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Discussion Paper

POLICY REFORMS ON POULTRY INDUSTRY IN INDONESIA

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POLICY REFORMS ON POULTRY INDUSTRY IN INDONESIA

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EXECUTIVE SUMMARY

The Indonesian poultry industry is a key sector for the national economy, supplying 65% of all animal protein and employing 10% of the national labour force. All over the country, though local production successfully copes with domestic demand, the potential for growth is high, consistent with expectations of rising GDP per capita. The market looks healthy and attractive, which has resulted in this gradual entry of new foreign groups. In past decades, the production process has evolved and modernized. The market is dominated by five main players—three foreign companies operating in feed production and two in day-old chick production.

Even though expectations for the industry are strongly positive, prices for both broiler chicken and eggs are consistently higher in Indonesia than in Europe and America. From March–October 2018, Indonesian broiler chicken meat cost an average of about IDR 40,500/kg, while in the EU the price was around IDR 32,600/kg (+24%). Over the same period, the average egg price in Indonesia was around IDR 28,000/kg, compared to just above IDR 21,000/kg (+33%) in the EU. The differences in price are partially due to differences in demand and supply—Indonesia is a Muslim country, so the demand for chicken meat may be stronger than in countries with higher pork consumption. However, Indonesia's higher prices are surprising given lower production costs. In Indonesia, farm salaries are lower than in Europe. In addition, the EU banned egg layer battery cages in 2012, forcing layer farmers to decrease bird density and therefore to implement more expensive methods of production, pushing up egg production costs. So production costs are higher in the EU, but consumer prices are lower.

Price differences can also be explained in part by general market conditions in the EU and Indonesia. While the European market is a mature one, the constant growth in Indonesia, supported by growing demand, is an important element keeping prices high.

While many economic factors are out of Indonesia's control, prices are also affected by Indonesian public policy. Therefore, we propose policy modifications that aim to support sound growth of the industry, which might be accompanied by lower prices. The first important act would be to resolve conflicts between existing regulations, in particular between Regulation of the Minister of Trade (MOT) 21/2018 and Regulation of the Minister of Agriculture (MOA) 57/2015 on the ministerial recommendation letter for maize import and maize import rights.

Our second suggestion, related to MOA 26/2016, is to liberalize parent stock¹ imports, enabling poultry producers to more freely implement sound entrepreneurial strategies rather than relying on incorrect government estimations. At the same time, we believe that it is necessary to open Indonesia to the international market for maize, rather than using trade protections to force local production. Current regulations have driven domestic maize prices incredibly high compared to the international price. Since maize is the main component of poultry feed, and feed is in turn the major cost in Indonesian poultry production, free access to international markets would heavily and positively affect production costs in the poultry industry, helping prices to cool down.

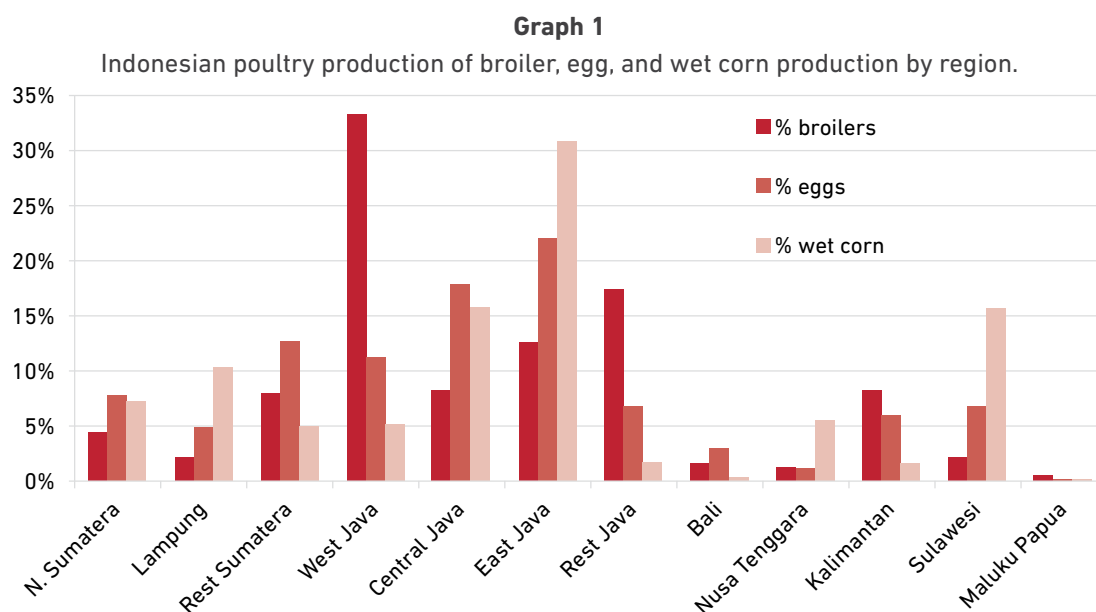
¹ In the poultry industry, "parent stock" refers to chickens breeding to produce fertilized eggs.

Finally, the government could play an important role in improving infrastructure, which, at the moment, burdens the industry—particularly in the case of transporting raw materials for feed from the ports to the mills. An improvement in road infrastructure would also allow the transport of heavy machinery, further boosting modernization of the poultry industry.

CURRENT SITUATION

The poultry industry plays an important role in the Indonesian economy. According to the Indonesian Feed Producers Association (APPI/GPMT), the sector is able to supply 65% of Indonesia's animal protein, provides jobs for 12 million people, and has an estimated value of over 34 billion USD (Wright and Darmawan, 2017, p. 2).² Estimates for the year 2015 reported a poultry population of 3.5 billion broilers,³ 200 million layers,⁴ and 24.8 million breeders.⁵

The poultry industry is spread throughout Indonesia (Graph 1), with significant egg production in East Java, due to the availability of locally grown corn and the relative ease of transporting eggs to the markets in West Java. Broiler production is widespread all over the country but focused in West Java (Bandung), close to its fresh bird markets, which lack an adequate cold chain (Iowa Economic Development Authority, 2017, p. 13).



Source: Iowa Economic Development Authority (2017), p. 13.

² Total Indonesian GDP in 2017 was slightly above 1 trillion USD. While agriculture contributed around 14% of GDP, it employed around 32% of the labour force. Valued at 34 billion USD, the poultry industry represents around 24% of the agriculture sector. The poultry industry's 12 million workers represent around 10% of the total Indonesian labour force (estimated, for 2017, in 126.1 million workers).

³ Broilers are chicken raised to become poultry meat. Male and females are usually grown together, as they are slaughtered before reaching sexual maturity. In Indonesia, broilers are usually slaughtered at 1.7–2 kg. The structure of the broiler industry can be seen in the appendix.

⁴ Layers are chicken hens (females) raised to produce table eggs. The structure of the layer industry can be seen in the appendix.

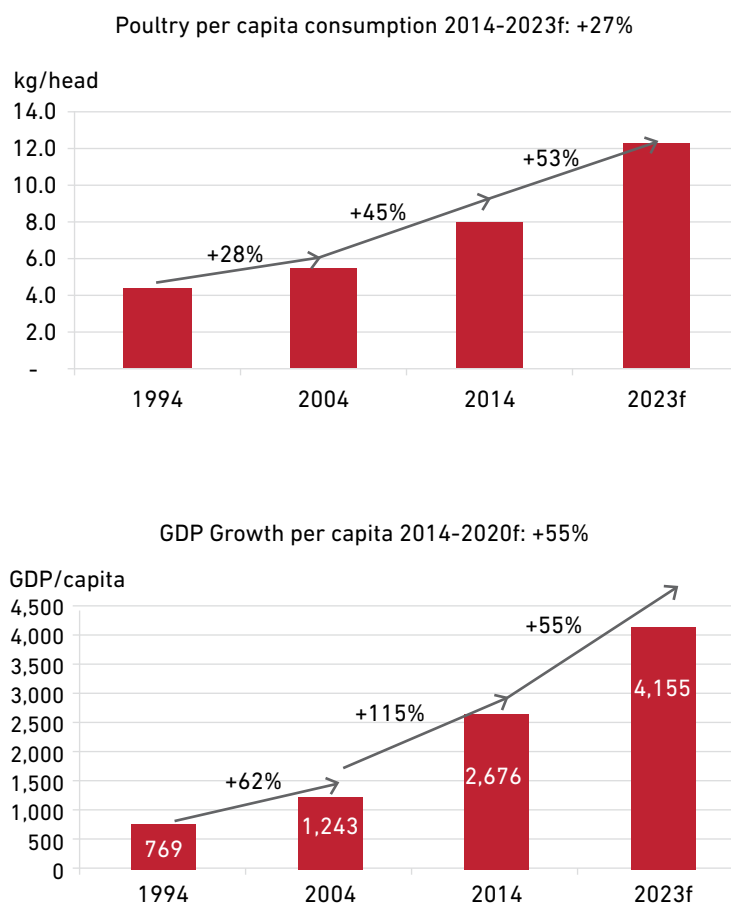
⁵ Breeders are chickens raised to produce fertilized eggs; according to the genetic of the breeders, such eggs, once hatched, can give commercial broilers, layers, or other breeders.

There is a correlation between regional broiler and egg production and the population distribution. High temperatures, poor road infrastructure, and the high demand for fresh eggs make it difficult to transport live birds medium distances, so demand must be met within the region (Iowa Economic Development Authority, 2017, p. 14).

The poultry industry in Indonesia has experienced cyclical fluctuations but grown consistently over the past three decades. Graph 2 shows the positive correlation between the GDP per capita growth and the poultry per capita consumption.

Graph 2

Per capita poultry consumption and per capita GDP growth from 2014 to 2023 (forecast/f) in Indonesia.



Source: Mulder, Kumar and van Horne (2015), p. 5.

“Chicken can be considered an inferior good, meaning its consumption may decrease, at the margin, as consumers become richer.”

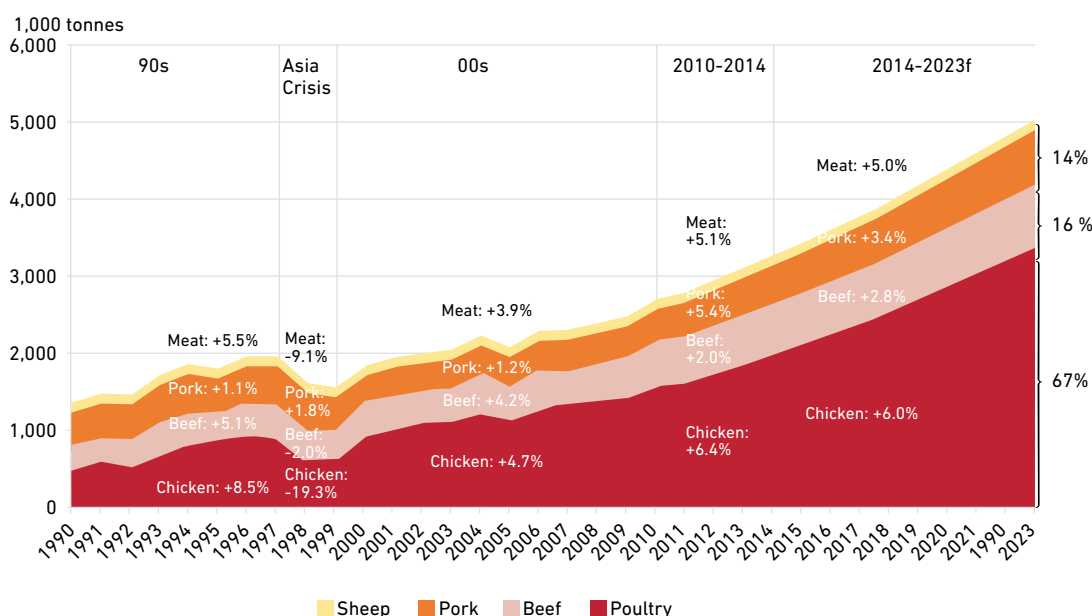
In order to understand why per capita poultry consumption has grown slower than per capita GDP, we have to consider that to some extent, chicken can be considered an inferior good, meaning its consumption may decrease, at the margin, as consumers become richer. Beyond a certain consumption level, consumers shift to more “prestigious,” expensive protein sources,

such as beef.⁶ Regardless, the potential for growth in this industry in Indonesia is high. In fact, in a country with a similar consumption structure, Malaysia, annual per capita chicken consumption has already reached 45 kg. In Indonesia, per capita chicken consumption is expected to reach 12.7 kg in carcass weight (CWT)⁷ this year, which means an annual increase of around 5%, resulting in total consumption of 3.3 million tonnes CWT (3.2 million at the end of 2017) (Mulder, 2018a, p. 11). Just few years ago, in 2012, annual per capita consumption was only 7.5 kg (Wright and Darmawan, 2017, p. 2). Therefore, Rabobank estimates robust industry growth, though slower than in past decades (Figure 1). Growth in 2017 and 2018 was so strong that all the major players are planning further expansions (Anonymous, 2018a, pp. 2-3).

Figure 1

The Indonesian meat market, 1990–2023.

The Indonesian meat market: ongoing growth, but slower as in the past



Source: Mulder, Kumar and van Horne (2015), p. 4.

Indonesia is expected to play a growing role in world poultry production in the next decade, together with other Asian countries, such as China, India, Pakistan, and Vietnam. This is illustrated in Graph 3.

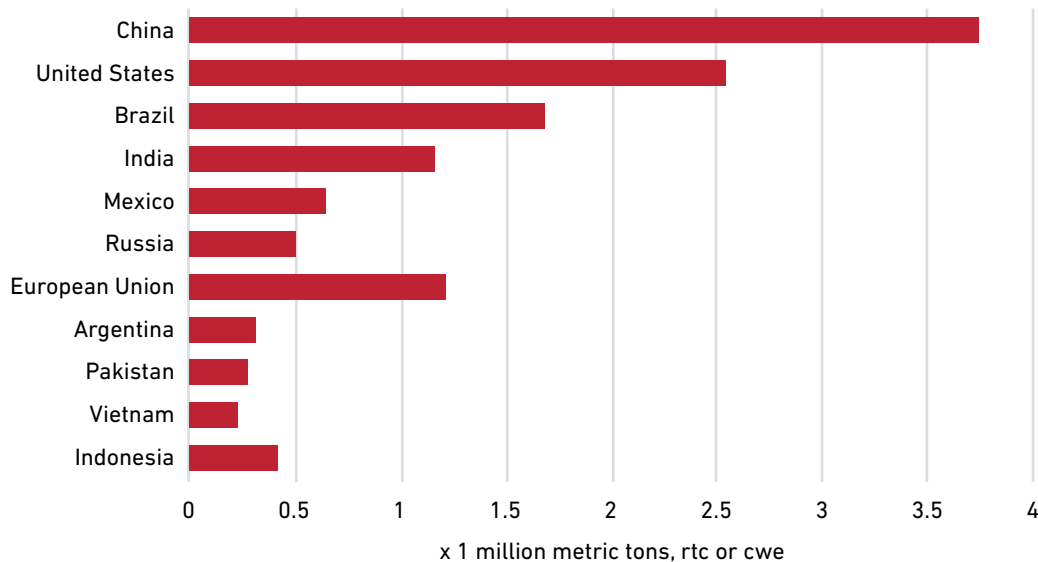
“Indonesia is expected to play a growing role in world poultry production in the next decade, together with other Asian countries”

⁶ As explained in Varian (2010, p. 96), when «an increase of income results in a reduction in the consumption of one [good] [...] [s]uch a good is called an inferior good. This may be “abnormal,” but when you think about it, inferior goods aren’t all that unusual. There are many goods for which demand decreases as income increases; examples might include gruel, bologna, shacks, or nearly any kind of low-quality good». Chicken is the kind of meat which can become protein (from farm to table) in the fastest period of time; this fact contributes to making chicken among the cheapest sources of protein. Therefore, it is reasonable to assume that beyond a certain income, consumers will shift toward, for example, beef or pork, rather than increasing their consumption of chicken. The level at which this occurs depends on consumer preferences and tastes.

⁷ The weight of an animal’s carcass. In contrast to live weight, the weight of an animal before slaughter.

Graph 3

Countries with the greatest share of additional poultry production. Growth from 2014–16 base period average to 2026 projection.

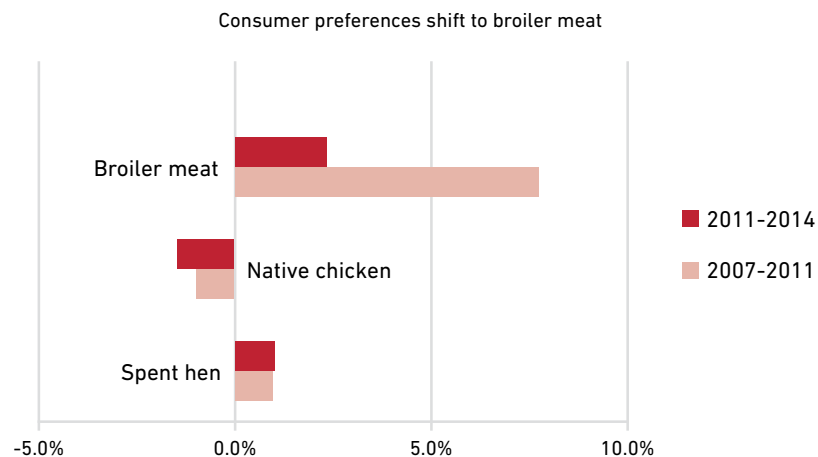


Source: Conway (2017), p. 24. © WATT Global Media 2017.

This quantitative growth is expected to be accompanied by an ongoing qualitative change. As the industry has experienced production modernization and concentration, consumer preferences have gradually shifted toward broiler meat and away from native chicken^{8,9} as shown in Graph 4.¹⁰

Graph 4

Indonesian consumer preferences, broiler meat vs. native chicken.



Source: Mulder, Kumar and van Horne (2015), p. 6.

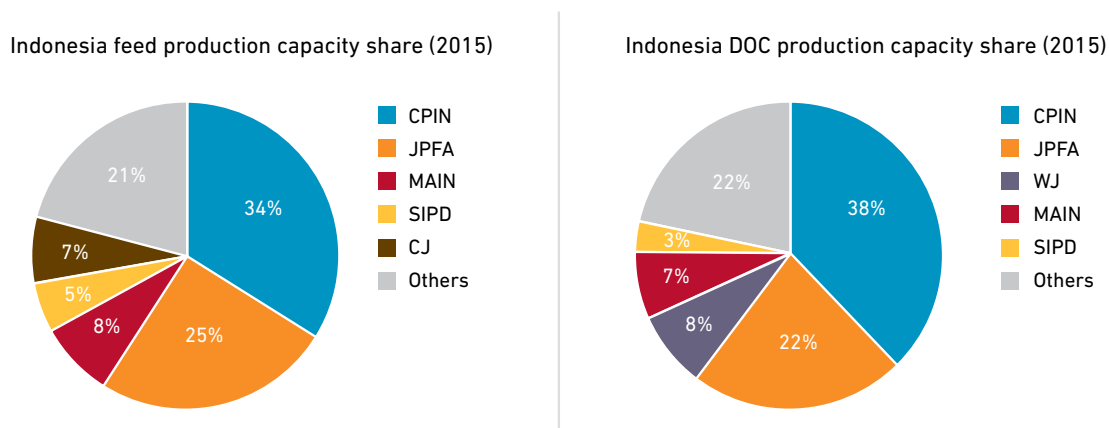
⁸ As explained in USAID (2013, p. viii), native chickens, “are breeds specialized for joint production of meat and eggs. They are much harder than broiler or layer chickens and suited for scavenging in village environments. They have less meat than broilers and the meat is much darker due to the exercise that the birds get. This is preferred by many customers and the price of native chickens (“ayam kampung”) can be double that of broiler chickens. The breeding of native chickens is usually very informal and takes place at the village level, but specialized native chicken breeding units are developing.”

⁹ Spent hens are a breeder or commercial type of egg laying hen that no longer performs at a desired production level.

¹⁰ Some initiatives are now in place to preserve some varieties of native chicken, such as the production of pelung chicken operated in West Java by Unggas Lestari Unggul (Fachrudin, 2018).

The growth process has been supported by gradual modernization and concentration. As of 2017, the number one player in the Indonesian poultry market, PT Charoen Pokphand Indonesia, retained a 31% market share in the production of poultry feed and a 41% market share in the Day-Old-Chicks (DOCs) production (Partners, 2017a). As of 2015, the Indonesian poultry and feed markets had been consolidated, with 80% and 63% of the market share captured by the top five players respectively (Partners, 2017b).

Figure 2
Feed and DOC production shares in Indonesia (2015).



Source: seekingalpha.com (CPIN = Charoen Pokphand Indonesia, JPFA = Japfa Comfeed,¹¹ MAIN = Malindo Feedmill, SIPD = Sierad Produce,¹² WJ = Wonokoyo Jaya Corporindo¹³).

Figure 2 also shows that the Indonesian market is dominated by foreign players (Alonzo, 2016). Charoen Pokphand Indonesia¹⁴ belongs to a Thai group,¹⁵ Malindo¹⁶ is the name for the local operations of the Malaysian based Leong Hup,¹⁷ and CJ¹⁸ is a Korean corporation which was part of Samsung until the 1990s.¹⁹ The growth potential of the Indonesian poultry market has recently attracted more foreign investors—the most important ‘new entries’ are the Chinese group New Hope,²⁰ which started operations in Indonesia in 2006 under the name of New Hope Indonesia, and more recently, Bounty Fresh²¹ from the Philippines. Bounty entered Indonesia in 2015 thanks to a joint venture with Triputra Group and Persada Capital Group, called Bounty Segar Indonesia. In 2016 Japfa, through its subsidiary So Good Food, and the U.S.-owned agri-business firm PT Cargill Food Investment Indonesia, agreed to establish PT Cahaya Gunung Foods, a 40/60 joint venture to produce fully-cooked poultry products (Sulistiyono, 2016).

¹¹ For further information about Japfa Comfeed please take a look at <https://www.japfacomfeed.co.id/id>.

¹² For further information about Sierad Produce please take a look at www.sieradproduce.com/.

¹³ For further information about Wonokoyo Jaya Corporindo please take a look at <http://www.wonokoyo.co.id/>.

¹⁴ For further information about Charoen Pokphand please take a look at <https://cp.co.id/>. To the public, CP is mostly known through and for the Fiesta brand, which appears in super and minimarkets.

¹⁵ For further information about Charoen Pokphand internationally please take a look at <http://www.cpgroupglobal.com/>.

¹⁶ For further information about Leong Hup in Indonesia please take a look at <http://www.malindofeedmill.com/>.

¹⁷ For further information about Leong Hup internationally please take a look at <http://www.cpgroupglobal.com/>.

¹⁸ For further information about CJ in Indonesia please take a look at <http://www.cj.co.kr/cj-kr/>. CJ is very active in business diversification; the public in Southeast Asia is familiar with Tous LesJours (<https://www.tljus.com/>), a bakery franchise part of CJ foodville, a business group of CJ Group.

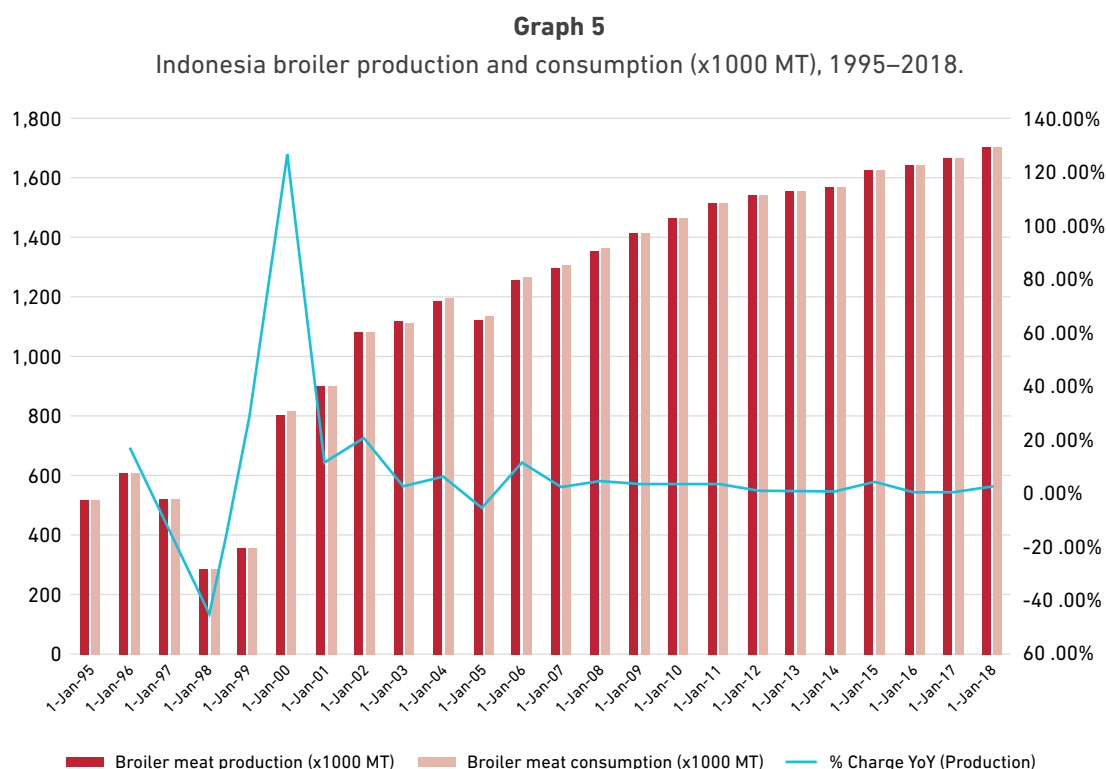
¹⁹ The separation took place between 1993 and 1997; see So-hyun, 2013.

²⁰ For further information about New Hope Group please take a look at <http://www.newhopegroup.com/>.

²¹ For further information about Bounty Fresh please take a look at <http://www.bountyfreshchicken.com/>.

The presence of big corporations has played an important role in allowing Indonesia to achieve a growing level of technological modernization and supply independence. It is estimated that 60% of poultry production comes from industrialized farms (closed housing system), while 40% remains in the hands of small and medium players (open housing system) (Brockotter, 2017). Among the small players, the role of independent farmers who are not bound to any bigger poultry company has sharply decreased. According to the Indonesian Public Poultry Association (PINSAR Indonesia), the number of independent farmers has fallen from 100,000 in 2008 to 6,000 today, corresponding with a decrease in the market share of independent farmers from 70% in 2008 to 18% in 2016 (Wright and Darmawan, 2017, p. 2).

Graph 5 shows that local production has been consistently able to meet domestic demand and that the international poultry trade is virtually inexistent in Indonesia. Broiler meat production suffered a heavy cut in 1997 and 1998, but this crisis moment can be attributed to the general macroeconomic difficulties experienced by several Asian countries in that period (Saptana and Rusastra, 2001). During recovery from this crisis 1999, production grew rapidly before slowing down and then stabilizing after 2012 (Graph 5).²²

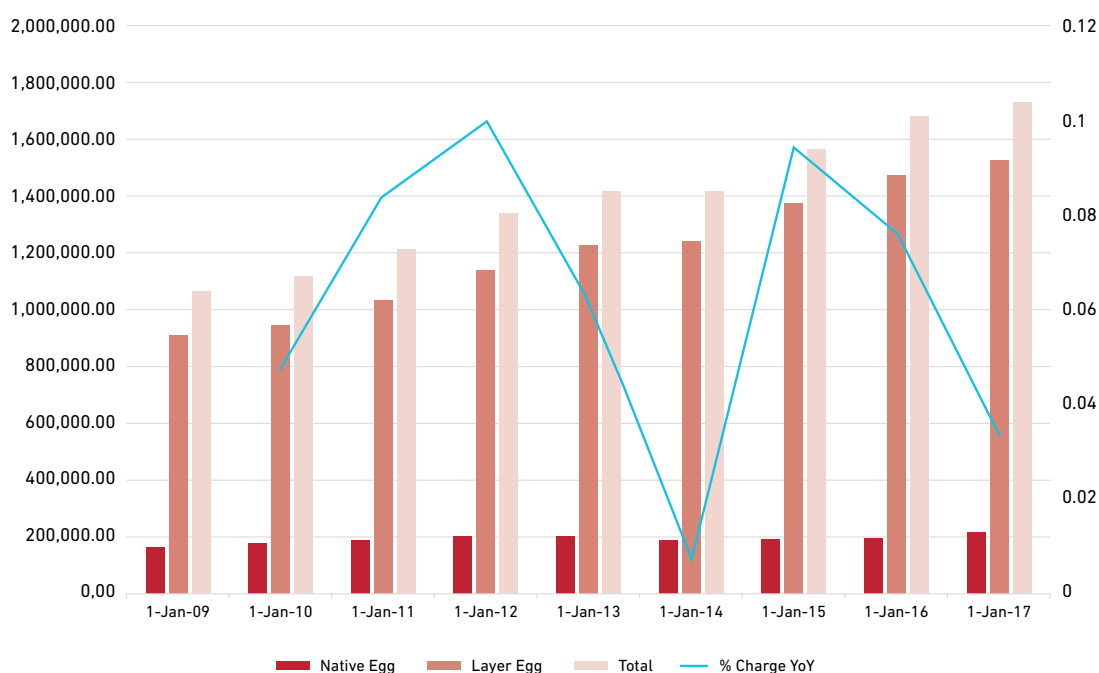


In the last decade, egg production has also experienced robust growth. In 2009 Indonesia produced slightly more than one million tons of eggs, while production reached 1.7 million tons in 2017 (+62.4%). Egg production also showed clear signs of modernization; native egg production grew between 2009 and 2017 from 160,920 tons to 210,924 tons (+31.1%), while layer egg production in the same period grew from 909,519 tons to 1.5 million tons (+67.9%).

²² The exceptional drop in 2005 was mainly due to an intense avian influenza outbreak, which killed 100 million birds (Collins, 2007, p. 4).

Between 2009 and 2017, the total percentage of native eggs declined from 15% to 12%, while layer eggs grew from 85% to 88%. While native chicken eggs are normally produced in small sized backyard farms, layer eggs are the result of intensive caged hen farming. A battery cage layer house can accommodate 50,000–60,000 hens, which can produce 200,000–240,000 eggs per week (a farm usually consists of more than one house).

Graph 6
Indonesian egg production, 1999–2017.



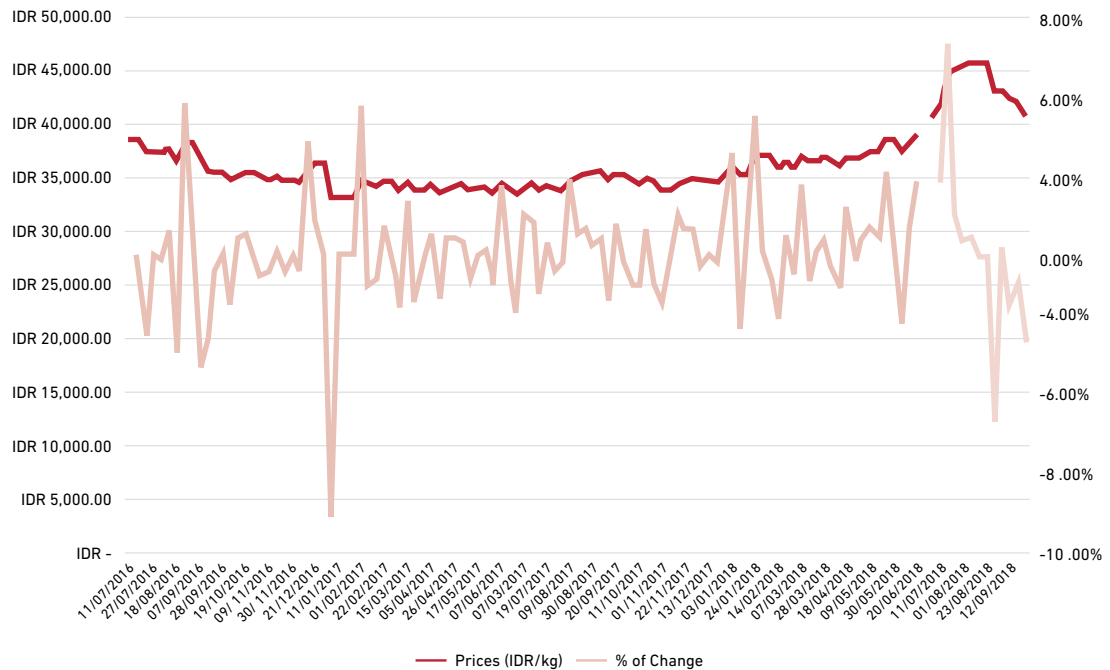
Source: Our elaboration of Badan Pusat Statistik data.

This scenario affects broiler meat and egg prices. As one would expect, commodity prices are affected by both economic and non-economic factors. The interaction between supply and demand is important, and in Indonesia is quite equilibrated. Per capita GDP trends and general macroeconomic conditions of the country are also important, as evidenced by the effect of the Asian financial crisis (1997–1998) on poultry production. The risk of avian influenza and the impact on demand of seasonal festivities are important non-economic factors affecting the industry. Finally, an exogenous, yet important economic role is played by the institutional framework and specifically by government regulation (the subject of the next section).

Unfortunately, it is not easy to source a complete data series of broiler meat and egg prices for the Indonesian market, but thanks to the PIHPS Nasional database, we were able to trace the weekly price fluctuations of the last two years. These are illustrated in Graph 7.

Graph 7

Indonesia broiler meat prices, all provinces (IDR/kg), 2016–2018.



Source: Our elaboration on PIHPS Nasional data referring to all provinces.
The break in the lines is due to the absence of data for the week of 27/06/2018.

“After this period, and for a period of around one and a half years between the beginning of 2017 and May 2018, prices fluctuated between IDR 33,000/ kg and IDR 36,500/kg. Prices surged in June and July 2018, reaching a new peak of IDR 45,650/kg on 8 August.”

Broiler meat prices declined steadily for the entire second half of 2016, moving from more than IDR 38,450/kg to close to IDR 35,000/kg. After this period, and for a period of around one and a half years between the beginning of 2017 and May 2018, prices fluctuated between IDR 33,000/kg and IDR 36,500/kg. Prices surged in June and July 2018, reaching a new peak of IDR 45,650/kg on 8 August (an increase that may be partially attributed to the Hari Raya festivities, though an important role was also played by the bullish market).

Mulder (2018b, p. 11) reports, “broiler retail prices ranged between IDR 35,500/kg CWT and IDR 39,500/kg CWT in May 2018—well above the government reference price of IDR 32,000/kg CWT. [...] We expect prices to moderate by the end of June, as demand normalises.” And indeed, prices began cooling down in August 2018. The last observed price, from 26 September, was IDR 40,750/kg.

The average price over the period covered by Graph 7 was IDR 35,873/kg, with a standard deviation of IDR 2,423.90/kg, 6.76% of the average value. For comparison, the broiler price (CWT) in the European Union (EU) between August 2017 and August 2018 fluctuated between €1.83/kg and €1.90/kg (IDR 31,707/kg and IDR 32,919/kg) (European Commission, 2018a). In the same period, prices in the United States fluctuated between USD 1.9/kg and USD 2.5/kg (IDR 27,973/kg and IDR 37,587/kg) (Ycharts, 2018). This means that at the peak of the festivity season, chicken prices in Indonesia were somewhat higher than in Europe and the United States. Average prices in Indonesia are more moderately higher than ‘Western’ prices, somewhat surprising

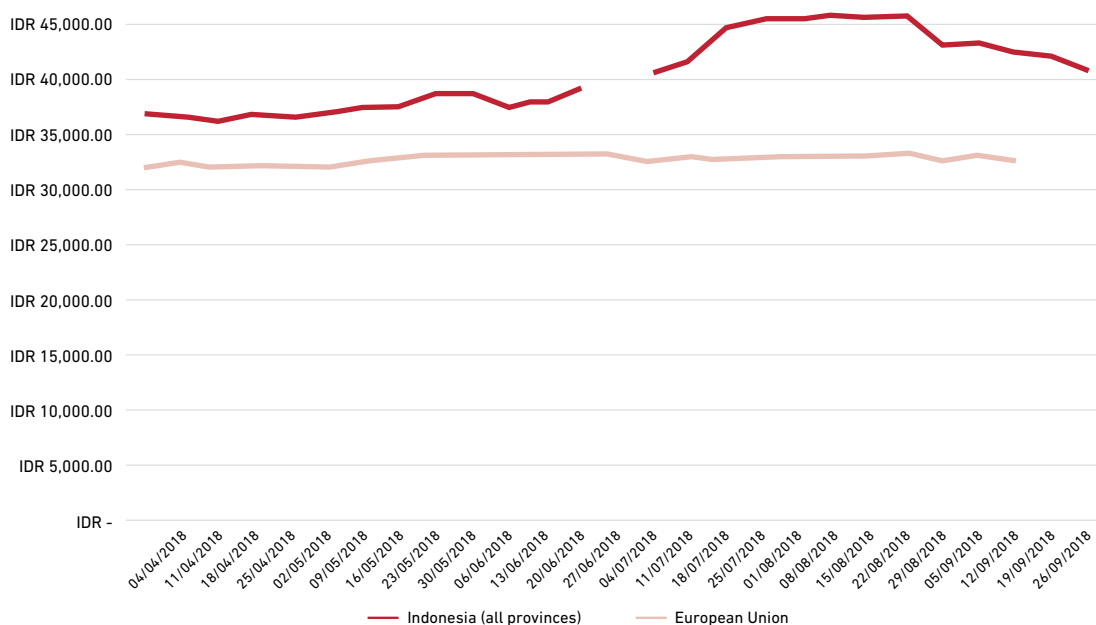
considering Indonesia's lower labour costs, which in Indonesia represents 9% of the production cost in broiler farming and 16% in layer farming.

This means that at the peak of the festivity season, chicken prices in Indonesia were somewhat higher than in Europe and the United States.

We believe that regulations concerning the import of raw materials and poor infrastructure play a role in these high prices. Graph 8 shows not only that prices in Indonesia are consistently higher than in Europe, but also that the latter are more stable over time.

Graph 8

Broiler prices in Indonesia and the EU, March–September 2018 (IDR/kg CWT).

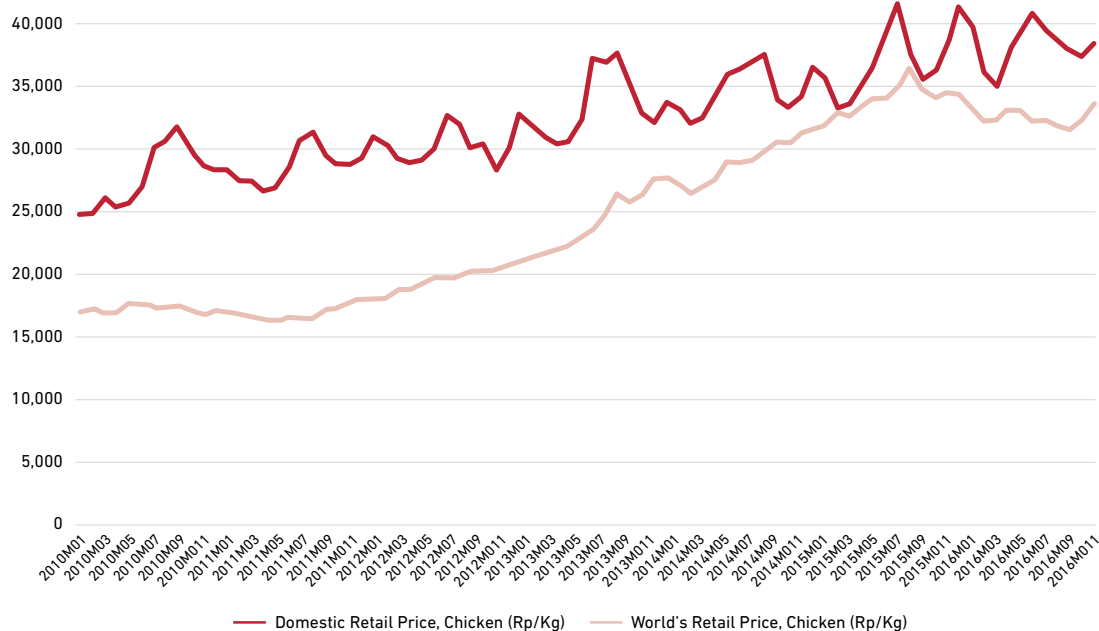


Source: Our elaboration on PIHPS Nasional data referring to all provinces and European Commission (2018a). The cut in the blue line is due to the absence of data for the last part of June 2018.

While data from Graph 8 refer to March–September 2018, a longer historical series is also available for comparing Indonesian retail prices with world retail prices²³ between 2010 and 2016, as is illustrated in Graph 9.

²³ I would like to thank Assyifa Szalmi Ilman, researcher at CIPS, for providing me with those data.

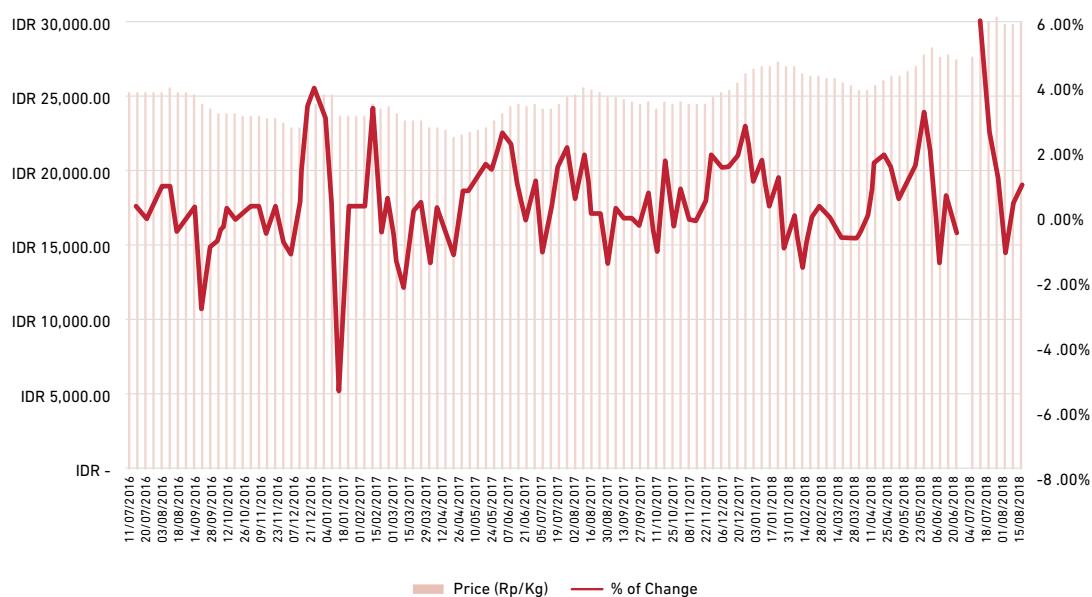
Graph 9
Retail Price for Chicken (IDR/kg), Indonesia and World prices, 2010–2016.



Sources are collated from Statistics Indonesia (2010–2016) and the World Bank (2010–2016).
Data elaboration by Assyifa Szalmi Ilman.

Egg prices (Graph 10) have shown a similar dynamic to that of broiler prices (Graph 8).

Graph 10
Indonesia egg prices, all provinces (IDR/kg), 2016–2018.



Note: The data for July 2018 is unavailable.
Source: Our elaboration on PIHPS Nasional data referring to all provinces.

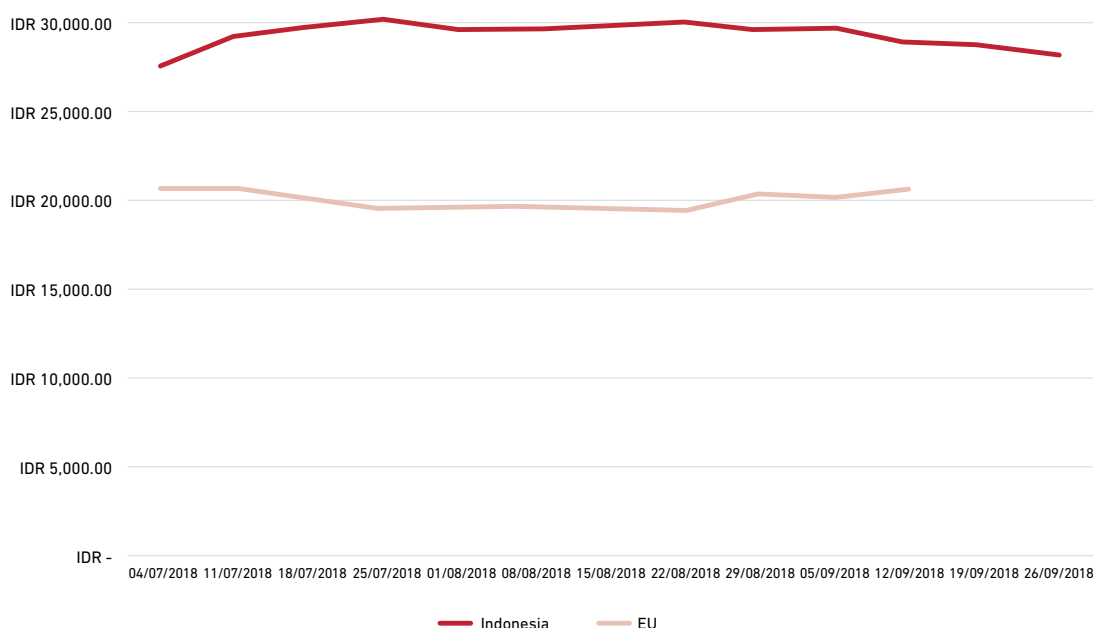
Egg prices declined for most of the second half of 2016 and remained between IDR 22,000/kg and IDR 25,000/kg for almost all of 2017. In 2018 egg prices have been stable and above IDR 25,000/kg, peaking at IDR 30,100 on 25 July 2018. As with broiler meat prices, egg prices have been declining since August and the latest observation (26 September) showed a price of IDR 28,200/kg. In general, we can say that fluctuations have not been particularly violent over the past two years, with exception in few 'hot' moments such as Christmas and Hari Raya. The average egg price was IDR 25,220/kg, with a standard deviation of IDR 1,950.30/kg, 6.7% of the average value.

Over the past year, egg prices in the European Union have fluctuated between a peak of €1.92/kg (December 2017) and a minimum of €1.13/kg on August 2018 (IDR 33,270/kg and IDR 19,580/kg) (European Commission, 2018b). In contrast to the broiler market, the egg market in Europe has been more subject to fluctuations relative to Indonesia. Graph 11 shows that in the past six months the situation in Europe stabilized, with prices fluctuating around IDR 21,019/kg, while in Indonesia the average price was close to IDR 28,000/kg. This illustrates that eggs in Indonesia tend to be more expensive compared to in the European Union, in spite of cheaper labour in Indonesia and the 2012 ban in the EU of battery layer cages, which forces European producers to use more humane, but more expensive, methods of production.²⁴

This illustrates that eggs in Indonesia tend to be more expensive compared to in the European Union, in spite of cheaper labour in Indonesia and the 2012 ban in the EU of battery layer cages.

Graph 11

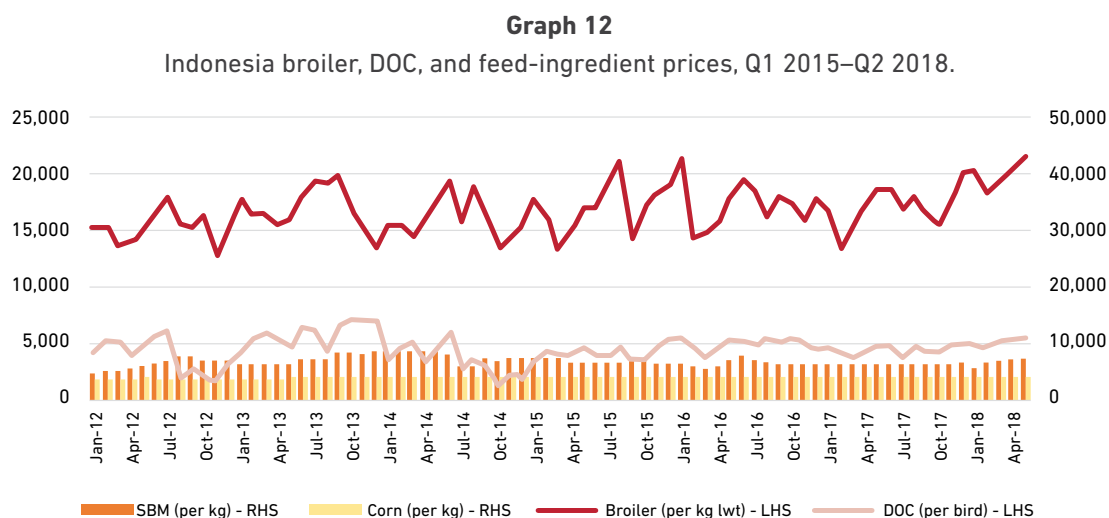
Egg prices in Indonesia and the European Union, March–September 2018.



Source: Our elaboration on PIHPS Nasional data referring to all provinces and European Commission (2018b).

²⁴ The 2012 battery cages ban was approved with the European Union Council Directive 1999/74/EC. The directive banned conventional battery cages in the EU from 1 January 2012. Only non-cage systems and furnished cages are now allowed. Furnished cages must provide at least the following: 750 cm² per hen, of which 600 cm² is 45 cm high, a nest, a littered area for scratching and pecking, 15 cm of perch and 12 cm of food trough per hen and a claw shortening device. Such a ban necessitated not only a restructuring of egg production at the farmer level, but also the introduction equipment producers had been forced to implement new systems and, in turn, reshape their production processes.

Following Mulder (2018a, p. 11), it is interesting to analyze the price of broilers at their live weight (LWT)²⁵ in the West Java region, one of the key Indonesian markets. In this region, broiler prices have been strong since the beginning of 2018 (average IDR 20,000/kg LWT, +20% YOY²⁶), but fell beginning in February 2018 (IDR 18,123/kg LWT) (Graph 12). Day-old-chick (DOC) prices have been more stable over the past two years, fluctuating between IDR 4,500 and IDR 5,000. In May 2018, broiler prices averaged IDR 21,345/kg LWT (+15% YOY) in key markets of West Java while DOC prices rose to IDR 5,300/chick, with a yearly increase of 19%.



Source: Mulder (2018b), p. 11.

To close this section, it is useful to provide a brief comparison of poultry prices in Indonesia and in neighboring countries in Southeast Asia. These data are presented in Table 1.

Table 1
Price of breast meat, meat, and eggs in Indonesia, Thailand, Malaysia, Vietnam, and the Philippines, 2016.

Country	Price of Breast Meat (Kg)	Price of Meat (Kg)	Price of Egg (Kg)
Indonesia	42,024	30,000 - 60,000	13,200 - 22,000
Thailand	39,034	30,179 - 57,598	16,127 - 25,343
Malaysia	36,379	25,722 - 48,229	12,861 - 19,291
Vietnam	52,137	36,917 - 79,988	14,767 - 21,535
The Philippines	43,983	35,282 - 52,923	17,641 - 22,983

Source: Wahyono and Utami (2018), p. 2.

In Thailand and Malaysia, where the poultry meat industry is more highly developed (Thailand is among the top exporters to the EU), prices are cheaper when compared to economies where the sector is still growing and operates with a lower level of infrastructure, as in Indonesia and the Philippines. In Vietnam, where the industry is still in its infant stage (Vietnam consumers prefer pork, it has the second highest consumption Asia, after China), prices are much higher.

²⁵ Live weight is the weight of a live animal before it is slaughtered. It generally refers to price quotes (eg ¢/kg LWT) where the price for the animal is quoted per kilogram for the live animal.

²⁶ YOY = year on year.

EXISTING POLICIES

There are several policies affecting poultry production in Indonesia, and therefore the prices of eggs and chicken at the market. Most of the relevant policies were implemented in 2016 and revised in 2018. According to Article 14 of the Regulation of the Minister of Agriculture (MOA) 57/2015 on the export and import of plant-based animal feed, product quality cannot be based on an internationally-approved standard, but on the Indonesian National Standard (SNI). This measure, as one would expect, makes importing processes more complicated.

While broiler and layer chickens are produced in Indonesia, the different breeders with the special genetic lines necessary for producing hatching eggs are mainly imported. In fact, 81% of Indonesian poultry has genetic stock that originated from the United States (Wright and Darmawan, 2017, p. 2). The different stages of the breeding process depend on great grand-parent stock (GPS), grand-parent stock (GPS),²⁷ and parent stock (PS).

In Indonesia, the government is involved in the procurement of GGPS, GPS, and PS through MOA 26/2016. According to Articles 9 and 11 of this regulation, poultry producers are not free to import breeders according to their expected business needs. Instead, imports are regulated by supply and demand calculations made by an analysis team appointed by the government. The team consists of government officers, academics, experts, poultry breeder operators, and chicken farmers. There is no transparent method for the selection of these team members, so it's impossible to know whether there might be a conflict of interest that could lead to inaccurate calculations.

Also important is MOA 34/2016, which regulates the importation of carcasses, meat, intestine, and/or their processed products into Indonesia. To make things more complicated, Article 2 of this regulation establishes the *halal* requirements as stipulated by the Islamic Supreme Council of Indonesia (*Majelis Ulama Indonesia* / MUI), which officially recognizes 45 Islamic *halal* bodies in 26 countries. The information on *halal* requirements is only available in Bahasa Indonesia, which may make it difficult for importers to fully understand the requirements. This means that this regulation can be used as an excuse to block imports of chicken meat, as was the case when Brazil complained to the WTO about Indonesia's practices in 2016.

To obtain all required documents stipulated in the regulation of the Minister of Trade (MOT) 20/2018 in Articles 10 and 11, importers need supporting documents that take at least 20 working days to complete. This slows down the import process and burdens importers with the extra cost and time. This extra cost is likely to be passed on to consumers, driving prices even higher.

“According to Articles 9 and 11 of this regulation, poultry producers are not free to import breeders according to their expected business needs. Instead, imports are regulated by supply and demand calculations made by an analysis team appointed by the government.”

²⁷ GGPS and GPS belong to the “primary breeding sector”, which consists of companies that breed pedigree stock (“pure line”). Their eggs are hatched in a special pedigree hatchery. These eggs then go to a special GP hatchery to produce parent stock, which passes to the production sector. In a nutshell, broilers and layers hatch from eggs coming from so-called commercial hatcheries, which receive eggs from breeder farm, where parent stock breeds. PS, in turn, hatch from eggs coming to GPS hatchery from grand-parent breeder farms and so on.

“To obtain all required documents stipulated in the regulation of the Minister of Trade (MOT) 20/2018 in Articles 10 and 11, importers need supporting documents that take at least 20 working days to complete.”

We strongly believe that the most important regulations affecting the poultry industry in Indonesia are those regarding the importation of maize, which have been deeply analyzed in Freddy and Kumara Gupta (2018). MOT 21/2018 replaced older regulations governing corn imports, specifically MOT 20/2016 and MOT 56/2016. The most critical aspect of this important regulation is the power granted to BULOG.²⁸ Article 3(1) of MOT 21/2018 stipulates that BULOG remains the sole importer for maize for animal feed, including for poultry. This makes BULOG crucial in the development of all farming activity.

According to a Statistics Indonesia (Badan Pusat Statistik) estimation, poultry feed represents almost 57% of the production cost for broiler chickens and almost 72% in layer farming, while wages represent 9% and 16%, respectively. These figures can help us to understand how important MOT 21/2018 is to the poultry industry. According to Freddy and Kumara Gupta (2018, p. 7), it is “estimated that 58% of the national demand for maize is for livestock feed, while 30% is for human consumption [...]. The poultry industry consumes about 87% of livestock feed supplies.”

In contrast to the previous MOA regulation, MOA 21/2018 does not require a letter of recommendation from the ministry to authorize the import of maize. While this is an improvement, the regulation also introduces potential problems because it contradicts other, older regulations. In fact, according to Article 16 of MOA 57/2015, a letter of recommendation from the MOA is still a required document to import maize. Moreover, Article 3(1) of MOT 21/2018 contradicts Article 4(1) of MOA 57/2015, which governs the export and import of plant-based products. According to MOT 21/2018, only BULOG is allowed to import maize, while MOA 57/2015, which was never formally abolished, gives any private sector or State-Owned Enterprises (SOEs) in the area of animal health and husbandry the right to import and export. These contradictions create confusions in the industry and give discretionary power to the officials who authorize imports. In the worst scenario, the port authority may confiscate imported maize if the recommendation letter is missing.

²⁸ The Indonesia Logistics Bureau (Indonesian: Badan Urusan Logistik/BULOG) is a government-owned company in Indonesia that deals with food distribution and price control. See Yonekura (2005).

ANALYSIS

Understanding how and why the policies discussed above have failed to drive industry growth and improve prices for chicken and eggs is important to understanding the best policy recommendations.

Introduction: The Method

This section constitutes two main parts. Part 4.1 (parts 1–4) discusses a theoretical overview of some crucial aspects of the market process and part 4.2 (parts 1–3) features a more technical discussion of access to some key raw materials.

4.1.1 Costs and price adjustments

It is important that the reader not fall into the trap of thinking that reducing the costs of production is enough to get cheaper market prices in a directly proportional way. While economists agree that the value of a good is subjective, many believe that the costs are determined by objective conditions. This is a mistake.

Costs, like values, are subjective (Mitchell and Boettke, 2017, pp. 34–35). The real cost that matters in economic decisions is the opportunity cost, “the value that one assigns to the highest-valued alternative that one must forgo in order to take the action”. Costs refer to actions—to choices—not to things, which economically speaking have no cost. “There are no “objective” costs. All costs are costs to someone who places value on forgone opportunities”. (Heyne, Boettke and Prychitko, 2014, pp. 76–77).

Opportunity costs are, at the same time, *marginal* costs. While opportunity cost is the value of a foregone opportunity because of an action/choice, marginal costs focus on the change in the existing situation that the action entails (Heyne, Boettke and Prychitko, 2014, p. 79). What will matter in the following discussion is that changes in the marginal cost of production will tend to change the supply curve.

In the case of the policy recommendations we make, a fall in the price of a factor of production will lower marginal costs (meaning alternatives become relatively more expensive), and therefore lead to a different supply curve, characterized by an increase in overall supply (and alternative courses of action become more expensive). This new supply curve corresponds with farmers who are willing and able to deliver their product at a lower price than before. (Heyne, Boettke and Prychitko, 2014, pp. 84–86).

It is difficult to predict the *quantitative* impact of policy suggestions. The effect we just described has to be considered as *ceteris paribus* (all other things remaining equal) and as a result of the adjustment process taking place *in time*. Cost of production is not the only element affecting price movements. They are subject to a much wider range of factors; therefore, the *quantitative* supply change and the consequent price reduction resulting from the policy changes we suggest are impossible to predict. These theoretical considerations are the necessary *interpretative key* that makes it possible for economists to understand the reality under observation. Data are not objective—they require interpretation (Mitchell and Boettke, 2017, p. 12; Huerta de Soto, 2000, pp. 72–73; Mises, 1957).

4.1.2 The information and knowledge problem

A detailed discussion of the critical aspects of existing policies requires an understanding of some general arguments about why central planning is, in general, a non-solution for economic development. Even if the attempt to centralize the import of parent stock²⁹ and feed ingredients like maize is done with the intention of achieving idealized development of the market, such solutions fail to recognize the difficulties implied by central planning, which can be summarized as the calculation (Mises, 1920) and knowledge problems (Hayek, 1937, 1945)³⁰.

Individuals, when exercising human action as purposeful behaviour, set their goals based on their expectations. Having defined their ends, the means for achieving them must be chosen through a process that unfolds over time. Attaining certain objectives must involve costs that arise from the subjective perception of the foregone opportunities to achieve other goals (as discussed above). The expectation in the case of any action taken is that the subjective benefit of achieving goals will be higher than the cost. The concept of *entrepreneurial profit* lies in this difference between this cost and benefit.

Kirzner (1973, p. 14) defines entrepreneurs as those special individuals, who “are able to perceive opportunities for entrepreneurial profits; that is, they are able to see where a good can be sold at a price higher than that for which it can be bought”. Since *entrepreneurship* is *alertness* to profit opportunities deriving from market ignorance, and the market process is the set of revisions in plans following the modification of knowledge, the two concepts are intrinsically bonded.

In a centrally planned system, the central authority tries to collect the necessary information from the minds of individuals, claiming to be able to provide all the information regarding prices, which goods to produce, how many, and so on. However, the nature of the information necessary for to make the choices that individuals would in economic action makes it impossible for a central planner to collect and distribute sound information. The information needed is, by its nature, tacit and not articulated, dispersed among individual minds, and ever-changing over time.

There is, among economists, an attempt to imitate the method of physical sciences, with its possibility of exact predictions (Hayek, 1974), but this attempt assumes away the impossibility of gathering the required information. Moreover, while it might be possible for a government body to possess technical/scientific knowledge (how to do things), it is impossible for it to gather entrepreneurial knowledge, which is based on the (uncertain) intuition that to do something somewhere can generate a profit. This is the essence of the knowledge problem.

4.1.3 The calculation problem and the market

Even if the knowledge problem could be overcome and this information could be gathered, the calculation problem remains. The calculation problem concerns the interaction process of price formation as the interaction between subjective evaluations over time.

²⁹ From now on we use the synthetic expression ‘parent stock’ to refer to all of the different levels of the breeding process as described in the previous section.

³⁰ See also Lavoie (1985a, 1985b), Huerta de Soto (1992) and Ferlito (2013, chapter 4).

Competition is a discovery process (see Hayek, 1946 and 1968). The process of interaction between competing suppliers as well as competing consumers acting in the market should be considered a restless process in the search of not an objectively correct point, but the mutual coordination of constantly (and unexpectedly) changing plans (Shackle, 1972, pp. 76-79; Lachmann, 1976, p. 56).

The market is therefore not a thing or a place, but a process in which individual purposes and plans matter and tend toward coordination through an ongoing exchange of information made possible and intelligible thanks to shared institutions. Economists can interpret and understand this process, but they cannot guide or predict it. The outcome of the market process is orderly, even though no one is in charge of ordering it. It is, “the result of human action, but not the execution of any human design” (Ferguson, 1782).

For this reason, only under a free market regime can entrepreneurial action bring about the best set of entrepreneurial decisions, which are revised in response to competition and changing conditions in the dynamic discovery process implied in the market process. Improving entrepreneurial decisions fine-tune the production process. Profits reward the wiser entrepreneurs (the ones whose choices better meet consumer needs at a lower cost) and losses penalize less insightful or inefficient decisions. The survival and consolidation of better entrepreneurs and corporations is possible only if entrepreneurs are able to gain from competition by offering better products or better prices.

Prices arise from all of these interactions between the subjective evaluations of entrepreneurs and consumers in the market process. Without the market, meaningful prices cannot exist, and so any consideration about success and failure of entrepreneurial ventures is impossible.

4.1.4 The law of comparative advantage

In order to understand the reason for preferring international trade specialization, one must understand the law of comparative advantage, which was developed two hundred years ago by David Ricardo (1817, chapter 7).³¹ According to this law, a country has a comparative advantage in producing a particular good if that good can be produced at a lower relative opportunity cost than in other markets. Following Rothbard (1995, pp. 94–95), “countries should specialize in what they are best or most efficient at, and then exchange these products, for in that case the people of both countries will be better off.”

Ricardo also discussed that protection is often demanded by domestic producers (as may be the case for Indonesian producers of maize). Although producers and governments may try to argue that poor or developing countries may be left out in order to maintain trade protections, these protections mean that both consumers and industry lose the benefits of international trade, and as discussed above, all market decisions are affected by the interference. “[The law of comparative advantage] means that even if a country is in such poor shape that it has no absolute advantage in producing anything, it still pays for its trading partners, the people of other countries, to allow it to produce what it is least worst at” (Rothbard, 1995, p. 95).

³¹ Ricardo developed what was already explained by William Spence in 1807.

4.2.1 The import of parent stock

The calculation and knowledge problems help illuminate our concerns about MOA 26/2016 and MOT 21/2018, and also reveal problems with MOA 57/2015 (regarding the export and import of plant-based animal feed).³² As mentioned above, Articles 9 and 11 of MOA 26/2016 do not leave poultry producers free to import breeders according to their expected business needs. Instead, imports are regulated by supply and demand calculations implemented by the government's analysis team.

The intent of MOA 26/2016 is to determine in advance, through a pool of 'experts', the objective market need for parent stock, or, in other words, to simulate on paper, and in advance, the supply and demand dynamics in order to determine the market equilibrium point. Even if we do not take into account the possibility of conflicts of interest on the government's team, the knowledge and calculation problems mean that experts will fail to predict the outcomes of the market (Koppl, 2018).

In a nutshell, the government's attempt to set a plan controlling demand and supply behaviour is always and everywhere destined to fail because the market process can only be interpreted and not guided or predicted from the outside. Sound plans can be implemented only by individuals participating in the market process, which is the only institution that provides the tools to ensure that information can be acquired, interpreted, and transmitted among individuals. This discovery process is never at rest and drives purposes and plans, as well as their revision, in order to increase the degree of mutual compatibility of plans.

So far, the market, though not perfect, has proved to be the best system to enable such consistency to emerge as a spontaneous order—the result of human action, but not of human design.

4.2.2 The role of maize

The same argument can be used against the BULOG monopoly of the import of feed products, and in particular of maize. Freddy and Kumara Gupta (2018) have already provided a brilliant analysis of the maize market in Indonesia. As already discussed, MOT 21/2018 does not require a letter of recommendation from MOA in order to import maize, but according to Articles 16 and 22 of MOA 57/2015, a letter of recommendation from MOA remains a required document to import maize. Moreover, Article 3(1) of MOT 21/2018 contradicts Article 4(2) of MOA 57/2015 on whether only BULOG is allowed to import maize for animal feed. These contradictions not only create confusions in the industry, but in the worst case scenario may result in confiscation of imported maize. These contradictions create arbitrary power in the hands of port authorities, which is difficult (if not impossible) to predict.

The importance of maize for the poultry industry cannot be underestimated. Recall that feed represents almost 57% of the production cost in broiler farming and almost 72% in layer farming, and that 58% of the national demand for maize is for livestock³³ feed, while 30% is for human consumption and the poultry industry consumes about 87% of livestock feed (Badan Pusat Statistik and Freddy and Kumara Gupta (2018, p. 7).

³² A reminder that, according to Article 14 of this regulation, product quality cannot be based on internationally approved standards, but must be based on a specific Indonesian National Standard (SNI), which makes the import processes more complicated.

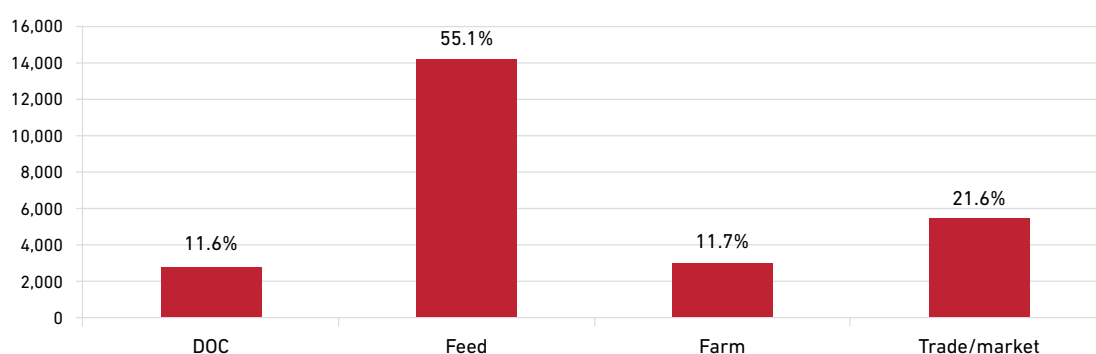
³³ To avoid confusions, it is appropriate to clarify that here by 'livestock' we mean land farm animals.

“The importance of maize for the poultry industry cannot be underestimated.”

Following Dr. Vijaya Kumar, we know that a 50 kg bag of broiler feed contains 7.2 kg of whole maize and 11.9 kg of maize germ and a 50 kg bag of broiler starter feed (1–4 weeks) contains 28.6 kg of whole maize (Kumar, n.d.). A 70 kg bag of layer mash (for birds older than 18 weeks) has 24.3 kg of whole maize and 7.1 kg of maize bran. These claims are supported by similar figures produced by USAID (2013), according to which (p. 16), feed represents 55.1% of the total costs of the production chain (Graph 13).

Graph 13

Breakdown of costs in broiler production chain to consumer (IDR/kg dressed weight and as a percent of total costs by subsector in the chain).



Source: USAID (2013), p. 16.

The crucial role of maize is amplified by the high level of dependence on foreign production (Table 2).

Table 2

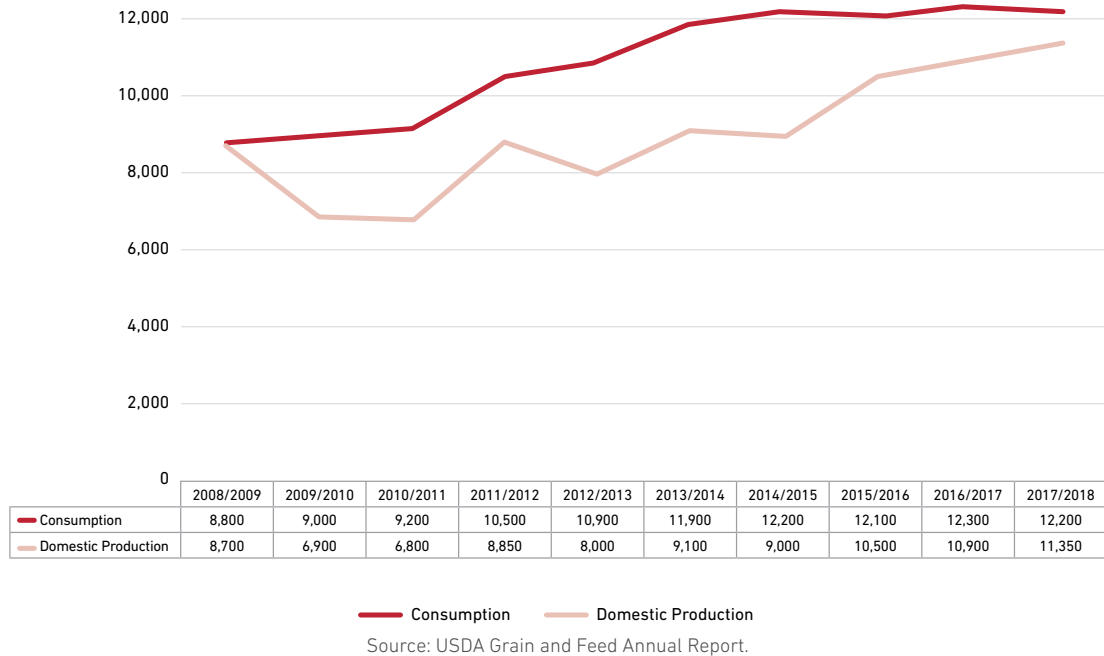
Volume and value of imports for broiler and layer feeds.

	Volume of Imports	Value of Imports	Protein Import Value
Broiler feeds	76%	69%	85%
Layer feeds	73%	57%	60%

Source: USAID (2013), p. 32.

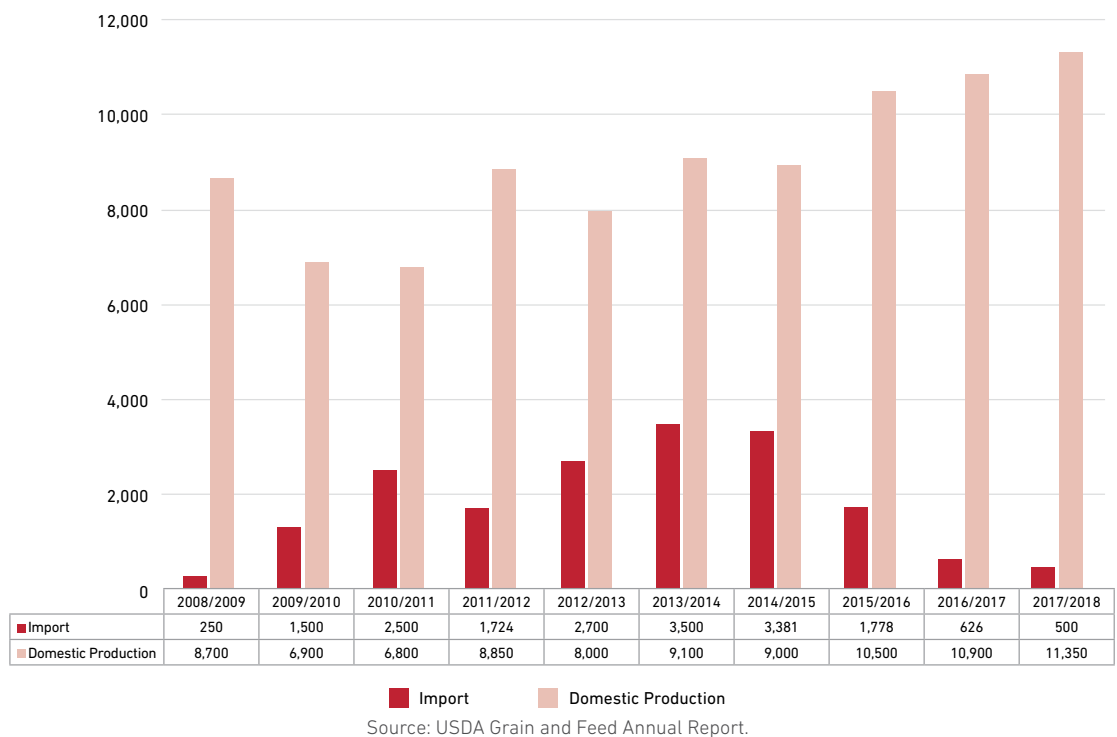
Dependence on foreign production makes industry supply vulnerable to currency fluctuations. The government is optimistic about domestic production and Andi Amran Sulaiman, Minister of Agriculture, declared that Indonesia was self-sufficient in 2017 (Asian Poultry Magazine, 2018b, p. 3). However, according to official data, despite the increase in local production, consumption has grown faster and Indonesia is not self-sufficient. These data are illustrated in Graph 14.

Graph 14
Indonesia maize production and consumption, 2008–2018.



A half million tons of maize were imported in 2017 (not enough to cover the domestic demand), but the government claims to be ready to export that amount in 2018 (Graph 15).

Graph 15
Indonesia maize imports and domestic production, 2008–2018.

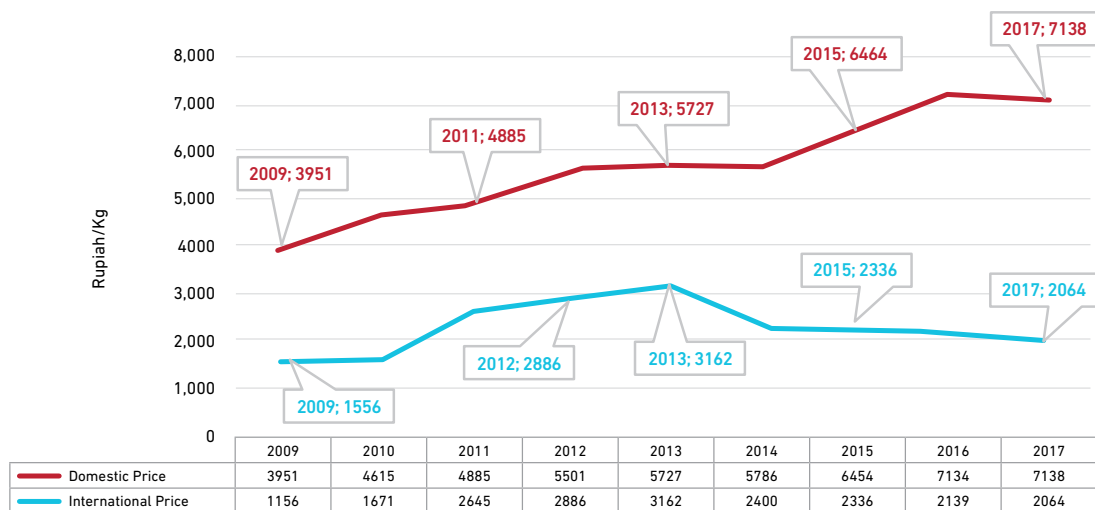


In spite of the government's apparent goals, the problem is not self-sufficiency. In a globalized economy, international trade can fill gaps in domestic production and it may be that imports are a better solution than the autarchic principle of 'doing it by yourself' that seems to inspire some of the most recent Indonesian policies. Respatiadi and Nabila (2017) have expanded this argument in the context of beef imports and production. The power of trade and the law of comparative advantage (Cowen and Tabarrok, 2015, chapter 2) cannot be overestimated.

Graph 16 illustrates that international maize prices are much cheaper than domestic Indonesian prices. Over the past 10 years, while international prices have shown a cyclical dynamic and decreased since their 2013 peak, Indonesian prices have constantly risen. Indonesia's rising prices should be considered mostly the result of constant demand pressure paired with import restrictions. Demand pressure effects could have been mitigated by foreign maize inflow if policy enabled imports according to market conditions rather than political considerations motivated by autarchic desires.

Graph 16

Maize price comparison between domestic and international markets, 2009–2017.



Source: Freddy and Kumara Gupta (2018), p. 9.

Table 3 illustrates how the small quota of permitted imports keeps prices high when compared with neighboring countries.

Table 3
Maize imports and domestic consumption in Southeast Asia (2018).

Countries	Maize Import (Tons)	Domestic Consumption (Tons)++	Imports as % of Domestic Consumption	Domestic Price (IDR/kg)
South Korea*	10,200,000	10,211,760	99.9%	4,178
Thailand**	250,040	4,820,230	5.2%	3,031
Vietnam***	8,917,120	14,208,480	62.8%	3,198
China****	5,000,000	219,230,140	2.3%	3,122
Mexico*****	16,700,000	38,005,290	43.9%	3,909
Indonesia+	500,000	23,300,000	2.1%	7,138

*: Agricensus (2018)

** : Bank of Thailand (2018)

***: collated from USDA (2018b)

****: Ren (2018)

*****: FAO (2018)

+: USDA (2018a)

++: OECD-FAO Agricultural Outlook (2018)

Source: Freddy and Kumara Gupta (2018), p. 9.

The previous section reviewed the regulation of maize, which is mainly characterized by two factors: complex and contradictory rules and the BULOG import monopoly. BULOG's government monopoly is doing no good for poultry prices. The monopoly makes the use and discovery of entrepreneurial knowledge and the market process impossible. In addition, because BULOG is a government body it is naturally subject to political considerations over actual market needs. Based on these characteristics of the market, we would expect prices to be higher than they would otherwise.

The price of maize supports this claim. Even though international feed prices remain much lower than Indonesian prices, the government continues to pursue its political goal of self-sufficiency in spite of the fact that it causes high production costs in several industries. The final result of this strategy is that consumer prices remain high, penalizing the people with lowest purchasing power the most. Therefore, while a sort of autarchic approach may seem inspired by the defence of the national interest, that very interest is harmed by forcing people to buy chicken at a price higher than what would have emerged if the importation of a basic raw material were liberalized.

4.2.3 The weight of the infrastructure gap

The last point we want to touch and which suggests policy recommendations in the next section is related the problem of insufficient infrastructure in Indonesia and its effect on the poultry industry. In particular, port infrastructure and road connections between cities are insufficient.

Andersson and Andersson (2018, p. 1) recently argued that the "performance of any economic system depends on its infrastructure, because infrastructure changes at a much slower pace than other relevant factors" and they added that "material infrastructure consists of networks for transmitting information and energy or for transporting goods and people" (p. 2). Even if the infrastructure situation is improving, in particular in Jakarta, it is well known that Indonesia suffers from a lack of adequate infrastructure.

It is estimated that the country needs USD 157 billion to fulfil President Jokowi's five-year infrastructure plan. According to this plan, only USD 15 billion should come from the government, while the rest of the money is expected to come from private and international investors (Salna, 2018; see also Oxford Business Group, 2017).

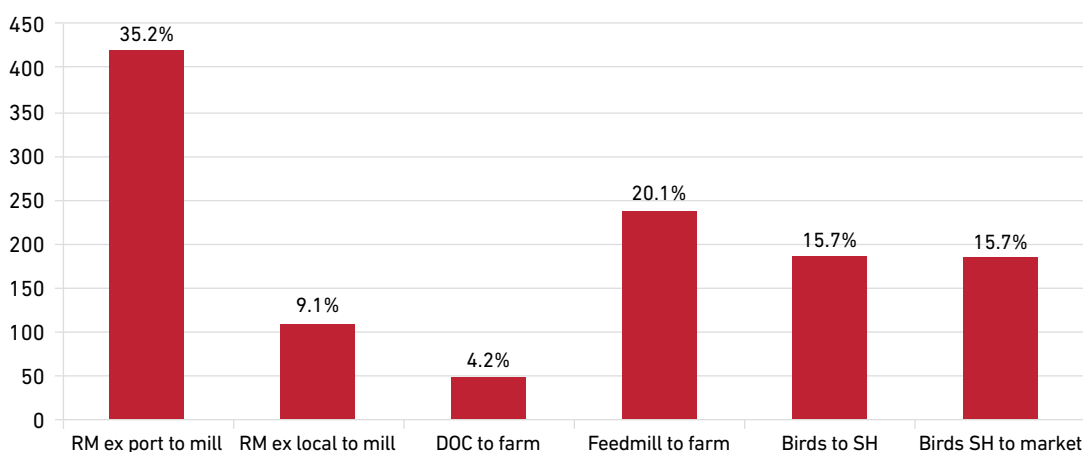
According to data published by the Indonesian Chamber of Commerce and Industry (Kadin Indonesia), around 17% of a company's total expenditures in Indonesia is absorbed by logistics costs, while in peer economies this figure is below 10%. Such discrepancies can make investors more reluctant to invest in Indonesia (particularly in the case of foreign direct investment). At the same time, logistics problems make it difficult for existing entrepreneurs to expand their business, limiting their potential (Indonesia Investments, 2017).

In the poultry industry, transport costs are estimated to be 4.7% of the retail price for broilers (USAID, 2013, p. 21). This problem is linked with the importation of raw materials (analyzed in the previous section). In the case of imported raw materials, the price of transporting feed from the port to the mill can be up to 35% of the total transport cost. As stressed by USAID (2013, p. 21), this cost is peculiarly high for several reasons, including the high import content of Indonesian poultry feed (75% of broiler feed raw materials are imported), inefficient port handling facilities (insufficient berths in Jakarta), excess demurrage due to slow turnaround of vessels, slow transport time from port to mill, and therefore a higher number of trucks to execute the process.

“Around 17% of a company's total expenditures in Indonesia is absorbed by logistics costs, while in peer economies this figure is below 10%. Such discrepancies can make investors more reluctant to invest in Indonesia.”

Graph 17

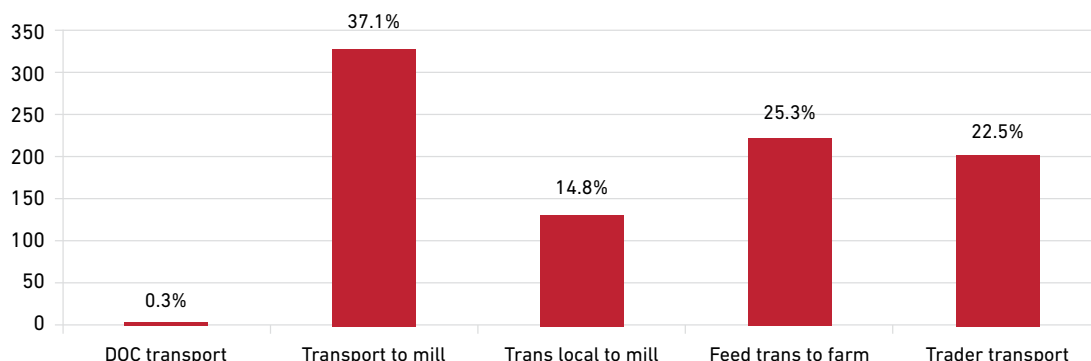
Transport costs for broilers to consumer in Indonesia.



Source: USAID (2013), p. 21.
RM = Raw Materials. SH = Slaughter House.

A similar situation affects the egg market. Transport is 5.1% of the cost of the retail price for eggs. Similarly, the highest transport cost is that of imported raw materials from the port to the feed mill.

Graph 18
Transport cost for egg production in Indonesia.



Source: USAID (2013), p. 22.

“The situation is further aggravated by the fact that poultry facilities are not located in the main cities or in the neighbourhoods of ports.”

The situation is further aggravated by the fact that poultry facilities are not located in the main cities or in the neighbourhoods of ports. They are located in rural areas, reachable only after many hours of travelling by truck.

To understand how the infrastructure issue affects poultry operations in particular, consider that, for example, feed bins are usually not used on poultry farms in Indonesia because it is impossible, on the existing roads, to transport them to farms. Feed bins for poultry farms usually range from a three metric tonne to a 100 metric tonne capacity, with a diameter ranging from 1.5 to 5 meters and a height from 3 to 12 meters, and special trucks, which Indonesian roads often cannot support, are required to transport them. Farms instead build local small hoppers, which are continuously manually fed by workers.

In five weeks, a broiler chicken consumes around 3.3 kg (for an average body weight of 2.0 kg) of feed (Akinbobola, n.d.). An average broiler house (and a farm usually consists of several houses) holds around 25,000 birds, so consumption will reach around 81.7 tonnes of feed in five weeks, or 2.3 tonnes per day. According to the same source, the cumulative feed intake of layer chicken over 42 weeks is 4.7 kg. For a layer cage house of 50,000 birds, this means 232.8 tons in 42 weeks, or 0.791 tonnes per day. Given the volume of feed involved, it's obvious this system is only viable for as long as labour costs remain low—as was outlined above, Badan Pusat Statistik estimates that wages represent respectively 9% and 16% of the production cost in broiler and layer farming.

An improvement in infrastructure will have several benefits on the final price of chicken and eggs. Not only should the impact of transport costs be reduced, lowering a cost of production, but better roads would allow the transport of specialized equipment such as feed bins.

Infrastructure has to be taken into account also from a more general perspective. Table 4 shows some poultry welfare measures related to loading and transport of the chickens from the hatchery to the farm and from the farm to the slaughter house.

Table 4

Poultry welfare standards with related to the loading and transport of chicken.

Loading and transport	
All chickens, including chicks, selected for transport must be examined by the person in charge prior to loading to ensure they are fit for transport and are able to withstand the journey without suffering unreasonable or unnecessary pain or distress.	<ul style="list-style-type: none">• All chickens are fit and healthy when transported and don't show injuries resulting from poor catching and loading practices.• Chicks are delivered to the place where they will be reared as soon as possible after catching.• There are documented records of chickens injured or dead on arrival.• Chickens are transported in an upright sitting position.• Ventilation and stocking rate during transport are controlled according to weather and hen condition (e.g. weight, health and feather status).• There is no evidence painting, huddling and shivering in the chickens.• There is documented training record for loading and transport crews.• A documented contingency plan is evident.
Persons responsible for the loading and transport of chickens must be trained in careful handling procedures and understand the effect that poor transport condition may have on the welfare of the chickens.	
Conveyances and containers must have sufficient ventilation, even when stationary, to prevent harmful concentrations of gases or water vapour, and to protect the chickens from climatic conditions that would compromise their welfare.	
A contingency plan must be in place to address potential transport problems.	
Drivers of vehicle must be properly briefed on the contingency plan.	
Feed must not be withheld from chickens for more than 12 hours prior to arrival at the processing plant.	
Day-old chicks must be held and transported in conditions of controlled temperature and airflow.	
Crates and containers containing chickens must be handled with care and not thrown or dropped.	
Chickens that are injured during the catching and loading procedures must be humanely killed immediately.	
Conveyances and containers must have adequate ventilation to allow the free flow of air to all chickens, even when stationary, to prevent the build-up or harmful concentrations of gases or water vapour or temperature.	

Source: Phillips (2018), p. 39. These have to be considered as general management suggestions rather than compulsory rules.

“The transport of chickens from hatchery to farm and from farm to the slaughter plant have to be done in a way that does not damage the birds.”

The transport of chickens from hatchery to farm and from farm to the slaughter plant have to be done in a way that does not damage the birds. While the welfare and safety of the birds matters, in poultry farming chickens also represent the main capital good in production. Damage to their bodies translates to damage to the product and therefore the main income source. Poor road conditions can damage the birds, reducing meat quality. In addition, as mentioned in Table 4, chicks must be delivered to the place where they will be reared as soon as possible after hatching. Bad infrastructures, thus, could result in a delay to the birds' access to feed and water.

As explained by Bergoug et al. (2013, p. 3301), EU legislation specifies that broiler chicks can be transported for a maximum of 24 hours and deprived of feed or water for, 72 hours at most after hatching. These standards are based on the fact that chicks' metabolic reserves last up to three days. The first week of life is the most crucial in the life of DOCs. The risk of mortality is higher in this period and can be increased by combined stress of post-hatch handling in hatcheries, *transportation*, and poor adaptation to grow-out conditions (Bayliss and Hinton, 1990).

POLICY RECOMMENDATIONS

Consideration of the topics in this report lead to policy recommendations for the Indonesian government. This section highlights four points of action: harmonization of regulations, parent stock import liberalization, maize import liberalization, and infrastructure improvement.

5.1 Harmonization of regulations

In previous sections, this report discussed contradictions between regulations of maize imports. Harmonizing existing regulations by clearing up contradictions between MOT 21/2018 and MOA 57/2015 is important to help importers avoid confusion and to reduce discretionary power in the import process that might affect the smooth progress of the industry.

The government should abolish the requirement for a letter of recommendation from the Ministry of Agriculture that is stipulated in MOA 57/2015 Article 16 in order to expedite the import licensing process.

5.2 Parent stock import liberalization

This report has discussed that the breeders that provide the genetic lines for broilers and layers are mainly imported. According to Articles 9 and 11 of MOA 26/2016, poultry producers are not free to import breeders according to their expected business needs. Instead, imports are regulated by supply and demand calculations by an analysis team appointed by the government.

The interaction between demand and supply is a dynamic process which unfolds over time. It is based on the discovery, interpretation, processing, and exchange of information. Experts can observe the outcomes of the market process as an emerging coordination pattern, but they cannot control it.

The final outcome of a market process unleashed from mandates based on government calculations would be better organization of the poultry value chain, followed by a reduction in prices due to competition and the consequent cost reduction (thanks to the implementation of better production methods in order to win market competitions).

Under a free trade regime, breeder import decisions would be left in the hands of the players in the poultry industry and therefore be based on profit expectations and entrepreneurial calculations. To make this possible, the government should abolish the parts of MOA 26/2016 (Articles 9 and 11) that make it illegal for private producers to import parent stock.

5.3 Maize import liberalization

The argument in section 5.2 can be extended to the import of maize, and Indonesia's maize industry should be opened to the international market. In addition to the arguments made for parent stock, which also apply to the maize market, the law of comparative advantage explains why Indonesia and its trading partners would both benefit from an opened maize market.

“Harmonizing existing regulations by clearing up contradictions between MOT 21/2018 and MOA 57/2015 is important to help importers avoid confusion and to reduce discretionary power in the import process that might affect the smooth progress of the industry.”

“The government should liberalize maize imports in Indonesia through revisions to MOT 21/2018 and MOA 57/2015. This would allow the country to specialize in the production of goods in which it can perform more efficiently.”

Under existing regulations, Indonesian poultry producers are paying virtually double the price they could be paying for one of their key raw materials. It goes without saying that this additional cost is reflected in market prices for chicken and eggs, and this limits both domestic consumption possibilities and further expansion of the industry. Moreover, since chicken is a major source of protein in Indonesia,³⁴ higher prices are particularly hard on the lower income population.

The government should liberalize maize imports in Indonesia through revisions to MOT 21/2018 and MOA 57/2015. This would allow the country to specialize in the production of goods in which it can perform more efficiently. Indonesia clearly does not have a comparative advantage in maize production and could import it at a lower price. This would decrease poultry production costs, benefitting not only poultry producers but also consumers, in particular low income consumers, by making it possible to provide cheaper chicken and eggs.

Eliminating trade protections for maize could also allow Indonesia to modernize its poultry industry, becoming more efficient and perhaps developing its own comparative advantage in the future, potentially turning the country into a poultry exporter, enhancing business opportunities and creating advantages in the labour market.

5.4 Infrastructure improvement

Although the Indonesian poultry market would benefit from the removal of government interference in the liberalization of trade in strategic elements such as parent stock and feed, we can recognize a role for the government in supporting economic development through infrastructure projects. Infrastructure is a strategic part of a sound development framework. This report has discussed the reasons that transportation is an important element in the total production cost both for chicken and eggs, and that the most intensive transportation costs occur between the port and the feed mill.

The government should invest in improving the road system, with a focus on connecting ports with nearby agriculture areas. This would naturally benefit the production process by making lower freight fares possible. Improved transportation infrastructure would also allow the movement of heavy equipment that would help Indonesian poultry farms modernize and make them better able to deal with rising wages. This would enable more efficient production processes and thus better prices.

“The government should invest in improving the road system, with a focus on connecting ports with nearby agriculture areas. This would naturally benefit the production process by making lower freight fares possible.”

³⁴ Between 86 and 87% of total meat consumption is poultry meat (Santoso, 2016, p. 5).

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APPENDIX

Figure 1A
The Broiler Industry Structure according to McKay (2008).

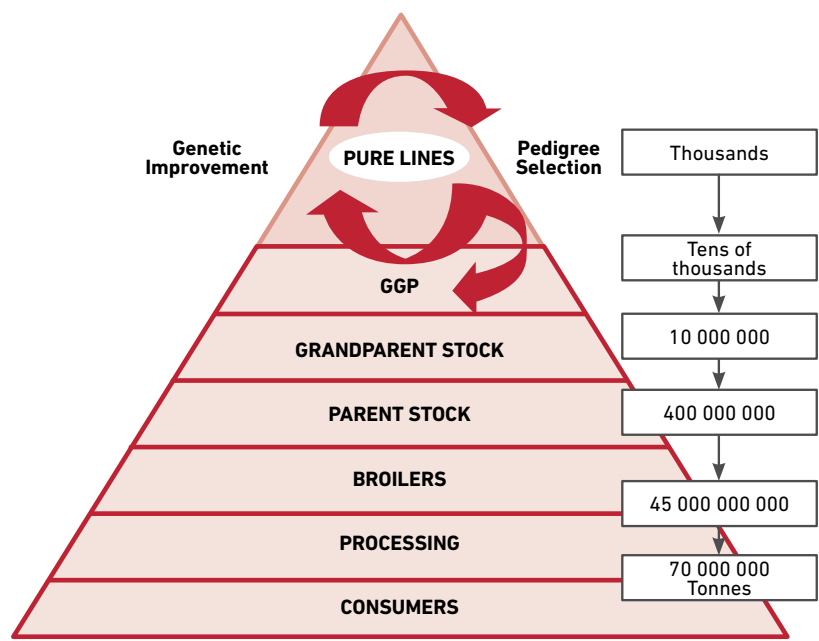
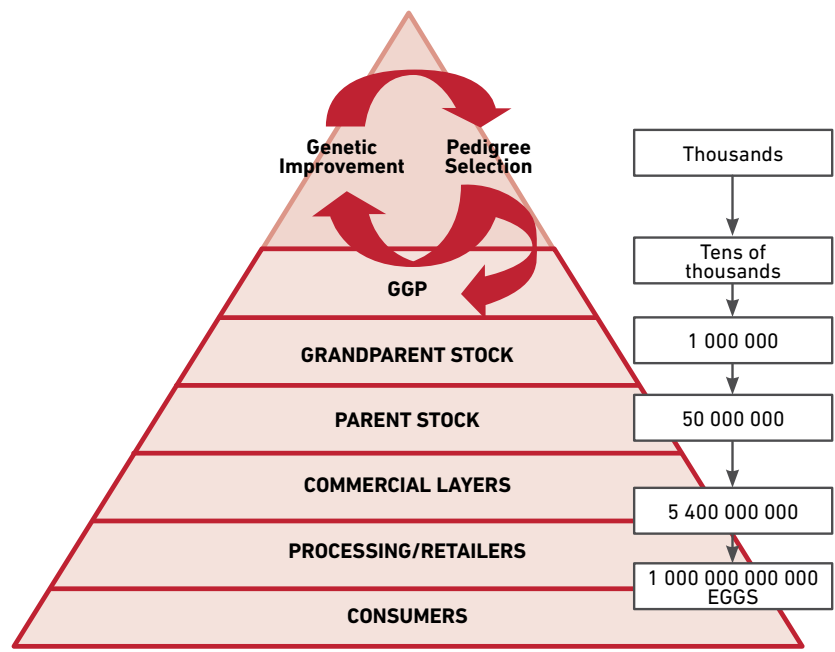


Figure 2A
The Layer Industry Structure according to McKay (2008).







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