

HACCP PLAN FOR THE "UŽICE BEEF PRSHUTA" TRADITIONAL DRY FERMENTED MEAT PRODUCT

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Background

Hazard Analysis and Critical Control Points (HACCP) is an up-to-date and prevention concept which improve different aspects of food safety. First time used about 20 years ago in American energetics and chemical industry, later HACCP was developed and accepted by WHO, CAC, USDA, FDA, over EU Directive (93/94), Danish Standard (DS 3227) and ISO 15161:2001 (QMS and HACCP). Many companies all over the world which produces meat and meat products, have already developed and applied in practices HACCP concept, as a part of QMS (ISO 9001:2000 / ISO 15161), or as an independent concept of food safety and quality.

Objectives

Having in mind that Serbia has all presumptions for producing and exporting different kinds of safety and high quality meat and meat products, it is necessary to start HACCP implementation in practice as an comprehensive concept of food safety and quality. The aim of this paper is to show M.P. "Cajetina" experience on possible model of HACCP plan - developed for top quality and geographically protected traditional dry meat products, "Užice Beef Pshuta" (also "Užice Pork Pshrshuta"), originate from region of mountain Zlatibor (South-West part of Serbia). Namely, as a part of permanent activity on advancing a certified QMS (JUS ISO 9002:1996) and most of all activities on enhancing safety and quality of meat and meat products, top management in M.P. "Cajetina", located in area of mountain Zlatibor, at the end of year 2000 made the decision to implement contemporary principles of the HACCP concept.

Methods

All projected activities on implementation of HACCP concept meant to be fully harmonized with activities on converting existing Quality Assurance system (JUS ISO 9002:1996) to actual Quality Management System (JUS ISO 9001:2001), all according to requirements of new version of Standard - JUS ISO 9001:2001 (QMS) and Guidelines on the application of ISO 9001:2000 for the food and drink industry (ISO 15161:2001).

Results and discussion

Immediately after the decision was made, the HACCP team leader together with the consultant has determined a plan and dynamics of HACCP concept implementation project. The plan understood two basic group of activities: **Preparation** (Assembling and training of HACCP team about the principles and requirements of HACCP concept, Describing products, Defining processes and constructing flow diagrams) and **Realisation** (applying the seven HACCP principles).

As a part of preparation activities, Quality Manager suggested HACCP team, which has been verified by the Quality Board as well as a HACCP Team Leader was confirmed. Else, the team was outlined as an operative working group made from most responsible managers of all organizing departments as well as functioning ones, from the structural framework of meat plant. Prior to the beginning of work, all the members of HACCP team and top management went through 3 days training course. During that time they where introduced to history, development, goals and importance of HACCP concept, as well as necessary preparation activities as a part of implementation process. Specifically, they where introduced in detail to the basic seven principles of the HACCP concept, making procedures of the HACCP Plans and record-keeping documentation. One among other prior tasks that were laying ahead of HACCP Team was to define processes precisely, which has been done as following:

- **MAIN (PRIMAL) PROCESSES** (Raw Meat; Meat Products; Freezing);
- **SUPPORT PROCESSES** (Hygiene; Maintenance; Supplies; Sales; Marketing; Storage; Laboratory; Administrative jobs; Feeding the employees; Security)
- **MANAGEMENT PROCESSES** (Planning; Managing resources; Development of managing system; Control of documents and data; Record control).
- **OUTSOURCES** (Scientific based collaboration; Informatics-Hardware and software; Legal/Law affairs)

Having in mind that HACCP basically addresses main (primal) processes and striving to decrease the number of HACCP plans to a necessary one, in M.P."Cajetina" from each processes, Raw Meat (*beef meat; lamb meat; pork meat*) and Meat Products (*dry, fermented products; dry fermented sausages; dry bacon*), derived three sub processes. Hence, there were six sub processes defined in total, confirming the number of overall HACCP Plans (corresponding products represent output results of the processes/sub processes). Since, in view of the fact that the objective of this papers is HACCP Plan for dry meat products, more exactly HACCP Plan for "Užice beef prshuta" only as an example, we must mention that safety production of raw materials (Beef slaughter, Dressing and chilling of carcasses, Splitting,) is subject of an separate HACCP Plan. Consequently, production of "Užice beef prshuta" comes after a production of raw material (beef meat).

In addition of preparation activities, HACCP Team carried out a detail estimation of hazards that are most likely to occur, possible reasons and frequency of their appearance as well as consequences. Estimation was conducted concerning three most important groups of hazards, on which basis the lists of biological, chemical and physical hazards were developed.

Finally, as a part of preparation activities, a description of product "Užice beef prshuta" was made. Within the tabular review of product characteristics there had been given information's about: description of the raw materials (from meat), ingredients breakdown, details of all intrinsic factors with tolerance limits (e.g. pH, a_w , salt etc.), spices used, additives added substances, packaging information's, requirements about quality level of water used in production and other important information's.

During the application of HACCP principles and developments of HACCP plans, in working conditions of M.P."Cajetina, seven specific and mutually connected groups of activity of HACCP concept (HACCP plan requirements) had been conducted as: (1) Identification and hazard analysis; (2) Determination of critical control points - CCP; (3) Establishing critical limits for all CCP's; (4) Establishing monitoring procedures; (5) Establishing corrective actions; (6) Establishing verification procedures; (7) Establishing record-keeping and documentation procedures.

In the process of hazard analysis in production of "Užice beef prshuta", using rich experience in appropriate field and relevant literature as well as standard helping tool named "decision tree", HACCP team had identified four critical control points: three of them within biological/

microbiological hazards (CCP-1B, CCP-2B, CCP-3B) and one among chemical hazards (CCP-4H).

The first one, **CCP-1B**, was identified within the process of receiving of stored (frozen), shaped and prepared meat (beef rounds and lions). Namely, in case of deviation from assigned temperature $-20 \pm 2^\circ\text{C}$ in the central parts of meat, which is in the same time a critical limit for this critical control point, it opens a possibility for presence of many, even pathogenic, micro organisms (e.g. *Salmonella*, *Listeria monocitogenes*...). During monitoring of receiving, manager of final meat processing systematically is conducting a visual control and inspection of stored raw materials (colour, odour) and taking two randomly chosen samples and controlling its temperature, while the observations and results are registered in a Monitoring log book. Besides this, Manager of maintenance department (or person named by him) monitors all the time functioning of cooling system and devices: at the beginning and every two hours, controlling room temperature and writing down registered values in Temperature monitoring log paper. Temperature monitoring device calibration occurs once a day and this activity is being registered in Thermometer calibration log paper. If there is a deviation from critical limits, based on suggestion made by the Manager of production, HACCP team leader determines appropriate corrective action, off course depending on level and time of deviation and consulting authorized Veterinary inspection. Based on results of corrective action the decision is made whether the product is safe, incompliant, restricted or suspended (retained). Quality service will automatically identify reasons for incompliance, eliminate them and prevent repeating. Also, if there is necessity, maintenance department intervene immediately and eliminate any damage on cooling system and devices. Finally, within the verification process of this CCP, manager of department for meat production conducts a verification and certifies Monitoring logs once in a shift, while the manager of maintenance department checks integrity of cooling system and devices and certifies Room temperature and Device functioning logs once during the same period of time.

The second one, **CCP-2B**, was identified within the process of smoking, drying and fermentation. Striving to prevent increasing the overall number of micro organisms, especially pathogen species and formation of toxins, respecting of critical limits is a must, as following: in the beginning of smoking and drying phase temperature of the chamber must not exceed $+20^\circ\text{C}$, while the relative humidity in the cabinet for smoking, drying and fermentation must be 90% in early phase, but with gradual decrease down to 75%. Within monitoring procedures, manager of meat production department systematically inspects the process of drying, smoking and fermentation and every two hours checks relative humidity and temperature, ratified values of these parameters are registered in a Monitoring log book. If there is a deviation from critical limits, based on suggestion made by the Manager of production, Quality manager determines optimal corrective action, depending on level and time of deviation and consulting authorized Veterinary inspection. Based on the results of corrective action, the decision is made whether the product is safe, incompliant, restricted or suspended (retained). Besides this, Quality service will automatically identify reasons for incompliance, eliminate them and prevent their repeating. Finally, manager of production department conducts a verification and certifies CCP Monitoring logs, once in a shift.

Third (**CCP-3B**) and forth (**CCP-4B**) critical control point were identified within the process of final quality control. CCP-3B refers to assurance of full microbiological safety of the product, in regard to accomplishing joint conservation effect of sodium chloride (NaCl) and sodium nitrite (NaNO₂), in order to take preventive steps against increasing growth of all micro organisms, especially pathogenic ones. Established critical limits refer to possible presence of *Enterobacteriaceae*, but no more than $10^4/\text{g}$, while presence of pathogenic species is not allowed. Conservation effect of curing mixture (NaCl/ NaNO₂) is confirmed also at final quality control of product, which in the same time represent critical control point CCP-4H as a chemical hazard. Namely, critical limit for conservation effect of salt is established at a level of 3.5% NaCl (± 0.5) in the centre of product, while the maximal granted share of sodium nitrite (NaNO₂) is up to 0,02%. We mention that specified share of NaCl (3.5%) in the centre of product, as a minimum amount for conservation effect, is also a usual and most acceptable nutritive and sensory upper limit. Also, sodium nitrite (NaNO₂) presence in final products is limited by the domestic Book of regulations - Quality of meat products, there for this CCP's critical limit (up to 0,02%) is established not only concerning conservation effect but for consumer protection from toxic impact of sodium nitrite, as well. Within monitoring process, Manager of the laboratory takes two randomly chosen samples from every production lot and conducts suitable microbiological and chemical researches which results registers in Book of microbiological research results of final products or in Book of chemical research results of final products. In case of a deviation from critical limits for CCP 3-B and CCP 4-H, based on suggestion made by the Manager of laboratory, Quality manager determines optimal corrective action, depending on level and time of deviation and consulting authorized Veterinary inspection. Based on the results of corrective action, the decision is made whether the product is safe, incompliant, restricted or suspended (retained). Besides this, Quality service will automatically identify reasons for incompliance, eliminate them and prevent their repeating. Finally, manager of laboratory conducts a verification and certifies microbiological and chemical research results logs of final products.

All documentation about development, implementing and constant improvement of HACCP concept is established, implemented, changed, substituted and archived by the appropriate quality management system procedure - Control of documentation and data.

Conclusion

In the present time, implemented HACCP concept (all HACCP plans) in M.P."Cajetina" is in the process of validation. Duration of validation process will be at least 3 months (from february to may 2003). If the results of validation would be satisfied, the next step will be certification of HACCP system, under the competent certification body - of course.

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