

Salted egg agroindustry in Brebes during the covid-19 pandemic

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ABSTRACT: This study aims to describe changes in the agro-industrial activities of salted eggs in Brebes Regency during the Covid-19 pandemic, both in marketing and agro-industrial processes. This research was conducted from January to April 2021. A total of 135 active salted egg agroindustries located in 12 sub-districts of 17 subdistricts in Brebes Regency were applied in this study. The research sample was 50 industries determined by purposive random sampling, namely districts with the most significant number of salted egg agroindustries (Brebes, Bulakamba, and Warnasari Regencies). Respondents are the owners of salted egg agroindustries who were selected as samples. Primary data (marketing distribution of salted eggs and salted egg processing technology) were collected by interview using a questionnaire and observation. Secondary data were collected by recording related documents from the government and the Central Bureau of Statistics of Brebes Regency. Data on the distribution of egg processing technology was analyzed descriptively. During the Covid-19 pandemic, producers had difficulty obtaining raw materials during a pandemic which triggered a 59% decline in salted egg production followed by a decrease in demand. Changes in salting salted eggs did not occur during the Covid-19 pandemic despite a decline in production. Salted egg producers do not reduce the quality of the salting method. As many as 30% of salted egg producers produce a combination of original, grilled, and baked flavors.

Keywords: Agroindustry; Brebes; Pandemic Period; Producers; Salted Eggs

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INTRODUCTION

Eggs are a source of animal protein, where all the nutrients the body needs for a healthy life are in eggs; besides that, eggs also have a good taste and are relatively cheap (Chaiyasit et al., 2019). However, eggs have a weakness. Namely, they are easily damaged, both natural and chemical damage, as well as damage due to microbial contamination through the pores of the eggshell.

Therefore, preservation is necessary to maintain the quality of the eggs (Fahri et al., 2019). One of the efforts to preserve eggs is to carry out salt so that it can extend the shelf life of the eggs, reduce the fishy smell in the eggs, and can create new tastes.

Salted eggs are processed from fresh eggs that are still intact and then preserved using the main ingredient of salt. Salted egg is a processed egg product, which is very easy to do. In principle, the process of making salted eggs is salting. The salty taste of eggs is due to the osmosis process in the eggs; namely, the NaCl salt will first be converted into sodium ions (Na⁺) and chloride ions (Cl⁻).

The salt solution (NaCl) will enter the eggs through the skin's pores, leading to the white part, and finally to the yolk (Xu et al., 2017). Making salted eggs requires a concentrated salt solution with a concentration of between 25% - 40%. The higher the salt content in salted eggs will further increase the product's shelf life (Novia et al., 2019).

The production of salted eggs on a large scale by producers is also called salted egg agroindustry because it is carried out continuously to produce an economical product (Sumekar and Al-Baarri, 2020). Salted egg agroindustry is an activity that utilizes livestock products in the form of duck eggs as raw material (Doronina et al., 2016), while others design and provide equipment and services for these activities to form new products with economic value (Manuela et al., 2012). Agroindustry activities are usually carried out by

companies that process raw materials through physical or chemical treatment, preservation, storage, packaging, and distribution (Fadhil et al., 2017). Salted egg agroindustry activities in Brebes Regency have become a livelihood for the Brebes community and have even become a culture.

In October 2020, Brebes salted eggs were designated as an intangible heritage by the Ministry of Education and Culture of the Republic of Indonesia. The development of variations in salted eggs that continues to be innovated shows that salted eggs are a superior product of Brebes Regency. Moreover, Brebes salted eggs have their peculiarities, namely the "**masir**" condition of the egg yolk, as well as a salty taste that is evenly distributed and does not sting on the white of the egg.

The advantages and differences of Brebes salted eggs are not yet fully recognized. Most connoisseurs of salted eggs still have the same taste description between Brebes salted eggs and salted eggs made in other cities. The salted egg industry in Brebes Regency has positively impacted people's lives, and the amount of labor absorption by this industry continues to increase.

The Covid-19 pandemic has greatly affected human life (Fagoonee and Pellicano, 2020). Daily life becomes difficult, especially for those living in lockdown areas (Laska et al., 2020). The Covid-19 pandemic's impact is felt by all groups, including salted egg producers in Brebes as providers of nutritious and unique food for Brebes. Salted egg consumers declined sharply due to restrictions on human movement during the lockdown and on returning home during muslim holidays by the Indonesian government.

Salted eggs are a food product suitable for consumption during a pandemic because of their long-lasting and nutritious nature, and the availability of long-lasting food is the community's top priority in the midst of the Covid-19 pandemic (Hossain, 2020). This study describes the changes in

agroindustry activities and marketing of salted eggs in Brebes during the early Covid-19 pandemic in Indonesia.

MATERIALS AND METHODS

This research started from January to April 2021. A total of 135 active salted egg agroindustry located in Brebes Regency were applied in this study. The research sample was 50 industries determined by purposive random sampling based on the ownership of business licenses in the food processing sector, most of which were in three sub-districts, namely Brebes, Bulakamba, and Warnasari sub-districts. The sample selected by the owner of the salted egg agroindustry is also the respondent.

Primary data collection (salted egg processing technology and salted egg marketing distribution during the early Covid-19 pandemic) was collected using questionnaires and observation. Secondary data collection is by recording relevant documents from the government and the Central Bureau of Statistics of Brebes

Regency. Description method was used to process the data obtained from the distribution of egg processing technology and the marketing process.

RESULT AND DISCUSSION

Salted egg production

Animal food products usually have a higher selling value than plant food products. The need for animal food products such as duck eggs to be used as salted eggs always increases yearly. However, during the covid pandemic, there was a change in the amount of salted egg production. The policy of restricting human movement to suppress the transmission of Covid-19 has hampered the distribution of industrial raw materials and stopped production activities.

The policy of limiting human movement to suppress the transmission of Covid-19 causes industrial raw material distribution activities to be hampered and production activities to stop. Sources of raw materials and production of salted eggs before and during the Covid-19 pandemic can be seen in table 1 and table 2.

Tabel 1. Sources of salted egg raw materials

Sources of Salted Egg Raw Materials	Number of Respondents		Information
	n	%	
Brebes	25	50	Limbangan Wetan, Jatibarang, Grinting Village, Sengon Village, Pesantunan Village.
Outside Brebes	25	50	East Java (Siduarjo, Blitar, Ponorogo, Tulungagung), Pemaslang, Tegal, Cirebon.

Source: own research

Tabel 2. Production of salted eggs before and during the covid 19 pandemic

Number of Respondents (n)	Total production (eggs)		Percentage of reduction in production
	Before the pandemic	During a Pandemic	
50	121.004	49.080	59%

Source: own research

Table 1 shows that 50% of the raw material for making salted eggs comes from outside Brebes Regency, and during the Covid-19 pandemic, there was a decrease in

production by 59% (table 2). This makes it difficult for producers to get raw materials during a pandemic. This has triggered a decline in the production of salted eggs,

which is supported by lower demand because most salted egg producers sell directly to consumers. Demand and supply influence salted egg production (Sidharta, 2020) and marketing techniques (Telukdarie et al., 2020).

The existence of a policy restricting human movement by the government is also one of the factors determining the decline in salted egg production. While on the other hand, people need food for life and more effective marketing methods, for example, the e-commerce method (Petcharat et al., 2018). Economic and non-economic losses are faced by all sectors, including food security (Nicola et al., 2020).

The supply of agroindustry for the food security of an area during a pandemic is urgently needed (Avvisati et al., 2019). However, on the other hand, risk management is needed so that there is no

massive transmission in the producer environment (Lusk and Chandra, 2021) and the marketing chain by increasing social distancing and following health protocols lockdowns from the government (Krausmann et al., 2019). However, this limitation creates problems, namely the decline in agroindustry production and limited marketing patterns (Laborde et al., 2020).

Salting technology and salted egg flavor variants

There was no change in salted egg manufacturing techniques during the Covid-19 pandemic. The only noticeable differences were the decreased salted egg production and the difficulty in selling during the pandemic. Producers of salted eggs do not reduce the quality of the salting method. The method of salting and curing time can be seen in Table 3 below.

Table 3. Salting technology and variants of products in the agroindustry of salted eggs

Type of Technology and variants	Number of Respondents	
	n	%
<u>Salting Material</u>		
Soil, salt, water, ash,	3	6
Soil, salt, water, red brick,	2	4
Ash, salt, water	2	4
Salt, red brick, ash, water	30	60
Soil, salt, water, red brick, ash	7	14
<u>length of salting (day)</u>		
≤ 14	26	52
> 14 - 18	19	38
> 18	5	10
<u>Flavor variants</u>		
Original	15	30
Original + Burn	12	24
Original + Pindang	1	2
Original + Baked	2	4
Original + Burn + Pindang	1	2
Original + Burn + Baked	15	30
Original + Baked + Pindang	4	8

Source: own research

In table 3, it can be seen that the cooking method most used is the dough method with raw materials of salt, red brick, rubbing ash, and water. The duration of ripening to produce salty duck eggs is

mainly used between 10 - 14 days or ≤ 14 days, whereas to produce salted and oily eggs, the ripening time is usually > 14 - 18 days. In general, the length of the salting process carried out in making salted eggs is

14 days (Wang et al., 2017), where the albumen has lost its viscosity and has become diluted. The yolk gradually solidifies and hardens due to salt entry (Lai et al., 2010). Salting eggs by ripening takes 14-30 days (Wang, 2017) while salting with a saturated salt solution takes about 7-10 days (Venkatachalam et al., 2019). The longer the eggs are wrapped in a salty paste dough, the more salt will enter the eggs so that the eggs will last longer (Novia et al., 2019).

Generally, the manufacture of salted eggs in Brebes Regency uses the ripening method. Making salted eggs with the ripening process requires a dough that coats the eggs thoroughly to produce better product quality, such as cleaner colors and a more delicious and savory taste. The technique of making salted eggs has three methods: soaking in a saturated salt solution, polishing the eggs with solid or dry clay or brick dough, and immersing the eggs in red sticky paste or half-wet thickened kitchen ash (Nurbaety and Nurwati, 2021). There are many ways to make salted eggs, ranging

from simple ingredients (salt) to using various ingredients by curing them to get the desired taste and aroma (Tharukliling and Fanani, 2018). The mixture of ingredients in making salted eggs using a curing method other than salt and water is rubbing ash, brick, or clay (Chi and Tseng, 1998), or there is also a mixing of 2 types of these additives. The variation in the use of these materials will undoubtedly be the technology producers must choose, which materials are better and more needed (Wibawanti et al., 2013).

Table 3 also shows that 30% of producers only produce original flavor variants, while other flavor variants are complementary to provide choices to consumers. Salted egg producers produce flavors with different combinations depending on marketing patterns. Table 3 also shows that 30% of salted egg producers produce a combination of original, grilled, and baked flavors. The large selection of flavors or flavor variants produced by the manufacturer will provide trust and satisfaction to customers (Patrick, 2012).

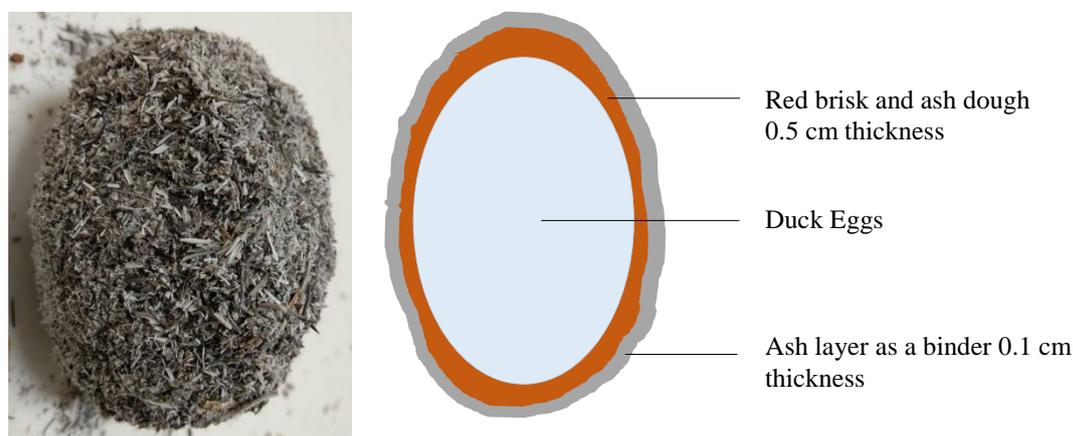


Figure 1. The layer covering the duck eggs in the salting process

Table 4. Processing methods for salted egg variants

No	Variants	Method
1	Original	The eggs are salted and then boiled
2	Burn	Original salted egg product which is roasted on a burning stove with coconut shell fuel
3	Pindang	The eggs are salted and then boiled using spices
4	Baked	Salted eggs and then in the oven

Source: own research

Table 4 shows the method of making salted eggs in the Brebes agroindustry, and there are different methods to produce four variations of flavors. Developing variations in the taste of salted eggs in Brebes provides many choices to consumers, especially to maintain consumer satisfaction and confidence in salted egg products.

The method for obtaining flavor variations in salted eggs is carried out in the cooking process: baked, baked, pindang, and boiled. Original salted egg is a salted egg flavor variant that consumers most demand; the manufacturing process is only boiled for 1 - 4 hours.

This pindang variant of the salted egg has yellow spices outside due to the boiling process, which uses yellow spices made from spices. Roasted salted egg is a continuation of the original salted egg process, which is burned using coconut shell charcoal which produces salted egg products with a brown color due to the smoking process. This egg has a distinctive taste and aroma of smoke from coconut shells

(Mediantari et al., 2017). Baked salted eggs are processed using an oven as a toaster to produce a reasonably dry egg texture, and the yolk is not so oily and not so salty because the oven process can remove the salt content in the eggs.

The cooking process for salted eggs is one way to preserve salted eggs for a more extended period and affects the characteristics of the salted eggs produced. Salted eggs are generally cooked by boiling (Zou et al., 2018). One innovation in cooking salted eggs is an oven. Oven cooking is a cooking process using hot air from a heating medium. In the oven process, water discharge will be discharged due to osmotic differences. Along with the release of water from the eggs, there will also be a release of NaCl, affecting the salty taste produced by salted eggs (Lai et al., 2010). Giving spices to pindang eggs also gives consumers a different taste because it can reduce the salty taste due to the influence of the spices and provide a slightly softer texture (Xianglei et al., 2013).



Figure 2. Boiled salted eggs (original)



Figure 3. Burn salted eggs



Figure 4. Pindang salted eggs



Figure 5. Baked salted eggs

Salted egg marketing

Table 5 shows the marketing chain pattern of salted egg producers, namely 52% through direct marketing to consumers, 40% through retailers, and only 8% through collectors. Usually, salted egg producers who can produce between 3.000-5.000 eggs per day are directly sold to retailers. Salted

egg producers who can produce more than 5.000 eggs per day are usually accommodated by collectors who will be marketed outside Brebes, such as Jakarta and Karawang, while producers can only afford it. Produce below 3.000 eggs directly sold to consumers because they have a salted egg shop or shop.

Table 5. The number of respondents by marketing and industry license of salted eggs

Marketing and Industry License	Number of Respondents	
	n	%
<u>Marketing Reach</u>		
Consumers	26	52
Retailers-Consumers	20	40
Collectors- Retailers-Consumers	4	8
<u>Home Industry License</u>		
have a license	27	54
has no license	23	46

Source: own research

In this study, 54% of salted egg producers have a home industry license, and 46% do not yet have a home industry license. Usually, salted egg producers produce above 3.000 eggs due to a broader market share. However, 10% of salted egg producers with a capacity below 3.000 items per day already have a home industry license.

This shows that the awareness of salted egg producers is to convince consumers that the salted egg products they produce are suitable for consumption. Food products with a home industry license will give consumers confidence in the food safety of these products (Sadiku et al., 2019). Salted egg products with a home industry license can be freely and widely marketed. They are fit for distribution,

product safety and quality are guaranteed, product selling value, products can enter modern shops (supermarkets), and buyers' trust increases (Tolo et al., 2016).

The production of salted eggs with flavor variants requires duck eggs as raw material, which generally costs Rp. 2.000 - Rp. 2.500 per grain. The selling price of the most pungent flavors is in salted eggs and roasted and roasted flavors, while the lowest is in the original flavor variants. The determination of the selling price occurs because there is a different process after the salting process and more raw materials, such as using coconut shells, the pindang process using yellow spices, and the oven process. This selling price is commonly referred to as the cost of goods manufactured (Suryaningrat, 2016).

Tabel 6. The price of raw materials, selling price, and shelf life of salted eggs are based on flavor variants

Flavor variant	Price of raw materials for duck eggs per egg (Rp)	Selling price per egg (Rp)	Shelf life (day)
1. Original	2.000 – 2.500	3.000 – 3.500	7 - 14
2. Baked		3.500 – 5.000	14 - 15
3. Pindang		3.500 – 4.500	14 - 15
4. Burn		3.500 – 5.000	15 - 25

Source: own research

Cost of Production is the cost incurred in connection with the production, namely the total cost of direct materials and direct labor by agroindustry producers (Mohebalizadeh and Handfield, 2018). The cost of production includes all costs and sacrifices that need to be incurred and made to produce finished products (Dewi and Muryanti, 2017). All costs related to the product (goods) obtained are elements of product costs, such as raw material costs, direct labor costs, and agroindustry overhead costs (Hidayat et al., 2018).

In general, the production percentage of original flavor variants is almost 60-70% of the total production of salted eggs due to the higher demand for original salted egg flavors. The high incidence of choosing the

original salted egg flavor variant occurred before the Covid-19 pandemic. During the Covid-19 pandemic, the demand for original flavored salted eggs was still higher than other flavor variants.

Consumers use various criteria in evaluating alternative products to choose including (Kumar et al., 2019) agroindustry products such as salted eggs. Consumers choosing agroindustry products always consider the functional, psychosocial, and financial consequences (Horská et al., 2010).

The consumer decision-making process is influenced by three components: individual differences, environmental factors, and marketing strategies (Martinho, 2020).

Table 7. Utilization of sorted salted eggs

No	Salted Eggs In Sorted	Price (Rp)	Buyer	Information
1	After cooking (boil, oven, pindang)	1.200 – 1.500	1. The end consumer 2. Side dishes producer	3. Consumed directly 4. Used as raw material for salted egg pepes products, which cost around Rp. 3.500 – 5.000, -
2	Before cooking (boil, oven, pindang)	1.000 – 1.500	Collectors	5. Sold to martabak cake producers to be used as raw material for making martabak cakes

Source: own research

Table 7. shows that the salted egg products that have been sorted due to damage before and during cooking are not more than 1%. Damage that occurs before cooking, such as cracking or cracking after

removing the wrapper for salting dough, occurs due to workers' negligence, not due to decay of microorganisms. So that cracked or broken salted egg products can still be consumed, the nutritional value and taste do

not change much. Damage during the cooking process generally occurs during the boiling, oven, or roasting, although the nutritional value decreases slightly. Salted tea products that crack or break during cooking are still consumed but do not last long.

The production process of a product cannot be separated from the name of a problem or rejected goods (Sbabu et al., 2012). Often, rejected goods can be caused by human factors, machines, and even materials (Knaflewska and Pospiech, 2007). To get the best quality products, employees and quality control must work together well (Rotaru et al., 2005). Producing good quality products will give customers satisfaction (Ratanamananeichat and Rakkarn, 2015). Agro-industrial companies will continue to run with the best products for their customers (Grunert, 2014).

The salted egg sorting products still being utilized are immediately sold at a low price. Sales of damaged salted eggs before cooking are usually directly to collectors for Rp. 1.000 – 1.500, which then the collectors sell to martabak cake producers as raw material for making martabak cakes. Sorted salted eggs are usually sold directly to consumers who choose these products because they are cheap. Consumers also use them again as raw material for making diversification salted egg like "Pepes" which have high economic value as side dishes.

Direct sales of salted egg products are carried out to avoid the accumulation of waste and increase income from selling sorted salted eggs (Mu, 2019). On the other hand, salted egg producers no longer carry out the process to increase the added value of sorted eggs but are sold to collectors or to direct consumers before and during the Covid-19 pandemic.

There is no activity to increase the added value economically to sorted salted eggs due to limited labor, knowledge, and skills possessed by salted egg producers (Wiklund and Shepherd, 2003).

CONCLUSIONS

During the Covid-19 pandemic, producers had difficulty getting raw materials during the pandemic, which triggered a decrease in salted egg production by up to 59% and was followed by a decrease in demand. Changes in techniques for salting salted eggs did not occur during the Covid-19 pandemic despite a decline in production. Producers of salted eggs do not reduce the quality of the salting method. As many as 30% of salted egg producers produce a combination of original, burn, and baked flavors.

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