APPLICATION OF THE HAZARD ANALYSIS CRITICAL CONTROL POINT (HACCP) SYSTEM IN CANNED MEAT MANUFACTURING

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BACKGROUND

The Hazard Analysis Critical Control Point System (HACCP), defined as a preventive food control system aiming mainly at food safety or innocuousness, implies a systematic approach for hazard identification, assessment and control; the system offers a rational method to be able to control microbiological hazards in food products, thus avoiding the drawbacks presented in an inspectional consideration as well as the inconveniences from relying on microbiological analysis. The HACCP system makes much easier the tasks of official control, providing a much more complete and objective view of the company events at any moment, achieving in this way the rationalization of human and economic resources which must be devoted to watch over food salubrity.

OBJECTIVES

This work covers in a practical way the implantation of the HACCP system in canned meat manufacturing in Losimon, S.L. meat industry, located at Almadén , Ciudad Real, Spain. Canned meat products (meat in sauce, seasoned meat, meat cooked in tomato sauce, precooked dishes, etc.) are products prepared from edible parts from authorized game and poultry and other market species, which have undergone different heat processes (thermal treatment), obtaining a F0 * value equal or over 3, previously introduced in hermetically sealed containers.

METHODOLOGY

In order to be able to apply correctly the principles of the HACCP system, the following tasks were performed: (1) creation of a multidisciplinary team, (2) complete description of products, (3) study of consumer's expected use, (4) description of the process or flow diagram, (5) several checkings of the process, (6) list of all biological, chemical or physical hazards which can be reasonably foreseen in each stage, (7) study of preventive measures, (8) determination of CCP, specifying the critical limit for each preventive measure, (9) supervision of measures or observations to demonstrate that a CCP is under control, (10) formulation of all corrective measures which are specific for each CCP of the system, (11) creation of procedures to verify that the HACCP system works properly and (12) development of the necessary actions to ensure that the HACCP system introduced is really efficient, allowing also system feedback in case of detection of deviations.

RESULTS AND DISCUSSION

This section presents the process or flow diagram, from raw material reception to issue of the final product, according to the field of study and basing always on the observations carried out in Losimon, S.L. meat industry. We also include a synoptic table showing the application process for each stage describing the main predictable hazards as well as the preventive measures to be considered to minimize or eliminate such hazard. The synoptic table reflects also the type of CCP, the critical limit for each preventive measure and the necessary supervision to demonstrate that a critical point is under control. Aiming at solving the possible deviations over or under the critical limits established, all corrective measures specific for each control point of the system have been clearly stated. Finally there is an enumeration of the necessary parameters (temperature control in chambers, water analysis, etc.), to provide data about what is happening in our industry at a specific moment.

FLOW DIAGRAM

1. Raw material and ingredients reception. ● CCP2 → 2. Raw material and ingredients storage. ○ CCP2 →
3. Reception and storage of packs and containers. ○ CCP2 → 4. Preparation. ○ CCP2→ 5. Mixture or blend preparation. ○ CCP2 →
6. Canning or placing in glass jars. ○ CCP2 → 7. Sterilization. ○ CCP1 → 8. Cooling. ○ CCP2 →
9. Labelling, packing and "paletizado". → 10. Storage. ○ CCP2 → 11. Issue of final product. ○ CCP2

CCP1= Completely effective Critical Control Point. CCP2= Partially effective Critical Control Point.
● = Important contamination. ○ = Unimportant contamination

STAGE	HAZARDS	PREVENTIVE MEASURES	CCP	CRITICAL LIMIT	SUPERVISION	CORRECTIVE MEASURES	REGISTERS
1. Ingredients and raw material reception. Water supply.	* Microbiological contamination	* Ensure adequate transport and reception conditions of raw materials and ingredients. * Adequate potable water supply source.	2	* T^{e} <7ºC in refrigerated meat. * T^{e} <-12ºC frozen meat. * T^{e} <3 ºC for wastes. * T^{e} < 4ºC for poultry and rabbit refrigerated meat. * Satisfy potable water requirements (R.D. 1138/1990)	* Mean of transport control (T^{e}, hygiene). * Satisfy purchase specifications. * Batch control: T^{e} and organoleptic features. * Water physical-chemical and microbiological analysis and chlorine control.	* Unsuitable material turndown. * Withdraw homologation to suppliers. * Chlorine addition if necessary. * Change the water supply source.	* Corrective measures. * Results from water analysis. * Entry register with the controls performed and final report.
2. Raw material and ingredients storage	* Microbiological contamination.	* Adequate storage conditions: time, T^{e}. Store hygiene, stock rotation, air circulation in the chamber. * Adequate ingredients storage.	2	* T^{e} <7ºC in refrigerated meat. * T^{e} <-12ºC frozen meat. * T^{e} <3ºC for wastes. * T^{e} <4ºC for poultry and rabbit refrigerated meat. * Adequate storage time. * Satisfactory health conditions in store. * Appropriate storage conditions	* Raw material preservation state. * Temperature control. * Stowage conditions. * Preservation time. * Application of the cleaning and disinfection program.	* Correction of storage conditions(T^{e}, time). * Unsuitable material turndown.	* Temperature register. * Corrective measures.
3. Packs and containers reception and storage	* Microbiological contamination	* Checking of packs and containers state. * Correct storage (stock rotation, storage, cleaning, etc.) * Supplier's homologation	2	* Satisfy purchase specifications. * Adequate storage conditions.	* Storage and hygienic conditions. * Storage conditions.	* Unsuitable containers turndown. * Withdraw homologation to suppliers. * Correction of storage conditions.	* Corrective measures.
4. Preparation	* Microbiological contamination.	* Adequate time/T^{e}. * Satisfactory handling conditions. * Hygienic conditions of tools and equipment	2	* SHP. * Satisfactory hygienic conditions. * Room T^{e} under 12 ºC .	* Correct application of the cleaning and disinfection program. * Handling practice. * Room T^{e}.	* Correction of working conditions. * Correction of cleaning and disinfection program.	* Corrective measures. * Temperature register.
5. Mixture or blend preparation	* Microbiological contamination * Incorrect or excessive additive addition.	* Adequate time/ T^{e}. * Satisfactory handling conditions. * Hygienic conditions of tools and equipment * Specific formulation.	2	* SHP. * Authorized additives limit. * Satisfactory hygienic conditions. * Room T^{e} under 12 ºC.	* Hygienic conditions. * Correct application of the cleaning and disinfection program. * Handling conditions. * Weight control.	* Correction of working conditions. * Correction of cleaning and disinfection program. * Unsuitable material turndown if necessary.	* Corrective measures. * Room temperature.
6. Canning or placing in glass jars.	* Microbiological contamination	* Use of potable water to wash container. * Satisfactory handling practice. * Satisfactory performance of the filling and sealing equipment.	2	* Satisfactory hygienic conditions. * SHP. * Seal hermeticity.	* Visual inspection of the cleaning and filling process. * Hermeticity checking. * Period revision of equipments.	* Change of water supply source. * Correction of the cleaning and disinfection program and working conditions. * Equipment preparation. * Defective containers turndown.	* Corrective measures. * Results from hermeticity controls. * Equipment keep-up.
7. Sterilization	* Microbiological contamination	* Adequate time/T^{e} * Sterilizer correct performance.	1	* Satisfy technical specifications of process. * Satisfactory hygienic conditions. * Commercial sterility Fo>3	* Periodic calibration of equipment and tools. * Graphic register of time/T^{e}.	* New thermal treatment. * Products turndown. * Correction of working conditions.	* Corrective measures. * Graphic register of thermal treatment.
8. Cooling	* Microbiological contamination	* Use of potable water with chlorine. * Do not handle directly wet containers. * Hygienic conditions of equipment.	2	* Satisfy potable water requirements (R.D. 1138/1990). * Fulfilment of the process defined.	* Control of binomial refrigeration time/ T^{e} * Water chlorine level. * Product microbiological examination. * Seals effectiveness.	* Process correction. * Product revision. * Unsuitable product turndown.	* Results from incubation tests. * Corrective measures. * Water analysis register.
9. Labelling, packing and "paletizado".	* Contamination by containers breaks.	* Adequate storage conditions.		* Correct containers state.	* Containers conditions.	* Defective or broken containers turndown.	* Register of broken containers.
10. Storage.	* Products alteration.	* Store hygienic conditions. * Adequate T^{e}. * Correct storage, air circulation, etc.	2	* Avoid extreme temperatures. * Satisfactory hygienic conditions. * Adequate stowage conditions.	* Correct application of cleaning and disinfection program. * Correct handling. * Storage conditions.	* Unsuitable products turndown. * Correction of storage hygienic conditions. * Correction of cleaning and disinfection program.	* Corrective measures. * Storage conditions.
11. Issue of final product.	* Product alteration.	* Hygienic handling practice. * Avoid extreme T^{e}. * Adequate stowage conditions.	2	* Transport T^{e} * Adequate stowage conditions. * Load incompatibility.	* Correct application of stowage and transport conditions.	* Correction of hygienic and stowage conditions.	* Corrective measures.