

## THE APPLICATION OF HACCP SYSTEM ON THE CHICKEN *RENDANG* MENU FOR VA-44 AIRLINE AT AF. Ltd

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### ABSTRACT

AF Ltd. is one of the companies engaged in providing food and beverages in fresh conditions for airlines. This company has ISO 22000:2005 and ISO 9001:2015 certificates and applies HACCP (Hazard Analysis Critical Control Point). *Chicken Rendang* is one of the menus served for VA-44 airline. This menu is made from boneless chicken meat. This menu is served with steamed rice, yellow pickles and fried shallots. *Chicken Rendang* is produced and packaged with full consideration of food safety, so it would not be damaged and is safe for consumption despite a long flight distance. HACCP system at AF Ltd. for the *Chicken Rendang* product for the VA-44 airline has been implemented properly starting from receiving raw materials, storage (storage freezer), cooking, blast chilling, to portioning. The *Chicken Rendang* menu for the VA-44 airline is suitable for consumption, because the production process is still below the critical limit of each CCP that has been set by AF Ltd. Bali.

### 1. INTRODUCTION

Product quality is an important factor as well as a determining factor in creating customer satisfaction. According to Hidayat<sup>[1]</sup> product quality is a form of product with a complex satisfaction value. With good product quality, the desires and needs of consumers for a product will definitely be fulfilled. If the quality of the product received is higher than expected, then the perceived quality of the product will surely be even better.

In order to determine the quality of a product, a quality assurance concept specifically was applied to food known as HACCP (Hazard Analysis Critical Control Points). The HACCP system is a food safety management system. The emergence of the HACCP concept, started from the increasing awareness of consumers about health, which gave rise to demands for guarantees of safety and quality of food and food consumed. HACCP application is generally carried out by critical control analysis on the process of receiving raw materials, the production process, up to storage before the product is marketed.<sup>[2],[3]</sup>

Along with the increasing number of users of aviation services, the demand for providing food for airlines is also increasing. Food service services for airlines are generally known as in-flight catering. In-flight catering, in this case, of course, plays an important role in

providing good food and according to the needs of consumers on the plane and because of this, this business has become one of the interesting industries yet is quite complex in its operating system.<sup>[4],[5]</sup>

AF Ltd. is one of the companies providing food and beverages in fresh conditions for various airlines. This company has been certified with ISO 22000:2005 and ISO 9001:2015. It also applies HACCP (Hazard Analysis Critical Control Point) to maintain the quality of their products. In order to take care of the consumers' trust, AF Ltd. has implemented a strict system in its production process so that the quality of the products produced can be well maintained. AF Ltd. applies CCP (Critical Control Point) in every production process, starting from receiving raw materials, the production process to the final product. The CCP set by AF Ltd. includes CCP 1 (Receiving), CCP 2 (Storage, Cold room storage), CCP 3 (Hot Kitchen), CCP 4 (Blast Chiller), CCP 5 (Dishing/Portion/Meal Tray Set-Up).<sup>[6]</sup>

*Chicken Rendang* is one of the menus served for VA-44 airline. This menu is made from boneless chicken meat. This menu is served with steamed rice, yellow pickles and fried shallots. *Chicken Rendang* is produced and packaged with full consideration of food safety, so it would not be damaged and is safe for consumption despite a long flight distance. According to Angelillo *et al.*<sup>[7]</sup> in-flight food that has been contaminated with

microbes can cause Foodborne Diseases or food poisoning, which can cause illness for people who consume it. Foodborne Diseases are caused by pathogenic bacteria, viruses, and fungi that contaminate the food. This causes the need for a food quality control system at AF Ltd. Therefore, a review was carried out on the application of the HACCP system in the processing of this menu.

## 2. METHOD

### 2.1. Raw Materials Collection

Raw materials collection is the earliest step in the food production process at AF Ltd. Bali. At this stage, the goods entered through a purchasing request from the storage department and kitchen department which was finally then submitted to the purchasing department. Purchasing Department then made purchasing orders for distributors. Ordered goods were then delivered according to the date and the amount of arrival which had been determined earlier.

In the next stage, Quality Control officers played their significant roles. Their tasks were checking the incoming raw materials in terms of the quality and quantity of the ones to be received, weighing them, sorting them, recording their date of receipt and expiry date, recording their temperature as well as labeling each raw material. Generally, goods were delivered every Monday-Saturday. However, at certain times there were some raw materials that were sent on Sundays and Quality Control officers were in charge of receiving these raw materials.<sup>[6]</sup>

### 2.2. Raw Material Storage

Raw materials that meet the standards were then brought to the store which is a temporary storage place for production materials. Raw material storage consists of 3 (three) rooms, namely freezer (temperature  $\leq -18^{\circ}\text{C}$ ), chiller (chiller, temperature  $0^{\circ}\text{C} - 5^{\circ}\text{C}$ ), and dry store (dry goods storage room, temperature  $22^{\circ}\text{C} - 25^{\circ}\text{C}$ ). The quality and quality of raw materials must be highly maintained, therefore AF Ltd. applies the FIFO (First In First Out) system, which means that the first item that

enters the storage room was removed or used first. The FIFO system is generally used for goods that are less durable or if stored for a long time it would be damaged.<sup>[8],[9]</sup>

### 2.3 Thawing

Thawing is the process of defrosting frozen food such as meat and fish. It is very important to maintain the quality and taste of the food ingredient. This process was not included in the CCP, but it was included in the Operational Prerequisite Program (OPRP). The stages of thawing chicken meat were carried out in the poultry room. This process was carried out properly so that the growth of pathogenic bacteria such as *Salmonella*, *E.coli*, *Listeria monocytogenes* and *Staphylococcus aureus* could be controlled.

### 2.3. Cooking

Kitchen is a special room that is designated as a place to cook food. The hot kitchen room is part of it used to make hot dishes such as main courses through the cooking process. The kind of cooking process are frying, roasting, boiling, steaming, and grilling.<sup>[10]</sup>

## 3. Blast Chiller

Food that is put into the blast chiller will maintain its freshness by storing it at a sufficient and stable temperature so that the food will not go stale easily. Not only the freshness of the food will be guaranteed, but also the color and taste that are not much different after the food is cooked, so that the quality of the food is maintained.

## 4. Dishing/Portioning/Meal Tray Set Up

Before the Chicken *Rendang* was divided into certain portions, it was sorted first to reduce the risk of contamination both physically and biologically. It aimed to check and to remove foreign objects (hair, caterpillars, insects, plastic, etc.) in the food. The sorting process was usually carried out by the Quality Control staff.

The flow chart of the chicken *rendang* production process can be seen in the figure below.

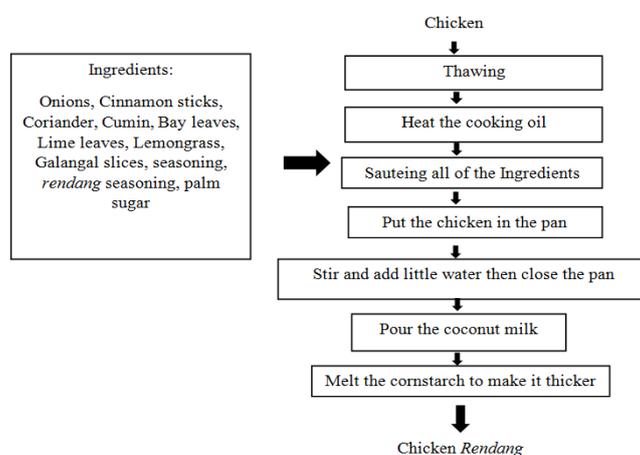


Figure 1: Flowchart of Chicken *Rendang* Processing.

### 3 RESULT AND DISCUSSION

#### 3.1 Raw materials collection

The raw materials received must meet the standards set by AF Ltd. The types of raw materials received were chilled products, frozen products, dry good raw materials, fresh raw materials and so on. The types of raw materials included in CCP 1 were chiller and frozen.

Chicken received at AF Ltd. was in frozen form. The raw material for chicken meat received in the collection section and the number of goods arriving were matched with the list prepared by the company so that the raw materials did not accumulate in the storage section. The incoming raw materials was labeled on the chicken meat packaging. The purpose of giving the label was to know when the raw material was received. The following is the CCP 1 for chicken meat at AF Ltd. listed in Table 1.

**Table 1: CCP 1 (Collection) Critical and Actual Limits of Chicken Meat.**

Stages	Thread types	Critical Limit/ Specification	Actual	Notes
CCP 1 (collection stage) collection of Chicken Meat (Raw Materials) (Frozen)	Biological: The growth of pathogenic microbes in food which is potentially hazardous.	Collection temperature $< -8^{\circ}\text{C}$ .	The temperature of raw materials during the collection stage when checked: $-13.1^{\circ}\text{C}$ .	Based on CCP 1 (collection stage) Critical and Actual Limit of Chicken Meat at AF Ltd. was appropriate and acceptable.
		No sign of previous thawing	No sign of previous thawing	
		<i>Vacuum, No Expired, No Damage</i>	<i>Vacuum, No Expired, No Damage</i>	
		<i>Flesh Colour Red</i>	<i>Flesh Colour Red</i>	

Source: AF Ltd. (2018)

The collection of raw chicken meat must be considered very carefully. The standard temperature of the chicken meat was  $-8^{\circ}\text{C}$  and there was no sign of previous thawing. The materials received was placed in a basket provided by AF Ltd. based on the type of the goods. The use of baskets was classified with different colors according to the type of goods, namely: (1) yellow for meat-based products; (2) green color for types of fruit and vegetable products; (3) red color for types of pastry and bakery products; (4) blue color for the type of goods in the hot dishing section; (5) the color of the basket is black for the type of goods in the equipment section. The baskets were then arranged on pallets that had been provided to facilitate the transportation of goods into storage.

The use of these pallets aimed to facilitate the transportation of raw materials and to minimize contamination of the product. In the storage room, all employees must wear special clothes; in addition, they must also wear the harness properly and wear shoes (safety shoes). Wearing accessories while working was also prohibited. The temperature of the storage room was checked every 4 hours by the Quality Control staff.

The raw materials included in CCP 2 were only chillers and freezers. Chicken received at the collection stage was stored in a freezer with a temperature of  $-18^{\circ}\text{C}$ . The following is CCP 2 for Chicken Meat at AF Ltd. listed in Table 2.

#### 3.2 Raw Material Storage

Raw materials which were to be loaded into the storage room were transported using trolleys lined with pallets.

**Table 2: CCP 2 (Storage) Critical and Actual Limits of Chicken Meat.**

Stages	Thread types	Critical Limit/ Specification	Actual	Notes
CCP 2 (storage) chicken meat	Biological: The growth of pathogenic microbes in food which is potentially hazardous.	<i>freezer</i> temperature: $-18^{\circ}\text{C}$	<i>freezer</i> temperature when checked: $-18,3^{\circ}\text{C}$	Based on CCP 2 (Storage) Critical and Actual Limit of the chicken meat at AF Ltd. was appropriate and acceptable.

Source : AF Ltd. (2018)

#### 3.3 Thawing

The thawing process can be carried out by three methods, namely Refrigerator/Thawing box, running water and room temperature. Thawing in the

refrigerator/thawing box uses a thawing room with a temperature of  $10^{\circ}\text{C}$ . In addition, the other way of thawing is using running water which has to be monitored every 2 hours from the start of the process to

completion. The temperature of the flowing water is 21°C with the condition of the tightly closed packaging and the final surface temperature of the product is < 8°C. Furthermore, thawing using room temperature is monitored every 6 hours from the start of the thawing process to completion; the room temperature used is < 21°C and the final product surface temperature is < 8°C.

Thawing on chicken meat for chicken *rendang* menu used the Refrigerator/Thawing box method. The actual result obtained at the thawing room temperature was 8.9°C, these results has already met the standards that had been determined in the thawing room, which was 10°C.

### 3.4 Cooking

Cooking was done in the hot kitchen according to the request of each airline, such as the VA airline for the

Chicken *Rendang* menu. During the processing, there was a critical temperature limit that was checked by the QC staff, measurements of the product were carried out at the end of each cooking by measuring the product temperature. Each menu has a critical limit for cooking temperatures that varied depending on the type of raw and processed ingredients, such as the Chicken *Rendang* menu, which has a minimum critical cooking temperature of 74oC. The cooking time for chicken *rendang* was done for about 30 minutes until the texture of the meat was soft, so that the cooking temperature of the meat was reached automatically.

The following is CCP 3 on the Chicken *Rendang* menu at AF Ltd. listed in the following Table 3.

**Table 3: CCP 3 (Cooking) Critical and Actual Limits on the Chicken *Rendang* menu.**

Stages	Thread types	Critical Limit/ Specification	Actual	Notes
CCP 3 (Cooking) Chicken <i>Rendang</i>	Biological: The growth of pathogenic microbes in food which is potentially hazardous.	Minimum cooking temperature of chicken pieces was 74°C.	The temperature of Chicken <i>Rendang</i> when checked was 75.1°C.	Based on CCP 3 (Storage) Critical and Actual Limit of the chicken meat at AF Ltd. was appropriate and acceptable.

Source: AF Ltd. (2018)

CCP 3 examination was done by checking the core temperature of the food using a thermometer stick. If the final cooking temperature did not reach the set temperature, the food would be re-cooked until it reached the set temperature. Quality Control in the hot kitchen was in charge of labeling cooked food and checking the temperature of the food.

### 3.5 Blast Chiller

The cooked chicken *rendang* is then put into the blast chiller. Blast chiller is a food cooling device by using cold air and direct contact with food quickly. In the blast chiller, the temperature of the food is lowered to a

temperature of 5°C - 10°C within a maximum of 4 hours. This blast chiller is included in CCP 4.

Storage in the blast chiller used trolleys and trays that had been labeled with production according to the processing date. Checking the temperature on the blast chiller was done to determine the condition of the food using a thermometer stick. The food that had been processed and had been put into the blast chiller, if it has not been used, can be stored in the chiller at a temperature of 0-5°C with a maximum time limit of 3 days.<sup>[11]</sup> Here is the CCP 4 on the Chicken *Rendang* menu at AF Ltd. listed in the following Table 4.

**Table 4: CCP 4 (Blast Chiller) Critical and Actual Limits on the Chicken *Rendang* menu.**

Stages	Thread types	Critical Limit/ Specification	Actual	Notes
CCP 4 (Blast Chiller) Chicken <i>Rendang</i>	Biological: The growth of pathogenic microbes in food which is potentially hazardous.	The food temperature was lowered from 60oC to 5°C -10°C in a maximum of 4 hours.	At the time of checking the blast chiller, the cooking temperature was completed at 75.1°C. after being put into the blast chiller, the temperature of the chicken <i>rendang</i> drops to 6.4°C within 3 hours. Time in 12.00 pm and time out 3.00 pm (Middle Indonesia Time)	Based on CCP 4 (Storage) Critical and Actual Limit of the chicken meat at AF Ltd. is appropriate and acceptable.

Source: AF Ltd. (2018)

### 3.6 Dishing/Portioning/Meal Tray Set Up

Hot dishing is a place to arrange and portion dishes that have been cooked in the hot kitchen. Monitoring on hot dishing was done by checking the room temperature, product surface temperature and portioning time in accordance with CCP 5. The task of QC in hot dishing was to record the food menu on the food quality checklist form by weighing the food and determining the surface temperature of the product, filling out the hot dishing performance form, and CCP 5 verification report form.

In the hot dishing section, the food that had been cooked and put into the chiller was arranged or dished according to the specifications agreed by AF Ltd. With the airlines. The portioning begins with the presentation of the golden sample which was used as a standard so that workers can serve food according to the specifications of the menu, both in terms of quantity and appearance in its presentation.

The following is a CCP 5 on the Chicken *Rendang* menu at AF Ltd. listed in table below.

**Table 5: CCP 5 (Dishing/Portioning/Meal Tray Set Up) Critical and Actual Limits on the Chicken *Rendang* menu.**

Stages	Thread types	Critical Limit/ Specification	Actual	Notes
CCP 5 (Dishing/ Portioning/Meal Tray Set Up) Chicken <i>Rendang</i>	Biological: The growth of pathogenic microbes in food which is potentially hazardous.	Room Temperature 15°C-21°C	Room Temperature: 22°C	there are some findings that are not appropriate based on CCP 5 (Dishing/ Portioning/ Meal Tray Set Up) Critical and Actual Limits on the Chicken <i>Rendang</i> menu at AF Ltd.; however they are still acceptable.
		Portioning at most takes 45 minutes	Portioning took 40 minutes	
		Maximum food surface temperature 15°C	food surface temperature: 13°C	

source: AF Ltd. (2018)

The actual results obtained for the hot dishing room temperature were not in accordance with the critical limit that had been determined. The actual results obtained showed that the hot dishing room temperature exceeded the standard, which was 22°C, which should be around 15°C to 21°C. However, even though the hot dishing room temperature was high it did not affect the surface temperature of the food. The surface temperature of the

food was in accordance with the critical limit that had been set, which was 13°C. Thus, Chicken *Rendang* at the time of portioning was still safe for consumption. The cause of high room temperature was because of damage on the compressor. The solution for this was to send a WO (Who Order) to the Engineering department to solve this matter. Chicken *Rendang* packaging can be seen in Figure 2.



**Figure 2: Chicken *Rendang* Packaging.**

Meal Tray Set Up (MTSU) is the last stage in the food processing process. It is included in CCP 5. This is a place to arrange all food from appetizer, main course, dessert, bread, drinks and equipment to each flight into the tray. Meals are arranged according to the Airline Meal Order Set (AMOS). AMOS is a guide and

information about the food menu, the number of orders from each airline.

After the food is put into the tray, the tray is then put into a trolley which is then put into the holding room for at least 3 hours before being sent to the plane so that the

temperature of the food is maintained. The holding room is where the last food is refrigerated before being distributed onto the plane.

### 3.7 Quality Control in the Laboratory

Food processing companies must ensure the quality of their products so that they are fit and safe for consumption by consumers. Food safety, according to Government Regulation of the Republic of Indonesia Number 28 of 2004 concerning safety, explains that food quality and nutrition are conditions and efforts needed to prevent food from being contaminated with biological, chemical and other objects that can interfere, harm, and endanger the consumers' health.<sup>[12]</sup>

One of the activities carried out by AF Ltd. before the food was sent on board was quality control in the laboratory. According to Widaningrum and Winarti<sup>[13]</sup>, aspects of food quality and safety are the main problems in production. Therefore, Gustiani<sup>[14]</sup> added, proper processing can suppress microbial growth. Furthermore, Perdana<sup>[15]</sup> states that the catering industry, including in-flight catering, has a high risk of disease transmission through food if the food is not handled properly.

The purpose of quality control is to ensure that the product is safe from microbial contamination that can harm consumers and the company. According to Angelillo *et al.*<sup>[7]</sup> aviation food that has been contaminated with microbes can cause food borne diseases or food poisoning, which can cause illness for people who consume them<sup>[16]</sup>. The standard microbiological parameters for processed meat can be seen in Table 6.

**Table 6: Microbiological Parameter Standard of Processed Meat.**

Mikrobiological Test (unit)	Quality Standard
TPC (colony/g)	10 <sup>6</sup>
<i>Enterobacteriaceae</i> (colony/g)	10 <sup>2</sup>
<i>Salmonella</i>	Negative/25g
<i>Staphylococcus aureus</i>	2x10 <sup>2</sup> colony/g
<i>Listeria monocytogenes</i>	Negative/25g

Source: AF Ltd. (2018)

In addition to conducting internal testing, AF Ltd. also conduct external testing at the Provincial Public Health Office. Usually, routine internal testing is carried out every day and testing is carried out on 20 samples taken at random, while routine external testing is carried out once a month and external testing is carried out on 10 samples taken at random. The parameters tested were the *E. coli*, *Staphylococcus aureus*, *Salmonella*, *Shigella*, and *Vibrio Collera* *gms*.

### 4. CONCLUSION

HACCP system at AF Ltd. for the Chicken *Rendang* product for the VA-44 airline has been implemented properly starting from receiving raw materials, storage

(storage freezer), cooking, blast chilling, to portioning. The Chicken *Rendang* menu for the airline VA-44 is suitable for consumption, because the processing process is still below the critical limit of each CCP that has been set by AF Ltd. Bali. It takes upkeep and prevention of contamination in every process of the Chicken *Rendang* menu production with the aim that the food consumed by consumers is safe from contamination.

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