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To develop and implement a quality assurance system based on Hazard Analysis Critical Control Points (HACCP) to a cook-freeze operation: Research project

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EDITH COWAN UNIVERSITY
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FOOD SCIENCE & NUTRITION PROGRAM

TO DEVELOP AND IMPLEMENT A QUALITY ASSURANCE SYSTEM BASED ON HAZARD ANALYSIS CRITICAL CONTROL POINTS (HACCP) TO A 'COOK-FREEZE' OPERATION

RESEARCH PROJECT

BY: DENISA BACA

1998

BSc(Hons)

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ABSTRACT

The purpose of this study was to identify and develop a suitable quality assurance system based on Hazard Analysis Critical Control Points (HACCP), which was implemented to the 'cook-freeze' operation, currently employed at Healthcare Foods. In addition, the quality assurance system was implemented as a systematic approach to food quality, and as a means of ensuring food safety.

The samples, which consisted of all the chicken dishes, were used in the development of the HACCP plans comprising of flowcharts and HACCP control charts. These dishes are regarded as 'high risk', in terms of microbiological growth, and therefore, were chosen to be monitored.

The research was conducted in the following way: I) the chicken recipes were reviewed; II) the ingredients required for each chicken recipe were listed; III) all the procedures employed in the production of each chicken dish were analysed; and IV) the personnel responsible for each particular operation were observed and informally interviewed.

The information collected throughout the conduct of the study provided the groundwork for the development of a flowchart and HACCP control chart for each chicken dish. The study shows that certain areas within the 'cook-freeze' operation need improving or changing. Therefore, a number of recommendations have been put forward.

CONTENTS PAGE

LIST OF FIGURES PAGE

LIST OF TABLES PAGE

1.0 INTRODUCTION

This project examined and allowed for the development of a suitable quality assurance system based on Hazard Analysis Critical Control Points (HACCP), which was incorporated to the 'cook-freeze' operation, currently employed at Healthcare Foods.

The project was suggested by Dr. Ajay Shah (Senior Lecturer in Food Science & Technology at Edith Cowan University) and Cheryl Shellabear (sessional lecturer at Edith Cowan University) in collaboration with the clients Mr. Ivor Langford (General Manager at Healthcare Foods) and Mr. John Hague (Marketing and Quality Control Officer at Healthcare Foods).

The analysis and development of a suitable quality assurance system for a 'cook-freeze' operation can be very valuable and beneficial to the clients. By incorporating a quality assurance system based on HACCP to food production, a systematic approach to food quality control can be adapted, which in turn can be used as a means of ensuring food safety.

Healthcare Foods is located in the centre of Sir Charles Gairdner Hospital, and produces nearly 200 dishes for various organisations. The company was formed in order to prepare premium quality nutritious dishes for Sir Charles Gairdner Hospital, Canningvale Prison, Royal Australian Air Force (R.A.A.F.), Law Courts, Wanneroo Shire and other hospitals, and various other organisations. Thus, the meals produced can be individually tailored, in terms of portion sizes and packaging, to suit the needs of the various organisations.

Healthcare Foods uses a 'cook-freeze' technique, thus using carbon dioxide as the cryogenic agent to freeze the numerous dishes. The 'cook-freeze' technique prepares dishes, which can be stored for up to 12 months without any change to the quality and sensory characteristics of the food. Hence, this technique is more efficient and economical as opposed to other techniques such as 'cook-chill' or traditional methods of cooking.

The standard of dishes prepared by Healthcare Foods demands strict supervision, in that, the meals must be of the highest quality and safety. A food poisoning outbreak, which can occur as a result of negligent food handling can be very costly in terms of damage claims, and may be responsible for the death of a person consuming the prepared meal.

Therefore, there was a need to develop a quality system based on HACCP to ensure food quality and safety. By developing HACCP flowcharts, which map the exact steps that a meal takes during its production, and HACCP control charts, which identify possible hazards and Critical Control Points (CCP's) in a process, dishes of consistently high quality and safety can be produced.

In order to develop a successful Quality System based on HACCP, it is necessary to conduct a thorough literature review.

2.0 LITERATURE REVIEW

2.1 Food Quality, Safety and Hygiene

In order to discuss food quality, food safety and food hygiene, the terms must firstly be defined to provide a better understanding.

2.1.1 Definition of Food Quality

Food quality may be defined as a measurement of food against a standard regarded as excellent. Quality can be measured in terms of the senses, such as taste and smell, chemical composition, physical properties and the microbial flora (Hayes, 1992, p. 313). Food quality can also be defined as the characteristics that differentiate between foods, and that which determines the degree of acceptability of that food (Marriott, 1994, p. 361-362). Food quality is very important in total customer satisfaction.

Food quality, such as at Healthcare Foods, can be accomplished by implementing a successful quality assurance system. Full control over all aspects of meal preparation and meal serving must be achieved in order to maintain the consistency of food quality (Hayes, 1992, p. 314). As pointed out by Skulberg (1986, p. 286), it is simply not enough, in terms of food quality, to just inspect and examine the finished product. Hence, it is impossible to 'put' the right quality into a product by inspection and examination.

2.1.2 Definition of Food Safety

Food safety is the procedure carried out to maintain "safe food". Safe food is one that presents the minimum risk of illness to the consumer, whether from pathogenic

microorganisms, toxins, chemical residues or injuries to foreign material. Illnesses caused by microorganisms by far exceed those caused by the other risks mentioned. For this reason, it is important to place emphasis on reducing the hazards caused by unwanted pathogens, including those able to produce toxins, in order to maintain safe food (Shapton & Shapton, 1991, p. 21).

The Environmental Health Guide to Food Safety (1994) lists some safe food handling practices, which can be adapted by any food premises. The Guide to Food Safety includes:

- Thoroughly washing hands with soap and warm water before: handling food, after going to the toilet, handling rubbish, touching hair or other parts of body, cleaning equipment, and between handling raw and cooked foods.
- Never storing foods in the Temperature Danger Zone (5-60 ^{0}C).
- Always keeping hot foods HOT and cold foods COLD.
- Always ensuring that equipment and premises are maintained in clean and hygienic conditions.
- Always ensuring that raw foods are kept separate from cooked foods to avoid cross contamination.

2.1.3 Definition of Food Hygiene

Food hygiene is similar to food safety. Food hygiene can be defined as the action taken to ensure that food is handled, stored, prepared and served in such a way, and under such conditions, as to prevent any contamination of the food (Donaldson, 1993, p. 8).

Sprenger (1991, p.5) states that food hygiene is not only cleanliness, it also includes practices such as:

- Protecting food from harmful bacteria, poisons and foreign bodies.
- Preventing any bacteria, present in food, from multiplying to a level where spoilage of food can occur or worse, a consumer can become ill.
- Destroying any harmful bacteria in food by adequate cooking and processing.

Poor food hygiene can result in: food poisoning outbreaks, food contamination, pest infestation, waste of food due to spoilage, closure of food premises, fines and legal costs, civil action taken by food poisoning sufferers, loss of production, or decontamination cleaning and replacement of equipment. Hence, the highest standards of food hygiene should be observed (Sprenger, 1991, p. 5).

2.2 Cook-freeze System for Meal Production

2.2.1 What is a Cook-freeze System for Meal Production?

Cook-freeze system for meal production is a type of system whereby meals are prepared in advance and stored frozen until required at a later date (Cook-chill and cook-freeze, n.d.). In this type of catering system, meals are prepared using traditional methods of cooking, they are then portioned, packaged and rapidly frozen in a blast freezer (Robinson, 1985, p. 235). The meals must be frozen to the correct temperature in the correct time, as this plays an important role in determining the overall quality, appearance and nutritive value of the meals (Cook-chill and cook-freeze, n.d.).

The cook-freeze system can be broken down into seven stages: incoming storage, preparation, cooking, portioning and packaging, blast freezing, storage, and distribution (Cook-chill and cook-freeze, n.d.).

The first stage within a cook-freeze operation involves the storage of ingredients. Foods can be delivered frozen, refrigerated, or dry and must be kept under the same conditions until required for preparation. The next stage, which is the preparation of ingredients, involves portioning and weighing. The preparation area of a cook-freeze system is similar to a traditional cooking operation and must be suitably partitioned, so there is a distinct separation between raw and cooked foods, meat and vegetables, and clean and used utensils. Strict hygiene practices must always be observed. The third stage involves cooking of the food using suitable continuous batch-type equipment, as this greatly reduces capital and energy costs. Portioning and packaging follows the cooking stage. The efficiency of the cook-freeze system greatly depends on the type of packaging used. Different types of packaging containers can be use such as aluminium, paper or plastic. The container size can also vary and range from individual dishes to complete meals or single to multi-portion packs. However, the length of freezing will be greatly influenced by the depth of the container, hence, the depth must not exceed 50mm. The portioned and packaged meals are than blast frozen rapidly reducing the temperature to -20°C within 90 minutes and transferred to a freezer store where they are kept at -20°C until they are ready for distribution. During distribution the correct temperature must be maintained to ensure that the meals are kept frozen (Cook-chill and cook-freeze, n.d.).

2.2.2 Advantages of Using a Cook-freeze System

The main advantage associated with using a cook-freeze system, in the catering industry, is its preservative effect on food. This is due to the fact that freezing greatly retards the growth of many microorganisms. Cook-frozen meals can be safely stored for up to 12 months with only minimal changes to the sensory characteristics of the food (McWilliams, 1989, p. 512-513).

In addition, the cook-freeze operation is the most convenient of all catering systems employed by the food industry, in that, it separates the cooking operation from the serving operation, hence, utilises the division of labour. This greatly reduces working pressures on staff, since the Central Production Unit is only concerned with the preparation, portioning, packaging and freezing of the meals, thus, leaving the re-heating and serving of the meals up to the satellite kitchens (Robinson, 1985, p. 243).

Furthermore, a cook-freeze operation utilises larger quantities of food, which reduces the purchasing costs, less equipment is generally required, meals can be planned months in advance, energy savings are achieved and the system ensures uniformity in the standard of meals prepared (Cook-chill and cook-freeze, n.d.).

2.2.3 Risks Associated with Using a Cook-freeze System

The cook-freeze system is regarded as safe and free from microbiological hazards, providing the operation is controlled by a Quality Assurance System such as HACCP. By employing correct hygiene procedures and ensuring that the temperature of the cooked food is reduced to below –5°C within 90 minutes of entering the freezer and that the food is frozen to at least –18°C and stored at that temperature until adequately

re-heated and immediately consumed will not give rise to any microbiological contamination (Wilkinson, Dart & Hadlington, 1991, p. 222-224).

2.3 Quality Assurance

2.3.1 Definition of Quality Assurance

Quality assurance can be defined as the prevention of quality defects and safety hazards, such as microbiological, chemical and physical contamination, at every stage of food production (Mallet, 1993, p. 94). Quality assurance also deals with the design of machinery, process line layout, packaging, storage and distribution as well as retailing of the product (Hayes, 1992, p. 312-113). Hence, quality assurance can be further defined as the inspection and management of all the factors that affect quality, and if properly implemented within a company, may make the whole process of food production much more efficient and economical (Skulberg, 1986, p. 288). In comparison to quality control, which focuses on the detection of failure, quality assurance focuses on the prevention of failure (Christian, 1994, p. 81).

Quality assurance can be introduced into a company in three phases. Phase one, involves the introduction of the quality assurance system concept, such as HACCP. Phase two, looks at the implementation of the system and the accomplishment of required tasks. Finally, the third phase involves evaluation and further development of the system, if it is needed. This phase also requires constant reassessment, renewal and revision of the system, as it is a continuous process and one that needs to be changed according to the needs of the company (Skulberg, 1986, p. 289).

2.3.2 Importance of Quality Assurance

Without a competent quality assurance system within a company, the sum of negative quality costs can grow. These can include the following: 1) fault and defect costs; 2) costs associated with investigating complaints; 3) legal costs, such as compensation for food poisoning or food borne diseases. It is important to increase positive quality costs, since they eliminate negative quality costs. Positive quality costs involve: 1) cost of preventive measures; 2) cost of control and inspection. Therefore, when positive costs are increased, the total costs are decreased, since there are less negative costs. This is an optimum situation for a company (Skulberg, 1986, p. 289).

2.4 Food Hazards

2.4.1 What is a Food Hazard?

A food hazard can be regarded as anything present in a particular food that can cause harm to a consumer through injury or illness. There are a number of different types of food hazards. These can be grouped as biological hazards, chemical hazards or physical hazards. Therefore, a food hazard can be further defined as a biological, chemical or physical characteristic of a food that can make it unsafe for human consumption (Mortimore & Wallace, 1994, p. 35). Hence, it is necessary to control these food hazards in order to avoid food contamination. By thoroughly inspecting food at all stages of food production, from raw materials to distribution and by following standards, these hazards can be minimised (Pierson & Corlett, 1992, p. 26).

2.4.2 Biological Hazards

A biological hazard can be either macrobiological, such as the presence of flies or insects or microbiological, such as the presence of bacteria. The macrobiological

hazards are rarely a threat to food safety. They mostly spoil appearance, as they tend to be unpleasant and repulsive if found. However, there are exceptions, such as contamination of food by poisonous insects or the risk of cross-contamination from the pests to the food (Mortimore & Wallace, 1993, p. 36).

On the other hand, microbiological hazards are considered to pose more threat to food safety. These hazards can be further divided into bacterial, viral and parasitic hazards. Bacterial hazards, which can result in foodborne diseases or illnesses, are caused by many different types of bacteria including *Clostridium botulinum, Listeria monocytogenes, Salmonella, Staphylococcus aureus* or *Clostridium perfringens.* Viral hazards are caused by viruses, which are tiny particles unable to be seen under the microscope and can include Hepatitis A virus, Norwalk virus or Rotavirus. Viruses can be transmitted to foods by the faecal-oral route. Parasitic hazards can be caused by protozoa, nematodes (roundworms), cestodes (tapeworms), and trematodes (flukes). Parasites can also be transmitted to the food by the faecal-oral route (Pierson & Corlett, 1992, p. 8-18).

2.4.3 Chemical Hazards

Chemical hazards can be caused by naturally occurring chemicals, such as mycotoxins, mushroom toxins and shellfish toxins, or by added chemicals, such as pesticides, toxin elements & compounds, and food additives. Naturally occurring toxins include a wide variety of toxins, primarily of plant, animal and microbiological origin. On the other hand, added chemicals include those that are added to foods at some stage during growing, harvesting, processing, storage and distribution. These are not considered hazardous. However, if these chemicals are improperly used or

used in larger than permitted quantities, then they may be considered a food hazard (Pierson & Corlett, 1992, p. 21-25).

2.4.4 Physical Hazards

Physical hazards can be described as foreign matter or objects, which can cause harm or illness to an individual (Pierson & Corlett, 1992, p. 25). Like biological and chemical hazards, physical hazards can be introduced into food at any stage of production (Mortimore & Wallace, 1994, p. 47). Foreign matter or objects, which can contaminate food, include glass fragments, metal, stones, wood and plastic. The presence of foreign matter or objects in food can have very serious consequences on the health of an individual. Physical hazards can cause cuts, bleeding, infection, choking and broken teeth (Pierson & Corlett, 1992, p. 27).

2.4.5 State of Food Regarding Pathogens and Common Food Poisoning Organisms

2.4.5.1 Foods of Plant Origin

Fresh fruit and vegetables do not significantly support the growth of pathogens and food poisoning organisms. Foods such as cereals and dried foods have also not presented any problems. However, problems with plant foods do arise, during post-cooking and handling, when foods of this nature can be contaminated by infected food handlers or through cross-contamination from other foods (Murrell, 1986, p. 323-324).

2.4.5.2 Foods of Animal Origin

Foods of animal origin are the major concern and cause of microbiological hazards. The outbreaks of food poisoning and food borne diseases caused by foods of animal origin cost the animal industry large amounts of money annually. Organisms of major concern include *Salmonella*, usually associated with meat, poultry and its products, and dried milk. *Clostridium botulinum* is usually associated with meat and its products, cheese and seafood. *Clostridium perfringens* on the other hand, is usually associated with meat and its products. *Staphylococcus aureus* is usually associated with meat and its products, and milk and its products. *Escherichia coli* is usually associated with milk products, whereas *Vibrio parahaemolyticus* is usually associated with seafood, and *Bacillus cerus*, is usually associated with cooked rice and milk products (Murrell, 1986, p. 366- 367).

2.4.5.3 Other Types of Foods

Foods such as soft drinks, acid foods, alcoholic beverages, syrups and confectionery do not normally support the growth of microorganisms and generally do not lead to hazardous situations, such as food poisoning or food borne diseases (Murrell, 1986, p. 324).

2.4.6 Degree of Contamination

The degree to which foods are contaminated depends on the nature of the food. Most raw meat, animal products and processed animal foods are contaminated to an extent and may be contaminated to quite high levels with many of the organisms found in foods of animal origin, mentioned previously. Acceptable levels of food poisoning organisms are found in instant dried milk, dates and figs, desiccated coconut, frozen

dessert pies, drinking chocolate powder, skimmed milk powder, chocolate bars, refrigerated dips and dairy custard (Murrell, 1986, p. 367).

Data collected from microbiological tests carried out on different types of foods indicate that foods of animal origin are the most frequent causes of food poisoning and food borne diseases. This is because, firstly, most animals carry large numbers of bacteria in their intestinal tracts. It is very difficult to prevent contamination of the raw food during slaughter. Secondly, infections found in animals can be transmitted to humans through eating contaminated meat. Thirdly, foods of animal origin provide optimum conditions for the growth of microorganisms. Fourthly, due to poor 'animal health control', poor slaughtering methods, lack of training and education of food handlers, and cross-contamination from the slaughter house to processing lines, through to the final product (Murrell, 1986, p. 367-369).

2.5 Control Measures - Key Factors in Food Safety Decision Making

The highest priority in the handling and preparation of food is food safety. One approach to food safety is the implementation of three concepts: *risk assessment, risk management* and *risk communication.* Research has shown that these concepts are very effective in the regulation of food safety (Hudson, 1991, p. S10).

2.5.1 Risk Assessment

Hudson (1991, p. S10) defines risk assessment as "the use of scientific data to define the health effects of exposure of individuals, or populations to hazardous materials or situations". The determination of whether a risk exists and its severity is an important part of risk assessment (Hudson, 1991, p. S10). To put this into context, risk

assessment implemented by a catering organisation, such as Healthcare Foods would involve the identification and evaluation of a problem, the identification and evaluation of the possible sources causing this problem, and the effects they have on consumers.

2.5.2 Risk Management

Risk management, is defined by Hudson (1991, p. S10), as "the process of weighing policy alternatives and selecting the most appropriate regulatory action". In other words, risk management is the evaluation of appropriate control approaches to food safety and the implementation of these in the process to eliminate the problem. Time and temperature controls are an important part of risk management in food operations (Hudson, 1991, p. S10).

2.5.2.1 Time and Temperature Controls

Time and temperature controls play a very important part in the overall safety of food production. The potential safety of a catering system can be determined by the time/temperature evaluation of that system, taking into consideration microbiological growth (Munce, 1981, p. 328).

The prevention of microbiological growth is very significant and is necessary at all stages of food production. The most important method of controlling microbiological growth is by the use of correct temperature. Bacteria grow at an optimum temperature of 37°C, but they can grow anywhere between 10°C and 45°C. Perishable foods, if not served immediately, need to be kept either below 5°C or above 60°C, in other words out of the 'Temperature Danger Zone' (Food safety for

consumers, 1996, leaflet). Bacteria do not usually grow below 5°C due to insufficient warmth or above 60°C, as they are killed by heat, except spores. The general rule is to keep HOT foods HOT and COLD foods COLD (Brownsell, Griffith and Jones, 1989, p. 238-239).

Not all bacteria grow at the same temperature. There are three different groups of bacteria, which can be distinguished by their temperature relationships. The first group are *Thermophiles*. These are hot-temperature loving bacteria that grow between 35°C and 80°C, with an optimum temperature between 45°C and 70°C. The second group are *Mesophiles*. These are moderate-temperature loving bacteria that grow between 5°C and 50°C, with an optimum temperature between 30°C and 45°C. The third group are *Psychrotrophs*. These are cold-temperature loving bacteria that grow between 0°C and 40°C, with an optimum temperature between 20°C and 35°C. There is also a fourth group of microorganisms called *Psychrophiles*. These are bacteria that have an extremely low optimal growth temperature (5°C-20°C), but also have the ability to grow well at 0°C (Hayes, 1992, p. 20-21).

During cooking, microorganisms are destroyed because the heat energy is transferred into the food, hence, killing the microorganisms. For bacterial killing to occur, the internal temperature of the food must be sufficiently high (Brownsell et al., 1989, p. 246). It should be at least 70°C and must be reached throughout the food, including the centre (Donaldson, 1993, p. 42). This can be achieved with adequate cooking time. The process of heating food to a sufficiently high temperature and for an adequate period of time will ensure safe food (Brownsell et al., 1989, p. 246).

In a cook-freeze operation, once the food has been cooked, portioned and packaged, it is necessary to rapidly reduce the temperature of that food to at least –20°C within 90 minutes (Cook-chill and cook-freeze, n.d.). Hence, freezing inhibits the growth of microorganisms and guarantees long-term storage without bacterial multiplication (Mallett, 1993, p.18). While the food is cooling, it must pass through the 'Temperature Danger Zone' in as little time as possible, therefore, quick freezing is necessary (Donaldson, 1993, p. 44).

Thoroughly re-heating frozen food is also necessary in ensuring safe food as many cases of food poisoning are caused by re-heated foods. Therefore, 'warming up' of food will not be sufficient in the killing of microorganisms. Hence, it is important to thoroughly re-heat food to at least 70°C. This temperature has to be reached at the core of the food for at least two minutes. It should also be noted that food should never be re-heated more than once (Donaldson, 1993, p. 45).

2.5.3 Risk Communication

Hudson (1991, p. S10), states that risk communication "involves explaining the decision making process to the public, including concepts of uncertainty, concepts of assessment of risk, and relative risks". Within a catering organisation, such as Healthcare Foods risk communication can be defined as the education of all employees within that department about food quality, food safety, food hygiene and the potential dangers and consequences, such as incidents of food poisoning, occurring as a result of unsatisfactory food handling practices.

2.5.3.1 Education

All staff involved in the production, preparation and serving of food should be educated about quality, safety and hygiene of food, and all the required standards. Such an education program should cover personal responsibility, protective clothing requirements and use, hand washing requirements, and prevention of cross-contamination from raw materials to finished products (Shapton & Shapton, 1991, p. 200).

Within Australia, education of food hygiene and food microbiology for food handlers as well as the community is poor (Murrell, 1986, p. 372). There are a limited number of educational institutions, such as the Australian Institute of Food Science and Technology and the Health Department of Western Australia, conducting hygiene training courses for people involved in the food industry. However, these courses can only be useful if the hygiene practices taught are implemented at the work place. Task distribution among employees, is also an important part of quality, safety and hygiene of food. Fewer simultaneous tasks carried out by one person can reduce the chance of cross-contamination. With sufficient staff on duty, work pressures may be reduced, and in turn more time may be available for individuals to think about and execute the correct quality, safety and hygiene procedures (Munce, 1981, p. 330).

2.6 The Hazard Analysis Critical Control Points (HACCP) Approach to Quality Assurance

2.6.1 What is HACCP?

Microbiological hazards are the most important food safety issues facing anyone who is involved in food production or preparation. Therefore, a system is needed that can identify the potential microbiological hazards and monitor the steps taken from the beginning of food production to the end. One such quality assurance system is known as Hazard Analysis Critical Control Points (HACCP). HACCP is a systematic approach to food quality assurance used by food producers, or anyone involved in the food industry, as a means of ensuring food safety (Mraci, 1995, p. 19).

HACCP was developed in 1959 by the Pillsbury Company in collaboration with The National Aeronautics and Space Agency (NASA), the Natick Laboratories of the U.S. Army, and the U.S. Air Force Space Laboratory Project Group (Pierson & Corlett, Jr., 1992, p. 1).

HACCP is the most cost-effective way of reducing risks associated with microbiological hazards (Cameron, 1994, p. 554). It is a system that monitors and manages the overall food processing chain, from raw materials to the point of consumption. However, it cannot be guaranteed that by implementing the HACCP system pathogen-free food will be produced. Nevertheless, the system will ensure food safety by reducing the risk of development of food poisoning or food borne diseases (Mraci, 1995, p. 19).

Prior to the development of HACCP, in 1959, the only way to ensure food safety was to analyse and test the end product, but this was very costly and less effective. HACCP looks at the entire food production process, by closely examining all steps of the process with regard to occurrence of biological (pathogenic organisms), chemical (pesticides, heavy metals) or physical (glass, metal fragments) hazards in the food. Once the hazards are identified and the risks are assessed, Critical Control Points (CCPs) can be identified. These CCPs then need to be monitored to assure the system is under control. If the system deviates slightly, corrective action must be implemented to get the system back on track and under control (Mraci, 1995, p. 19).

Within a commercial kitchen, such as the one at Healthcare foods, the monitoring of CCPs could involve close examination of the relationship between storage temperature and bacterial growth, and the relationship between the time of cooking and pathogen death. Information obtained from monitoring CCPs needs to be recorded as this aids in the verification of the system. Verification of the system is important because, it can determine whether the system is achieving food safety or not. The HACCP system must be flexible and continually improved, due to the occurrence of new hazards, which will need to be identified and controlled (Mraci, 1995, p. 19).

2.6.2 Steps Involved in Implementing HACCP as a Quality Assurance System into the Catering Industry

2.6.2.1 Conduct of Hazard Analysis and Risk Assessment

Hazard analysis and risk assessment is the first step of the HACCP system. In this step all actual and potential hazards, which can be of a biological, chemical or

physical nature, must be identified (Mortimore & Wallace, 1994, p. 84). This step also involves the assessment of the hazards' severity and prediction of any risks associated with each hazard (Procedures to implement the hazard analysis critical control point system, 1991, p. 9).

To identify the hazards of a particular product all raw materials and ingredients required for its production should be listed along with the steps involved in the production process of that product (Pierson & Corlett, 1992, p. 30). Furthermore, hazard analysis can be conducted by observing the various operations involved in a particular process and reviewing them for hazards, interviewing the various people responsible for each operation in a process, reviewing recipes for hazards, and collecting samples of foods and measuring their pH, water activity and time/temperature exposure (Procedures to implement the hazard analysis critical control point system, 1991, p. 10-15).

The next part of this step is to assess the severity (magnitude) and risks (probability of occurrence) of the hazards. There are three groups of disease-causing hazards. These include life threatening illnesses (LI), caused by *Clostridium botulinum, Salmonella typhi, Listeria monocytogenes* (for foetuses, infants, immunosuppressed), and *Vibrio cholerae.* Severe or chronic illnesses (SI) are caused by *Brucella, Campylobacter, Escherichia coli, Salmonella* and *Streptococcus.* Moderate or mild (MI) illnesses are caused by *Bacillus spp., Clostridium perfingens, Listeria monocytogenes* (healthy adults), *Staphylococcus aureus,* and most parasites. Most heavy metals cause mild acute illnesses (Procedures to implement the hazard analysis critical control point system, 1991, p. 4).

The degree of a risk can be classified as high (H), moderate (M), low (L), and negligible (N). Microbiological hazards are usually considered as high risk hazards as they can affect a large number of people at any one time (Procedures to implement the hazard analysis critical control point system, 1991, p. 4).

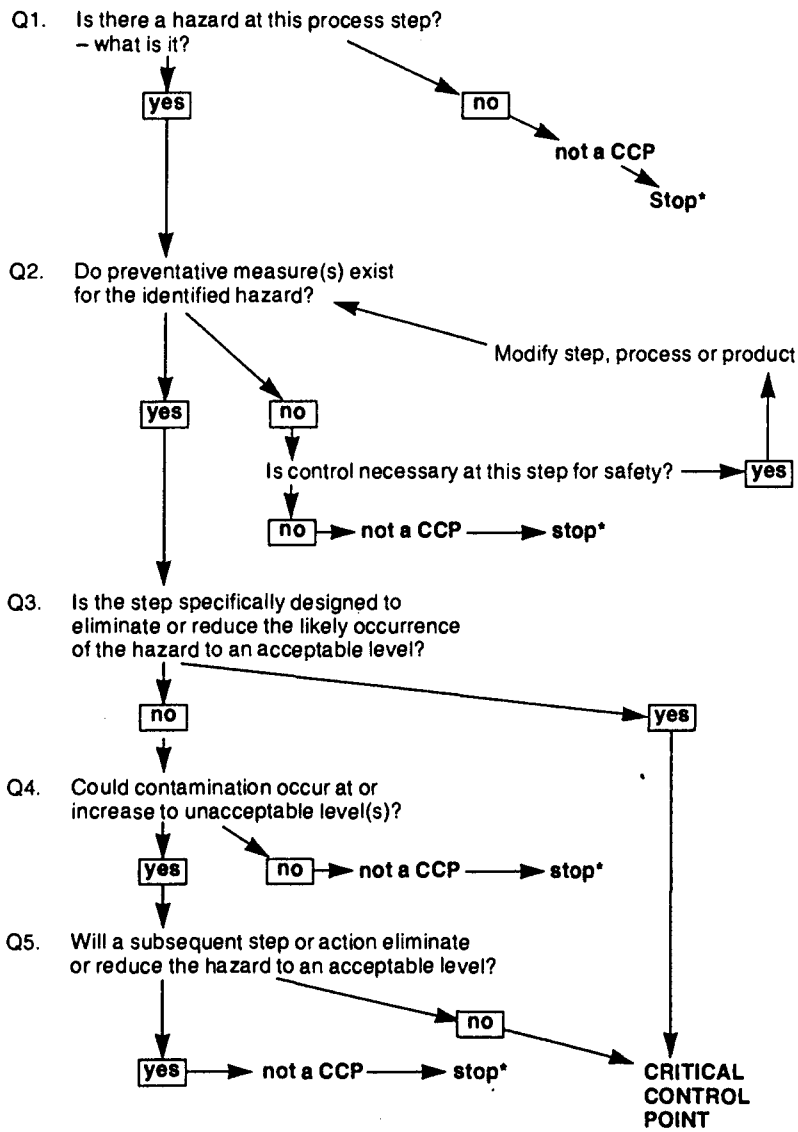
2.6.2.2 Identification of Critical Control Points

The next step of the HACCP system is the identification of critical control points. A critical control point (CCP) can be defined as a process at which a preventive measure can be applied to eliminate, prevent or minimise a hazard. CCPs can be further classified as CCPe, CCPp and CCPr. CCPe eliminates a hazard. CCPp prevents a hazard but does not necessarily eliminate it, and CCPr minimises a hazard but does not eliminate or even prevent it (Procedures to implement the hazard analysis critical control point system, 1991, p. 4-5).

There are different types of CCPs that can be used at various stages of production. Among many, these include, pesticides, temperature and time controls, metal detectors, protective clothing, sanitising procedures, and product codes and labels (Pierson & Corlett, 1992, p. 40-46).

The CCP decision tree (Figure 1), which asks a number of questions, can be used to determine the various CCPs of a particular process (Mortimore & Wallace, 1994, p. 101).

Figure 1 – The CCP Decision Tree (Mortimore & Wallace, 1994, p. 102).



* Stop and proceed with the next hazard at the current step or the next step in the described process

In addition to CCPs, there are also control points (CPs), which can be defined as preventive actions employed to ensure correct manufacturing practices, regulations, product reputation, company policies and aesthetics, hence, the difference between the two (Procedures to implement the hazard analysis critical control point system, 1991, p. 5).

2.6.2.3 Establishment of Critical Limits for Critical Control Points

The third step in the HACCP system is the establishment of critical limits for each critical control point. A critical limit can be defined as a measure, which must be met to ensure that a CCP is working effectively and controls the specified hazard. In addition, a critical limit can be defined as a boundary for safety (Pierson & Corlett, 1992, p. 51). These critical limits can be of a physical, chemical or biological nature, but must be specified for each critical control point (Procedures to implement the hazard analysis critical control point system, 1991, p. 5). Physical limits, which can include temperature and time limits, are those associated with tolerance for physical hazards. Chemical limits can include pH, water activity and humidity levels, and are associated with occurrence of chemical hazards, and biological limits, such as bacterial counts, include those associated with biological hazards (Mortimore & Wallace, 1994, p. 113-114).

It is important that the critical limits are set at the correct level for each critical control point. Hence, it is necessary to understand the nature of the potential hazards that can occur at each critical control point along with their preventive measures. By understanding all the safety factors associated with each critical control point, critical

limits can than be set. Hence, each safety factor acts as a boundary (critical limit) between what is safe and unsafe (Mortimore & Wallace, 1994, p. 112).

2.6.2.4 Monitoring of Critical Control Points

The fourth step in the HACCP system involves the monitoring of the critical control points. Monitoring can be defined as a process that checks whether the procedure at each particular critical control point is under control (Procedures to implement the hazard analysis critical control point system, 1991, p. 5). In addition, monitoring can involve testing and observation of a process to determine its effectiveness in controlling a particular critical control point and its critical limits (Pierson & Corlett, 1992, p. 62).

It is important to monitor critical control points, because it can serve as a warning, which can signal that a particular process is loosing control. Hence, the data collected can be helpful in making any decisions regarding that particular process (Pierson & Corlett, 1992, p. 62). The two most basic monitoring procedures include on-line systems, where monitoring takes place during the actual process, and off-line systems, where samples are collected and monitoring is carried out elsewhere. Hence, the on-line monitoring procedure is favoured, as it is more accurate and representative of the whole batch (Mortimore & Wallace, 1994, p. 120-121). Monitoring can be accomplished in several ways and can include:

- Observation of handling practices and cleaning procedures.
- Measurement of time and temperature relationships, and
- Testing of food samples (Procedures to implement the hazard analysis critical control point system, 1991, p. 5).

To ensure that a system is working effectively it is important to monitor the critical control points on regular basis. Whether the monitoring is continuos or non-continuous, it must indicate that the system is under control (Pierson & Corlett, 1992, p. 70).

2.6.2.5 Establishment of Corrective Action Procedures for Deviations

The next step in the HACCP system is to establish corrective action, which must be employed when deviations occur within a system. Corrective action can be defined as a prompt action that needs to be taken when critical limits are not met and the system deviates (Procedures to implement the hazard analysis critical control point system, 1991, p. 5). Corrective action can be further defined as a response to monitoring and involves four steps. The first step is to maintain control, the second step is to deal with non-conforming products, the third step is to correct the cause of non-conformance, and the fourth step is to record any corrective actions employed (Pierson & Corlett, 1992, p. 72).

However, the primary reason of employing HACCP, as a quality assurance system, is to prevent any problems that may occur within a process. Hence, a HACCP plan should have two types of corrective actions, those that prevent deviations and those that correct deviations. The corrective actions employed to prevent a deviation may include procedures that adjust temperature, time, pH, and flow rates according to need. Those actions that can correct a deviation may include processes that bring a system back under control and deal with products produced while the deviation was occurring (Mortimore & Wallace, 1994, p. 122).

2.6.2.6 Establishment of Procedures for Verification of the HACCP System

The sixth step in the HACCP system is the establishment of verification procedures. Verification procedures can involve additional tests and assessments of the various monitoring records in order to establish whether a system is working effectively and efficiently (Procedures to implement the hazard analysis critical control point system, 1991, p. 5). This step is very important in ensuring the success of the HACCP system. Hence, verification can provide assurance that HACCP is achieving its objectives – food safety (Pierson & Corlett, 1992, p. 90).

The verification procedure consists of five components. The first component involves a review of the HACCP plan. The second component is concerned with whether the system complies with the established critical control points. The third component is involved with confirming the compliance of the corrective action procedures. The fourth component is associated with a visual inspection of a particular process. Finally, the fifth component comprises of a written report (Pierson & Corlett, 1992, p. 91).

2.6.2.7 Establishment of Documentation of the HACCP Plan

The final step in the HACCP system is the establishment of a record-keeping system that can document the HACCP plan. Records can be defined as written reports, which can document a particular operation, and serve as evidence of product safety. Hence, by maintaining an effective record-keeping system, written evidence can be accessed at any time and anywhere. Record-keeping can involve the documenting of physical, chemical and biological measurements, deviations, corrective actions and verifications (Pierson & Corlett, 1992, p. 83).

It is very important to review records on regular basis, as this ensures that standard documentation procedures are employed. In addition, it is necessary to continually update and improve records, as the HACCP system changes (Pierson & Corlett, 1992, p. 87).

2.6.3 Advantages of using HACCP as a Quality Assurance System

The obvious advantages associated with using HACCP as a quality assurance system are:

- Production of safe food that is of consistent quality.
- Reduction of waste.
- Fulfillment of legal requirements.
- Increased customer confidence as well as customer satisfaction (Mraci, 1995, p. 20).

2.6.4 Disadvantages of using HACCP as a Quality Assurance System

There are also disadvantages associated with using HACCP, in that, it is highly specific, it may require trained staff and may become awkward if there are too many CCPs to monitor. However, in the long run, the advantages outweigh the disadvantages of using the system (Mraci, 1995, p. 20).

2.7 Justificatory Statement

The safety of food, with regard to microbiological contamination, is a very important aspect of food preparation. Food safety needs to be monitored in order to avoid any occurrence of food poisoning or food borne diseases. Many outbreaks of food poisoning and food borne diseases have occurred in the past due to the consumption

of microbiologically contaminated food, resulting from unacceptable and careless practices implemented during the preparation, storage or delivery of food.

When food reaches the consumer it needs to be of the highest possible quality, safety and hygiene, as this guarantees total customer satisfaction. Strict food safety guidelines need to be followed by every organisation to ensure that prepared food is safe to eat. One way of monitoring and ensuring food safety is by implementing a quality assurance system into the overall operation.

The main objective of this project was to examine and develop a suitable quality assurance system based on Hazard Analysis Critical Control Points (HACCP), which was incorporated to the 'cook-freeze' operation, currently employed at Healthcare Foods.

3.0 AIMS OF THE STUDY

3.1 General Aim

- To identify and develop a suitable quality assurance system based on HACCP, which will be implemented to the 'cook-freeze' operation, and employed as a systematic approach to food quality, and also as a means of ensuring food safety.

3.2 Specific Aims

- To develop HACCP plans - flowcharts and HACCP control charts.
- To identify possible hazards in a particular process.
- To identify Critical Control Points in a particular process.
- To establish Critical Limits for Critical Control Points in a particular process.
- To develop Corrective Action for deviations from Critical Limits.

4.0 METHODOLOGY

4.1 Meal Production

The ingredients used in the various dishes prepared by Healthcare Foods are either delivered dry, chilled or frozen, hence, they are stored accordingly. On arrival to Healthcare Foods, all ingredients are inspected and stored in their correct storage areas. When the various ingredients are required for a particular dish they are portioned, weighed and transferred to the appropriate preparation areas. Meats, fish, fruit and vegetables, and pastries are all prepared in separate preparation areas, so as to avoid cross-contamination of pathogens. Once the ingredients are prepared for cooking they are transferred to the central kitchen and combined together to make up a particular dish according to a recipe. When the food is thoroughly cooked it is transferred to the packaging area, where it is portioned and packaged into suitable containers. The packaged food is than blast frozen and stored in a freezer until required for delivery.

4.2 Sample

The samples, which were used in the development of the flowcharts and the HACCP control charts, were selected by the client and include all chicken dishes. The main reason for this choice was that, these dishes are regarded as 'high risk', in terms of microbiological growth, and therefore, need to be closely monitored. The chicken dishes included:

- Chicken Whole Roasted
- Chicken Curry
- Chicken Casserole

- Chicken Fricassee
- Chicken & Ham Pie
- Chicken Crumbed
- Chicken Roast
- Chicken Macaroni
- Chicken in Wine
- Minced Chicken & Gravy
- Minced Chicken & Apricot
- Braised Chicken
- Chicken A La King

4.3 Materials

Chicken recipes supplied by the client, production floor layout plan.

4.4 Procedure

Firstly, the recipes of the chosen dishes were reviewed and the ingredients listed for each chicken recipe. Secondly, a detailed analysis of all the procedures employed in the production of each chicken dish was conducted. All of the procedures, including the procedures involved in the preparation, cooking, portioning, packaging, freezing and storage of each chicken dish were thoroughly observed from the beginning to the end. Thirdly, the personnel responsible for each operation were informally interviewed in order to obtain information about each required procedure. Hence, all these steps provided the groundwork for the development of the flowcharts. The

flowcharts were then used to design the HACCP control charts. Each HACCP control chart was constructed so as to include:

1) the name of each operation involved in the production of a particular chicken dish;
2) the possible hazards that can occur at that operation;
3) the degree of concern (severity and risk) of a particular hazard;
4) the type of CCP (CCPe, CCPp or CCPr) exercised at that particular operation;
5) the critical limits employed at each operation;
6) the monitoring procedures used to monitor the critical limits for each operation;
7) the corrective action implemented to correct a particular problem at each operation;
8) the personnel responsible for each operation; and
9) the records used to document relevant information at each operation.

4.5 Data Analysis

All the information collected from the review of the recipes, observation of procedures and interviews with the staff was used to develop a flowchart and a HACCP control chart for each chicken dish.

4.5.1 HACCP Plan

A HACCP plan can be defined as a plan that documents all critical information to food safety management. A HACCP plan is made up of two parts: a flowchart and a HACCP control chart (Mortimore & Wallace, 194, p. 79).

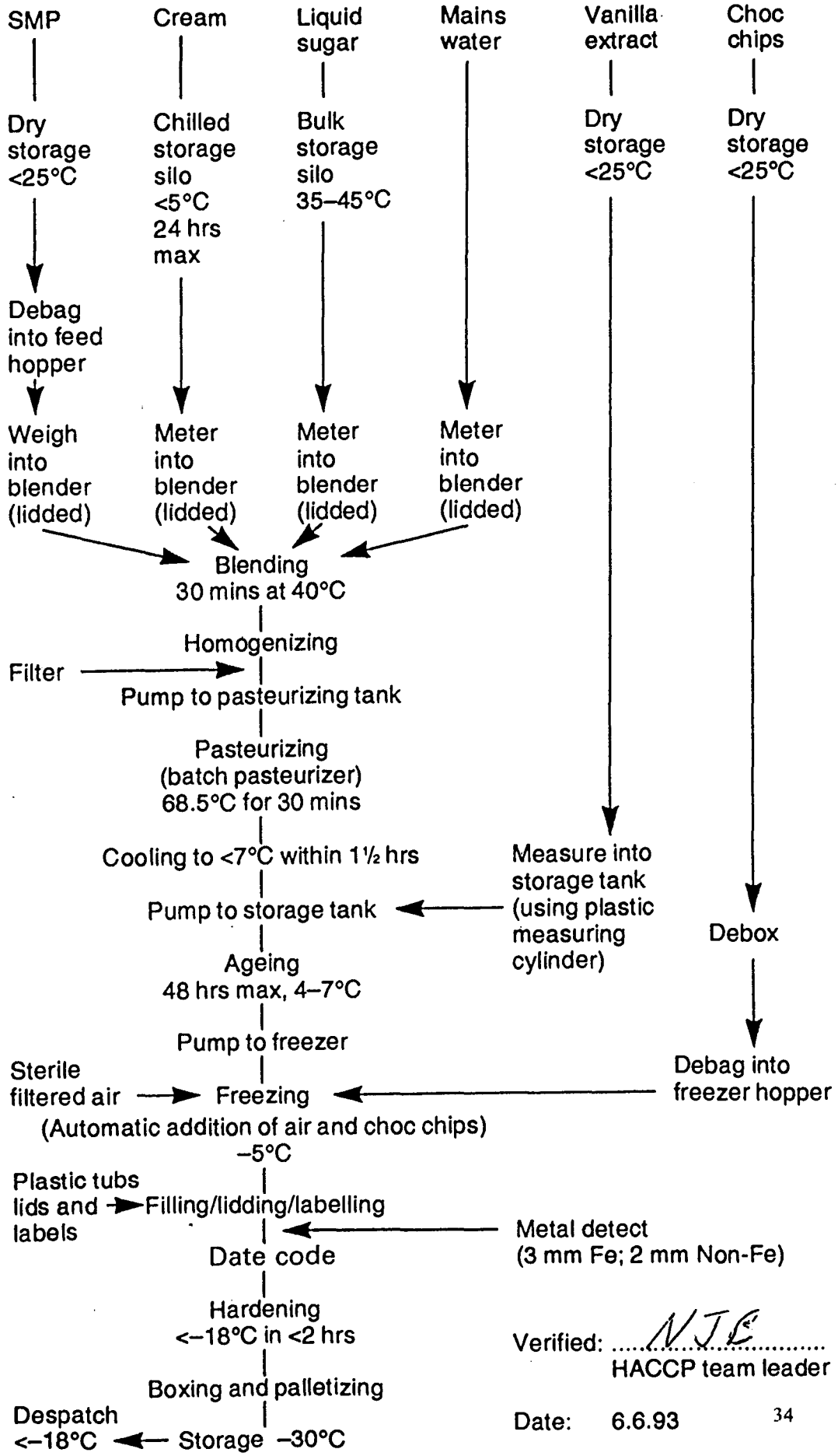
4.5.1.1 Flowchart

The purpose of a flowchart is to describe, step-by-step, how a product is made. It should be simple and clear (Mortimore & Wallace, 1994, p. 80). Figure 2 illustrates an example of a flowchart.

4.5.1.2 HACCP Control Chart

The purpose of a HACCP control chart is to define all the steps in a particular process, hazards, critical limits, monitoring procedures, corrective action, and responsibility (Mortimore & Wallace, 1994, p. 81). An example of a HACCP flow chart can be seen in Table 1.

Figure 2 – Flowchart for Chocolate Chip Ice-cream (Mortimore & Wallace, 1994, p. 85).



Verified: ..... N.J.E. .....
HACCP team leader

Date: 6.6.93

Table 1 – HACCP Control Chart for Chocolate Chip Ice-cream (Mortimore & Wallace, 1994, p. 134).

HACCP plan Ref. HP001			Iced Delights HACCP CONTROL CHART					Date 14.8.93 Supersedes: N/A Approved by: .N.J.G..... HACCP Team Leader
Process Step:	CCP No.	Hazard	Preventative measure	Critical limits	Monitoring		Corrective action	Responsibility
					Procedure	Frequency		
Pasteurizing	8.1	Survival of vegetative pathogens	Correct heat process	65.6°C/ 30 minutes	Chart recorder — visual inspection and sign off	Each batch	Contact QA and discuss: — continue heating /holding period	Production Operator
					Check temperature sensor against traceable calibrated thermometer	Daily	Quarantine product (rework or disposal)	Operations Manager QA Technician
Cooling	8.2	Outgrowth of spores due to slow cooling	Rapid cooling — Chilled water jacket — Continuous mixing	<7°C within 1½ hours max	As 8.1	As 8.1	As 8.1	As 8.1
Ageing	9	Spore outgrowth due to poor temperature control and batch stock rotation	Effective temperature control	7°C maximum	Chart recorder — visual inspection and sign off	Each shift	Quarantine product. Contact QA and discuss	Production Operator
			Effective stock rotation	48 hours maximum	Record date and time in and out of ageing tank	Daily	Quarantine product and discuss with QA	QA Technician
					Check temperature sensor against traceable calibrated thermometer	Every batch	Quarantine product and discuss with QA	Production Operator
Freezing	10.1	Ingress of foreign material at chocolate chip addition (non-metal)	Empty through grating (20 mm holes)	Intact grating in place	Visual deception	Every batch	Replace grating	Production Operator
	10.2	Pathogens in air	Effective filtration	Intact filter in place (BS Class E/F or equivalent)	Microbiological analysis for indicator organisms in air sample	Monthly	Replace filter	QA Manager

5.0 RESULTS

Figure 3 - Flowchart for Chicken Whole Roasted

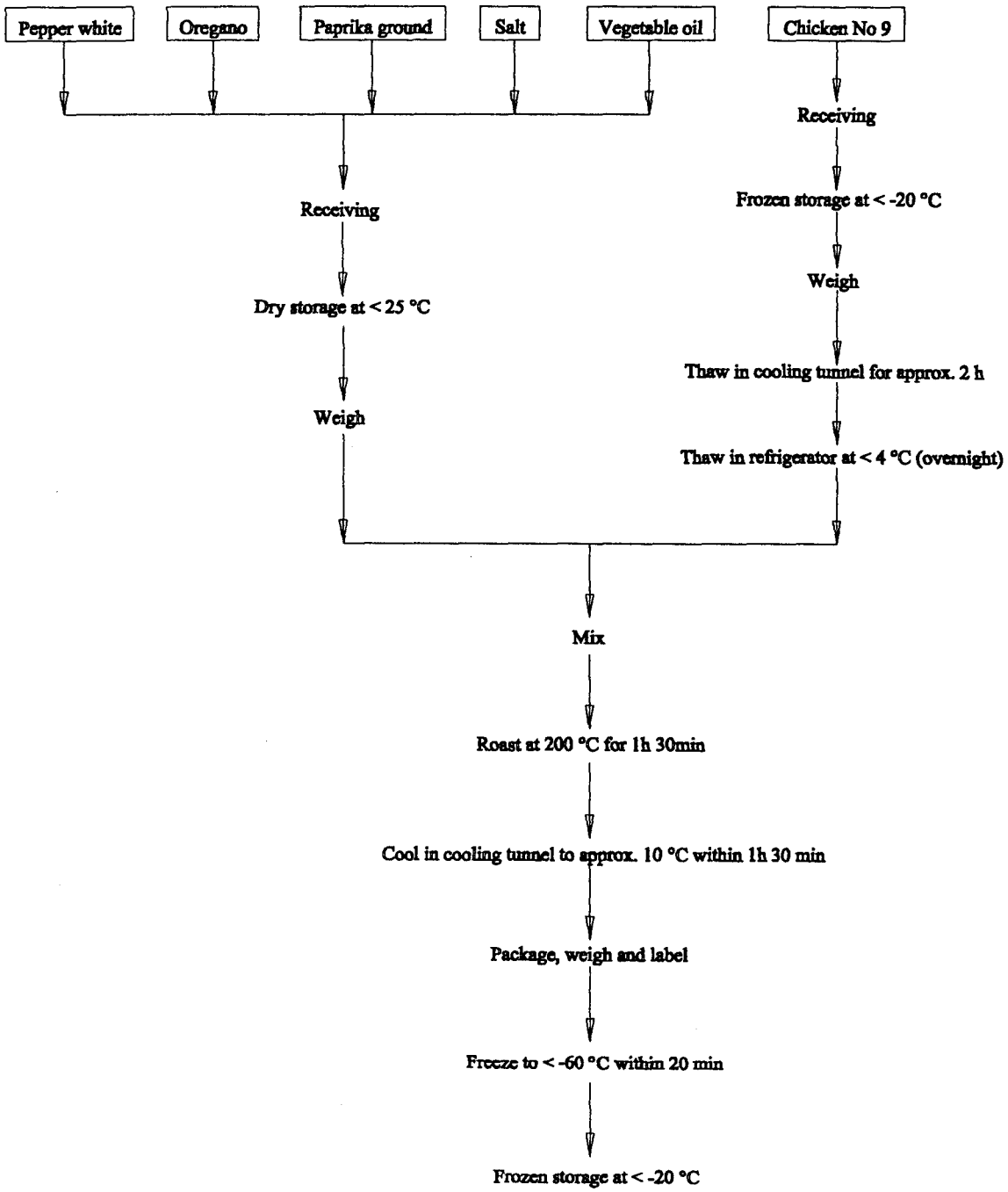


Table 2 - HACCP Control Chart for Chicken Whole Roasted

*To view records refer to Appendix C

Operation	Hazard	Degree of concern S	Degree of concern R	Type of CCP	Critical limits	Monitoring procedure	Corrective action	Responsibility	*Records
RECEIVING Pepper white Oregano Paprika ground Salt Vegetable oil	Heat resistant spores	LI	H	CCPr	Ingredient audit - all ingredients must be the correct temperature and free from spoilage on arrival.	Inspect all ingredients upon arrival by sensory evaluation and temperature check. Inspect certificates of microbiological analysis (if supplied).	Contact supplier/reject product/change supplier.	Store person	CFAD93:6/91 CFAD81:2/96 FAD132:5/92 FAD133:5/92
					Supplier audit	Inspect supplier on regular basis (once/year).			
Chicken	*Salmonella*	SI	H						
	Camphylobacter	SI	H						
	Clostridium perfringens	MI	H						
	Other pathogens	SI/LI	H						
STORAGE OF INGREDIENTS	Pathogen growth	SI/LI	H	CCPp	Products must be stored at the correct temperature (frozen products at < -20 °C, refrigerated products at < 4 °C, and dry products at < 25 °C).	Observe storage procedure and measure the air temperature of the storage area (every 4 hours). Visually inspect products to detect any spoilage.	Adjust the thermostat to correct temperature and discard any products that are spoilt.	Store person	CFJD18:4/91 CFJD86:5/94 FAD130:5/92 FAD115:2/92
THAWING CHICKEN	Pathogen growth	SI/LI	H	CCPr	Thaw chicken under refrigeration at < 4 °C and ensure that complete thawing has taken place.	Observe thawing procedure and visually inspect and feel whether chicken has completely thawed. Ensure that chicken is promptly used after it has been thawed.	Adjust the refrigerator's thermostat to correct temperature and continue to thaw chicken until completely thawed.	Chef	CFJD18:4/91 CFJD86:5/94 FAD130:5/92
ROASTING CHICKEN	Pathogen and spore survival	MI/SI	H	CCPe	Roast chicken at 200 °C for sufficient time (approximately 1½ hours). Ensure that the internal temperature of the chicken is > 80 °C after roasting has been completed.	Observe roasting procedure. Measure the internal temperature of the chicken after roasting has been completed.	Extend the roasting time and roast until the internal temperature of the chicken reaches > 80 °C.	Chef	FAD130:5/92 CFJD72 CFJD86:5/94
COOLING CHICKEN IN COOLING TUNNEL	Spore germination and resulting pathogen growth	SI/LI	H	CCPp	Cool rapidly to approximately 10 °C within < 1½ hours.	Observe cooling procedure. Measure the air temperature in the cooling tunnel (every 4 hours) and the time elapsed to cool the chicken to approximately 10 °C. Measure the internal temperature of the chicken at completion of cooling.	Adjust the cooling tunnel's thermostat to correct temperature.	Chef	CFJD86:5/94 FAD130:5/92
PACKAGING, WEIGHING AND LABELING	Contamination from food handlers, equipment and utensils	MI/SI	H	CCPr	Avoid handling the chicken with bare hands, soiled equipment and utensils. Avoid working in a dirty working area.	Observe packaging procedure. Ensure that plastic disposable gloves are worn and that equipment, utensils and working area are thoroughly sanitised and disinfected before and after use.	Staff education	Packaging staff	CFJD90:4/91 FAD131:5/92 CFJD86:5/94
FREEZING	Pathogen and spore survival	MI/SI	H	CCPp	Freeze chicken rapidly to < -65 °C in 20 minutes and within 30 minutes of packaging.	Observe freezing procedure. Measure the air temperature in the freezer and duration of freezing.	Adjust freezer's thermostat to correct temperature.	Packaging staff	FAD132:5/92 FAD115:2/92
FROZEN STORAGE	Pathogen and spore survival	MI/SI	H	CCPp	Store chicken at < -20 °C for no longer than 12 months.	Measure the air temperature in the freezer and note the production date of the chicken.	Adjust freezer's thermostat to correct temperature. Discard any chicken if kept in the freezer longer that 12 months.	Packaging staff Head chef	FAD132:5/92 FAD115:2/92

Figure 4 - Flowchart for Chicken Curry

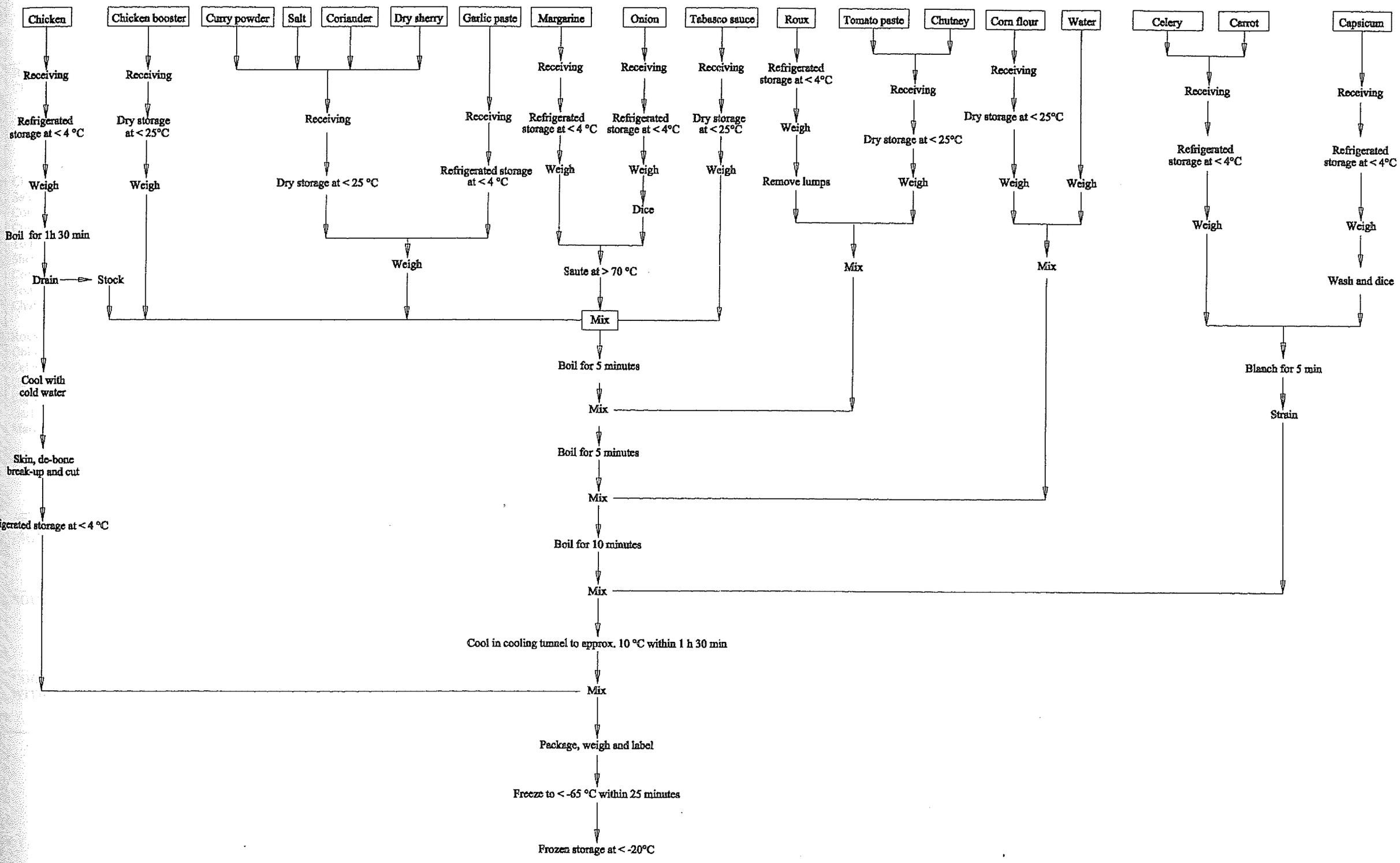


Table 3 - HACCP Control Chart for Chicken Curry

*To view records refer to Appendix C

Operation	Hazard	Degree of concern S	Degree of concern R	Type of CCP	Critical limits	Monitoring procedure	Corrective action	Responsibility	*Records
RECEIVING Chicken	*Salmonell* *Camphylobacter* *Clostridium perfingens* Other pathogens	SI SI MI SI/LI	H H H H	CCPr	Ingredient audit - all ingredients must be the correct temperature and free from spoilage on arrival. Supplier audit	Inspect all ingredients upon arrival by sensory evaluation and temperature check. Inspect certificates of microbiological analysis (if supplied). Inspect supplier on regular basis (once/year).	Contact supplier/reject product/change supplier.	Store person	CFAD93:6/91 CFAD81:2/96 FAD132:5/92 FAD133:5/92
Chicken booster Salt Coriander Curry powder Tobasco sauce Sherry dry Corn flour Tomato paste Chutney	Heat resistant spores	LI	H						
Roux Onion Celery Carrot Capsicum Garlic paste Margarine	Pathogens	SI/LI	H						
Water	Microbiological and chemical contamination	SI/LI	H		Regulatory compliance (see specifications).	Testing to include microbiological, chemical and toxic substances. Inspect certificates of analysis from Water Authority.	Contact Water Authority.	Quality assurance manager	
STORAGE OF INGREDIENTS	Pathogen growth	SI/LI	H	CCPp	Products must be stored at the correct temperature (frozen products at < -20 °C, refrigerated products at < 4 °C, and dry products at < 25 °C).	Observe storage procedure and measure the air temperature of the storage area (every 4 hours). Visually inspect products to detect any spoilage.	Adjust the thermostat to correct temperature and discard any products that are spoilt.	Store person	CFJD18:4/91 CFJD86:5/94 FAD130:5/92 FAD115:2/92
BOILING CHICKEN	Pathogen and spore survival	MI/SI	H	CCPe	Boil chicken for sufficient time (approximately 1½ hours). Ensure that the internal temperature of the chicken is > 80 °C after boiling has been completed.	Observe boiling procedure. Measure the internal temperature of the chicken after boiling has been completed.	Extend the boiling time and boil until the internal temperature of the chicker reaches > 80 °C.	Chef	FAD130:5/92 CFJD86:5/94
COOLING CHICKEN WITH COLD WATER	Spore germination and resulting pathogen growth	SI/LI	H	CCPp	Rapidly cool the chicken with cold running water until it is cool enough to handle.	Observe cooling procedure. Feel the chicken to ensure it is cool enough to be handled comfortably.	Continue to cool the chicken with cold running water until it reaches a temperature where it can be handled comfortably.	Chef	FAD130:5/92 CFJD86:5/94

SKINNING, DE-BONING, BREAKING-UP AND CUTTING CHICKEN	Contamination from food handlers, equipment, utensils and working area	MI/SI	H	CCPr	Avoid handling the chicken with bare hands, soiled equipment and utensils. Avoid working in a dirty working area.	Observe skinning, de-boning, breaking-up and cutting procedure. Ensure that plastic disposable gloves are worn and that equipment, utensils and working area are thoroughly sanitised and disinfected before and after use.	Staff education Staff meeting	All staff involved with this operation.	CFJD86:5/94 FAD130:5/92
SAUTEING ONION AND MARGARINE	Pathogen and spore survival	MI/SI	H	CCPe	Sauté ingredients for sufficient time (refer to recipe). Ensure that the temperature of the ingredients is > 70 °C after sautéing has been completed.	Observe sautéing procedure. Measure the temperature of the ingredients after sautéing has been completed.	Extend the sautéing time and sauté until the temperature of the ingredients reaches > 70 °C.	Chef	FAD130:5/92 CFJD86:5/94
BLANCHING VEGETABLES	Pathogen and spore survival	MI/SI	H	CCPe	Blanch vegetables for sufficient time (refer to recipe). Ensure that the temperature of the vegetables is > 70 °C after blanching has been completed.	Observe blanching procedure. Measure the temperature of the vegetables after blanching has been completed.	Extend the blanching time and blanch until the temperature of the vegetables reaches > 70 °C.	Chef	FAD130:5/92 CFJD86:5/94
BOILING CURRY SAUCE	Pathogen and spore survival	MI/SI	H	CCPe	Boil curry sauce for sufficient time (refer to recipe).	Observe boiling procedure. Ensure curry sauce bubbles.	Extend the boiling time and boil until the curry sauce bubbles.	Chef	FAD130:5/92 CFJD86:5/94
MIXING INGREDIENTS	Contamination from hands, equipment and utensils	MI/SI	H	CCPr	Avoid hand contact and the use of soiled equipment and utensils.	Observe mixing procedure. Ensure that plastic disposable gloves are worn and that equipment and utensils are thoroughly disinfected before and after use.	Staff education Staff meeting	Chef	FAD130:5/92 CFJD86:5/94
COOLING CURRY SAUCE IN COOLING TUNNEL	Spore germination and resulting pathogen growth	SI/LI	H	CCPp	Cool rapidly to approximately 10 °C within < 1½ hours.	Observe cooling procedure. Measure the air temperature in the cooling tunnel (every 4 hours) and the time elapsed to cool the curry sauce to approximately 10 °C. Measure the temperature of the curry sauce at completion of cooling.	Adjust the cooling tunnel's thermostat to correct temperature.	Chef	CFJD86:5/94 FAD130:5/92
PACKAGING, WEIGHING AND LABELING	Contamination from food handlers, equipment and utensils	MI/SI	H	CCPr	Avoid handling the chicken curry with bare hands, soiled equipment and utensils. Avoid working in a dirty working area.	Observe packaging procedure. Ensure that plastic disposable gloves are worn and that equipment, utensils and working area are thoroughly sanitised and disinfected before and after use.	Staff education	Packaging staff	CFJD90:4/91 FAD131:5/92 CFJD86:5/94
FREEZING	Pathogen and spore survival	MI/SI	H	CCPp	Freeze the chicken curry promptly after packaging to < -65 °C in 25 minutes.	Observe freezing procedure. Measure the air temperature in the freezer and duration of freezing.	Adjust freezer's thermostat to correct temperature.	Packaging staff	FAD132:5/92 FAD115:2/92
FROZEN STORAGE	Pathogen and spore survival	MI/SI	H	CCPp	Store the chicken curry at < -20 °C for no longer than 12 months.	Measure the air temperature in the freezer and note the production date of the chicken curry.	Adjust freezer's thermostat to correct temperature. Discard any chicken curry if kept in the freezer longer that 12 months.	Packaging staff Head chef	FAD132:5/92 FAD115:2/92

Figure 5 - Flowchart for Chicken Casserole

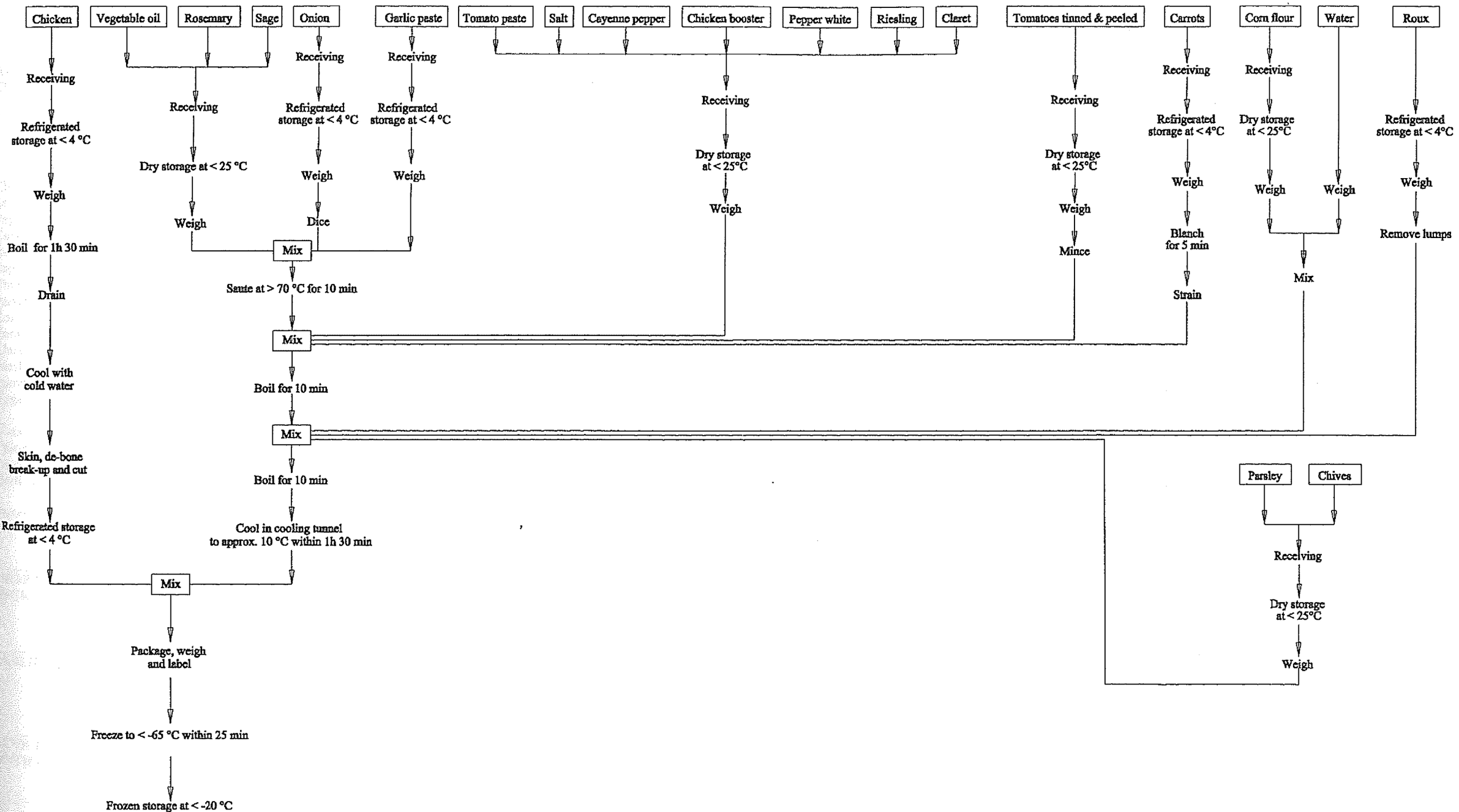


Table 4 - HACCP Control Chart for Chicken Casserole

*To view records refer to Appendix C

Operation	Hazard	Degree of concern S	Degree of concern R	Type of CCP	Critical limits	Monitoring procedure	Corrective action	Responsibility	*Records
RECEIVING Chicken	*Salmonell* *Camphylobacter* *Clostridium perfingens* Other pathogens	SI SI MI SI/LI	H H H H	CCPr	Ingredient audit - all ingredients must be the correct temperature and free from spoilage on arrival. Supplier audit	Inspect all ingredients upon arrival by sensory evaluation and temperature check. Inspect certificates of microbiological analysis (if supplied). Inspect supplier on regular basis (once/year).	Contact supplier/reject product/change supplier.	Store person	CFAD93:6/91 CFAD81:2/96 FAD132:5/92 FAD133:5/92
Chicken booster Salt Pepper white Cayenne pepper Rosemary Sage Chives Parsley Corn flour Tomato paste Claret Riesling Tomatoes (tinned) Vegetable oil	Heat resistant spores	LI	H						
Roux Onion Carrot Garlic paste	Pathogens	SI/LI	H						
Water	Microbiological and chemical contamination	SI/LI	H		Regulatory compliance (see specifications).	Testing to include microbiological, chemical and toxic substances. Inspect certificates of analysis from Water Authority.	Contact Water Authority.	Quality assurance manager	
STORAGE OF INGREDIENTS	Pathogen growth	SI/LI	H	CCPp	Products must be stored at the correct temperature (frozen products at < -20 °C, refrigerated products at < 4 °C, and dry products at < 25 °C).	Observe storage procedure and measure the air temperature of the storage area (every 4 hours). Visually inspect products to detect any spoilage.	Adjust the thermostat to correct temperature and discard any products that are spoilt.	Store person	CFJD18:4/91 CFJD86:5/94 FAD130:5/92 FAD115:2/92
BOILING CHICKEN	Pathogen and spore survival	MI/SI	H	CCPe	Boil chicken for sufficient time (approximately 1½ hours). Ensure that the internal temperature of the chicken is > 80 °C after boiling has been completed.	Observe boiling procedure. Measure the internal temperature of the chicken after boiling has been completed.	Extend the boiling time and boil until the internal temperature of the chicken reaches > 80 °C.	Chef	FAD130:5/92 CFJD86:5/94
COOLING CHICKEN WITH COLD WATER	Spore germination and resulting pathogen growth	SI/LI	H	CCPp	Rapidly cool the chicken with cold running water until it is cool enough to handle.	Observe cooling procedure. Feel the chicken to ensure it is cool enough to be handled comfortably.	Continue to cool the chicken with cold running water until it reaches a temperature where it can be handled comfortably.	Chef	FAD130:5/92 CFJD86:5/94

SKINNING, DE-BONING, BREAKING-UP AND CUTTING CHICKEN	Contamination from food handlers, equipment, utensils and working area	MI/SI	H	CCPr	Avoid handling the chicken with bare hands, soiled equipment and utensils. Avoid working in a dirty working area.	Observe skinning, de-boning, breaking-up and cutting procedure. Ensure that plastic disposable gloves are worn and that equipment, utensils and working area are thoroughly sanitised and disinfected before and after use.	Staff education Staff meeting	All staff involved with this operation.	CFJD86:5/94 FAD130:5/92
SAUTEING ONION, VEGETABLE OIL, SAGE, ROSEMARY AND GARLIC PASTE	Pathogen and spore survival	MI/SI	H	CCPe	Sauté ingredients for sufficient time (refer to recipe). Ensure that the temperature of the ingredients is > 70 °C after sautéing has been completed.	Observe sautéing procedure. Measure the temperature of the ingredients after sautéing has been completed.	Extend the sautéing time and sauté until the temperature of the ingredients reaches > 70 °C.	Chef	FAD130:5/92 CFJD86:5/94
BLANCHING CARROTS	Pathogen and spore survival	MI/SI	H	CCPe	Blanch carrots for sufficient time (refer to recipe). Ensure that the temperature of the carrots is > 70 °C after blanching has been completed.	Observe blanching procedure. Measure the temperature of the carrots after blanching has been completed.	Extend the blanching time and blanch until the temperature of the carrots reaches > 70 °C.	Chef	FAD130:5/92 CFJD86:5/94
BOILING SAUCE	Pathogen and spore survival	MI/SI	H	CCPe	Boil sauce for sufficient time (refer to recipe).	Observe boiling procedure. Ensure sauce bubbles.	Extend the boiling time and boil until the sauce bubbles.	Chef	FAD130:5/92 CFJD86:5/94
MIXING INGREDIENTS	Contamination from hands, equipment and utensils	MI/SI	H	CCPr	Avoid hand contact and the use of soiled equipment and utensils.	Observe mixing procedure. Ensure that plastic disposable gloves are worn and that equipment and utensils are thoroughly disinfected before and after use.	Staff education Staff meeting	Chef	FAD130:5/92 CFJD86:5/94
COOLING SAUCE IN COOLING TUNNEL	Spore germination and resulting pathogen growth	SI/LI	H	CCPp	Cool rapidly to approximately 10 °C within < 1½ hours.	Observe cooling procedure. Measure the air temperature in the cooling tunnel (every 4 hours) and the time elapsed to cool the sauce to approximately 10 °C. Measure the temperature of the sauce at completion of cooling.	Adjust the cooling tunnel's thermostat to correct temperature.	Chef	CFJD86:5/94 FAD130:5/92
PACKAGING, WEIGHING AND LABELING	Contamination from food handlers, equipment and utensils	MI/SI	H	CCPr	Avoid handling the chicken casserole with bare hands, soiled equipment and utensils. Avoid working in a dirty working area.	Observe packaging procedure. Ensure that plastic disposable gloves are worn and that equipment, utensils and working area are thoroughly sanitised and disinfected before and after use.	Staff education	Packaging staff	CFJD90:4/91 FAD131:5/92 CFJD86:5/94
FREEZING	Pathogen and spore survival	MI/SI	H	CCPp	Freeze the chicken casserole promptly after packaging to < -65 °C in 25 minutes.	Observe freezing procedure. Measure the air temperature in the freezer and duration of freezing.	Adjust freezer's thermostat to correct temperature.	Packaging staff	FAD132:5/92 FAD115:2/92
FROZEN STORAGE	Pathogen and spore survival	MI/SI	H	CCPp	Store the chicken casserole at < -20 °C for no longer than 12 months.	Measure the air temperature in the freezer and note the production date of the chicken casserole.	Adjust freezer's thermostat to correct temperature. Discard any chicken casserole if kept in the freezer longer that 12 months.	Packaging staff Head chef	FAD132:5/92 FAD115:2/92

Figure 6 - Flowchart for Chicken Fricassee

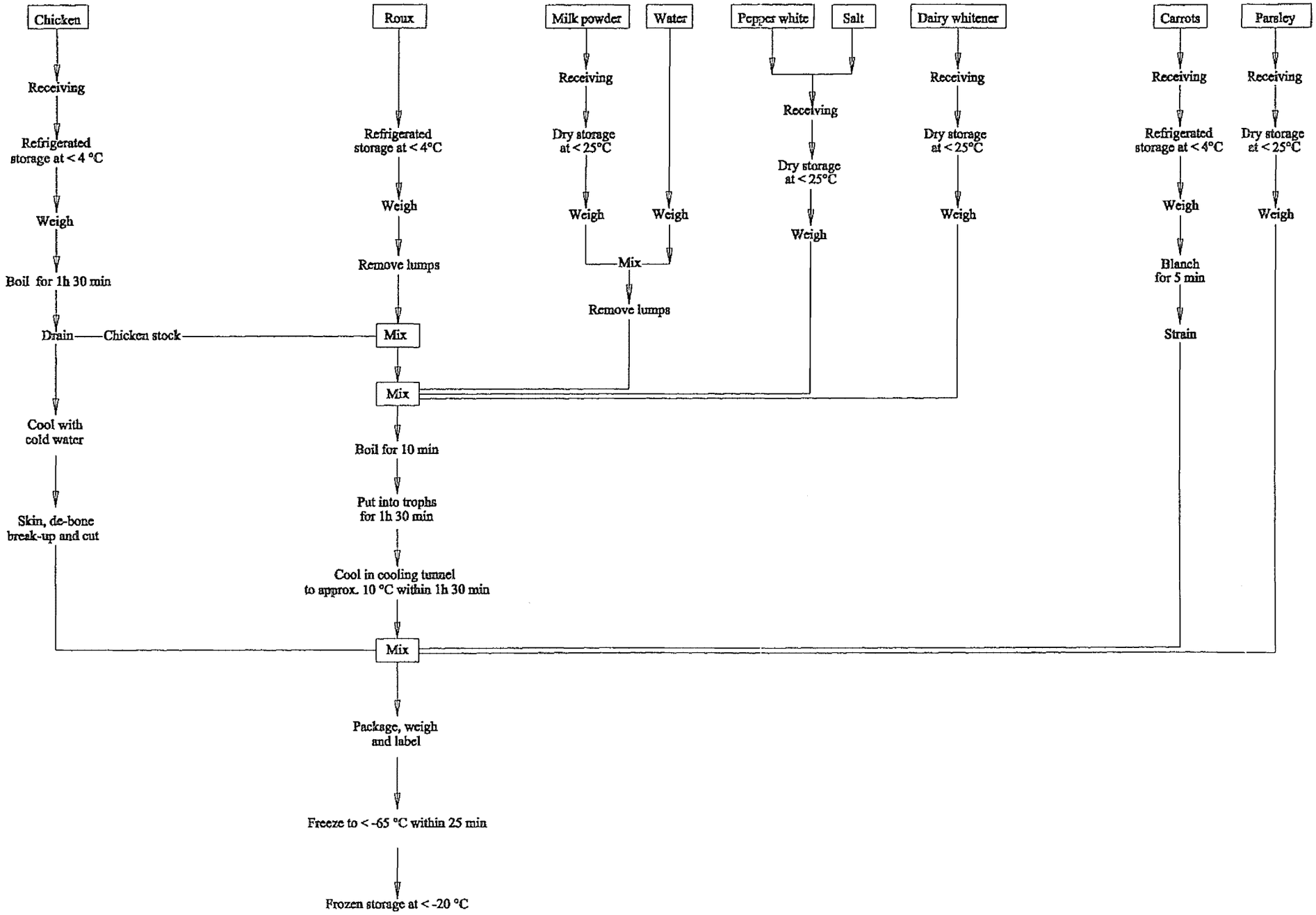


Table 5 - HACCP Control Chart for Chicken Fricassee

*To view records refer to Appendix C

Operation	Hazard	Degree of concern S	Degree of concern R	Type of CCP	Critical limits	Monitoring procedure	Corrective action	Responsibility	*Records
RECEIVING Chicken	*Salmonell* *Camphylobacter* *Clostridium perfingens* Other pathogens	SI SI MI SI/LI	H H H H	CCPr	Ingredient audit - all ingredients must be the correct temperature and free from spoilage on arrival. Supplier audit	Inspect all ingredients upon arrival by sensory evaluation and temperature check. Inspect certificates of microbiological analysis (if supplied). Inspect supplier on regular basis (once/year).	Contact supplier/reject product/change supplier.	Store person	CFAD93:6/91 CFAD81:2/96 FAD132:5/92 FAD133:5/92
Milk powder Salt Dairy whitener Parsley Pepper white	Heat resistant spores	LI	H						
Roux Carrot	Pathogens	SI/LI	H						
Water	Microbiological and chemical contamination	SI/LI	H		Regulatory compliance (see specifications).	Testing to include microbiological, chemical and toxic substances. Inspect certificates of analysis from Water Authority.	Contact Water Authority.	Quality assurance manager	
STORAGE OF INGREDIENTS	Pathogen growth	SI/LI	H	CCPp	Products must be stored at the correct temperature (frozen products at < -20 °C, refrigerated products at < 4 °C, and dry products at < 25 °C).	Observe storage procedure and measure the air temperature of the storage area (every 4 hours). Visually inspect products to detect any spoilage.	Adjust the thermostat to correct temperature and discard any products that are spoilt.	Store person	CFJD18:4/91 CFJD86:5/94 FAD130:5/92 FAD115:2/92
BOILING CHICKEN	Pathogen and spore survival	MI/SI	H	CCPe	Boil chicken for sufficient time (approximately 1½ hours). Ensure that the internal temperature of the chicken is > 80 °C after boiling has been completed.	Observe boiling procedure. Measure the internal temperature of the chicken after boiling has been completed.	Extend the boiling time and boil until the internal temperature of the chicken reaches > 80 °C.	Chef	FAD130:5/92 CFJD86:5/94
COOLING CHICKEN WITH COLD WATER	Spore germination and resulting pathogen growth	SI/LI	H	CCPp	Rapidly cool the chicken with cold running water until it is cool enough to handle.	Observe cooling procedure. Feel the chicken to ensure it is cool enough to be handled comfortably.	Continue to cool the chicken with cold running water until it reaches a temperature where it can be handled comfortably.	Chef	FAD130:5/92 CFJD86:5/94
SKINNING, DE-BONING, BREAKING-UP AND CUTTING CHICKEN	Contamination from food handlers, equipment, utensils and working area	MI/SI	H	CCPr	Avoid handling the chicken with bare hands, soiled equipment and utensils. Avoid working in a dirty working area.	Observe skinning, de-boning, breaking-up and cutting procedure. Ensure that plastic disposable gloves are worn and that equipment, utensils and working area are thoroughly sanitised and disinfected before and after use.	Staff education Staff meeting	All staff involved with this operation.	CFJD86:5/94 FAD130:5/92
BLANCHING CARROTS	Pathogen and spore survival	MI/SI	H	CCPe	Blanch carrots for sufficient time (refer to recipe). Ensure that the temperature of the carrots is > 70 °C after blanching has been completed.	Observe blanching procedure. Measure the temperature of the carrots after blanching has been completed.	Extend the blanching time and blanch until the temperature of the carrots reaches > 70 °C.	Chef	FAD130:5/92 CFJD86:5/94
BOILING SAUCE	Pathogen and spore survival	MI/SI	H	CCPe	Boil sauce for sufficient time (refer to recipe).	Observe boiling procedure. Ensure sauce bubbles.	Extend the boiling time and boil until the sauce bubbles.	Chef	FAD130:5/92 CFJD86:5/94

MIXING INGREDIENTS	Contamination from hands, equipment and utensils	MI/SI	H	CCPr	Avoid hand contact and the use of soiled equipment and utensils.	Observe mixing procedure. Ensure that plastic disposable gloves are worn and that equipment and utensils are thorougily disinfected before and after use.	Staff education Staff meeting	Chef	FAD130:5/92 CFJD86:5/94
COOLING SAUCE IN COOLING TUNNEL	Spore germination and resulting pathogen growth	SI/LI	H	CCPp	Cool rapidly to approximately 10 °C within < 1½ hours.	Observe cooling procedure. Measure the air temperature in the cooling tunnel (every 4 hours) and the time elapsed to cool the sauce to approximately 10 °C. Measure the temperature of the sauce at completion of cooling.	Adjust the cooling tunnel's thermostat to correct temperature.	Chef	CFJD86:5/94 FAD130:5/92
PACKAGING, WEIGHING AND LABELING	Contamination from food handlers, equipment and utensils	MI/SI	H	CCPr	Avoid handling the chicken fricassee with bare hands, soiled equipment and utensils. Avoid working in a dirty working area.	Observe packaging procedure. Ensure that plastic disposable gloves are worn and that equipment, utensils and working area are thoroughly sanitised and disinfected before and after use.	Staff education	Packaging staff	CFJD90:4/91 FAD131:5/92 CFJD86:5/94
FREEZING	Pathogen and spore survival	MI/SI	H	CCPp	Freeze the chicken fricassee promptly after packaging to < -65 °C in 25 minutes.	Observe freezing procedure. Measure the air temperature in the freezer and duration of freezing.	Adjust freezer's thermostat to correct temperature.	Packaging staff	FAD132:5/92 FAD115:2/92
FROZEN STORAGE	Pathogen and spore survival	MI/SI	H	CCPp	Store the chicken fricassee at < -20 °C for no longer than 12 months.	Measure the air temperature in the freezer and note the production date of the chicken fricassee.	Adjust freezer's thermostat to correct temperature. Discard any chicken fricassee if kept in the freezer longer that 12 months.	Packaging staff Head chef	FAD132:5/92 FAD115:2/92

Figure 7 - Flowchart for Chicken & Ham Pie

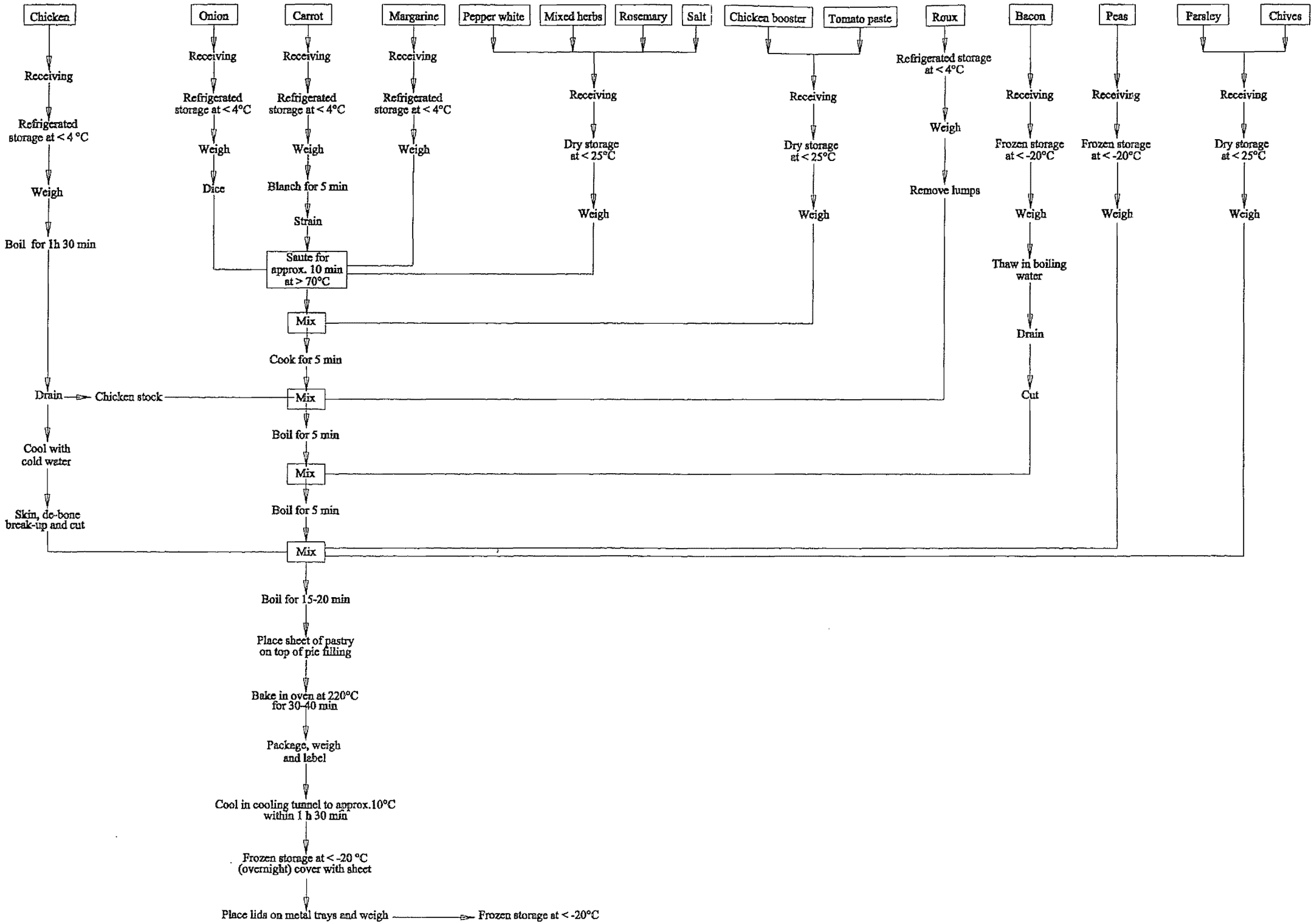


Table 6 - HACCP Control Chart for Chicken & Ham Pie

*To view records refer to Appendix C

Operation	Hazard	Degree of concern S	Degree of concern R	Type of CCP	Critical limits	Monitoring procedure	Corrective action	Responsibility	*Records
RECEIVING Chicken Chicken booster Salt Parsley Chives Rosemary Mixed herbs Pepper white Tomato paste Roux Onion Carrot Peas Bacon Margarine	*Salmonell* *Camphylobacter* *Clostridium Perfingens* Other pathogens Heat resistant spores Pathogens	SI SI MI SI/LI LI SI/LI	H H H H H H	CCPr	Ingredient audit - all ingredients must be the correct temperature and free from spoilage on arrival. Supplier audit	Inspect all ingredients upon arrival by sensory evaluation and temperature check. Inspect certificates of microbiological analysis (if supplied). Inspect supplier on regular basis (once/year).	Contact supplier/reject product/change supplier.	Store person	CFAD93:6/91 CFAD81:2/96 FAD132:5/92 FAD133:5/92
STORAGE OF INGREDIENTS	Pathogen growth	SI/LI	H	CCPp	Products must be stored at the correct temperature (frozen products at < -20 °C, refrigerated products at < 4 °C, and dry products at < 25 °C).	Observe storage procedure and measure the air temperature of the storage area (every 4 hours). Visually inspect products to detect any spoilage.	Adjust the thermostat to correct temperature and discard any products that are spoilt.	Store person	CFJD18:4/91 CFJD86:5/94 FAD130:5/92 FAD115:2/92
BOILING CHICKEN	Pathogen and spore survival	MI/SI	H	CCPe	Boil chicken for sufficient time (approximately 1½ hours). Ensure that the internal temperature of the chicken is > 80 °C after boiling has been completed.	Observe boiling procedure. Measure the internal temperature of the chicken after boiling has been completed.	Extend the boiling time and boil until the internal temperature of the chicken reaches > 80 °C.	Chef	FAD130:5/92 CFJD86:5/94
COOLING CHICKEN WITH COLD WATER	Spore germination and resulting pathogen growth	SI/LI	H	CCPp	Rapidly cool the chicken with cold running water until it is cool enough to handle.	Observe cooling procedure. Feel the chicken to ensure it is cool enough to be handled comfortably.	Continue to cool the chicken with cold running water until it reaches a temperature where it can be handled comfortably.	Chef	FAD130:5/92 CFJD86:5/94
SKINNING, DE-BONING, BREAKING-UP AND CUTTING CHICKEN	Contamination from food handlers, equipment, utensils and working area	MI/SI	H	CCPr	Avoid handling the chicken with bare hands, soiled equipment and utensils. Avoid working in a dirty working area.	Observe skinning, de-boning, breaking-up and cutting procedure. Ensure that plastic disposable gloves are worn and that equipment, utensils and working area are thoroughly sanitised and disinfected before and after use.	Staff education Staff meeting	All staff involved with this operation.	CFJD86:5/94 FAD130:5/92
BLANCHING CARROTS	Pathogen and spore survival	MI/SI	H	CCPe	Blanch carrots for sufficient time (refer to recipe). Ensure that the temperature of the carrots is > 70 °C after blanching has been completed.	Observe blanching procedure. Measure the temperature of the carrots after blanching has been completed.	Extend the blanching time and blanch until the temperature of the carrots reaches > 70 °C.	Chef	FAD130:5/92 CFJD86:5/94

SAUTEING ONION, MARGARINE AND CARROTS	Pathogen and spore survival	MI/SI	H	CCPe	Sauté ingredients for sufficient time (refer to recipe). Ensure that the temperature of the ingredients is > 70 °C after sautéing has been completed.	Observe sautéing procedure. Measure the temperature of the ingredients after sautéing has been completed.	Extend the sautéing time and sauté until the temperature of the ingredients reaches > 70 °C.	Chef	FAD130:5/92 CFJD86:5/94
THAWING BACON	Pathogen growth	SI/LI	H	CCPr	Thaw bacon in boiling water and ensure that complete thawing has taken place.	Observe thawing procedure and visually inspect and feel whether bacon has completely thawed. Ensure that bacon is promptly used after it has been thawed.	Continue to boil the bacon until thoroughly thawed.	Chef	FAD130:5/92 CFJD86:5/94
BOILING SAUCE	Pathogen and spore survival	MI/SI	H	CCPe	Boil sauce for sufficient time (refer to recipe).	Observe boiling procedure. Ensure sauce bubbles.	Extend the boiling time and boil until the sauce bubbles.	Chef	FAD130:5/92 CFJD86:5/94
MIXING INGREDIENTS	Contamination from hands, equipment and utensils	MI/SI	H	CCPr	Avoid hand contact and the use of soiled equipment and utensils.	Observe mixing procedure. Ensure that plastic disposable gloves are worn and that equipment and utensils are thoroughly disinfected before and after use.	Staff education Staff meeting	Chef	FAD130:5/92 CFJD86:5/94
BAKING CHICKEN & HAM PIE	Pathogen and spore survival	MI/SI	H	CCPe	Bake chicken & ham pie in metal trays at 220 °C for 30-40 minutes. Ensure that the internal temperature of the chicken & ham pie is > 80 °C after baking has been completed.	Observe baking procedure. Measure the internal temperature of the chicken & ham pie after baking has been completed.	Extend the baking time and bake until the internal temperature of the chicken & ham pie reaches > 80 °C.	Chef	FAD130:5/92 CFJD72 CFJD86:5/94
COOLING CHICKEN & HAM PIE IN COOLING TUNNEL	Spore germination and resulting pathogen growth	SI/LI	H	CCPp	Cool rapidly to approximately 10 °C within < 1½ hours.	Observe cooling procedure. Measure the air temperature in the cooling tunnel (every 4 hours) and the time elapsed to cool the chicken & ham pie to approximately 10 °C. Measure the temperature of the chicken & ham pie at completion of cooling.	Adjust the cooling tunnel's thermostat to correct temperature.	Chef	CFJD86:5/94 FAD130:5/92
FREEZING	Pathogen and spore survival	MI/SI	H	CCPp	Cover the trolley containing the chicken & ham pies with a cloth sheet and freeze to < -20 °C (overnight).	Measure the air temperature in the freezer.	Adjust freezer's thermostat to correct temperature.	Packaging staff Head chef	FAD132:5/92 FAD115:2/92
LIDDING, WEIGHING AND LABELING	Contamination from food handlers, equipment and utensils	MI/SI	H	CCPr	Avoid handling the chicken & ham pie with bare hands, soiled equipment and utensils. Avoid working in a dirty working area.	Observe packaging procedure. Ensure that plastic disposable gloves are worn and that equipment, utensils and working area are thoroughly sanitised and disinfected before and after use.	Staff education	All staff involved with this operation.	CFJD90:4/91 FAD131:5/92 CFJD86:5/94
FROZEN STORAGE	Pathogen and spore survival	MI/SI	H	CCPp	Store the chicken & ham pie at < -20 °C for no longer than 12 months.	Measure the air temperature in the freezer and note the production date of the chicken & ham pie.	Adjust freezer's thermostat to correct temperature. Discard any chicken & ham pie if kept in the freezer longer that 12 months.	Packaging staff Head chef	FAD132:5/92 FAD115:2/92

Figure 8 - Flowchart for Chicken Crumbed

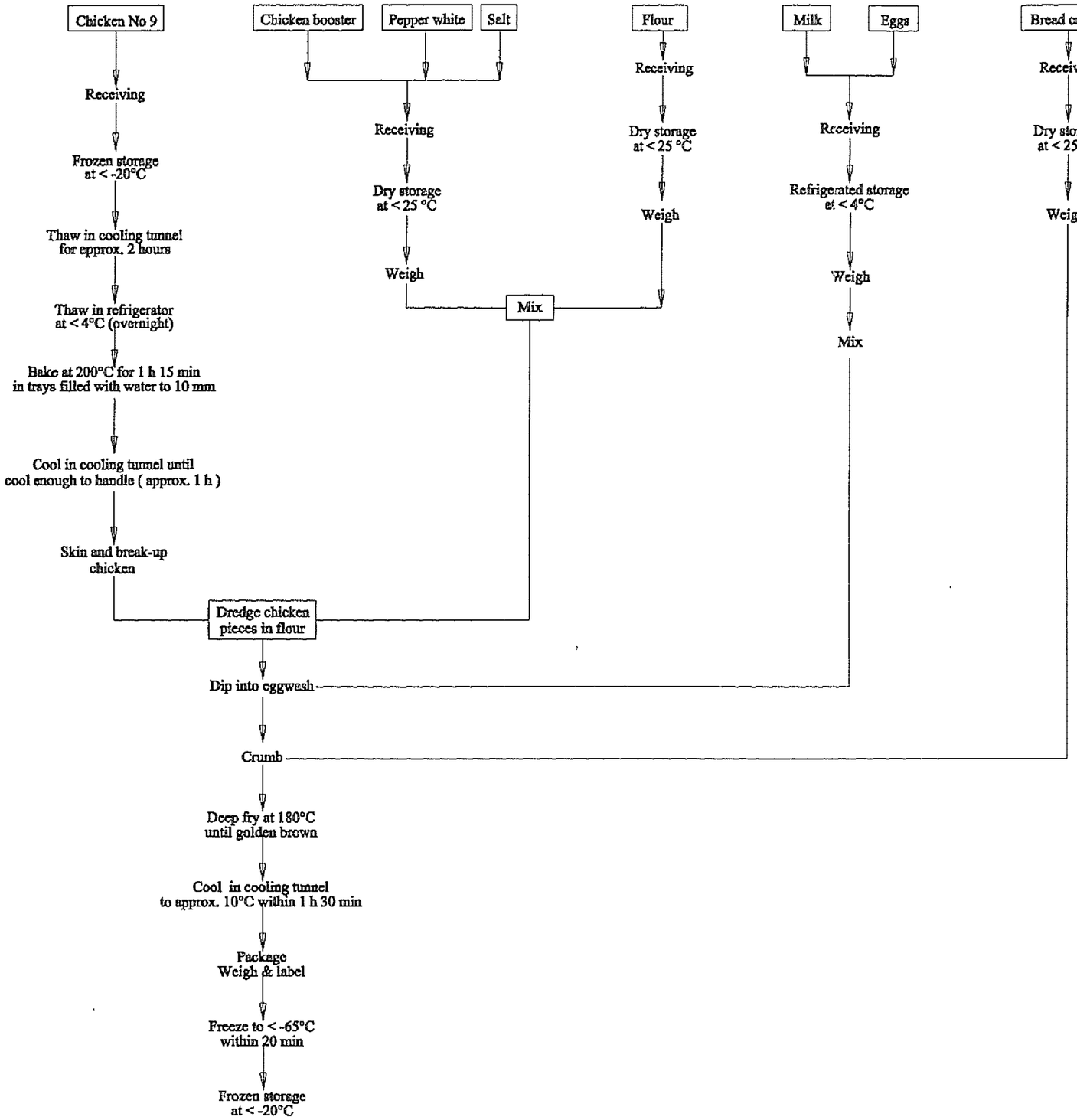


Table 7 - HACCP Control Chart for Chicken Crumbed

*To view records refer to Appendix C

Operation	Hazard	Degree of concern		Type of CCP	Critical limits	Monitoring procedure	Corrective action	Responsibility	*Records
		S	R						
RECEIVING Chicken Pepper white Chicken booster Salt Bread crumbs Flour plain Milk Egg	*Salmonella* *Camphylobacter* *Clostridium* *Perfringens* Other pathogens Heat resistant spores Pathogens	SI SI MI SI/LI LI SI/LI	H H H H H H	CCPr	Ingredient audit - all ingredients must be the correct temperature and free from spoilage on arrival. Supplier audit	Inspect all ingredients upon arrival by sensory evaluation and temperature check. Inspect certificates of microbiological analysis (if supplied). Inspect supplier on regular basis (once/year).	Contact supplier/reject product/change supplier.	Store person	CFAD93:6/91 CFAD81:2/96 FAD132:5/92 FAD133:5/92
STORAGE OF INGREDIENTS	Pathogen growth	SI/LI	H	CCPp	Products must be stored at the correct temperature (frozen products at < -20 °C, refrigerated products at < 4 °C, and dry products at < 25 °C).	Observe storage procedure and measure the air temperature of the storage area (every 4 hours). Visually inspect products to detect any spoilage.	Adjust the thermostat to correct temperature and discard any products that are spoilt.	Store person	CFJD18:4/91 CFJD86:5/94 FAD130:5/92 FAD115:2/92
THAWING CHICKEN	Pathogen growth	SI/LI	H	CCPr	Thaw chicken under refrigeration at < 4 °C and ensure that complete thawing has taken place.	Observe thawing procedure and visually inspect and feel whether chicken has completely thawed. Ensure that chicken is promptly used after it has been thawed.	Adjust the refrigerator's thermostat to correct temperature and continue to thaw chicken until completely thawed.	Chef	CFJD18:4/91 CFJD86:5/94 FAD130:5/92
ROASTING CHICKEN	Pathogen and spore survival	MI/SI	H	CCPe	Roast chicken at 200 °C for sufficient time (approximately 1¼ hours). Ensure that the internal temperature of the chicken is > 80 °C after roasting has been completed.	Observe roasting procedure. Measure the internal temperature of the chicken after roasting has been completed.	Extend the roasting time and roast until the internal temperature of the chicken reaches > 80 °C.	Chef	FAD130:5/92 CFJD72 CFJD86:5/94
COOLING CHICKEN IN COOLING TUNNEL	Spore germination and resulting pathogen growth	SI/LI	H	CCPp	Rapidly cool the chicken until it is cool enough to handle.	Observe cooling procedure. Feel the chicken to ensure it is cool enough to be handled comfortably.	Continue to cool the chicken until it reaches a temperature where it can be handled comfortably.	Chef	CFJD86:5/94 FAD130:5/92
SKINNING AND BREAKING-UP CHICKEN	Contamination from food handlers, equipment, utensils and working area	MI/SI	H	CCPr	Avoid handling the chicken with bare hands, soiled equipment and utensils. Avoid working in a dirty working area.	Observe skinning and breaking-up procedure. Ensure that plastic disposable gloves are worn and that equipment, utensils and working area are thoroughly sanitised and disinfected before and after use.	Staff education Staff meeting	All staff involved with this operation.	CFJD86:5/94 FAD130:5/92
MIXING INGREDIENTS	Contamination from hands, equipment and utensils	MI/SI	H	CCPr	Avoid hand contact and the use of soiled equipment and utensils.	Observe mixing procedure. Ensure that plastic disposable gloves are worn and that equipment and utensils are thoroughly disinfected before and after use.	Staff education Staff meeting	Chef	FAD130:5/92 CFJD86:5/94
CRUMBING CHICHEN	Contamination from food handlers, equipment, utensils and working area	MI/SI	H	CCPr	Avoid handling the chicken with bare hands, soiled equipment and utensils. Avoid working in a dirty working area.	Observe crumbing procedure. Ensure that plastic disposable gloves are worn and that equipment, utensils and working area are thoroughly sanitised and	Staff education Staff meeting	All staff involved with this operation.	FAD130:5/92 CFJD86:5/94

						disinfected before and after use.			
DEEP FRYING CHICKEN	Pathogen and spore survival	MI/SI	H	CCPe	Deep fry chicken at 180 °C for sufficient time (until golden brown). Ensure that the internal temperature of the chicken is > 80 °C after deep frying has been completed.	Observe deep frying procedure. Measure the internal temperature of the chicken after deep frying has been completed.	Extend the deep frying time and deep fry until the internal temperature of the chicken reaches > 80 °C.	Chef	FAD130:5/92 CFJD86:5/94
COOLING CHICKEN IN COOLING TUNNEL	Spore germination and resulting pathogen growth	SI/LI	H	CCPp	Cool rapidly to approximately 10 °C within < 1½ hours.	Observe cooling procedure. Measure the air temperature in the cooling tunnel (every 4 hours) and the time elapsed to cool the chicken to approximately 10 °C. Measure the internal temperature of the chicken at completion of cooling.	Adjust the cooling tunnel's thermostat to correct temperature.	Chef	CFJD86:5/94 FAD130:5/92
PACKAGING, WEIGHING AND LABELING	Contamination from food handlers, equipment and utensils	MI/SI	H	CCPr	Avoid handling the chicken with bare hands, soiled equipment and utensils. Avoid working in a dirty working area.	Observe packaging procedure. Ensure that plastic disposable gloves are worn and that equipment, utensils and working area are thoroughly sanitised and disinfected before and after use.	Staff education	Packaging staff	CFJD90:4/91 FAD131:5/92 CFJD86:5/94
FREEZING	Pathogen and spore survival	MI/SI	H	CCPp	Freeze the chicken promptly after packaging to < -65 °C in 20 minutes.	Observe freezing procedure. Measure the air temperature in the freezer and duration of freezing.	Adjust freezer's thermostat to correct temperature.	Packaging staff	FAD132:5/92 FAD115:2/92
FROZEN STORAGE	Pathogen and spore survival	MI/SI	H	CCPp	Store chicken at < -20 °C for no longer than 12 months.	Measure the air temperature in the freezer and note the production date of the chicken.	Adjust freezer's thermostat to correct temperature. Discard any chicken if kept in the freezer longer that 12 months.	Packaging staff Head chef	FAD132:5/92 FAD115:2/92

Figure 9 - Flowchart for Chicken Roast

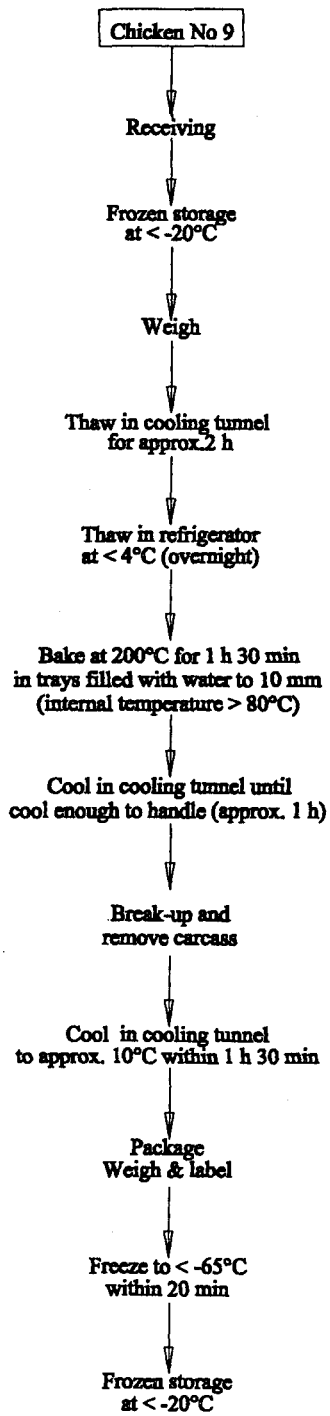


Table 8 - HACCP Control Chart for Chicken Roast

*To view records refer to Appendix C

Operation	Hazard	Degree of concern		Type of CCP	Critical limits	Monitoring procedure	Corrective action	Responsibility	*Records
		S	R						
RECEIVING Chicken	*Salmonella* *Camphylobacter* *Clostridium perfringens* Other pathogens	SI SI MI SI/LI	H H H H	CCPr	Ingredient audit - chicken must be the correct temperature and free from spoilage on arrival. Supplier audit	Inspect chicken upon arrival by sensory evaluation and temperature check. Inspect certificates of microbiological analysis (if supplied). Inspect supplier on regular basis (once/year).	Contact supplier/reject product/change supplier.	Store person	CFAD93:6/91 CFAD81:2/96 FAD132:5/92 FAD133:5/92
STORAGE OF CHICKEN	Pathogen growth	SI/LI	H	CCPp	Chicken must be stored at the correct temperature (frozen at < -20 °C).	Observe storage procedure and measure the air temperature of the storage area (every 4 hours). Visually inspect chicken to detect any spoilage.	Adjust the thermostat to correct temperature and discard any spoilt chicken.	Store person	CFJD18:4/91 CFJD86:5/94 FAD130:5/92 FAD115:2/92
THAWING CHICKEN	Pathogen growth	SI/LI	H	CCPr	Thaw chicken under refrigeration at < 4 °C and ensure that complete thawing has taken place.	Observe thawing procedure and visually inspect and feel whether chicken has completely thawed. Ensure that chicken is promptly used after it has been thawed.	Adjust the refrigerator's thermostat to correct temperature and continue to thaw chicken until completely thawed.	Chef	CFJD18:4/91 CFJD86:5/94 FAD130:5/92
ROASTING CHICKEN	Pathogen and spore survival	MI/SI	H	CCPe	Roast chicken at 200 °C for sufficient time (approximately 1½ hours). Ensure that the internal temperature of the chicken is > 80 °C after roasting has been completed.	Observe roasting procedure. Measure the internal temperature of the chicken after roasting has been completed.	Extend the roasting time and roast until the internal temperature of the chicken reaches > 80 °C.	Chef	FAD130:5/92 CFJD72 CFJD86:5/94
COOLING CHICKEN IN COOLING TUNNEL	Spore germination and resulting pathogen growth	SI/LI	H	CCPp	Rapidly cool the chicken until it is cool enough to handle.	Observe cooling procedure. Feel the chicken to ensure it is cool enough to be handled comfortably.	Continue to cool the chicken until it reaches a temperature where it can be handled comfortably.	Chef	CFJD86:5/94 FAD130:5/92
BREAKING-UP CHICKEN	Contamination from food handlers, equipment, utensils and working area	MI/SI	H	CCPr	Avoid handling the chicken with bare hands, soiled equipment and utensils. Avoid working in a dirty working area.	Observe breaking-up procedure. Ensure that plastic disposable gloves are worn and that equipment, utensils and working area are thoroughly sanitised and disinfected before and after use.	Staff education Staff meeting	All staff involved with this operation.	CFJD86:5/94 FAD130:5/92
COOLING CHICKEN IN COOLING TUNNEL	Spore germination and resulting pathogen growth	SI/LI	H	CCPp	Cool rapidly to approximately 10 °C within < 1½ hours.	Observe cooling procedure. Measure the air temperature in the cooling tunnel (every 4 hours) and the time elapsed to cool the chicken to approximately 10 °C. Measure the internal temperature of the chicken at completion of cooling.	Adjust the cooling tunnel's thermostat to correct temperature.	Chef	CFJD86:5/94 FAD130:5/92
PACKAGING, WEIGHING AND LABELING	Contamination from food handlers, equipment and utensils	MI/SI	H	CCPr	Avoid handling the chicken with bare hands, soiled equipment and utensils. Avoid working in a dirty working area.	Observe packaging procedure. Ensure that plastic disposable gloves are worn and that equipment, utensils and working area are thoroughly sanitised and disinfected before and after use.	Staff education	Packaging staff	CFJD90:4/91 FAD131:5/92 CFJD86:5/94

FREEZING	Pathogen and spore survival	MI/SI	H	CCPp	Freeze the chicken promptly after packaging to < -65 °C in 20 minutes.	Observe freezing procedure. Measure the air temperature in the freezer and duration of freezing.	Adjust freezer's thermostat to correct temperature.	Packaging staff	FAD132:5/92 FAD115:2/92
FROZEN STORAGE	Pathogen and spore survival	MI/SI	H	CCPp	Store chicken at < -20 °C for no longer than 12 months.	Measure the air temperature in the freezer and note the production date of the chicken.	Adjust freezer's thermostat to correct temperature. Discard any chicken if kept in the freezer longer that 12 months.	Packaging staff Head chef	FAD132:5/92 FAD115:2/92

Figure 10 - Flowchart for Chicken Macaroni

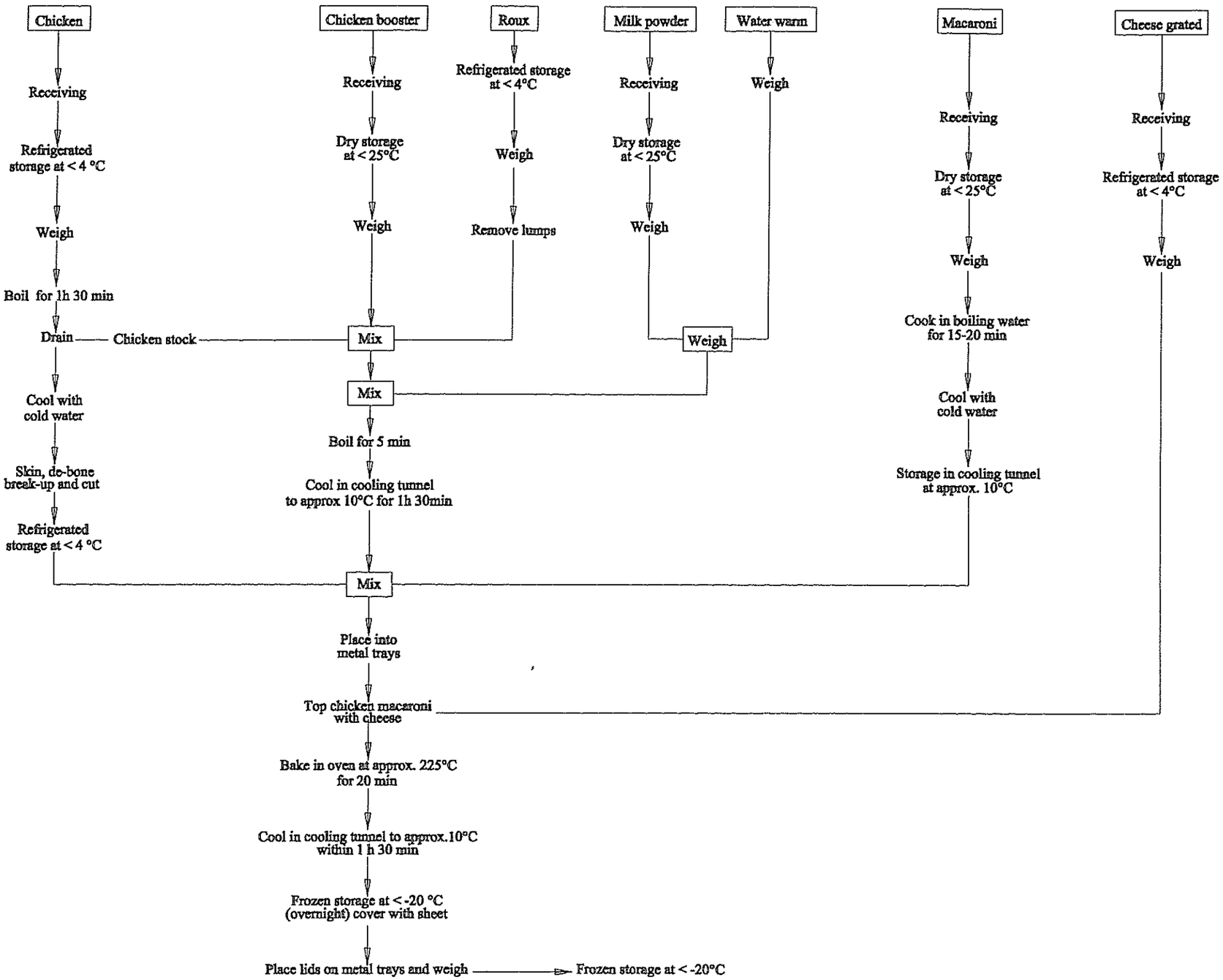


Table 9 - HACCP Control Chart for Chicken Macaroni

*To view records refer to Appendix C

Operation	Hazard	Degree of concern S	Degree of concern R	Type of CCP	Critical limits	Monitoring procedure	Corrective action	Responsibility	*Records
RECEIVING Chicken Chicken booster Milk powder Macaroni Roux Cheese semi-matured Water	*Salmonell* *Camphylobacter* *Clostridium Perfingens* Other pathogens Heat resistant spores Pathogens Microbiological and chemical contamination	SI SI MI SI/LI LI SI/LI SI/LI	H H H H H H H	CCPr	Ingredient audit - all ingredients must be the correct temperature and free from spoilage on arrival. Supplier audit Regulatory compliance (see specifications).	Inspect all ingredients upon arrival by sensory evaluation and temperature check. Inspect certificates of microbiological analysis (if supplied). Inspect supplier on regular basis (once/year). Testing to include microbiological, chemical and toxic substances. Inspect certificates of analysis from Water Authority.	Contact supplier/reject product/change supplier. Contact Water Authority.	Store person Quality assurance manager	CFAD93:6/91 CFAD81:2/96 FAD132:5/92 FAD133:5/92
STORAGE OF INGREDIENTS	Pathogen growth	SI/LI	H	CCPp	Products must be stored at the correct temperature (frozen products at < -20 °C, refrigerated products at < 4 °C, and dry products at < 25 °C).	Observe storage procedure and measure the air temperature of the storage area (every 4 hours). Visually inspect products to detect any spoilage.	Adjust the thermostat to correct temperature and discard any products that are spoilt.	Store person	CFJD18:4/91 CFJD86:5/94 FAD130:5/92 FAD115:2/92
BOILING CHICKEN	Pathogen and spore survival	MI/SI	H	CCPe	Boil chicken for sufficient time (approximately 1½ hours). Ensure that the internal temperature of the chicken is > 80 °C after boiling has been completed.	Observe boiling procedure. Measure the internal temperature of the chicken after boiling has been completed.	Extend the boiling time and boil until the internal temperature of the chicken reaches > 80 °C.	Chef	FAD130:5/92 CFJD86:5/94
COOLING CHICKEN WITH COLD WATER	Spore germination and resulting pathogen growth	SI/LI	H	CCPp	Rapidly cool the chicken with cold running water until it is cool enough to handle.	Observe cooling procedure. Feel the chicken to ensure it is cool enough to be handled comfortably.	Continue to cool the chicken with cold running water until it reaches a temperature where it can be handled comfortably.	Chef	FAD130:5/92 CFJD86:5/94
SKINNING, DE-BONING, BREAKING-UP AND CUTTING CHICKEN	Contamination from food handlers, equipment, utensils and working area	MI/SI	H	CCPr	Avoid handling the chicken with bare hands, soiled equipment and utensils. Avoid working in a dirty working area.	Observe skinning, de-boning, breaking-up and cutting procedure. Ensure that plastic disposable gloves are worn and that equipment, utensils and working area are thoroughly sanitised and disinfected before and after use.	Staff education Staff meeting	All staff involved with this operation.	CFJD86:5/94 FAD130:5/92
BOILING MACARONI	Spore survival	MI/SI	H	CCPe	Boil macaroni for sufficient time (refer to recipe).	Observe boiling procedure. Test macaroni with a skewer to see if thoroughly cooked.	Extend boiling time and boil until macaroni is thoroughly cooked.	Chef	FAD130:5/92 CFJD86:5/94
REFRIGERATED STORAGE OF CHICKEN AND MACARONI	Pathogen growth	SI/LI	H	CCPp	Cooked chicken and macaroni must be stored at < 4 °C if not used straight after cooking.	Observe storage procedure and measure the air temperature of the storage area (every 4 hours). Visually inspect chicken and macaroni to detect any spoilage.	Adjust the thermostat to correct temperature and discard any spoilt chicken or macaroni.	Chef	CFJD18:4/91 CFJD86:5/94 FAD130:5/92
BOILING SAUCE	Pathogen and spore survival	MI/SI	H	CCPe	Boil sauce for sufficient time (refer to recipe).	Observe boiling procedure. Ensure sauce bubbles.	Extend the boiling time and boil until the sauce bubbles.	Chef	FAD130:5/92 CFJD86:5/94

COOLING SAUCE IN COOLING TUNNEL	Spore germination and resulting pathogen growth	SI/LI	H	CCPp	Cool rapidly to approximately 10 °C within < 1½ hours.	Observe cooling procedure. Measure the air temperature in the cooling tunnel (every 4 hours) and the time elapsed to cool the sauce to approximately 10 °C. Measure the temperature of the sauce at completion of cooling.	Adjust the cooling tunnel's thermostat to correct temperature.	Chef	CFJD86:5/94 FAD130:5/92
MIXING INGREDIENTS	Contamination from hands, equipment and utensils	MI/SI	H	CCPr	Avoid hand contact and the use of soiled equipment and utensils.	Observe mixing procedure. Ensure that plastic disposable gloves are worn and that equipment and utensils are thoroughly disinfected before and after use.	Staff education Staff meeting	Chef	FAD130:5/92 CFJD86:5/94
BAKING CHICKEN MACARONI	Pathogen and spore survival	MI/SI	H	CCPe	Bake chicken macaroni in metal trays at 225 °C for 20 minutes. Ensure that the internal temperature of the chicken macaroni is > 80 °C after baking has been completed.	Observe baking procedure. Measure the internal temperature of the chicken macaroni after baking has been completed.	Extend the baking time and bake until the internal temperature of the chicken macaroni reaches > 80 °C.	Chef	FAD130:5/92 CFJD72 CFJD86:5/94
COOLING CHICKEN MACARONI IN COOLING TUNNEL	Spore germination and resulting pathogen growth	SI/LI	H	CCPp	Cool rapidly to approximately 10 °C within < 1½ hours.	Observe cooling procedure. Measure the air temperature in the cooling tunnel (every 4 hours) and the time elapsed to cool the chicken macaroni to approximately 10 °C. Measure the temperature of the chicken macaroni at completion of cooling.	Adjust the cooling tunnel's thermostat to correct temperature.	Chef	CFJD86:5/94 FAD130:5/92
FREEZING	Pathogen and spore survival	MI/SI	H	CCPp	Cover the trolley containing the chicken macaroni with a cloth sheet and freeze to < -20 °C (overnight).	Measure the air temperature in the freezer.	Adjust the freezer's thermostat to correct temperature.	Packaging staff Head chef	FAD132:5/92 FAD115:2/92
LIDDING, WEIGHING AND LABELING	Contamination from food handlers, equipment and utensils	MI/SI	H	CCPr	Avoid handling the chicken macaroni with bare hands, soiled equipment and utensils. Avoid working in a dirty working area.	Observe packaging procedure. Ensure that plastic disposable gloves are worn and that equipment, utensils and working area are thoroughly sanitised and disinfected before and after use.	Staff education	Packaging staff	CFJD90:4/91 FAD131:5/92 CFJD86:5/94
FROZEN STORAGE	Pathogen and spore survival	MI/SI	H	CCPp	Store the chicken macaroni at < -20 °C for no longer than 12 months.	Measure the air temperature in the freezer and note the production date of the chicken macaroni.	Adjust the freezer's thermostat to correct temperature. Discard any chicken macaroni if kept in the freezer longer that 12 months.	Packaging staff Head chef	FAD132:5/92 FAD115:2/92

Figure 11 - Flowchart for Chicken in Wine

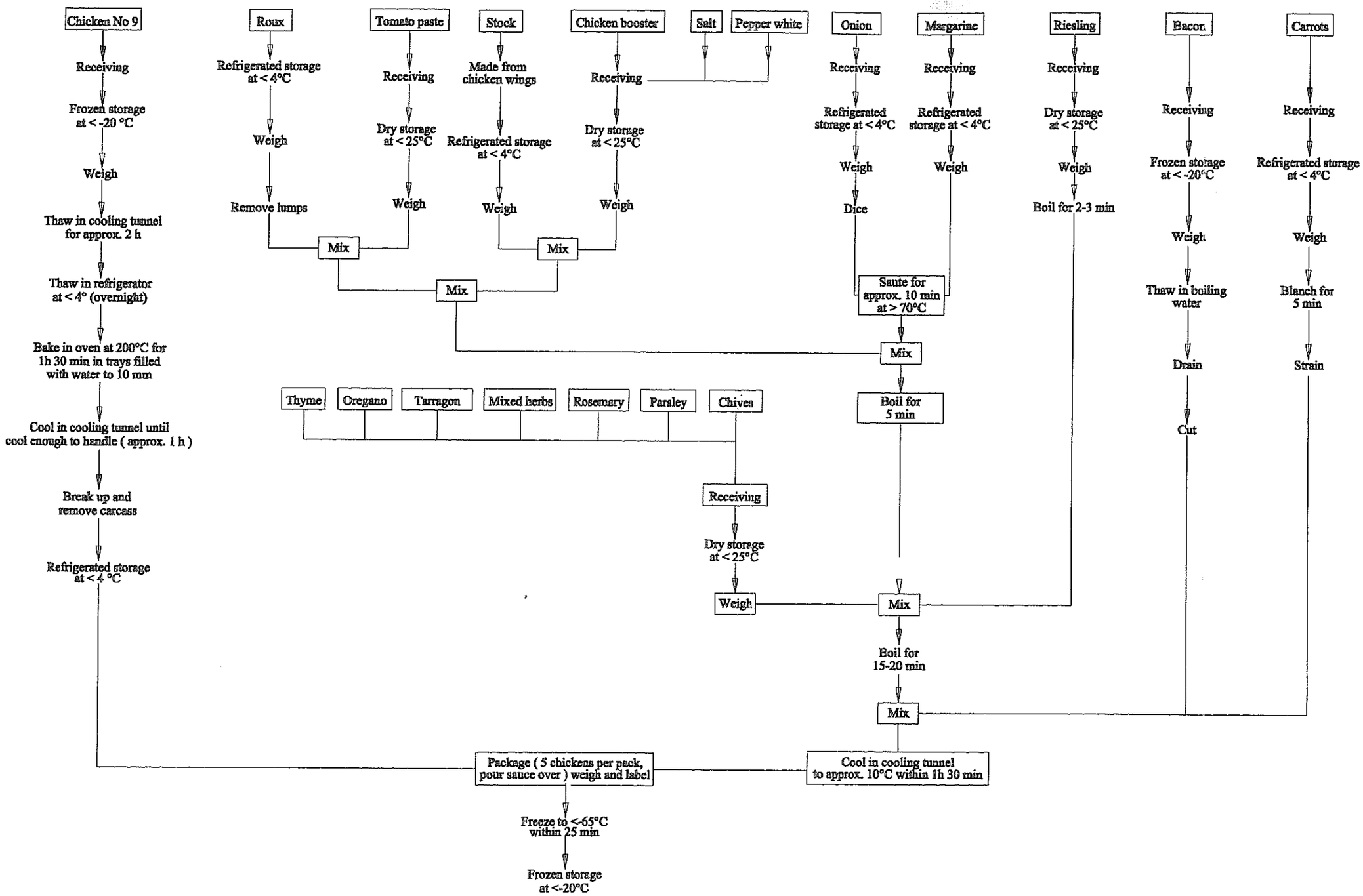


Table 10 - <u>HACCP Control Chart for Chicken in Wine</u>

*To view records refer to Appendix C

Operation	Hazard	Degree of concern		Type of CCP	Critical limits	Monitoring procedure	Corrective action	Responsibility	*Records
		S	R						
RECEIVING Chicken	*Salmonell* *Camphylobacter* *Clostridium Perfingens* Other pathogens	SI SI MI SI/LI	H H H H	CCPr	Ingredient audit - all ingredients must be the correct temperature and free from spoilage on arrival. Supplier audit	Inspect all ingredients upon arrival by sensory evaluation and temperature check. Inspect certificates of microbiological analysis (if supplied). Inspect supplier on regular basis (once/year).	Contact supplier/reject product/change supplier.	Store person	CFAD93:6/91 CFAD81:2/96 FAD132:5/92 FAD133:5/92
Chicken booster Salt Riesling Parsley Chives Mixed herbs Oregano Tomato paste Tarragon Thyme Rosemary Pepper white	Heat resistant spores	LI	H						
Roux Onion Bacon Carrot Margarine	Pathogens	SI/LI	H						
Water	Microbiological and chemical contamination	SI/LI	H		Regulatory compliance (see specifications).	Testing to include microbiological, chemical and toxic substances. Inspect certificates of analysis from Water Authority.	Contact Water Authority.	Quality assurance manager	
STORAGE OF INGREDIENTS	Pathogen growth	SI/LI	H	CCPp	Products must be stored at the correct temperature (frozen products at < -20 °C, refrigerated products at < 4 °C, and dry products at < 25 °C).	Observe storage procedure and measure the air temperature of the storage area (every 4 hours). Visually inspect products to detect any spoilage.	Adjust the thermostat to correct temperature and discard any products that are spoilt.	Store person	CFJD18:4/91 CFJD86:5/94 FAD130:5/92 FAD115:2/92
THAWING CHICKEN	Pathogen growth	SI/LI	H	CCPr	Thaw chicken under refrigeration at < 4 °C and ensure that complete thawing has taken place.	Observe thawing procedure and visually inspect and feel whether chicken has completely thawed. Ensure that chicken is promptly used after it has been thawed.	Adjust the refrigerator's thermostat to correct temperature and continue to thaw chicken until completely thawed.	Chef	CFJD18:4/91 CFJD86:5/94 FAD130:5/92
ROASTING CHICKEN	Pathogen and spore survival	MI/SI	H	CCPe	Roast chicken at 200 °C for sufficient time (approximately 1½ hours). Ensure that the internal temperature of the chicken is > 80 °C after roasting has been completed.	Observe roasting procedure. Measure the internal temperature of the chicken after roasting has been completed.	Extend the roasting time and roast until the internal temperature of the chicken reaches > 80 °C.	Chef	FAD130:5/92 CFJD72 CFJD86:5/94
COOLING CHICKEN IN COOLING TUNNEL	Spore germination and resulting pathogen growth	SI/LI	H	CCPp	Rapidly cool the chicken until it is cool enough to handle.	Observe cooling procedure. Feel the chicken to ensure it is cool enough to be handled comfortably.	Continue to cool the chicken until it reaches a temperature where it can be handled comfortably.	Chef	CFJD86:5/94 FAD130:5/92

BREAKING-UP CHICKEN	Contamination from food handlers, equipment, utensils and working area	MI/SI	H	CCPr	Avoid handling the chicken with bare hands, soiled equipment and utensils. Avoid working in a dirty working area.	Observe breaking-up procedure. Ensure that plastic disposable gloves are worn and that equipment, utensils and working area are thoroughly sanitised and disinfected before and after use.	Staff education Staff meeting	All staff involved with this operation.	CFJD86:5/94 FAD130:5/92
REFRIGERATED STORAGE OF CHICKEN	Pathogen growth	SI/LI	H	CCPp	Cooked chicken must be stored at < 4 °C if not used straight after cooking.	Observe storage procedure and measure the air temperature of the storage area (every 4 hours). Visually inspect chicken to detect any spoilage.	Adjust the thermostat to correct temperature and discard any spoilt chicken.	Chef	CFJD18:4/91 CFJD86:5/94 FAD130:5/92
SAUTEING ONION AND MARGARINE	Pathogen and spore survival	MI/SI	H	CCPe	Sauté ingredients for sufficient time (refer to recipe). Ensure that the temperature of the ingredients is > 70 °C after sautéing has been completed.	Observe sautéing procedure. Measure the temperature of the ingredients after sautéing has been completed.	Extend the sautéing time and sauté until the temperature of the ingredients reaches > 70 °C.	Chef	FAD130:5/92 CFJD86:5/94
BLANCHING CARROTS	Pathogen and spore survival	MI/SI	H	CCPe	Blanch carrots for sufficient time (refer to recipe). Ensure that the temperature of the carrots is > 70 °C after blanching has been completed.	Observe blanching procedure. Measure the temperature of the carrots after blanching has been completed.	Extend the blanching time and blanch until the temperature of the carrots reaches > 70 °C.	Chef	FAD130:5/92 CFJD86:5/94
THAWING BACON	Pathogen growth	SI/LI	H	CCPr	Thaw bacon in boiling water and ensure that complete thawing has taken place.	Observe thawing procedure and visually inspect and feel whether bacon has completely thawed. Ensure that bacon is promptly used after it has been thawed.	Continue to boil the bacon until thoroughly thawed.	Chef	FAD130:5/92 CFJD86:5/94
BOILING WINE SAUCE	Pathogen and spore survival	MI/SI	H	CCPe	Boil wine sauce for sufficient time (refer to recipe).	Observe boiling procedure. Ensure wine sauce bubbles.	Extend the boiling time and boil until the wine sauce bubbles.	Chef	FAD130:5/92 CFJD86:5/94
MIXING INGREDIENTS	Contamination from hands, equipment and utensils	MI/SI	H	CCPr	Avoid hand contact and the use of soiled equipment and utensils.	Observe mixing procedure. Ensure that plastic disposable gloves are worn and that equipment and utensils are thoroughly disinfected before and after use.	Staff education Staff meeting	Chef	FAD130:5/92 CFJD86:5/94
COOLING WINE SAUCE IN COOLING TUNNEL	Spore germination and resulting pathogen growth	SI/LI	H	CCPp	Cool rapidly to approximately 10 °C within < 1½ hours.	Observe cooling procedure. Measure the air temperature in the cooling tunnel (every 4 hours) and the time elapsed to cool the wine sauce to approximately 10 °C. Measure the temperature of the wine sauce at completion of cooling.	Adjust the cooling tunnel's thermostat to correct temperature.	Chef	CFJD86:5/94 FAD130:5/92
PACKAGING, WEIGHING AND LABELING	Contamination from food handlers, equipment and utensils	MI/SI	H	CCPr	Avoid handling the chicken and wine sauce with bare hands, soiled equipment and utensils. Avoid working in a dirty working area.	Observe packaging procedure. Ensure that plastic disposable gloves are worn and that equipment, utensils and working area are thoroughly sanitised and disinfected before and after use.	Staff education	Packaging staff	CFJD90:4/91 FAD131:5/92 CFJD86:5/94
FREEZING	Pathogen and spore survival	MI/SI	H	CCPp	Freeze the chicken in wine promptly after packaging to < -65 °C in 25 minutes.	Observe freezing procedure. Measure the air temperature in the freezer and duration of freezing.	Adjust freezer's thermostat to correct temperature.	Packaging staff	FAD132:5/92 FAD115:2/92
FROZEN STORAGE	Pathogen and spore survival	MI/SI	H	CCPp	Store the chicken in wine at < -20 °C for no longer than 12 months.	Measure the air temperature in the freezer and note the production date of the chicken in wine.	Adjust freezer's thermostat to correct temperature. Discard any chicken in wine if kept in the freezer longer that 12 months.	Packaging staff Head chef	FAD132:5/92 FAD115:2/92

Figure 12 - Flowchart for Minced Chicken and Gravy

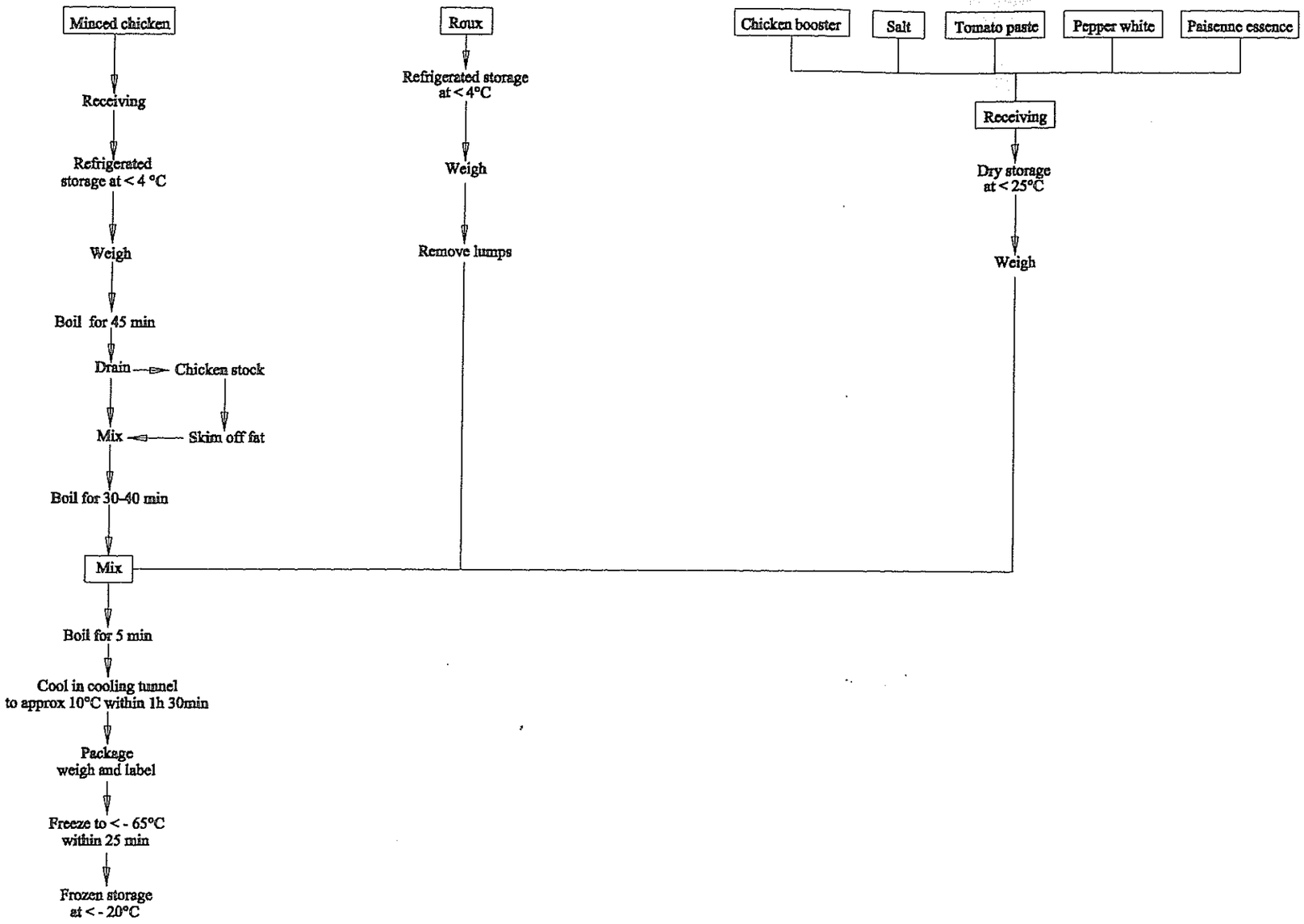


Table 11 - HACCP Control Chart for Minced Chicken and Gravy

*To view records refer to Appendix C

Operation	Hazard	Degree of concern		Type of CCP	Critical limits	Monitoring procedure	Corrective action	Responsibility	*Records
		S	R						
RECEIVING Minced chicken Chicken booster Salt Pepper white Tomato paste Parisienne essence Roux	*Salmonell* *Camphylobacter* *Clostridium perfingens* Other pathogens Heat resistant spores Pathogens	SI SI MI SI/LI LI SI/LI	H H H H H H	CCPr	Ingredient audit - all ingredients must be the correct temperature and free from spoilage on arrival. Supplier audit	Inspect all ingredients upon arrival by sensory evaluation and temperature check. Inspect certificates of microbiological analysis (if supplied). Inspect supplier on regular basis (once/year).	Contact supplier/reject product/change supplier.	Store person	CFAD93:6/91 CFAD81:2/96 FAD132:5/92 FAD133:5/92
STORAGE OF INGREDIENTS	Pathogen growth	SI/LI	H	CCPp	Products must be stored at the correct temperature (frozen products at < -20 °C, refrigerated products at < 4 °C, and dry products at < 25 °C).	Observe storage procedure and measure the air temperature of the storage area (every 4 hours). Visually inspect products to detect any spoilage.	Adjust the thermostat to correct temperature and discard any products that are spoilt.	Store person	CFJD18:4/91 CFJD86:5/94 FAD130:5/92 FAD115:2/92
BOILING MINCED CHICKEN	Pathogen and spore survival	MI/SI	H	CCPe	Boil minced chicken for sufficient time (approximately 45 minutes). Ensure that the temperature of the minced chicken is > 80 °C after boiling has been completed.	Observe boiling procedure. Measure the temperature of the minced chicken after boiling has been completed.	Extend the boiling time and boil until the temperature of the minced chicken reaches > 80 °C.	Chef	FAD130:5/92 CFJD86:5/94
MIXING INGREDIENTS	Contamination from hands, equipment and utensils	MI/SI	H	CCPr	Avoid hand contact and the use of soiled equipment and utensils.	Observe mixing procedure. Ensure that plastic disposable gloves are worn and that equipment and utensils are thoroughly disinfected before and after use.	Staff education Staff meeting	Chef	FAD130:5/92 CFJD86:5/94
BOILING MINCED CHICKEN & GRAVY	Pathogen and spore survival	MI/SI	H	CCPe	Boil minced chicken & gravy for sufficient time (refer to recipe).	Observe boiling procedure. Ensure minced chicken & gravy bubbles.	Extend the boiling time and boil until the minced chicken & gravy bubbles.	Chef	FAD130:5/92 CFJD86:5/94
COOLING MINCED CHICKEN & GRAVY IN COOLING TUNNEL	Spore germination and resulting pathogen growth	SI/LI	H	CCPp	Cool rapidly to approximately 10 °C within < 1½ hours.	Observe cooling procedure. Measure the air temperature in the cooling tunnel (every 4 hours) and the time elapsed to cool the minced chicken & gravy to approximately 10 °C. Measure the temperature of the minced chicken & gravy at completion of cooling.	Adjust the cooling tunnel's thermostat to correct temperature.	Chef	CFJD86:5/94 FAD130:5/92
PACKAGING, WEIGHING AND LABELING	Contamination from food handlers, equipment and utensils	MI/SI	H	CCPr	Avoid handling the minced chicken & gravy with bare hands, soiled equipment and utensils. Avoid working in a dirty working area.	Observe packaging procedure. Ensure that plastic disposable gloves are worn and that equipment, utensils and working area are thoroughly sanitised and disinfected before and after use.	Staff education	Packaging staff	CFJD90:4/91 FAD131:5/92 CFJD86:5/94

FREEZING	Pathogen and spore survival	MI/SI	H	CCPp	Freeze the minced chicken & gravy promptly after packaging to < -65 °C in 25 minutes.	Observe freezing procedure. Measure the air temperature in the freezer and duration of freezing.	Adjust freezer's thermostat to correct temperature.	Packaging staff	FAD132:5/92 FAD115:2/92
FROZEN STORAGE	Pathogen and spore survival	MI/SI	H	CCPp	Store the minced chicken & gravy at < -20 °C for no longer than 12 months.	Measure the air temperature in the freezer and note the production date of the minced chicken & gravy.	Adjust freezer's thermostat to correct temperature. Discard any minced chicken & gravy if kept in the freezer longer that 12 months.	Packaging staff Head chef	FAD132:5/92 FAD115:2/92

Figure 13 - Flowchart for Minced Chicken and Apricot

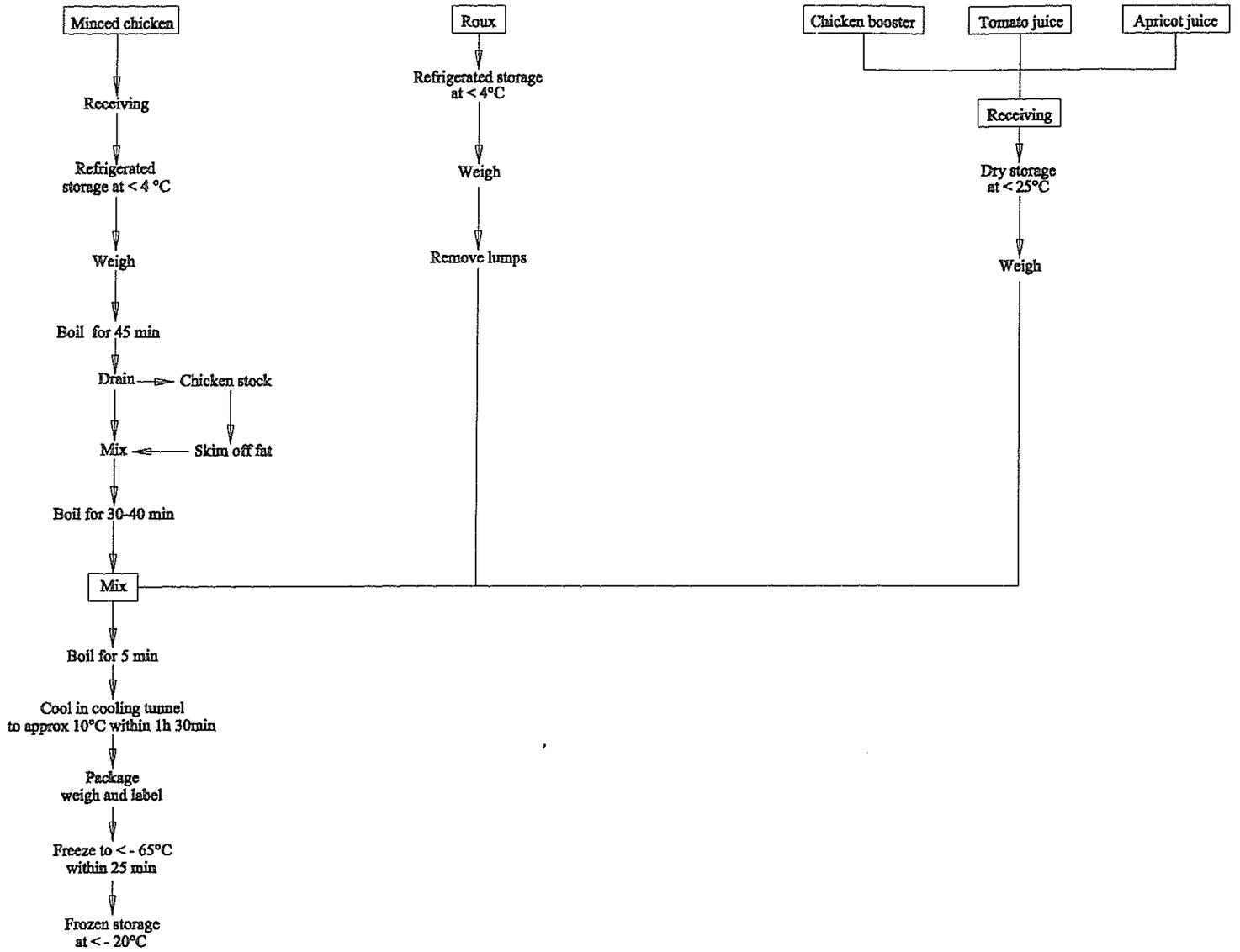


Table 12 - HACCP Control Chart for Minced Chicken & Apricot

*To view records refer to Appendix C

Operation	Hazard	Degree of concern S	Degree of concern R	Type of CCP	Critical limits	Monitoring procedure	Corrective action	Responsibility	*Records
RECEIVING Minced chicken Chicken booster Apricot juice Tomato juice Roux	*Salmonell* *Camphylobacter* *Clostridium perfingens* Other pathogens Heat resistant spores Pathogens	SI SI MI SI/LI LI SI/LI	H H H H H H	CCPr	Ingredient audit - all ingredients must be the correct temperature and free from spoilage on arrival. Supplier audit	Inspect all ingredients upon arrival by sensory evaluation and temperature check. Inspect certificates of microbiological analysis (if supplied). Inspect supplier on regular basis (once/year).	Contact supplier/reject product/change supplier.	Store person	CFAD93:6/91 CFAD81:2/96 FAD132:5/92 FAD133:5/92
STORAGE OF INGREDIENTS	Pathogen growth	SI/LI	H	CCPp	Products must be stored at the correct temperature (frozen products at < -20 °C, refrigerated products at < 4 °C, and dry products at < 25 °C).	Observe storage procedure and measure the air temperature of the storage area (every 4 hours). Visually inspect products to detect any spoilage	Adjust the thermostat to correct temperature and discard any products that are spoilt.	Store person	CFJD18:4/91 CFJD86:5/94 FAD130:5/92 FAD115:2/92
BOILING MINCED CHICKEN	Pathogen and spore survival	MI/SI	H	CCPe	Boil minced chicken for sufficient time (approximately 45 minutes). Ensure that the temperature of the minced chicken is > 80 °C after boiling has been completed.	Observe boiling procedure. Measure the temperature of the minced chicken after boiling has been completed.	Extend the boiling time and boil until the temperature of the minced chicken reaches > 80 °C.	Chef	FAD130:5/92 CFJD86:5/94
MIXING INGREDIENTS	Contamination from hands, equipment and utensils	MI/SI	H	CCPr	Avoid hand contact and the use of soiled equipment and utensils.	Observe mixing procedure. Ensure that plastic disposable gloves are worn and that equipment and utensils are thoroughly disinfected before and after use.	Staff education Staff meeting	Chef	FAD130:5/92 CFJD86:5/94
BOILING MINCED CHICKEN & APRICOT	Pathogen and spore survival	MI/SI	H	CCPe	Boil minced chicken & apricot for sufficient time (refer to recipe).	Observe boiling procedure. Ensure minced chicken & apricot bubbles.	Extend the boiling time and boil until the minced chicken & apricot bubbles.	Chef	FAD130:5/92 CFJD86:5/94
COOLING MINCED CHICKEN & APRICOT IN COOLING TUNNEL	Spore germination and resulting pathogen growth	SI/LI	H	CCPp	Cool rapidly to approximately 10 °C within < 1½ hours.	Observe cooling procedure. Measure the air temperature in the cooling tunnel (every 4 hours) and the time elapsed to cool the minced chicken & apricot to approximately 10 °C. Measure the temperature of the minced chicken & apricot at completion of cooling.	Adjust the cooling tunnel's thermostat to correct temperature.	Chef	CFJD86:5/94 FAD130:5/92
PACKAGING, WEIGHING AND LABELING	Contamination from food handlers, equipment and utensils	MI/SI	H	CCPr	Avoid handling the minced chicken & apricot with bare hands, soiled equipment and utensils. Avoid working in a dirty working area.	Observe packaging procedure. Ensure that plastic disposable gloves are worn and that equipment, utensils and working area are thoroughly sanitised and disinfected before and after use.	Staff education	Packaging staff	CFJD90:4/91 FAD131:5/92 CFJD86:5/94

FREEZING	Pathogen and spore survival	MI/SI	H	CCPp	Freeze the minced chicken & apricot promptly after packaging to < -65 °C in 25 minutes.	Observe freezing procedure. Measure the air temperature in the freezer and duration of freezing.	Adjust freezer's thermostat to correct temperature.	Packaging staff	FAD132:5/92 FAD115:2/92
FROZEN STORAGE	Pathogen and spore survival	MI/SI	H	CCPp	Store the minced chicken & apricot at < -20 °C for no longer than 12 months.	Measure the air temperature in the freezer and note the production date of the minced chicken & apricot.	Adjust freezer's thermostat to correct temperature. Discard any minced chicken & apricot if kept in the freezer longer that 12 months.	Packaging staff Head chef	FAD132:5/92 FAD115:2/92

Figure 14 - Flowchart for Braised Chicken

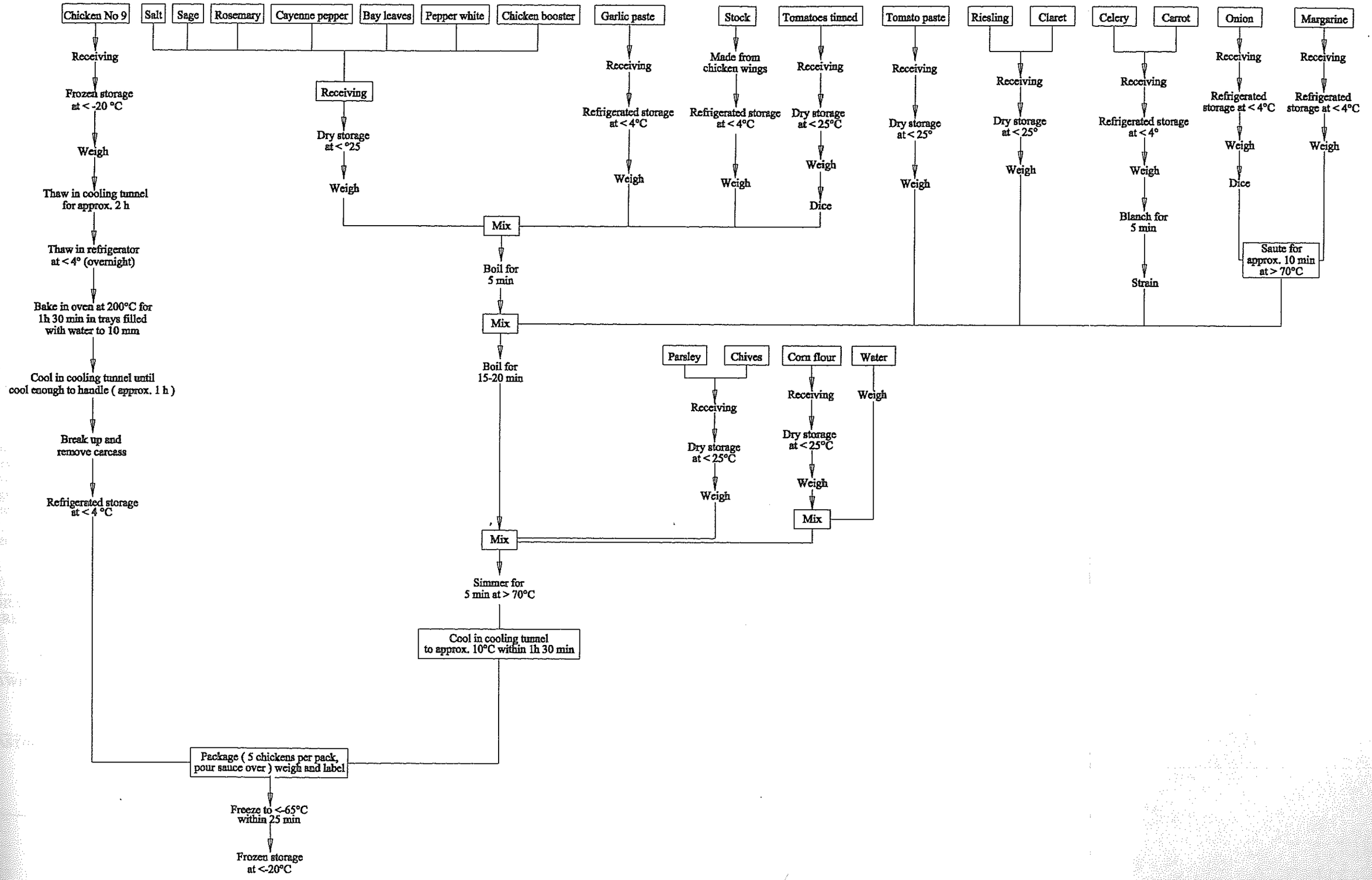


Table 13 - HACCP Control Chart for Braised Chicken

*To view records refer to Appendix C

Operation	Hazard	Degree of concern S	Degree of concern R	Type of CCP	Critical limits	Monitoring procedure	Corrective action	Responsibility	*Records
RECEIVING									
Chicken	*Salmonell*	SI	H	CCPr	Ingredient audit - all ingredients must be the correct temperature and free from spoilage on arrival.	Inspect all ingredients upon arrival by sensory evaluation and temperature check. Inspect certificates of microbiological analysis (if supplied).	Contact supplier/reject product/change supplier.	Store person	CFAD93:6/91 CFAD81:2/96 FAD132:5/92 FAD133:5/92
	Camphylobacter	SI	H						
	Clostridium Perfingens	MI	H						
	Other pathogens	SI/LI	H		Supplier audit	Inspect supplier on regular basis (once/year).			
Chicken booster									
Salt									
Riesling									
Parsley									
Chives									
Tomato paste									
Rosemary	Heat resistant spores	LI	H						
Pepper white									
Tomatoes canned									
Corn flour									
Claret									
Sage									
Cayenne pepper									
Bay leaves									
Onion									
Celery		SI/LI	H						
Carrot	Pathogens								
Margarine									
Garlic paste									
Water	Microbiological and chemical contamination	SI/LI	H		Regulatory compliance (see specifications).	Testing to include microbiological, chemical and toxic substances. Inspect certificates of analysis from Water Authority.	Contact Water Authority.	Quality assurance manager	
STORAGE OF INGREDIENTS	Pathogen growth	SI/LI	H	CCPp	Products must be stored at the correct temperature (frozen products at < -20 °C, refrigerated products at < 4 °C, and dry products at < 25 °C).	Observe storage procedure and measure the air temperature of the storage area (every 4 hours). Visually inspect products to detect any spoilage.	Adjust the thermostat to correct temperature and discard any products that are spoilt.	Store person	CFJD18:4/91 CFJD86:5/94 FAD130:5/92 FAD115:2/92
THAWING CHICKEN	Pathogen growth	SI/LI	H	CCPr	Thaw chicken under refrigeration at < 4 °C and ensure that complete thawing has taken place.	Observe thawing procedure and visually inspect and feel whether chicken has completely thawed. Ensure that chicken is promptly used after it has been thawed.	Adjust the refrigerator's thermostat to correct temperature and continue to thaw chicken until completely thawed.	Chief	CFJD18:4/91 CFJD86:5/94 FAD130:5/92
ROASTING CHICKEN	Pathogen and spore survival	MI/SI	H	CCPe	Roast chicken at 200 °C for sufficient time (approximately 1½ hours). Ensure that the internal temperature of the chicken is > 80 °C after roasting has been completed.	Observe roasting procedure. Measure the internal temperature of the chicken after roasting has been completed.	Extend the roasting time and roast until the internal temperature of the chicken reaches > 80 °C.	Chef	FAD130:5/92 CFJD72 CFJD86:5/94

COOLING CHICKEN IN COOLING TUNNEL	Spore germination and resulting pathogen growth	SI/LI	H	CCPp	Rapidly cool the chicken until it is cool enough to handle.	Observe cooling procedure. Feel the chicken to ensure it is cool enough to be handled comfortably.	Continue to cool the chicken until it reaches a temperature where it can be handled comfortably.	Chef	CFJD86:5/94 FAD130:5/92
BREAKING-UP CHICKEN	Contamination from food handlers, equipment, utensils and working area	MI/SI	H	CCPr	Avoid handling the chicken with bare hands, soiled equipment and utensils. Avoid working in a dirty working area.	Observe breaking-up procedure. Ensure that plastic disposable gloves are worn and that equipment, utensils and working area are thoroughly sanitised and disinfected before and after use.	Staff education Staff meeting	All staff involved with this operation.	CFJD86:5/94 FAD130:5/92
REFRIGERATED STORAGE OF CHICKEN	Pathogen growth	SI/LI	H	CCPp	Cooked chicken must be stored at < 4 °C if not used straight after cooking.	Observe storage procedure and measure the air temperature of the storage area (every 4 hours). Visually inspect chicken to detect any spoilage.	Adjust the thermostat to correct temperature and discard any spoilt chicken.	Chef	CFJD18:4/91 CFJD86:5/94 FAD130:5/92
SAUTEING ONION AND MARGARINE	Pathogen and spore survival	MI/SI	H	CCPe	Sauté ingredients for sufficient time (refer to recipe). Ensure that the temperature of the ingredients is > 70 °C after sautéing has been completed.	Observe sautéing procedure. Measure the temperature of the ingredients after sautéing has been completed.	Extend the sautéing time and sauté until the temperature of the ingredients reaches > 70 °C.	Chef	FAD130:5/92 CFJD86:5/94
BLANCHING CARROTS AND CELERY	Pathogen and spore survival	MI/SI	H	CCPe	Blanch carrots and celery for sufficient time (refer to recipe). Ensure that the temperature of the carrots and celery is > 70 °C after blanching has been completed.	Observe blanching procedure. Measure the temperature of the carrots and celery after blanching has been completed.	Extend the blanching time and blanch until the temperature of the carrots and celery reaches > 70 °C.	Chef	FAD130:5/92 CFJD86:5/94
BOILING SAUCE	Pathogen and spore survival	MI/SI	H	CCPe	Boil sauce for sufficient time (refer to recipe).	Observe boiling procedure. Ensure sauce bubbles.	Extend the boiling time and boil until the sauce bubbles.	Chef	FAD130:5/92 CFJD86:5/94
MIXING INGREDIENTS	Contamination from hands, equipment and utensils	MI/SI	H	CCPr	Avoid hand contact and the use of soiled equipment and utensils.	Observe mixing procedure. Ensure that plastic disposable gloves are worn and that equipment and utensils are thoroughly disinfected before and after use.	Staff education Staff meeting	Chef	FAD130:5/92 CFJD86:5/94
COOLING SAUCE IN COOLING TUNNEL	Spore germination and resulting pathogen growth	SI/LI	H	CCPp	Cool rapidly to approximately 10 °C within < 1½ hours.	Observe cooling procedure. Measure the air temperature in the cooling tunnel (every 4 hours) and the time elapsed to cool the sauce to approximately 10 °C. Measure the temperature of the sauce at completion of cooling.	Adjust the cooling tunnel's thermostat to correct temperature.	Chef	CFJD86:5/94 FAD130:5/92
PACKAGING, WEIGHING AND LABELING	Contamination from food handlers, equipment and utensils	MI/SI	H	CCPr	Avoid handling the braised chicken with bare hands, soiled equipment and utensils. Avoid working in a dirty working area.	Observe packaging procedure. Ensure that plastic disposable gloves are worn and that equipment, utensils and working area are thoroughly sanitised and disinfected before and after use.	Staff education	Packaging staff	CFJD90:4/91 FAD131:5/92 CFJD86:5/94
FREEZING	Pathogen and spore survival	MI/SI	H	CCPp	Freeze the braised chicken promptly after packaging to < -65 °C in 25 minutes.	Observe freezing procedure. Measure the air temperature in the freezer and duration of freezing.	Adjust freezer's thermostat to correct temperature.	Packaging staff	FAD132:5/92 FAD115:2/92
FROZEN STORAGE	Pathogen and spore survival	MI/SI	H	CCPp	Store the braised chicken at < -20 °C for no longer than 12 months.	Measure the air temperature in the freezer and note the production date of the braised chicken.	Adjust freezer's thermostat to correct temperature. Discard any braised chicken if kept in the freezer longer that 12 months.	Packaging staff Head chef	FAD132:5/92 FAD115:2/92

Figure 15 - Flowchart for Chicken a la King

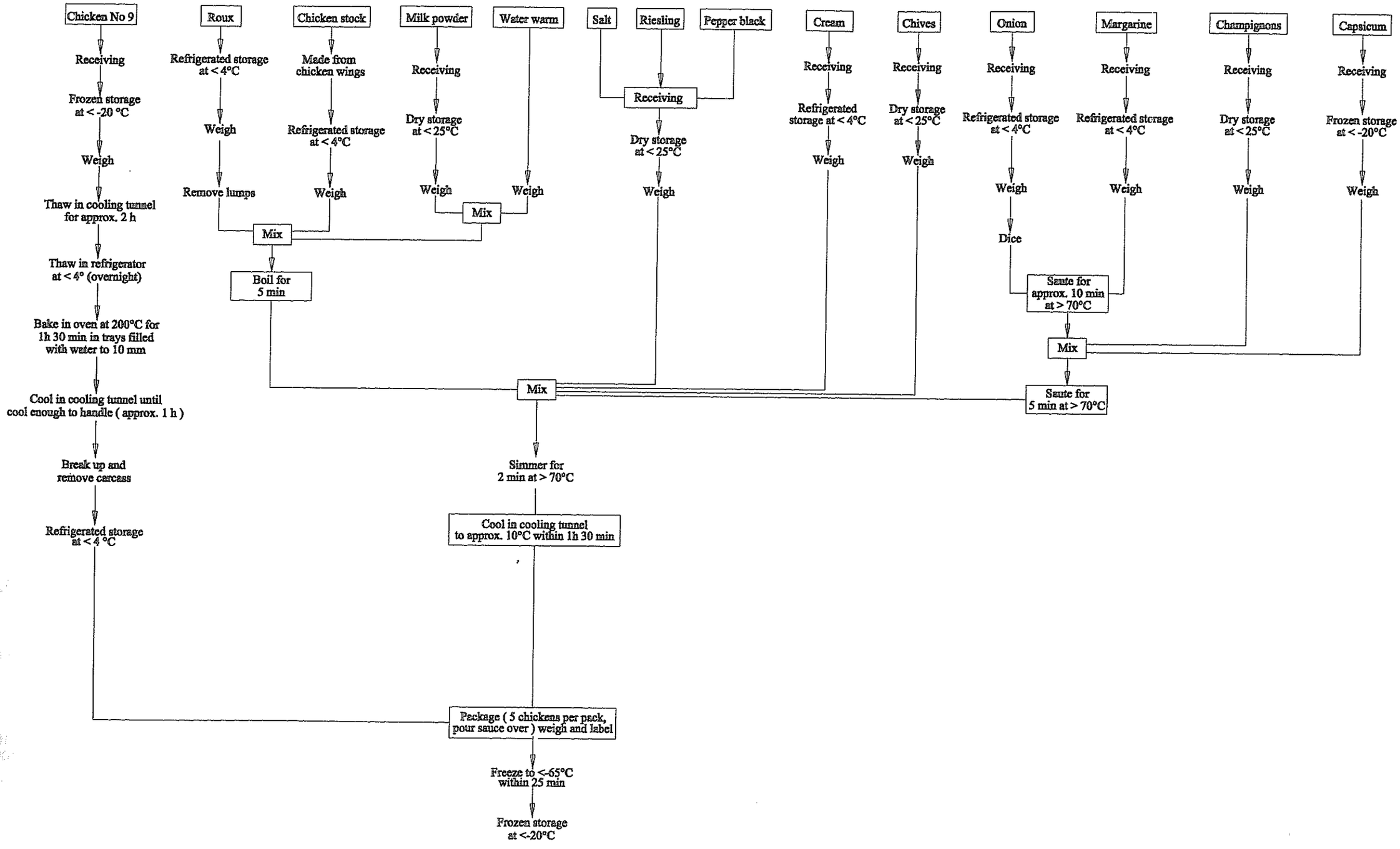


Table 14 - HACCP Control Chart for Chicken a la King

*To view records refer to Appendix C

Operation	Hazard	Degree of concern S	Degree of concern R	Type of CCP	Critical limits	Monitoring procedure	Corrective action	Responsibility	*Records
RECEIVING Chicken	*Salmonell* *Camphylobacter* *Clostridium Perfingens* Other pathogens	SI SI MI SI/LI	H H H H	CCPr	Ingredient audit - all ingredients must be the correct temperature and free from spoilage on arrival. Supplier audit	Inspect all ingredients upon arrival by sensory evaluation and temperature check. Inspect certificates of microbiological analysis (if supplied). Inspect supplier on regular basis (once/year).	Contact supplier/reject product/change supplier.	Store person	CFAD93:6/91 CFAD81:2/96 FAD132:5/92 FAD133:5/92
Riesling Chives Salt Pepper black Milk powder Champignons canned Roux Onion Cream Capsicum Margarine Water	Heat resistant spores Pathogens Microbiological and chemical contamination	LI SI/LI SI/LI	H H H						
STORAGE OF INGREDIENTS	Pathogen growth	SI/LI	H	CCPp	Products must be stored at the correct temperature (frozen products at < -20 °C, refrigerated products at < 4 °C, and dry products at < 25 °C).	Observe storage procedure and measure the air temperature of the storage area (every 4 hours). Visually inspect products to detect any spoilage.	Adjust the thermostat to correct temperature and discard any products that are spoilt.	Store person	CFJD18:4/91 CFJD86:5/94 FAD130:5/92 FAD115:2/92
THAWING CHICKEN	Pathogen growth	SI/LI	H	CCPr	Thaw chicken under refrigeration at < 4 °C and ensure that complete thawing has taken place.	Observe thawing procedure and visually inspect and feel whether chicken has completely thawed. Ensure that chicken is promptly used after it has been thawed.	Adjust the refrigerator's thermostat to correct temperature and continue to thaw chicken until completely thawed.	Chef	CFJD18:4/91 CFJD86:5/94 FAD130:5/92
ROASTING CHICKEN	Pathogen and spore survival	MI/SI	H	CCPe	Roast chicken at 200 °C for sufficient time (approximately 1½ hours). Ensure that the internal temperature of the chicken is > 80 °C after roasting has been completed.	Observe roasting procedure. Measure the internal temperature of the chicken after roasting has been completed.	Extend the roasting time and roast until the internal temperature of the chicken reaches > 80 °C.	Chef	FAD130:5/92 CFJD72 CFJD86:5/94
COOLING CHICKEN IN COOLING TUNNEL	Spore germination and resulting pathogen growth	SI/LI	H	CCPp	Rapidly cool the chicken until it is cool enough to handle.	Observe cooling procedure. Feel the chicken to ensure it is cool enough to be handled comfortably.	Continue to cool the chicken until it reaches a temperature where it can be handled comfortably.	Chef	CFJD86:5/94 FAD130:5/92

BREAKING-UP CHICKEN	Contamination from food handlers, equipment, utensils and working area	MI/SI	H	CCPr	Avoid handling the chicken with bare hands, soiled equipment and utensils. Avoid working in a dirty working area.	Observe breaking-up procedure. Ensure that plastic disposable gloves are worn and that equipment, utensils and working area are thoroughly sanitised and disinfected before and after use.	Staff education Staff meeting	All staff involved with this operation.	CFJD86:5/94 FAD130:5/92
REFRIGERATED STORAGE OF CHICKEN	Pathogen growth	SI/LI	H	CCPp	Cooked chicken must be stored at < 4 °C if not used straight after cooking.	Observe storage procedure and measure the air temperature of the storage area (every 4 hours). Visually inspect chicken to detect any spoilage.	Adjust the thermostat to correct temperature and discard any spoilt chicken.	Chef	CFJD18:4/91 CFJD86:5/94 FAD130:5/92
SAUTEING ONION AND MARGARINE	Pathogen and spore survival	MI/SI	H	CCPe	Sauté ingredients for sufficient time (refer to recipe). Ensure that the temperature of the ingredients is > 70 °C after sautéing has been completed.	Observe sautéing procedure. Measure the temperature of the ingredients after sautéing has been completed.	Extend the sautéing time and sauté until the temperature of the ingredients reaches > 70 °C.	Chef	FAD130:5/92 CFJD86:5/94
BOILING SAUCE	Pathogen and spore survival	MI/SI	H	CCPe	Boil sauce for sufficient time (refer to recipe).	Observe boiling procedure. Ensure sauce bubbles.	Extend the boiling time and boil until the sauce bubbles.	Chef	FAD130:5/92 CFJD86:5/94
MIXING INGREDIENTS	Contamination from hands, equipment and utensils	MI/SI	H	CCPr	Avoid hand contact and the use of soiled equipment and utensils.	Observe mixing procedure. Ensure that plastic disposable gloves are worn and that equipment and utensils are thoroughly disinfected before and after use.	Staff education Staff meeting	Chef	FAD130:5/92 CFJD86:5/94
COOLING SAUCE IN COOLING TUNNEL	Spore germination and resulting pathogen growth	SI/LI	H	CCPp	Cool rapidly to approximately 10 °C within < 1½ hours.	Observe cooling procedure. Measure the air temperature in the cooling tunnel (every 4 hours) and the time elapsed to cool the sauce to approximately 10 °C. Measure the temperature of the sauce at completion of cooling.	Adjust the cooling tunnel's thermostat to correct temperature.	Chef	CFJD86:5/94 FAD130:5/92
PACKAGING, WEIGHING AND LABELING	Contamination from food handlers, equipment and utensils	MI/SI	H	CCPr	Avoid handling the chicken a la king with bare hands, soiled equipment and utensils. Avoid working in a dirty working area.	Observe packaging procedure. Ensure that plastic disposable gloves are worn and that equipment, utensils and working area are thoroughly sanitised and disinfected before and after use.	Staff education	Packaging staff	CFJD90:4/91 FAD131:5/92 CFJD86:5/94
FREEZING	Pathogen and spore survival	MI/SI	H	CCPp	Freeze the chicken a la king promptly after packaging to < -65 °C in 25 minutes.	Observe freezing procedure. Measure the air temperature in the freezer and duration of freezing.	Adjust freezer's thermostat to correct temperature.	Packaging staff	FAD132:5/92 FAD115:2/92
FROZEN STORAGE	Pathogen and spore survival	MI/SI	H	CCPp	Store the chicken a la king at < -20 °C for no longer than 12 months.	Measure the air temperature in the freezer and note the production date of the chicken a la king.	Adjust freezer's thermostat to correct temperature. Discard any chicken a la king if kept in the freezer longer that 12 months.	Packaging staff Head chef	FAD132:5/92 FAD115:2/92

6.0 DISCUSSION AND CONCLUSION

The main objective of this project was to identify and develop a suitable quality assurance system based on HACCP, and incorporate it to a 'cook-freeze' operation employed at Healthcare Foods in order to obtain a systematic approach to food quality and safety. Primarily, the project focused on chicken dishes, because these are regarded as 'high risk' in terms of microbiological growth.

In discussing the HACCP control charts, there were a number of CCP's identified for each chicken dish. The first CCP, which was identified, relates to the receiving of dry, refrigerated and frozen ingredients. It is very important to monitor this procedure, as it is the very first part of the overall 'cook-freeze' operation. It is critical that all suppliers are audited and that ingredients are at the correct temperature and free from spoilage on arrival. To ensure this, it is important to inspect the suppliers on regular basis, and all ingredients upon arrival by sensory evaluation and temperature checks. Certificates of microbiological analysis should also be inspected if they are supplied. It is the responsibility of the store person to ensure that this monitoring procedure is carried out properly. If any deviations do occur, within this operation, it is essential that correct action be taken to rectify the problem. Several options that can be implemented if a problem does occur involve contacting the supplier(s), rejecting a particular product or changing the supplier (Procedures to implement the hazard analysis critical control point system, 1991, p. 70).

The second CCP that was identified deals with the storage of ingredients. It is crucial to store products at their correct temperature. The critical limits for this particular CCP include storing frozen products between the temperatures of –18°C to -23°C, but

preferably below –20°C, refrigerated products between the temperatures of 1°C to 5°C, but preferably below 4°C and dry products between the temperatures of 20°C to 25°C. Any temperatures below or above the specified levels can be considered unsafe as they can lead to either spoilage or changes in sensory characteristics of a product. To ensure that the critical limits are being met it is essential to monitor the storage temperature. This can be done in four-hour intervals and is sufficient to confirm whether the storage area is the correct temperature. If deviations occur and the temperature of a particular storage area rises or drops, it is important to adjust the thermostat to the correct temperature as soon as possible, and to discard any products that may have spoilt within the time the deviation was occurring. It is the responsibility of the store person or anyone else involved with this particular operation, to ensure that the various procedures within this operation are carried out correctly (Pearson & Dutson, 1996, p. 188, 196-197).

At present, Healthcare Foods monitors the temperature of its refrigerated and freezer storage areas, however, it is recommended that the temperature of the dry storage area is also monitored and recorded. It is also recommended to monitor and record the humidity level of the dry storage area, as it is essential that the dry products are stored at the correct humidity level.

The third CCP was identified as the thawing of chicken. However, this CCP only applies to frozen chicken. The critical limits set for this operation include thawing the chicken under refrigeration (below 4°C), and ensuring that complete thawing has taken place before cooking begins. It is the responsibility of the chef to make certain that this operation is carried out properly. The monitoring procedure within this

operation involves visually inspecting and feeling the chicken to see whether it has completely thawed and ensuring that the chicken is promptly used after it has been thawed. If a deviation occurs and the chicken does not completely thaw (overnight) it is possible that the temperature of the refrigerator dropped and the thermostat needs adjusting. In this case, the thermostat should be adjusted to the correct temperature as soon as possible and the chicken should be left to continue thawing until completely thawed (Pearson & Dutson, 1996, p. 200).

The thawing of other frozen ingredients such as bacon, which is used in the 'chicken & ham pie' and the 'chicken in wine' dishes, must also be treated as a CCP. However, the bacon is not thawed under refrigeration but boiled. In this instance, the critical limits are to thaw the bacon in boiling water and to ensure that complete thawing has taken place. Once again, it is the responsibility of the chef to observe the thawing procedure, to visually inspect and feel whether the bacon has completely thawed and to ensure that the bacon is promptly used after it has been thawed (Pearson & Dutson, 1996, p. 201).

The next CCP identified focuses on boiling or alternatively roasting or deep frying the chicken. Within Healthcare Foods fresh chicken is boiled and frozen chicken is either roasted or deep fried. During the boiling procedure, the critical limits that are set include boiling the chicken for sufficient time (usually one hour and 30 minutes for whole chicken and one hour and 15 minutes for minced chicken), and ensuring that the temperature of the chicken is above 80°C after boiling has been completed. The chef must observe the boiling procedure and measure the temperature of the chicken to make sure that the specified temperature is reached. If a deviation occurs and the

temperature of the chicken is lower then the specified temperature after boiling has been completed, then the boiling time must be extended and the chicken boiled until it attains the specified temperature (Procedures to implement the hazard analysis critical control point system, 1991, p. 67).

During the roasting procedure similar critical limits are set. The chef must ensure that the chicken is roasted at 200°C for sufficient time (approximately one hour and 30 minutes), and that the temperature of the chicken is above 80°C after roasting has been completed. Once again, the chef must observe the roasting procedure and measure the temperature of the chicken after roasting has been completed. If a temperature deviation occurs, then corrective action must be implemented (Procedures to implement the hazard analysis critical control point system, 1991, p. 54).

The crumbing of chicken precedes the deep frying procedure. The crumbing procedure is also regarded as a CCP because certain critical limits must be adhered to, in order to ensure safe food. The critical limits set for this procedure include handling the chicken with gloves, using clean equipment and utensils and working in a clean environment. The staff responsible for ensuring that, these critical limits are met include all the staff involved with this operation (Pearson & Dutson, 1996, p. 197-199).

The critical limits set for the deep frying procedure are similar to the boiling and roasting procedures, which include deep frying the chicken at 180°C for sufficient time (until crumbs are golden brown), and ensuring that the temperature of the

chicken is above 80°C after frying has been completed. It is the chef's responsibility to observe the deep frying procedure; to measure the temperature of the chicken; and to correctly rectify a temperature deviation (Procedures to implement the hazard analysis critical control point system, 1991, p. 54).

The cooling procedure, which follows boiling, roasting or deep frying of chicken or cooking of other ingredients, has been identified as another CCP. Healthcare Foods implements two different types of cooling procedures. The first cooling procedure takes place after the boiling of chicken. This procedure involves cooling the chicken with cold water. The critical limit set for this procedure comprises of rapidly cooling the chicken with cold running water until it is cool enough to be handled. It is the chef's responsibility to observe this procedure, and to continue cooling the chicken until it reaches a temperature where it can be handled comfortably (Pearson & Dutson, 1996, p. 202-203).

The second cooling procedure takes place after roasting or deep frying the chicken or cooking of other ingredients. This cooling procedure involves cooling the chicken or other ingredients, such as sauce in the cooling tunnel. At Healthcare Foods, the cooling tunnel has a temperature of approximately 10°C and the food, once placed in the tunnel, attains this temperature within 1½ hours. The critical limits set for this procedure are therefore, to cool all food rapidly to approximately 10°C within 1½ hours. However, the food should be cooled to a lower temperature, because currently it is cooled to a temperature that is within the "Temperature Danger Zone' (5°°C - 60°C) (Food safety for consumers, 1996, leaflet). It is difficult to obtain a temperature of approximately 5°C or below, because the cooling tunnel is not designed in such a

way. Therefore, it is recommended that Healthcare Foods improves and upgrades its cooling system.

The monitoring procedure for this operation is the responsibility of the chef, who needs to measure the air temperature in the cooling tunnel (approximately every 4 hours), the temperature of the chicken or other foods at completion of cooling and the time elapsed to cool these foods to a similar temperature as that within the tunnel. If a deviation takes place and the temperature in the cooling tunnel rises, the thermostat needs to be adjusted in order to lower the temperature (Pearson & Dutson, 1996, p.202). Alternatively, the cooling tunnel can be used as a means of quickly lowering the temperature of chicken, such as roast chicken, to a temperature where it can be handled so that it can be portioned. In this case, the chicken would be placed into the cooling tunnel for a reasonable time to reduce its temperature to a level where it can be handled comfortably.

At this stage, different types of operations are employed in the production of the various chicken dishes. The cooling procedure where boiled chicken is rapidly cooled with cold running water and roast chicken is cooled in the cooling tunnel to a temperature where it can be handled comfortably, is followed by the skinning, de-boning, breaking-up and cutting procedure, and breaking-up and removing of carcass procedure, respectively. The critical limits set for these operations are to avoid handling the chicken with bare hands, soiled equipment and utensils, and to avoid working in a dirty preparation area. All the staff involved with these operations must ensure that plastic disposable gloves are worn and that equipment, utensils and

working area are thoroughly sanitised and disinfected before and after use (Pearson & Dutson, 1996, p. 198-199).

Other operations that follow, depending on the type of chicken recipe, include sautéing of onion and added ingredients, blanching of vegetables, boiling of pasta, boiling of sauce, mixing of ingredients, and baking of dishes, all of which are regarded as CCPs. These points will be discussed at a later stage, once the operations that are common to all chicken recipes are considered.

The operation that follows the cooling in the tunnel procedure is packaging, weighing and labeling operation. This operation is regarded as a CCP as a number of critical limits must be observed while carrying it out. The critical limits set for the packaging, weighing and labeling procedure are to avoid handling the chicken or other foods, such as sauce, with bare hands, soiled equipment and utensils, and working in a dirty area. It is the responsibility of the staff involved with this operation to observe these rules and to ensure that plastic disposable gloves are worn and that equipment, utensils and the working environment are thoroughly sanitised and disinfected before and after use (Pearson & Dutson, 1996, p. 198-199).

The next CCP, which follows the packaging, weighing and labeling operation, is the freezing operation. Two types of freezing operations are employed at Healthcare Foods. These include cryogenic freezing, where dishes are frozen to below -65°C and freezing in a freezer, where the temperature of foods is reduced to below -20°C. The most often used freezing operation is "cryogenic freezing". The critical limit set for cryogenic freezing involves freezing a dish promptly after packaging to below -65°C

in 20 minutes for dry foods, such as 'roast chicken' or 25 minutes for moist foods, such as 'chicken curry'. It is the packaging staff's responsibility to observe the freezing procedure, to measure the air temperature in the freezer and to note the duration of freezing. If a temperature deviation occurs it needs to be rectified by adjusting the freezer's thermostat to the correct temperature (Cook-chill and cook-freeze, n.d.).

Healthcare Foods uses a 'Freezer Temperature Monitoring' chart to record the temperatures of the freezers. However, only one type of chart is used for both the cryogenic and large freezer. Therefore, it is recommended that separate charts are used to record the temperatures of the freezers, one chart labeled 'Cryogenic Freezer Temperature Monitoring' and the other 'Freezer Temperature Monitoring'. This will clearly distinguish between the two and aid in easier filing and accessing of the records if needed for future reference.

The second type of freezing employed, freezes dishes such as 'chicken and ham pie' and 'chicken macaroni', which are packaged in metal trays, baked, frozen, and than weighed and lidded. The critical limits set for this CCP involve covering the trolley containing the dishes with a cloth sheet and freezing them to below -20°C overnight. The responsibility, monitoring procedure and corrective action are the same as for the cryogenic freezing operation.

The very last CCP was identified as frozen storage. It is also very important to monitor this operation, as it is the last one before dispatch. The critical limit set for this operation is to store the dishes below -20°C for no longer than 12 months. It is

necessary that the packaging staff measure the air temperature in the freezer, note the production date of the dishes, rectify any temperature deviations immediately, and discard any products if kept in the freezer for longer than 12 months (Cook-chill and cook-freeze, n.d.).

The operations mentioned previously, which are not common to all chicken dishes but are regarded as CCPs, will now be examined. The first of these operations discussed is the sautéing of onion and added ingredients. The critical limits set for this operation include sautéing ingredients for a sufficient time, depending on the recipe, and ensuring that the temperature of the ingredients is above 70°C after sautéing has been completed. It is the chef's responsibility to observe this procedure and to measure the temperature of the ingredients. If a deviation occurs and the temperature of the ingredients is below 70°C after sautéing has been completed, then the sautéing time needs to be extended until the desired temperature is reached (Donaldson, 1993, p. 42). Another CCP is the blanching of vegetables. The critical limits, responsibility monitoring procedure and corrective action set for this operation are the same as for the sautéing operation.

The boiling of pasta and the boiling of the various chicken dishes and sauces accompanying the chicken are also regarded as CCPs. In this case, the critical limits set are to boil the pasta, chicken dish or sauce for a sufficient time, depending on the type of recipe. Once again, it is the chef's responsibility to observe these procedures and to ensure that the water, chicken dish or sauce bubbles. The corrective action applied to this procedure is to extend the boiling time until bubbles can be seen (Donaldson, 1993, p. 42).

The critical limits set for mixing ingredients are to avoid any hand contact, and the use of soiled equipment and utensils. The chef who is responsible for this operation must ensure that plastic disposable gloves are worn, and that equipment and utensils are thoroughly sanitised and disinfected before and after use (Pearson & Dutson, 1996, p. 198-199).

Another CCP, which applies to only a couple of chicken dishes, is baking. The critical limits set for this operation are to bake the dishes in metal trays at 220 °C for approximately 30-40 minutes (depending on recipe), and to ensure that the temperatures of the dishes are above 80 °C after baking has been completed. The baking procedure must be observed and the temperature of the dishes measured after the chef has completed baking. If the temperature of the dish is below 80 °C after baking has been completed, the baking time must be extended until this temperature is reached (Pearson & Dutson, 1996, p. 201-202).

It can be concluded that the HACCP system is a successful quality assurance system if it is correctly placed into action, monitored and verified. However, in order to achieve what HACCP sets out to achieve – production of safe food that is of consistent quality, everyone within a company needs to be involved (Mraci, 1995, p. 20). Therefore, it is necessary to properly train and educate employees, who are involved with the various food production operations, about HACCP. This can be achieved by attending short HACCP training courses and by raising awareness of food quality, safety and hygiene. It is also the responsibility of the head chef to see that the operations are carried out correctly by the staff involved with them.

As a consequence of correctly implementing HACCP, the most important goal can be achieved - increased customer confidence as well as customer satisfaction, this being the number one priority of any company within the food industry (Mraci, 1995, p. 20).

7.0 RECOMMENDATIONS

It is recommended that:

- the temperature of the dry storage area is monitored and recorded.

- the humidity level of the dry storage area is monitored and recorded.

- Healthcare Foods improves and upgrades its cooling system (cooling tunnel).

- separate charts are used to record the temperatures of the freezers, one chart labeled 'Cryogenic Freezer Temperature Monitoring' and the other 'Freezer Temperature Monitoring'.

- employees, who are involved with the various food production operations, are properly trained and educated about HACCP.

8.0 LIMITATIONS

The development of the quality assurance system based on HACCP, which was incorporated to the 'cook-freeze' production employed at Healthcare Foods, should be regarded as a pilot study, as only the chicken recipes were considered in the development of the flowcharts and the HACCP control charts. As a result, the quality assurance system only focuses on these recipes thus, this being the major limitation of the study. However, given the time constraints to complete the project successfully, the sample size was sufficiently large to satisfy the purpose of this study.

8.1 Possible Errors Arising in the Study

An error that could have indirectly affected this study focuses on the possibility that the information obtained from the personnel, who were observed and informally interviewed during the conduct of the study, may not have been truthful. This may have occurred, because the personnel may have been tempted to say the right thing and do the correct thing while they were being observed and interviewed, respectively.

9.0 ETHICAL CONSIDERATIONS

The ethical issues that were considered while this study was being carried out are as follows:

- Autonomy – the personnel will not be forced to participate in this study and will be free to withdraw at any time. Thus, the participant's current position will not be prejudiced in any way.

- Privacy – the information collected during the conduct of this study will be strictly for the project's purpose only.

- Confidentiality – the names of the personnel observed and informally interviewed will not be disclosed to anyone, including the research student, or anywhere.

- Anonymity – the personnel observed and informally interviewed will not be identifiable.

- Self-determination – the benefits of participation, objectives of the study, and ethical considerations will be clearly explained to the personnel involved in the observations and informal interviews.

- Safety – the personnel involved in the observations and informal interviews will not be physically or emotionally damaged as a result of participation in this study.

A written consent (Appendix B) to conduct this project will be obtained from Mr. Ivor Langford (General Manager at Healthcare Foods) and Mr. John Hague (Marketing

and Quality Control Officer at Healthcare Foods). Mr. Langford and Mr. Hague will also inform the personnel, working at Healthcare Foods, about the purpose of this project. Hence, all ethical considerations, as mentioned previously, will be strictly followed to ensure that the project is conducted in the proper manner.

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11.0 APPENDICES

11.1 Appendix A - Key to Abbreviations and Definitions

HACCP

Hazard Analysis Critical Control Points - systematic approach to food quality assurance and a means of ensuring food safety.

CCP

Critical Control Point – process at which a preventive measure can be applied to eliminate, prevent or minimise a hazard.

CCPe - process at which a preventive measure can be applied to eliminate a hazard.

CCPp – process at which a preventive measure can be applied to prevent a hazard.

CCPr – process at which a preventive measure can be applied to minimise a hazard.

CP

Control Point – preventive action employed to ensure correct manufacturing practices, regulations, product reputation, company policies and aesthetics.

LI

Life Threatening Illness – magnitude of hazard regarded as the most serious.

SI

Severe or Chronic Illness – magnitude of hazard not as serious as the life threatening illness.

MI

Moderate or Mild Illness – magnitude of hazard that is regarded as the least serious from the three.

H

High Risk – high probability of occurrence of a hazard.

M

Moderate Risk – moderate probability of occurrence of a hazard.

L

Low Risk – low probability of occurrence of a hazard.

N

Negligible Risk – negligible probability of occurrence of a hazard.

11.2 Appendix B

Consent Form

Attention: Mr. I. Langford and Mr. J. Hague

I, Denisa Baca am currently undertaking a Food Science Honours research project in order to develop a suitable quality assurance system based on Hazard Analysis Critical Control Points (HACCP), which will be implemented into the 'cook-freeze' operation, currently employed at Healthcare Foods, and implemented as a systematic approach to food quality, and also as a means of ensuring food safety.

There is a need to develop a quality assurance system based on HACCP in order to ensure food quality and safety. By developing HACCP flowcharts, which will map the exact steps that a meal takes during its production, and HACCP control charts, which will identify possible hazards and Critical Control Points (CCP's) in a process, dishes of consistently high quality and safety will be produced.

During the conduct of this project all ethical considerations, as outlined in the Ethical Considerations (section 6.0 in project proposal) will be strictly followed to ensure that the project is carried out in the proper manner.

Any questions concerning the project entitled 'To develop and implement a quality assurance system based on Hazard Analysis Critical Control Points (HACCP) into a 'cook-freeze' operation' can be directed to Denisa Baca (Food Science Honours Student) on [redacted] or Dr. Ajay Shah (Supervisor, Senior Lecturer in Food Science & Technology at Edith Cowan University) on

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I have read the information above and any questions I have asked have been answered to my satisfaction.

I agree to participate in this activity, realising I may withdraw at any time.

I agree that the research data gathered for this study may be published provided I am not identifiable.

Mr. Ivor Langford (General Manager at Healthcare Foods) — 10 June 98. Date

Mr. John Hague (Marketing and Quality Control Officer at Healthcare Foods) — 10 June 98. Date

Denisa Baca (Food Science Honours Student) — 10/6/98 Date

11.3 Appendix C - Records

HEALTHCARE FOODS

CFAD93:6/91

FACTORY VISIT

DATE: _____

FACTORY: _____

GENERAL MANAGER: _____

TECHNICAL MANAGER: _____

SALES MANAGER: _____

A. GENERAL

1. LOCATION

RURAL: _____ INDUSTRIAL: _____

2. NUMBER OF STAFF: _____

3. SHIFTS WORKED: _____

4. TYPE OF PRODUCTS MANUFACTURED: _____

B. PREMISES

1. PURPOSE BUILT: _____ CONVERTED: _____

2. DOORS: _____

_____

3. WINDOWS: _____

_____

4. LIGHT BULBS: _____

5. WALLS: _____

6. FLOORS: _____

7. WATER SUPPLY: MAINS _____ BORE _____

8. IS WATER CHLORINATED, CHECKED: _____

_____

C. PRODUCTION

1. TEMPERATURE CONTROLLED
(STATE TEMPERATURES) & (WHERE):_____

_____

2. ARE ALL CONTAINERS RAISED OFF FLOOR:_____

3. ARE ALL CHILLERS/FREEZERS EQUIPPED WITH THERMOMETERS:_____

_____

4. HOW OFTEN ARE THEY CHECKED AND RECORDS KEPT:_____

_____

5. ARE WOOD, GLASS POTENTIAL FOREIGN OBJECTS USED IN PRODUCTION AREA

_____

_____

D. CLEANING

1. IS THERE A CLEANING SCHEDULE:_____

2. ARE ALL CLEANING EQUIPMENT AND ASSOCIATED MATERIALS STORED
SEPARATELY:_____

3. ARE ALL MACHINES, EQUIPMENT AND INSTALLATIONS DISMANTLED AND
CLEANED DAILY:_____

4. IS ANY PROVISION MADE FOR STERILISATION OF KNIVES, SAWS, CLEAVERS
ETC. DURING WORKING HOURS:_____

5. ARE MACHINES AND CONTAINERS CLEANED BEFORE REUSE:_____

6. HOW OFTEN IS CLEANING DONE

ON i) WALLS _____

ii) FLOORS _____

iii) EQUIPMENT _____

iv) OVERHEADS _____

D. CLEANING Cont'd

7. IS CLEANING DONE BY OWN STAFF/CONTRACTORS:_____

8. WHAT MATERIALS ARE USED:_____

_____

9. ARE CLOTHS/RAGS USED IN THE PRODUCTION AREA:_____

11. HOW ARE THEY STERILISED:_____

E. PERSONNEL HYGIENE

1. ARE HANDWASHING FACILITIES SITUATED NEAR ENTRANCES:_____

2. ARE BASINS EQUIPPED WITH HOT WATER:_____

3. IS SOAP, NAIL BRUSHES, PAPER/ROLLER TOWELS PROVIDED:_____

4. IS HANDWASHING ENFORCED:_____

5. DO EMPLOYEES WEAR JEWELLERY:_____

6. ARE COATS, HATS, BOOTS, APRONS, GLOVES PROVIDED:_____

_____

7. ARE FOOTBATHS USED:_____

8. ARE CUTS ETC. COVERED WITH COLOURED PLASTERS AND GLOVES:_____

_____

9. HOW OFTEN IS CLOTHING CHANGED:_____

10. HOW IS THE CLOTHING WASHED:

i) BY EMPLOYEE:_____

ii) BY LAUNDRY:_____

11. ARE THE TOILETS CLEAN AND EQUIPPED WITH SOAP, HOT WATER AND TOWELS:_____

F. PEST CONTROL

1. IS THERE A PEST CONTROL CONTRACT:_____

2. HOW OFTEN DO THEY COME:_____

G. QUALITY ASSURANCE

1. IS THERE A QA OFFICER:_____

2. ARE THERE VETS ON SITE:_____

3. IS THE FACTORY REGISTERED TO EXPORT:_____

4. ARE THE PREMISES AUS MEAT REGISTERED:_____

5. IS THERE A LABORATORY ON SITE:_____

6. IS THE LABORATORY EQUIPPED TO DO CHEMICAL AND MICROBIOLOGICAL TESTS:_____

7. IF CARCASS IS BOUGHT IN, IS IT DELIVERED DAILY:_____

8. IS MEAT INSPECTED ON ARRIVAL (BY WHOM):_____

9. WHAT IS THE PROCEDURE FOR REJECTION:_____

_____

_____

10. WHAT ARE CARCASSES CHECKED FOR:_____

_____

_____

H. FINISHED PRODUCT

1. ARE SAMPLES CHECKED FOR

i) MICROSTANDARDS _____

ii) FAT LEVELS _____

iii) PESTICIDE LEVELS _____

iv) CHEMICAL CHECKS _____

2. WHAT IS THE FREQENCY OF CHECKING AND SAMPLING RATE:_____

H. FINISHED PRODUCT Cont'd

3. ARE THE OUTERPACKS LABELLED

i) DATE CODE _____

ii) UNITS _____

iii) WEIGHT _____

iv) PRODUCT NAME TYPE _____

I. DISTRIBUTION

1. ARE THE PRODUCTS DELIVERED FROZEN/CHILLED:_____

2. AT WHAT TEMPERATURE IS THE VEHICLE:_____

3. DISTANCE FROM FACTORY TO HEALTHCARE FOODS:_____

4. DO THE FACTORIES OWN VEHICLES DELIVER OR ARE CONTRACT VEHICLES USED:_____

HEALTHCARE FOODS

CFAD81:2/96

GOODS RECEIVED ASSESSMENT / STOCK CONTROL FORM

ITEM:_____ UNIT SIZE_____

P =Pass
X =Reject
PR=Perishable
D =Dry Goods

DATE	CODE	IN	OUT	BALANCE	ORDER NO.	SUPPLIER	DELIVERY VEHICLE	PACKAGING	TEMP.	APPEARANCE PORTION SIZE PRODUCT	P/X RESULT	PR/D

MONTHLY CLEANING SCHEDULE - RECEIVALS/FREEZERS

* Please tick tasks performed (✓)

MONTH:_____		TASKS									
DATE	NAME	WIPE SHELVING DRY GOODS	SWEEP FLOORS	SCRUB FLOORS	SWEEP FLOOR ON RAMP	FREEZER 7 SWEEP FLOOR	FREEZER 7 REMOVE ICE	FREEZER 13 SWEEP FLOOR	FREEZER 13 WASH/ SANITISE FLOOR	FREEZER 13 WASH SHELVING	SIGNATURE OF SUPERVISOR/QA

MONTHLY CLEANING SCHEDULE - RAMP/CRATEWASH AREA

* Please tick tasks performed (✓)

MONTH:_____		TASKS					
DATE	NAME	SWEEP FLOORS AND CORRIDORS	SCRUB AND CLEAN FLOORS AND CORRIDORS	WASH CRATES	CLEAN CRATE WASH	CLEAN WORK BENCH	SIGNATURE OF SUPERVISOR/QA

COOLROOM TEMPERATURE MONITORING

COOLROOM TEMPERATURE (°C) - GAUGE									
DATE	TIME	PACKAGING	MEAT	PASTRY	FISH	VEG RM 1	VEG RM 2	FISH PREP ROOM	SIGN

HEALTHCARE FOODS

CFJD72

TEMPERATURE MONITORING - COOKED MEATS

DATE	ITEM	PRODUCT USED FOR	TOTAL QTY	TIME IN	TOP SHELF	TIME TEMP MEAT(°C)	OUT BOTTOM SHELF

CFJD86:5/94

SANITIZING/FOGGING

* Please tick area fogged (✓)

DATE	NAME	MAIN KITCHEN	FRIDGE VEG RM1	VEG RM2	FISH ROOM	FISH FRIDGE	PASTRY SECTION	SLICING ETC AREA	MEAT FRIDGE	BUTCHER SHOP	COOLING TUNNEL	PACKING

HEALTHCARE FOODS

FAD130:5/92

MONTHLY CLEANING SCHEDULE - PRODUCTION AREA

* Please tick tasks performed (✓)

MONTH:_____		TASKS									
DATE	NAME	CLEAN INWARD AIR VENT	CLEAN HOODS ABOVE FRYERS	CLEAN & SCRUB COOLROOMS	CLEAN & SANITISE MEAT COOLROOM	CLEAN PASTRY COOLROOM	CLEAN WALLS FLOORS CEILINGS PRODUCTION AREA	SCRUB FLOORS	CLEAN FILTERS & WALLS COOLING TUNNEL	SANITISE EQUIPMENT	SIGNATURE SUPERVISOR/QA

HEALTHCARE FOODS

FINAL PRODUCT CHECKLIST - PACKAGING SECTION

CFJD90:4/91

* WEIGH AT LEAST 6 PACKS PER BATCH PER HOUR

DATE	TIME	PRODUCT	PACK WT/ PORTION SIZE	APPEARANCE/ CONSISTENCY/COLOUR	PACKAGING	ACTION	SIGNATURE

MONTHLY CLEANING SCHEDULE - PACKAGING AREA

* Please tick tasks performed (✓)

MONTH:_____		TASKS											
DATE	NAME	CLEAN & SANITISE PACKING MACHINES	SCRUB FLOOR	CLEAN CARBAS	CLEAN WALLS & SURFACES	CLEAN SANITISE AND FOG COOLROOM	CLEAN & SANITISE BENCHES	CLEAN CARBA TROLLEYS	CLEAN SANITISE PALLET DISCS	CLEAN & SANITISE BINS	CLEAN INTERIOR WINDOWS	SANITISE UTENSILS	SIGNATURE SUPERVISOR /QA

HEALTHCARE FOODS

FAD115:2/92

FREEZER TEMPERATURE MONITORING 0°C

DATE	TIME	FREEZER DIAL	PROBE	FREEZER DIAL	PROBE	ACTION	NAME	SIGNATURE