institutional consumers. A universal logo should be designed to identify raw beef products for consumers. The logo should include space for instructional information specific for the product. An example of a potential logo is depicted in Figure 2.

The seven CCPs are summarized in Table 1.

C. Distribution, Retailing, and Preparation

An effective HACCP plan for the production, slaughtering, and initial processing of raw beef will greatly increase control of pathogenic microorganisms; however, even under the best operating conditions low numbers of pathogens may remain on the carcass. Further, care must be exercised to prevent re-introduction of pathogens, such as *Salmonella* and *S. aureus*, that are epidemiologically linked to beef products.

After slaughter, dressing and processing, raw beef goes through a complex system of distribution and marketing (including wholesalers, distributors, retail stores and food service establishments) before ultimately reaching the end users who consume the products. Throughout distribution and preparation of raw meats, there is a significant potential for product mishandling leading to the introduction of additional pathogenic microorganisms, or the spread of any pathogens remaining on raw beef to other foods. Improper handling and storage practices, including improper holding temperatures, inadequate cooking, contaminated equipment and food worker hygiene, have all contributed to beef associated foodborne outbreaks (Bryan, 1988). The microbiological hazards associated with raw beef can be controlled by extending HACCP principles to product handling activities in retail stores, food service establishments, institutional feeding facilities, and homes.

The goal of the HACCP system in food distribution and preparation is to minimize microbial contamination, reduce the opportunities for pathogens that may be present to multiply, assure the destruction of pathogenic microorganisms through proper cooking procedures, and prevent the crosscontamination of pathogens from raw to cooked foods.

HACCP properly applied to all segments of distribution and preparation has the potential for:

1. Reducing the opportunities for pathogen growth, thereby reducing the risk of foodborne disease; 2. Assuring the destruction of enteric and other non-spore forming pathogens through proper cooking procedures;

3. Preventing the reintroduction of pathogens to the cooked product and cross-contamination of other foods; and

4. Controlling the growth of spore forming pathogens (e.g., *C. perfringens*) by use of proper time/temperature relations for storage, holding, and serving.

An effective HACCP system in food distribution and preparation depends on a general understanding of and adherence to the principles of sanitation, good manufacturing and food preparation practices as well as proper facility layout and equipment design and maintenance (See Attachment A). The education and training of all personnel is critical to the process and effectiveness of any HACCP program.

HACCP plans for handling and processing raw beef should be developed and implemented by food retailers and food service establishments as the optimal system for food safety assurance. In institutional feeding operations such as hospitals, nursing homes, day care centers, and prisons where the populations may be more vulnerable to foodborne disease, special care must be taken in the preparation of all foods, including raw beef products . The Committee recommends that HACCP systems be implemented immediately by food service establishments and institutions preparing foods for these special groups with increased susceptibility. General guidelines for the safe handling of raw beef in retail food stores and food service establishments are provided in Attachment B.

Several national surveys (Weimer and Jones, 1977; Williamson, et al., 1992) have shown that the public has a limited understanding of the basic principles of food microbiology and safe home food handling and preparation practices. In households, the successful use of HACCP principles is dependent on the interest, knowledge and skills of the food preparer. General guidelines for the safe handling of raw beef by consumers are provided in Attachment C.

D. HACCP Records and Verification

The acquisition and maintenance of records are an integral and critical principle of HACCP (NACMCF, 1992). Records of CCP performance along with documentation of related verification activities and process deviations are the primary tool by which a HACCP operation is managed and decisions are reached concerning the efficacy of process. The records of designated

objective and subjective observations that should be maintained must be specified in the HACCP plan and maintained at the processing location. All records should be reviewed and integrated on a specified, routine basis. This should include subjecting the data to trend analysis to identify and correct problems before they result in CCPs exceeding critical limits. It is recommended strongly that this review be integrated, and the results communicated to both employees and supervisory personnel. The mechanism and duration of records maintenance is the responsibility of plant management, and should be specified in the HACCP plan. However, any system established must take into account the primary role that records review plays in verifications by regulatory agencies.

Establishing procedures for verification that the HACCP system is working correctly is an integral element in developing an effective HACCP plan and system. The verification procedures should:

1. Verify that the critical limits for CCPs are satisfactory,

2. Ensure that the facility's HACCP plan is functioning effectively,

3. Consist of documented revalidations, audits, or other verification procedures to ensure the accuracy of the HACCP plan, and

4. Provide regulatory verification that the HACCP system is functioning satisfactorily.

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