equations, which is noted as follows:

$$P_{tt} = f(P_{db}, P_{dc}) \rightarrow F_1 \rightarrow \text{price domination at breeder level} \dots\dots(7)$$

$$P_{db} = f(P_{tt}, P_{dc}) \rightarrow F_2 \rightarrow \text{price domination at wholesaler level} \dots\dots(8)$$

$$P_{dc} = f(P_{tt}, P_{db}) \rightarrow F_3 \rightarrow \text{price domination at retailer level} \dots\dots(9)$$

In which P_{tt} is the price at the breeder level, P_{db} is the price at the wholesaler level, and P_{dc} is the price at the retailer level. The equation with the highest F statistic indicates that the price domination at the sub-producer level is the greatest. Obviously, the process of price formation on four equations can be presented in Figure 1.
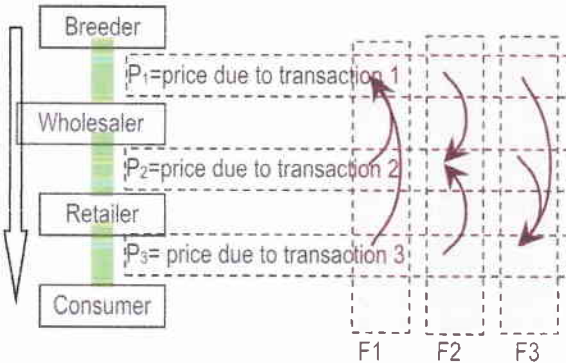
Figure 1. F-test with *Granger Causality* for APT Analysis

RESULTS AND DISCUSSION

Laying and broiler chicken livestocks make important contributions to the economy of Banyumas. In this regency, there are centers of poultry which products can fulfill the demand of the local needs, even selling out of Banyumas. For purebred chicken egg production, Baturaden is the main district of commodity producer with annual production of more than 62 thousand kilograms. Table 1 presents the main districts as the egg producers in Banyumas Regency.

Compared to the surrounding regencies, such as Purbalingga, Cilacap, and Banjarnegara, the production of eggs in Banyumas is relatively higher. Two regencies, Banjarnegara and Cilacap, have deficit of eggs production, in terms of not being able to produce the eggs sufficiently for the domestic consumption.

Table 1. Eggs Production Shares in Banyumas Regency

Subdistrict	Share	Accumulation
Baturaden	10.89%	10.89%
Pekuncen	8.67%	19.56%
Ajibarang	8.15%	27.71%
Kalibagor	7.57%	35.28%
Somagede	6.74%	42.02%
Kebasen	6.42%	48.44%
Rawalo	6.26%	54.70%
Kemranjen	5.94%	60.63%
Kembaran	4.31%	64.94%
Kedungbanteng	3.93%	68.87%
Karanglewas	3.46%	72.33%
others	27.67%	100.00%

Source: Banyumas Statistics, 2014

Cilacap has deficit as much as 8,792,802 eggs. It is reasonable because the consumption of eggs in Cilacap reached 10,371,330 eggs while its production is only 1,578,528 eggs. Egg deficit is experienced by Banjarnegara amounted 3,689,408 eggs.

Based on Table 2, it can be seen that Cilacap and Banjarnegara have egg deficit while Banyumas and Purbalingga have the opposite conditions. With the production of 14,052,006 eggs and the consumption of 9,973,508 eggs, Banyumas has a surplus of 4,078,498 eggs.

Table 2. Production and Consumption of Eggs in Four Regency in Banyumas Area, 2014

Regency	Production (pcs)	Consumption (pcs)
Banyumas	14,052,006	9,973,508
Purbalingga	6,528,844	5,471,333
Cilacap	1,578,528	10,371,330
Banjarnegara	1,823,593	5,513,001
Regency	Difference	Information
Banyumas	4,078,498	Surplus
Purbalingga	1,057,511	Surplus
Cilacap	-8,792,802	Deficit
Banjarnegara	-3,689,408	Deficit

Source: Central Java in Report, 2015

In the same condition, Purbalingga has a surplus of 1,057,511 eggs, the production is 6,528,844 eggs and the consumption is 5,471,333 eggs. However, the surplus in Banyumas and Purbalingga cannot fulfill the deficits occured in Cilacap and Banjarnegara Regencies.

Moving Pattern of Purebred Chicken Egg Price

By using the monthly data in range of 2012-2014, the egg price is shown as positive trend. The egg price in end of 2014 tends to be similar among the regions in range of Rp 19,500.00. Referring to the statistical behavior trend of egg price in Banyumas, the average egg price in Banyumas during 2012-2014 is Rp 16,868.00 with the increase in the average price per month is Rp118.00, or the increase of 0.75%. Meanwhile, based on the calculation of the Consumer Price Index, it moves up by 0.41 or the increase of 0.42% in average per month. Figure 2 below presents the movements of the egg price (in rupiah).

Source: BPS Banyumas, 2015

Figure 2. Egg Price Movements in Banyumas District, 2012 – 2014 (Rupiah)

The egg price, which shows a positive trend, has a seasonal pattern detected from the price changes that tend to be static in every same month among three years. By using the approach of seasonal index, the prices show the highest level in July and August, and in December and January. On the other hand, the prices tend to be the lowest every year in March and April. Figure 3 presents the information of egg price movement pattern monthly in Banyumas Regency.
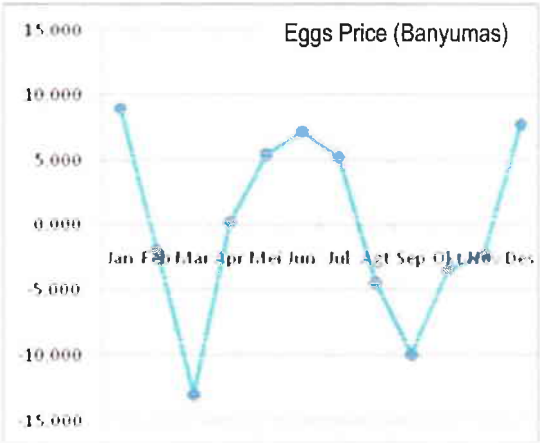
Source: Bank Indonesia Purwokerto, 2015

Figure 3. Seasonal Pattern of Egg Price in Banyumas Regency (Monthly, %).

The pattern of seasonal fluctuations for the egg price can be seen in January, April, May, June, July and December, which are the months with the higher prices than monthly average. Meanwhile, February, March, August, September, October, and November are the months with the lower prices than monthly average, during the period of 2012-2014.

The prices show the deflation trend in March with approximately 14% and the deflation is detected in September about 10%. Conversely, the prices show high value in June. All regions experience the same behavior where July is a month with the highest egg price. This highly price still remains in July but moves down gradually, or show the pattern of deflation in the months later. Then, the prices move up at the end of the year and early next year.

Characteristics of Laying Hen Breeders

In this research, the egg producers are the laying hen breeders spread in Banyumas Regency, especially Purwokerto and its surrounding area, such as Candi Negara Village (Pekuncen District) and Sikapat (Sumbang District). They have been operating this business for 5-15 years and the total hens in one last year are 2,700 to 20,000 heads. The breeders have the farm land and henhouse of 1,500 to 7,500 square meters.

As explained earlier that the distribution channels of eggs is divided into two ways; first, directly sold to the retailers and then to the final consumers; second, sold to the wholesalers prior to the retailers. The first distribution channel is found in many traditional markets in Banyumas Regency while the second one is often found in several markets in Ajibarang Regency. The breeders mostly choose to sell the eggs to the wholesalers because of the certainty of price,

profit, and time of purchase/retrieval. However, some also sell the eggs by combining in percentage of eggs that are sold to the wholesalers and sold to the retailers, even being sold directly to the final consumers.

In order to raise the added value of sale, the breeders apply several attempts. The majorities of them do the cleaning cages (50 percents) and check the hens' healthy regularly (50 percents). Some of them also do the packaging (25 percents) and service the delivery (25 percents) (see Figure 4).

Figure 4. Attempting Added Value of Egg Sales

The eggs sold to the buyers (wholesalers and retailers) are paid to the breeders in several ways. According to the survey, 75% of the wholesalers pay directly when buying while only about 50% of the retailers who pay directly. No traders take long time to pay off the debt because eggs are not durable (only two to three weeks) so the mobility of selling and purchasing is very high. Therefore, the method of payments is relatively short and easy (see Figure 5). In distributing the eggs, the breeders experience some obstacles. Poor weather is

often the biggest obstacle (50% of respondents think so). It causes a delay in delivery while the eggs cannot stand too long. In this condition, the breeders usually send their eggs by using a boxcar. Other obstacle is the high transportation costs. As many as 25% of respondents said so. The increase in this cost can be caused by the price of fuel oil (BBM) even when the location is far (see Figure 6).
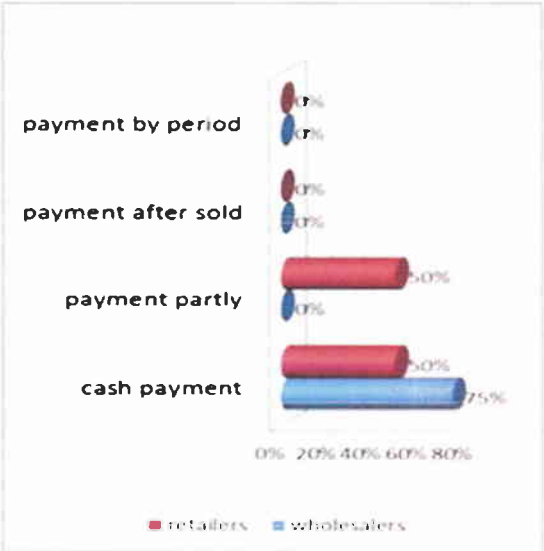
Figure 5. Payment Method of Egg Purchase
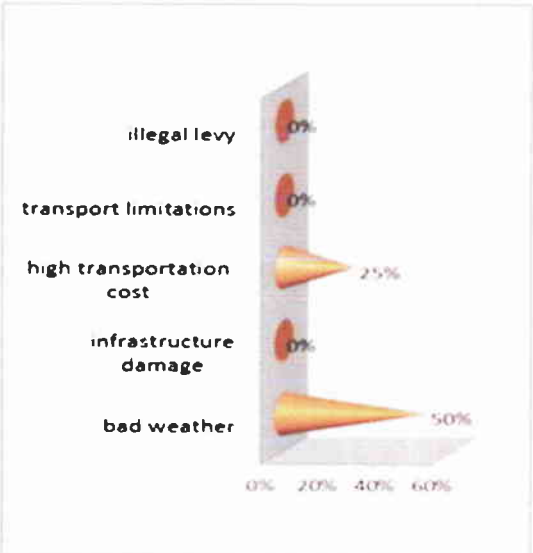
Figure 6. Obstacles of Egg Distribution

In the process of egg production, the breeders need some production factors such as seeds, fodder, medicines, cage/henhouse, and labor. The largest proportion of production costs are from the fodder purchase. The respondents on average say that fodder budget has the largest percentage, amounting to 75.58 percents. Then, the percentage of production costs respectively is labors (11.29%), medicines (10.25%), seeds (2.03%), and cages/henhouse (0.85%). The breeders buy the fodder and medicines from the distributor while the seeds come from the local and out of Banyumas (such as from Subang, West Java) (see Figure 7).
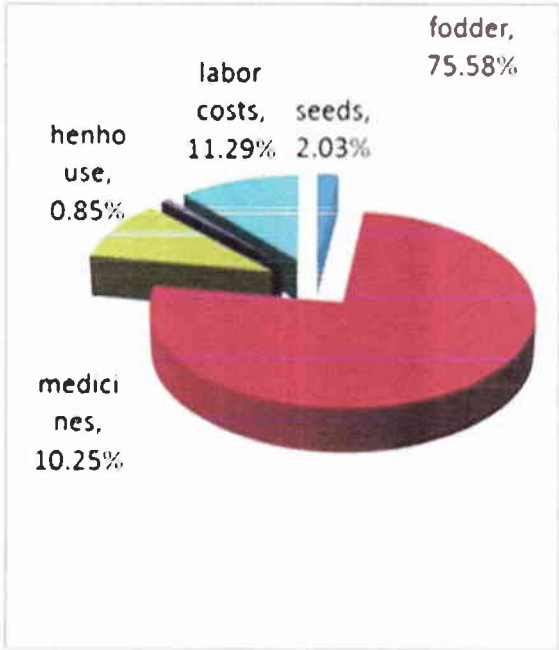
Figure 7. Egg Production Costs Composition

The breeders acquire the majority of capital by themselves, which is the average of 79% of all capital. Meanwhile, the capital is also come from a group (70%) and a bank loan (7%). Then, the profit gained from this business is approximately Rp 500.00 to Rp 5,400.00 per kilogram. Furthermore, it is presented in Figure 8.
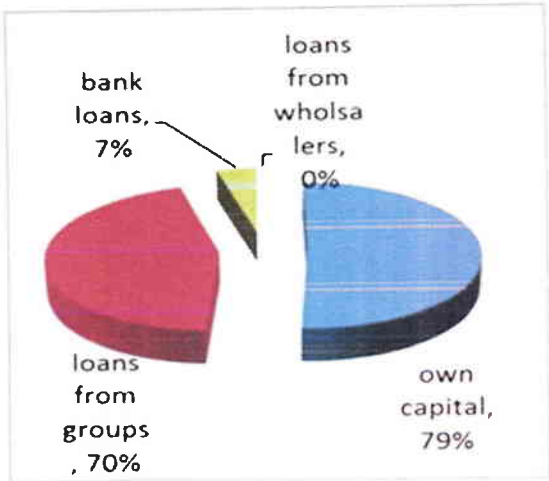
Figure 8. Capital Sources Percentages of Eggs Breeders

Characteristics of Purebred Chicken Egg Sellers

The egg sellers in Banyumas District can be differed on two types; the wholesaler or large-scale sellers and the retailer or little sellers. A part of the commodities is distributed directly to the wholesaler and the rest directly to the retailer. The wholesaler will offer to the retailer before the household or the final consumers receive the products, while the retailers that receive directly from the producer will sell directly to the final consumers.

The majority of egg retailers clarify that they prioritize to sell their commodity to the consumers in Banyumas area only. Some reasons are because their consumer will purchase in cash (72%), also the will receive the higher price level (22%). Only a few which reasons is the higher demand (6%) and the effective transportation cost (6%). Picture 9 shows the distribution of the seller opinions.
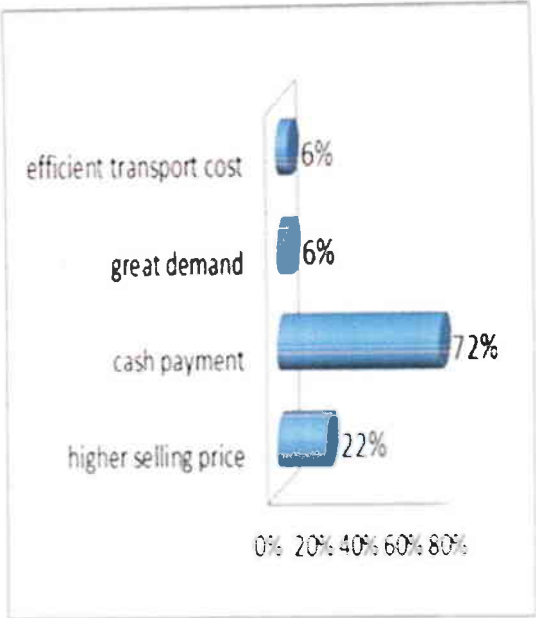
Picture 9. Reason of Egg Selling in Banyumas District

Related to the constraints, generally the respondents have no complaints. Only a few of them complain about the bad weather and the high cost of transportation. In cost of distribution perspective, most of 100% respondents extend that they face the transportation cost, and less for other cost like advertising and tax.

In financial capital formation aspect, the seller relatively can fulfil it. Of the respondents on research, 94% convey that their capital formation is fulfilled from their own properties and 6% come from the bank debt. To the bank debt, they pay in installments monthly.

The average on one day turnover of egg seller is Rp 577,433.00, maximum is Rp 2,080,000.00 and minimum is Rp 84,0000.00. The omzet can create the profit per kg in the range of Rp 500.00 to Rp 3,000.00.

Table 3. Price and Quantity of Egg Selling

Indicators	Average value	Minimum value	Maximum value
Average of Purchase price in normal condition (from breeder) (Rp)	12,412.50	11,500.00	14,000.00
Average of Purchase price in normal condition (from wholesaler) (Rp)	12,914.29	12,000.00	14,000.00
Mount of sales output in normal condition (kg)	157.28	6	1,000
Mount of sales output in more than normal condition(kg)	337.12	5	1,500
Average of purchasing price in normal condition (Rp)	12,412.50	11,500.00	14,000.00

In commodity distribution, the distribution channel of eggs is starting from the egg producers (chicken breeders) that produce the purebred chicken eggs. The commodities will be marketed to the retailer and wholesaler, where the sellers will distribute the product mainly to the local consumers (Banyumas District). The sellers face some constraints to sell widely. The properties of commodities, which are naturally perishable, are the important obstacles. The commodity is holding out one to two weeks only after the chicken lay eggs. Some respondents extend the information that the unstable transportation cost has impeded their product distribution to Purwokerto and Banyumas. The unpredictable weather problem has caused the barrier in the distribution process of the commodities to various locations such as modern and traditional markets, stores, and small shops.

In normal condition, the average price of egg received by the wholesaler from the producer is Rp 12,412.50 per kg. Then, the commodities will give over to the retail seller on the average price of Rp 12,914.29 per kg. Averagely, the number of eggs sold by the

seller to the consumer is 158 kg daily in normal condition, and 337 kg in a full stock capacity (more than normal condition), even reaches 1,500 kg daily.

Table 4. Determining of Final Egg Price (Rp/kg)

Determining of egg price per kg	Ave-rage	Mini-mum	Maxi-mum
Price to final consumer in normal condition	14,066.7	12.000	18.000
Price to final consumer in more than normal condition	13,308.3	11.50	15.000
Price to final consumer in minimum stock	15,768.7	13.000	21.000

The commodity will sell the eggs to the final consumers on the range of Rp 12,000.00 to Rp 18,000.00 per kg averagely in normal condition. When the stock is on excessive

capacity in market, the price will decrease in the range of Rp 11,750.00 to Rp 15,000.00/kg. Otherwise, in the few capacity condition in market, the price will reach to Rp 21,000.00/kg.

The producers (chicken breeder) have no ability to influence the price in egg market. They cannot influence it because of the capacity of egg in the market will follow the price mechanism and the competition among the sellers. The egg producer will follow the price and market mechanism to sell out their output.

Analysis of Distribution Channel, Market Structure, and Egg Price Formation Transmission

The type of distribution channel of the eggs includes two models. First, the commodity will be distributed by the producer directly to the retailer, and the retailer will distribute it to the final consumer. The model distribution can be seen in the traditional market, such as Pasar Wage, Pasar Manis and around. Second, the producer will market it to the wholesaler, then the wholesaler will sell it to the retailer, and the retailer will sell it out to the final consumers. The last model will be seen in Pasar Ajibarang and around. Figure 10 presents the illustration.The egg producers are spread in several locations in Purwokerto such as North Purwokerto, Sumbang, Pekuncen, and Karang Lewas. Then the eggs will be distributed through the wholesaler and the retailer that are located in Purwokerto City and its surroundings and then enter the traditional market especially in Pasar Wage, Pasar Manis, Pasar Karang Lewas, and Pasar Ajibarang and the rest to modern market. The final consumer will buy the product to the egg retailer that place in the traditional market also. Figure 11 shows as follows:
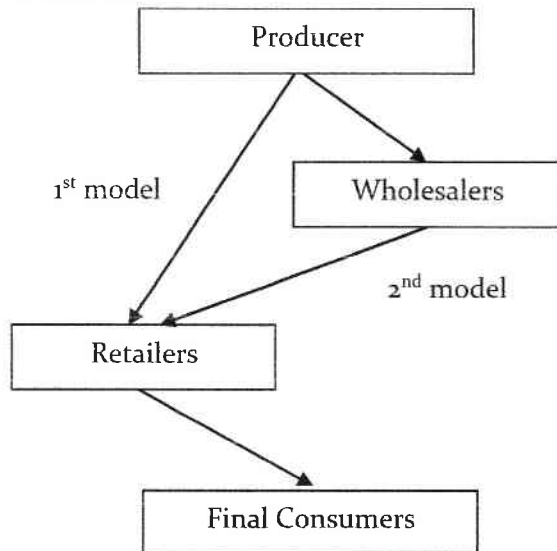
Figure 10. Distribution Channel of the Egg in Banyumas District

How the formation of the channel distribution depends on the market structure as indicator to determine the level of business competition among the producers. Based on the market structure analyses including the determination of market concentration (HI and CR) and the barrier to market entry (MES), it is obtained some research finding quantitatively. The value of HI is 0.1079, CR4 is 0.1784 and CR8 is 0.2487. All the result measurements show that the market of eggs in Banyumas Regency is categorized as the unconcentrated market or the low level of market concentration.

The value of HI shows the spreading of market powers among the egg sellers, in which every seller has 10% market power approximately. Therefore, among the sellers there is no significant difference on the size of business and selling turnover. It is supported by the value of CR4.
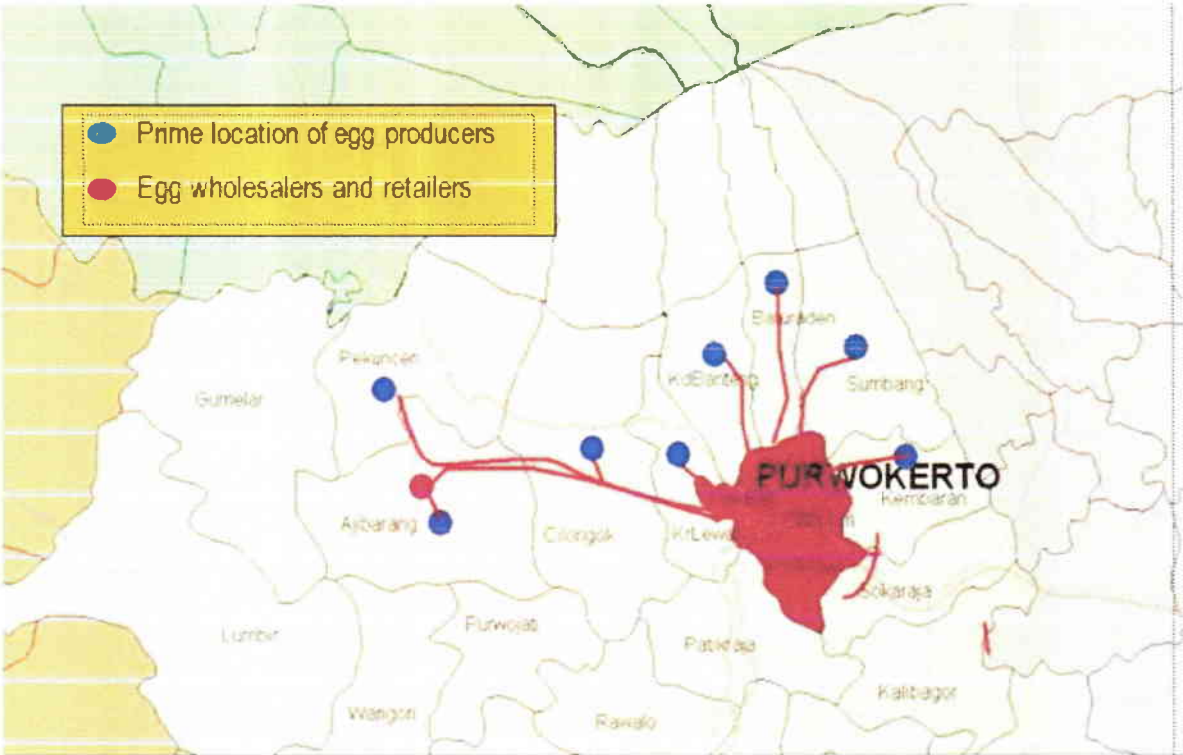
Figure 11. Map of Distribution Channel of Purebred Chicken Egg in Banyumas District

The value of 0.1784 means the total value of the four largest sellers contributing to the market amounted 17.84% calculated from total market selling. The value of CR$_8$ shows that eight largest sellers contribute to the market of 24.87% only. The industry with the eight largest enterprises that control the market power less than 33% is categorical as the unconcentrated industry (Keysan & Turner, in Kuncoro, 2007:142).

The value of MES = 0.0706 shows that the barrier to entry to the egg market is lower than 10%. It means that the mobility of every egg seller to enter and exit from the market is relatively high. There is no significant barrier to the entrant to open his business without the influencing competitor power of the other ones. Table 5 shows the output of calculation.

Based on the statistic description, it can be concluded that the industry (market) of purebred chicken eggs is a perfect competition market.

Table 5. Main indicators of Market Structure in Egg Commodity

Market Structure	Indicator	Value
Concentration	HI	0.1079
	CR$_4$	0.1784
	CR$_8$	0.2487
Barrier to Entry	MES	0.0706

Source : Primary data processing

The main characteristic of the market is an unconcentrated market to the power of one or little sellers and the low level in barrier to entry.

Furthermore, the distribution channel and the market structure condition will affect the mechanism of the egg price transmission, starting from the producers (poultry breeder) to the final consumers (households). Because the market structure is a perfect competition market, in which the market concentration is spread over the producer and seller, there is no dominant

power in the price transmission mechanism but every seller will take the proper profit margin.

On *Asymmetric Price Transmission* (APT) analyses, the main driver of price mechanism is the price transaction between the wholesaler and the retailers. It means that the transaction will determine the final price and the price will be followed by the next stage of channel distribution.

On the figure 12. The biggest F-value is showed by 12.645 in the equation calculated. The value is related to the influence of the price between the retailers – wholesaler that shaped the pattern of the final price. In other words, the egg price formation on the stage will determine the egg price mechanism. Because the egg market structure is a perfect competition, there is no dominant agent in the market, even the domination of the wholesaler to the retailer in the price creating.
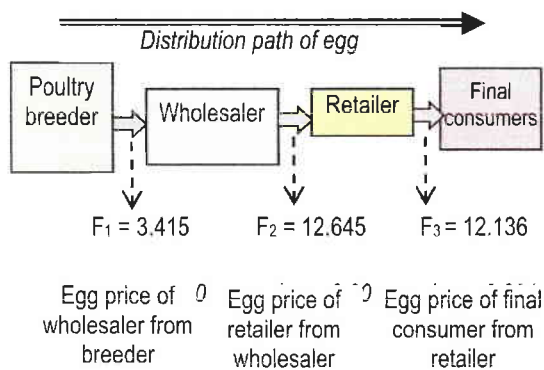

Figure 12. Statistic Examining of Price Transmission in Distribution Channel of Purebred Chicken Egg

The research result finding that there is no difference of market power from the producer to final consumer on the egg price is different from the other research finding. It refers to Asogwa and Okwoche (2012) in the case of sorghum trading in Nigeria that placed the final consumers as the price taker.

The seller, wholesaler and retailer, have significant effect on gaining the trading margin. The wealth of the sellers is created by every business activity in each stage. It is different from the finding of Magesa et al (2014) who detected the weakness of the egg producer on the market transaction.

Other research that is similar to this research is the finding of Summer et al (2010). He found that the egg consumption in United State has no powerful respond to the egg price changing. The increasing of egg price of 40% will decrease 10% of the egg consumption. In United State, the consumers consider that egg is a source of animal production. Therefore, the egg price mechanism could be supposed to have the important effect to the low income household.

CONCLUSION

This research aims to analyse the distribution channel, market structure, and the mechanism of price formation transmission on the purebred chicken eggs in Banyumas Regency. Based on the data analytical result, it can be concluded that the distribution channels of the egg selling can be separated by two kinds; first, starting from the egg breeder to the retailer then to the final consumer; second, starting from the egg breeder to the grocer or the wholesaler, then to the retailer and to the final consumer. Related to the distribution channel, the market structure formed in the market commodity is a perfect competition market. It is a market in which there is no dominant power between the whole producers (breeder or seller), especially on the egg price mechanism. It means that every agent of the market (breeder and seller) has the important role in the distribution channel. Each level of the transaction will

reach the price agreement that impact to the price changing significantly to final consumer. However, the role of the market driver keeps important. It is the role of transaction between the grocery and retailer level, which is the most important to determine the price of the commodity.

Some policies to support the stabilization the egg price in Banyumas Regency are needed. First, the market of purebred chicken eggs in Banyumas Regency tends to follow the market clearing model (perfect competition market). That is why some public policies to cut off the distribution channel can be applied. One of the policies is to create the market operation by selling the eggs under the market price directly to the retailers and the final consumers. The expectation is to prevent the market failure. Therefore, the increasing of eggs stock from outside Banyumas area will be required in the emergency condition, for example, when the supply of eggs in the market is in the critical condition, this may impact to the increasing of the price quickly. Besides, the local government, the Department of Farming, the Department of Industry, Trading and Cooperatives need to control the price in order to prevent the breeder from the loss if the price declines. This is appropriate to the research of Paranata and Umam (2015) who recommend that the government should control the price mechanism in order to prevent the loss of the producers in the farming sectors (the onion farming) when the price declines and to support the farmer to continue planting on the next period.

Second, the egg price in Banyumas Regency tends to change, which is caused by the changing of commodity supply in the breeder level. To reduce the egg price, the government needs to support the breeders to increase their productivity. It can be strived by making the availability of purebred chicken seeds, which are superior and endure on the climate changing.

This research finding is also similar to Kristiansen's (2003) research, which detected that the barrier factor to entry on the animal feed market of laying hen is still one of the constraints of the production of purebred chicken eggs in Indonesia. The government needs to give dissemination of information and knowledge of the rule of egg chicken commerce and broaden lthe ocal government service to participate on providing the extra amount of the local production.

Otherwise, although the market structure is placed on the high concentration of theegg seller, the egg price tends to increase every year. The price is fluctuating appropriate to the inflation rate and identified following the seasonal factor. The price tends to deflate in March and September. Otherwise, the price will jump to increase in the high price level in June. It reflects that the behavior of public consumption, in same manner as the broiler chicken consumption, is supposed to give the important impact on the fluctuation of the egg price in the market.

Related to the pattern of the egg consumption in Banyumas, the public consumption keeps constant and stable relatively. However, in certain months the scarcity of stock in the egg market has caused the increase in the price, which is particularly caused by the increasing demand of the food manufacturing and the sudden change of the public demand in June and July.

Because the purebred chicken egg is the important commodity to hold the nutrient and protein requirement on the

society, the government should maintain the stock on market, also increase and keep the quantity and quality of the commodity. The related official institutions need to minimize the spreading of the chicken endemic locally and inter regionally

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Appendix A. Egg Price

Period		Egg Price (IDR)	Price Changing (%)*	Seasonal factor*
2012	January	15,610	10.1826	8.9477
	February	15,921	1.9923	-1.9207
	March	15,092	-5.2070	-12.9590
	April	14,100	-6.5730	0.2123
	May	15,292	8.4539	5.4358
	June	15,492	1.3079	7.2455
	Jule	17,323	11.8190	5.3191
	August	15,958	-7.8797	-4.4094
	September	14,804	-7.2315	-9.9404
	October	14,860	0.3783	-3.4428
	November	15,125	1.7833	-2.2550
	December	16,213	7.1934	7.7669
2013	January	17,960	10.7753	8.9477
	February	17,779	-1.0078	-1.9207
	March	15,542	-12.5823	-12.9590
	April	15,893	2.2584	0.2123
	May	16,333	2.7685	5.4358
	June	18,417	12.7594	7.2455
	Jule	19,253	4.5393	5.3191
	August	19,625	1.9322	-4,4094
	September	16,783	-14.4815	-9.9404
	October	16,022	-4.5344	-3.4428
	November	15,250	-4.8184	-2.2550
	December	16,653	9.2000	7.7669
2014	January	18,250	9.5899	8.9477
	February	17,875	-2.0548	-1.9207
	March	15,313	-14.3329	-12.9590
	April	16,033	4.7019	0.2123
	May	17,563	9.5428	5.4358
	June	18,896	7.5898	7.2455
	Jule	19,533	3.3711	5.3191
	August	18,667	-4.4335	-4.4094
	September	18,500	-0.8946	-9.9404
	October	17,708	-4.2811	-3.4428
	November	17,771	0.3558	-2.2550
	December	19,850	11.6988	7.7669

Source: BPS Banyumas District,

*) Columns of prace changing and seasonal factor are output results of data processing.

Appendix B. Output Regression

ANOVAb						
Model		Sum of Squares	df	Mean Square	F	P-Value
1	Regression	1638021	2	819010.4	3.41488144	0.05995381
	Residual	3597535	15	239835.7		
	Total	5235556	17			
a. Predictors: (Constant), HK, HPK						
b. Dependent Variable: HPB						

ANOVAb						
Model		Sum of Squares	df	Mean Square	F	P-Value
1	Regression	6879971	2	3439986.0	12.6488541	0.00060406
	Residual	4079404	15	271960.3		
	Total	10959375	17			
a. Predictors: (Constant), HK, HPB						
b. Dependent Variable: HPK						

ANOVAb						
Model		Sum of Squares	df	Mean Square	F	P-Value
1	Regression	7856177	2	3928089.0	12.1360352	0.00073292
	Residual	4855073	15	323671.5		
	Total	12711250	17			
a. Predictors: (Constant), HPK, HPB						
b. Dependent Variable: HK						

No	Transmision	F-Value	P-Value
1	Egg price of grocer and retailer level > Egg price of farmer level	3.415	0.060
2	Egg price of farmer and retailer level > Price of grocer level	12.645	0.000
3	Price of farmer and grocer level > Price of retailer level	12.136	0.000

Appendix C. Price and Quantities of Egg Purchasing by Retailers

Indicators	Measure	Average	Minimum	Maximum
Average purchasing price normally (from breeders)	Rp	12.412,50	11.500,00	14.000,00
Average purchasing price normally (from wholesalers)	Rp	12.914,29	12.000,00	14.000,00
Commodity Quantities normally	Kg	157,28	6	1000
Commodity Quantities excessively	Kg	337,12	5	1500

Appendix D. Price Decision of Egg Retailers (Rp/kg)

Commodity Price per kg	Average	Minimum	Maximum
Price to final consumers normally	14.066,67	12.000	18.000
Price to final consumers excessively	13.308,33	11750	15.000
Price to final consumers shortage	15.768,75	13000	21.000