

REGULAR ARTICLE

Effect of Blast Chilling on The Organoleptic Quality of Chicken Rendang During Cold Storage AT PT PAREWA ASIAN CATERING*Rahel Danar Pratama^{*1}, Dianita Kumalasari², Diella Trisna Ayuningtyas***Address:**¹Universitas Pembangunan Nasional "Veteran" Jawa Timur, Faculty of Engineering and Science, Departement of Food Technology, Jl. Raya Gunung Anyar, 60294 Surabaya, East Java, Indonesia, Telp (031) 8782179:²Universitas Pembangunan Nasional "Veteran" Jawa Timur, Faculty of Engineering and Science, Departement of Food Technology, Jl. Raya Gunung Anyar, 60294 Surabaya, East Java, Indonesia³PT Parewa Asian Catering Jl. Lt. Gen. Wahono Jl. Raya By pass Juanda No.8, Sedati Gede, Kec. Sedati, Sidoarjo Regency, East Java 61253*Corresponding author: danar8710@gmail.com**ABSTRACT**

Chicken rendang is one of the main menu components served in airline catering and requires proper temperature control to maintain its quality and safety during storage. This study aimed to evaluate the effect of blast chilling on the organoleptic quality of chicken rendang during cold storage. The research was conducted at PT Parewa Asian Katering by comparing two storage treatments, namely blast chilling at -18°C to -20°C followed by storage at 1–5°C, and direct storage in a chiller at 1–5°C without blast chilling. Organoleptic observations were carried out on days 1, 3, 5, and 7, covering color, aroma, texture, and taste attributes. The results showed that chicken rendang subjected to blast chilling maintained its sensory characteristics better than the product stored without rapid cooling. Products treated with blast chilling exhibited slower deterioration in color, aroma, texture, and taste throughout the storage period. In contrast, products stored without blast chilling showed faster quality degradation, characterized by rancid odor development, softer texture, and undesirable taste changes. Therefore, blast chilling can be considered an effective method for preserving the quality and safety of chicken rendang in the airline catering industry..

Keywords: blast chilling, chicken rendang, organoleptic quality, cold storage, food safety**INTRODUCTION**

The airline catering industry plays an important role in providing safe, nutritious, and high-quality meals for passengers. In-flight meals must comply with strict food safety standards because they are prepared in large quantities, distributed over long distances, and often stored before consumption. Therefore, maintaining product quality and safety throughout processing and storage is a critical challenge for airline catering companies. Service quality, including food quality and safety, significantly influences passenger satisfaction and perceived value in airline services (Atalık et al., 2019; Chen & Chen, 2022). Nasi Lemak is one of the menu items commonly served by airline catering providers and consists of several components, including rice, sambal, side dishes, and chicken rendang. Chicken rendang is a traditional Indonesian food product prepared by cooking chicken meat with coconut milk and various spices for an extended period. The product is characterized by its rich flavor, distinctive aroma, and tender texture (Panggabean et al., 2016; Nabila et al., 2023b). Although the cooking process contributes to the product's sensory quality, the presence of coconut milk and meat ingredients makes chicken rendang susceptible to quality deterioration during storage due to microbial activity, lipid oxidation, and physicochemical changes.

Temperature control is one of the most important factors affecting the safety and quality of ready-to-eat food products. Improper cooling and storage conditions may accelerate microbial growth and increase the risk of foodborne illness (Doyle et al., 2020). According to James et al. (2020), food products should pass through the temperature danger zone (5–60°C) as quickly as possible to minimize microbial proliferation. In airline catering operations, rapid cooling methods such as blast chilling are widely applied to reduce product temperature efficiently and maintain product quality before distribution. Blast chilling is a rapid cooling process that lowers the temperature of cooked food products within a short period. This method not only improves food

safety by limiting microbial growth but also helps preserve the sensory characteristics of food products during storage. Trukhina et al. (2024) reported that rapid cooling and freezing methods improved the microbiological quality of finished products in airline catering systems. Furthermore, Mulot et al. (2019) and Zhang and Ertbjerg (2019) demonstrated that rapid cooling and freezing could reduce structural damage caused by ice crystal formation, thereby maintaining the texture and overall quality of meat products.

Despite the widespread use of blast chilling in foodservice and catering industries, information regarding its effect on the organoleptic quality of chicken rendang during refrigerated storage remains limited. Most previous studies have focused on microbiological quality and general food safety aspects, while studies evaluating sensory quality changes in traditional meat-based products are still scarce. Therefore, further investigation is needed to determine the effectiveness of blast chilling in maintaining the color, aroma, texture, and taste of chicken rendang during storage. This study aimed to evaluate the effect of blast chilling on the organoleptic quality of chicken rendang during cold storage by comparing products subjected to blast chilling and products stored without rapid cooling. The findings of this study are expected to provide useful information for improving quality control practices and food safety management in the airline catering industry.

MATERIAL AND METHODS

A. Study Site and Time

The study was conducted at PT Parewa Asian Catering, Surabaya, East Java, Indonesia, during the internship program from February to May 2025. Organoleptic quality observations were carried out on chicken rendang, one of the components of the Nasi Lemak Pak Nasser menu. Evaluation was performed during seven days of cold storage with observations on days 1, 3, 5, and 7.

B. Materials and Equipment

The material used in this study was chicken rendang produced by PT Parewa Asian Catering. The formulation consisted of boneless chicken meat, coconut milk, red chili peppers, shallots, garlic, ginger, galangal, lemongrass, kaffir lime leaves, salt, sugar, coriander, and other supporting seasonings according to the company’s standard recipe.

The equipment used included a blast chiller, chiller, stainless steel trays, a digital thermometer, and a thermo gun.

C. Research Procedure

Chicken rendang was produced according to the company’s standard procedure, beginning with thawing frozen chicken meat, seasoning preparation, cooking, and cooling. After cooking was completed and the product core temperature met the company’s food safety standard, the product was divided into two treatment groups. The first treatment involved blast chilling at -18°C to -20°C for approximately 45 minutes before storage in a chiller at 1–5°C. The second treatment involved direct storage in a chiller at 1–5°C without blast chilling.

Organoleptic observations were conducted on days 1, 3, 5, and 7 of storage. The parameters evaluated were color, aroma, texture, and taste. Observations were descriptive and compared sensory changes between blast-chilled and non-blast-chilled chicken rendang. Color was assessed based on visual changes during storage. Aroma was assessed based on spice aroma intensity and the appearance of off-odors. Texture was assessed based on hardness, softness, and structural changes in the product. Taste was assessed based on changes in the characteristic flavor of chicken rendang during storage. The organoleptic data were analyzed descriptively by comparing quality changes between treatments throughout the storage period. The results were presented in table form and interpreted based on changes in color, aroma, texture, and taste at each observation time.

RESULTS AND DISCUSSION

Results

Organoleptic observations of chicken rendang during cold storage showed that blast chilling was more effective in preserving sensory quality than storage in a chiller without rapid cooling. Quality changes were observed in color, aroma, texture, and taste over seven days of storage (Table 1).

No	Storage Day	Treatment	Color	Aroma	Texture	Taste
1	1	-18°C to -20°C	Slightly brownish yellow	Strong spice aroma	Firm	Normal savory taste
	1	0°C to 5°C	Slightly brownish yellow	Strong spice aroma	Firm	Normal savory taste

2	3	-18°C to -20°C	Brownish yellow	Strong spice aroma	Firm	Normal savory taste
	3	0°C to 5°C	Slightly dark/pale yellow	Slight spice aroma	Slightly soft	Slightly sour
3	5	-18°C to -20°C	Bright turmeric yellow	Slight spice aroma	Slightly soft	Slightly savory
	5	0°C to 5°C	Dark turmeric yellow	Rancid	Soft	Sour
4	7	-18°C to -20°C	Slightly pale yellow	Slight rancid odor	Slightly soft	Sour and slightly bitter
	7	0°C to 5°C	Dark yellow	Rancid	Soft and slimy	Sour and bitter

Table 1. Organoleptic observations of chicken rendang during cold storage

Both treatments showed similar sensory characteristics on the first day of storage. The product exhibited a slightly brownish yellow color, strong spice aroma, firm texture due to low storage temperature, and a normal savory taste.

Differences became apparent on the third day of storage. Blast-chilled products maintained relatively stable color, aroma, texture, and taste, whereas products without blast chilling showed darker color, reduced spice aroma, softer texture, and a slightly sour taste. By the fifth day, organoleptic differences became more pronounced. Blast-chilled products still retained relatively bright color and detectable spice aroma. In contrast, products without blast chilling exhibited more obvious color changes, rancid aroma, softer texture, and reduced flavor quality.

On the seventh day, blast-chilled products were still organoleptically acceptable despite some quality decline. Products without blast chilling showed more severe deterioration characterized by stronger rancid odor, soft and slimy texture, and sour and bitter taste.

Overall, organoleptic quality changes during storage occurred more slowly in the blast chilling treatment than in the non-blast chilling treatment.

Discussion

The chicken rendang used in this study was one of the main components of the Nasi Lemak Pak Nasser menu produced by PT Parewa Asian Catering. The production process began with thawing frozen chicken meat until it reached a suitable condition for processing. The chicken was then cut according to the company's standard specifications, followed by washing and draining. The seasoning preparation involved shallots, garlic, red chili peppers, curly red chilies, ginger, galangal, lemongrass, kaffir lime leaves, coconut milk, and other supporting ingredients. The chicken was subsequently cooked with the spices and coconut milk until the characteristic color, aroma, texture, and flavor of rendang were achieved. After cooking, the product underwent a cooling stage before storage. In the blast chilling treatment, chicken rendang was cooled using a blast chiller at temperatures ranging from -18°C to -20°C for approximately 45 minutes before being transferred to a chiller maintained at 1–5°C. In contrast, the non-blast chilling treatment involved direct storage in a chiller at 1–5°C. This difference in cooling methods served as the primary factor evaluated for its influence on organoleptic quality changes during storage. The production process of chicken rendang is illustrated in Figure 1

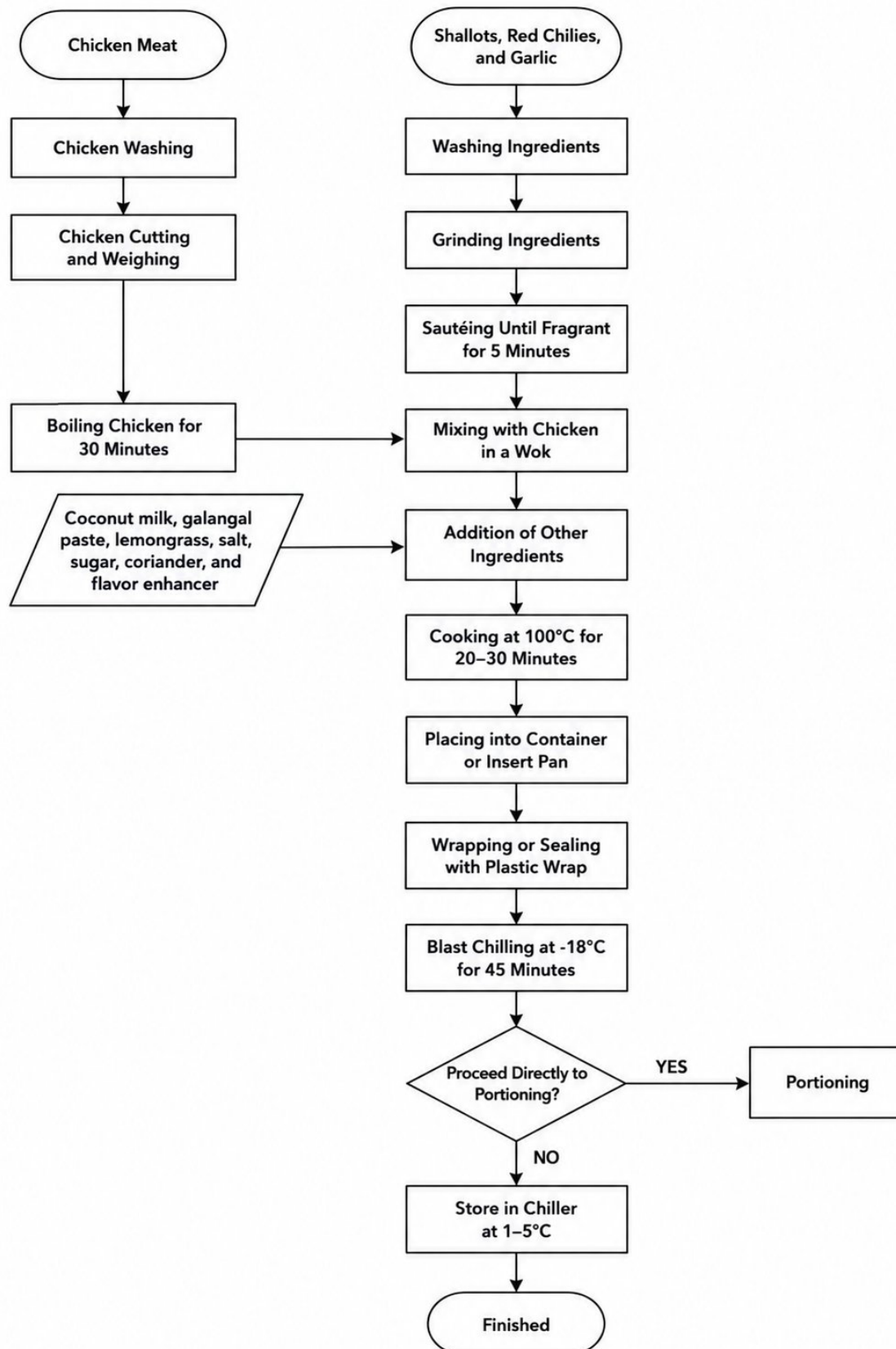


Figure 1 Flowchart of the chicken rendang production process

Rapid cooling through blast chilling enables cooked products to reach safe storage temperatures in a shorter period compared with conventional cooling methods. This process allows the product to pass through the temperature danger zone (5–60°C) more quickly, thereby reducing the risk of microbial growth and quality deterioration during storage. James et al. (2020) reported that rapid cooling is essential in foodservice operations because it minimizes the time food remains at temperatures favorable for microbial proliferation. Furthermore, blast chilling helps maintain product quality by slowing biochemical and oxidative reactions that contribute to quality deterioration. In contrast, products stored directly in a chiller without prior blast chilling experience a slower cooling rate. The gradual reduction in temperature causes the product to remain within the temperature danger zone for a longer period, increasing the likelihood of microbial activity and quality degradation. Slow cooling may also promote moisture migration and structural changes within the food matrix, which can negatively affect texture and overall sensory characteristics during storage. These differences in cooling mechanisms are likely responsible for the variations observed in the organoleptic quality of chicken rendang throughout the storage period.

The cooking process of rendang, which involves coconut milk and a variety of spices, produces complex sensory characteristics. According to Nabila et al. (2023b), the cooking process contributes to the development of the characteristic brownish color through browning reactions, intense spice aroma, and savory flavor that distinguish rendang products. Furthermore, the use of coconut milk contributes to the product's texture and flavor while simultaneously increasing its susceptibility to oxidative deterioration during storage. The results demonstrated that blast chilling was more effective in preserving the organoleptic quality of chicken rendang compared with storage without rapid cooling. This effect was observed in all evaluated parameters, including color, aroma, texture, and taste throughout the seven-day storage period. Changes in color during storage were likely associated with oxidative reactions occurring within the product. Chicken rendang subjected to blast chilling exhibited slower color deterioration than the non-blast chilled treatment. This finding suggests that rapid cooling effectively reduces the rate of reactions responsible for pigment degradation and visual quality deterioration. James et al. (2020) reported that blast chilling accelerates product temperature reduction, thereby minimizing exposure to the temperature danger zone. Consequently, quality deterioration affecting the visual appearance of the product can be delayed during storage.

Aroma changes observed during storage included a gradual reduction in spice aroma intensity and the development of rancid odors, particularly in products stored without blast chilling. These changes were likely associated with lipid oxidation, which produces volatile compounds responsible for off-flavors. Trukhina et al. (2024) reported that rapid cooling can delay sensory deterioration by suppressing oxidative reactions in food products. The development of rancid odors at the end of storage indicates more extensive lipid degradation in products that did not undergo blast chilling. Texture deterioration observed during storage was likely related to structural damage within muscle tissues caused by cooling conditions. Products subjected to blast chilling maintained a more stable texture than those without blast chilling. Rapid cooling promotes the formation of smaller and more uniformly distributed ice crystals, thereby minimizing cellular damage. In contrast, slower cooling allows the formation of larger ice crystals that can disrupt cell membranes and muscle fibers. The differences in ice crystal formation during rapid cooling (blast chilling) are presented in **Figure 2**.



Figure 2 Differences in Chicken Rendang (a. chicken rendang blast chilling, b. chicken rendang chiller)

Mulot et al. (2019) reported that higher cooling rates produce smaller ice crystals, resulting in better preservation of food tissue structure. Similarly, Zhang and Erthberg (2019) found that rapid freezing reduces tissue damage and moisture loss during storage. Reduced structural damage contributes to the maintenance of the desirable texture of chicken rendang during refrigerated storage. Taste changes followed a pattern similar to aroma deterioration. Blast-chilled products retained their characteristic rendang flavor throughout storage, whereas products without blast chilling developed sour and slightly bitter tastes. These changes were likely associated with microbial activity and the formation of degradation compounds derived from lipids and proteins. Mwakosya et al. (2025) stated that the accumulation of microbial metabolites is one of the primary indicators of quality deterioration in meat products.

In addition to maintaining sensory quality, blast chilling also contributes to food safety. Rapid cooling enables products to pass through the temperature danger zone (5–60°C) more quickly, thereby reducing microbial growth. Damayanti et al. (2024) emphasized that temperature control is a critical factor in preventing the proliferation of pathogenic microorganisms in ready-to-eat foods. This finding is consistent with the present study, where blast-chilled chicken rendang maintained superior organoleptic quality throughout seven days of storage. Overall, the results indicate that blast chilling is more effective in preserving the organoleptic quality of chicken rendang during cold storage than conventional chilling without rapid cooling. Blast chilling successfully delayed undesirable changes in color, aroma, texture, and taste, thereby maintaining product quality throughout storage.

CONCLUSION

This study demonstrated that blast chilling was more effective in preserving the organoleptic quality of chicken rendang during cold storage compared with storage without rapid cooling. Blast-chilled chicken rendang exhibited slower changes in color, aroma, texture, and taste throughout the seven-day storage period. In contrast, products stored without blast chilling experienced more rapid quality deterioration, characterized by rancid odors, softer and slimier textures, and the development of sour and bitter flavors. The effectiveness of blast chilling in maintaining product quality is likely associated with its ability to rapidly reduce product temperature, thereby inhibiting microbial growth, slowing oxidative reactions, and minimizing tissue damage caused by ice crystal formation. Therefore, blast chilling can be considered an effective method for maintaining the quality and safety of chicken rendang during cold storage in the airline catering industry. Further studies are recommended to evaluate the microbiological and physicochemical characteristics of chicken rendang during longer storage periods.

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