**Training Supplement: Understanding potential hazards associated with canning vegetables.**

While the processes of canning or bottling acidified or acidic foods extend shelf life and enhance flavors, these processes can also pose a serious public health threat if not performed according to safe guidelines.

Bottled or canned acidified foods such as sauces, dressings, and canned vegetables pose a substantial food safety risk, if not processed properly. Naturally occurring spores of toxin-forming bacteria such as ***Clostridium botulinum*** can result in toxin formation, if not inactivated by an approved thermal process as well as proper acidification. *Procedures for production of shelf-stable acidified foods must be either from a published and tested recipe from an academic source, or must be prescribed by an FDA-recognized Process Authority in conjunction with product assessment testing for pH*. Other potentially harmful bacteria such as pathogenic *E. coli*, *Salmonella* or *Listeria monocytogenes* may also be present in or on raw agricultural products, requiring an effective thermal process to destroy these organisms. Cuts, bruising or damage from harvesting provide areas of the fruit or vegetable that are especially likely to harbor harmful bacteria, making inspection before processing a necessary measure to reduce risk. Good handling and hygienic practices, and proper cleaning and sanitizing are essential to reduce the risk of cross-contamination or recontamination of ready-to-eat foods with *Listeria monocytogenes* or other pathogens.

*E. coli* O157:H7 and other pathogenic *E. coli* strains, *Shigella* and *Salmonella* are natural contaminants in certain raw foods. These pathogens can also be transmitted by human carriers to food through improper hygienic practices and failure to follow the employee health policy during final preparation and service. Other human pathogens, such as *Staphylococcus aureus*, Norovirus and Hepatitis A virus, can also be transmitted to ready-to-eat food from food workers, creating the risk of infecting customers who consume those foods. Proper handwashing, glove use and other procedures for handling of ready-to-eat foods, good employee hygienic practices, and carefully following the Employee Health Policy are essential to preventing contamination of food and protecting the health of consumers.

Batch production records must be maintained by the producer. These records must include a unique identifier for each production batch, as well as documentation of critical times, temperatures and pH values from in-house testing, as prescribed by the Process Authority and the establishment’s approved HACCP plan.

**Definitions of HACCP Terms:**

***Corrective action*:** one or more actions to be taken when monitoring at a CCP demonstrates failure to meet a critical limit. Corrective actions should address the actual *cause* of the observed problem. Example: If an oven fails to reach the set temperature, corrective action *may* be to repair or replace the oven.

***Critical Control Point (CCP)*:** A process step at which control must be applied, to prevent or eliminate a hazard, or to reduce it to an acceptable level.

***Critical Limit (CL)*:** The maximum or minimum allowed value for a control measure, separating acceptability from unacceptability. For example, cooking instructions: “Cook to at least 165oF for 15 seconds at the thickest part of the thickest piece of chicken in the coolest part of the oven.” At retail level, most CLs are defined by regulations (example: SC Regulation 61-25). Critical Limits established in the HACCP Plan must be no less strict than current regulatory standards.

***Flow diagram*:** A visual illustration of the sequence of steps in a food preparation process, from receiving of raw materials to the finished product as it is presented to the customer.

***HACCP Plan*:** a written document based on international standards for HACCP, defining the formal procedures to be followed to assure control of identified food safety hazards in a specific process.

***Hazard*:** A biological, chemical, or physical contaminant that has the potential to cause injury, illness, or death. Salmonella, cleaning chemicals, and bone fragments are examples of the three types of hazards.

***Hazard analysis*:** The process of collecting and evaluating information on potential hazards and the conditions leading to their presence, to identify significant hazards that must be addressed in the HACCP Plan.

***Monitoring*:** Conducting ongoing, planned routine observations or measurements of control parameters to determine whether a CCP is under control. Recording measurements of batch temperatures, cooking times, and verifying presence of batch date marks are examples of monitoring.

***Prerequisite Programs (PRPs)*:** Programs, policies and procedures that are separate from the HACCP Plan, but which are essential to the effectiveness of the HACCP Plan. PRPs are a critical part of any food production operation. Examples of PRPs include sanitation procedures (SSOPs), pest control, supplier approval and purchasing specifications, employee hygiene policy, hand-washing requirements, no bare-hands contact with ready-to-eat foods policy, employee training procedures, and good retail practices.

***Preventive (control) measure*:** an action or activity in a food preparation process that is used to prevent or eliminate a food safety hazard, or to reduce that hazard to an acceptable level. Examples: approved supplier; freezing fish for parasite destruction.

***Validation*:** Obtaining technical evidence that the elements of the HACCP Plan for your process are capable of achieving their intended purpose. May include such materials as scientific literature, regulatory references, a Product Assessment, or testing data from your own process monitoring.

***Verification*:** The use of observations, procedures, tests, auditing, or other means, *other than routine monitoring activities*, to assess compliance with the HACCP Plan. Examples include managerial review of temperature charts, batch pH records, thermometer calibration records, and planned observation of employee hand-washing procedures.