Lights, Camera, HACCP!

By Julie Larson Bricher
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Among the food safety programs used by today's food companies, Hazard Analysis and Critical Control Points (HACCP) is clearly the star of the show. As a systematic, science-based method for identifying and correcting microbiological, chemical and physical hazards that can exist within food manufacturing and handling operations, HACCP is universally recognized by industry as an essential element in assuring food safety. Its marquee status stems from the fact that the HACCP approach is proactive rather than reactive, emphasizing food hazard prevention rather than the detection of harmful defects in finished food products.

The latter scenario sets the stage for certain tribulation, says consulting food scientist Rick Stier, who develops HACCP plans and conducts HACCP audits of food processing facilities worldwide. "If you've detected contamination post-processing, your company faces a costly recall, a negative sales impact on the product and/or entire brand, and the legal and ethical liabilities associated with making people ill or causing death. This is why HACCP, in conjunction with the prerequisite programs that support it, constitutes good business. When properly applied, HACCP can significantly reduce the possibility that contamination exists in finished product."

Jerry Roberts, Director of Quality, Worldwide Concentrate Operations with PepsiCo Beverages International, agrees. "There is no question that a HACCP program protects the trademarks and the equity of the food company. It is a matter of making sure that the foods the company puts into the public domain are safe and wholesome. And it is more than an insurance: Not to have the level of due diligence that HACCP provides is like walking into a building that appears to be a bank, depositing your money and then walking out. A company that does not have a sound HACCP program designed to reduce or eliminate hazards in its process increases the chance that adulterated foods will enter the public domain," he states.

"Even if the product does not ultimately cause harm to the public, it could have a significant impact on how the consumer perceives the company's ability to protect them whether they will buy that product in the future," says Roberts. "As a food safety program, HACCP contributes to the bottom line in the sense that it protects the assets and equity of any corporation today that produces consumer packaged goods."

The fact that HACCP has been widely adopted by companies manufacturing foods and beverages that do not fall within the purview of government mandates is another testament to the approach's usefulness as a proven way to better ensure food safety. Meat, poultry, seafood and juice processing operations--food categories for which federal HACCP rules apply--have led the way in fine-tuning the model. Regulatory officials, citing recent U.S. Centers for Disease Control and Prevention (CDC) statistics showing that foodborne illnesses associated with pathogens such

as E. coli O157:H7, Listeria monocytogenes and Salmonella have been dramatically reduced, link those reductions to the implementation of HACCP that began nearly a decade ago.

Even with top billing, HACCP is not a "silver bullet" food safety program--prerequisite programs such as Good Manufacturing Practices (GMPs), Sanitation Standard Operating Procedures (SSOPs) and allergen control plans also are vital to meeting quality control parameters other than critical control points. However, as the concept has matured and greater numbers of food companies have implemented their plans, HACCP is now viewed by many industry professionals as the linchpin food safety approach. The approach can be applied in small or large operations, at any link in the food manufacturing supply chain--receiving, processing, transporting, storing and preparing--and it relates to ingredients, processes and post-processing use of products. In addition, the seven principles of HACCP provide a framework in which food processors can systematically focus on critical operations where control is crucial, preventing contamination from the outset and allowing for immediate corrective action if and when problems do occur.

Knowing how to process and prepare foods and beverages under a properly designed, implemented and maintained HACCP system, say food safety experts, remains key to the blockbuster combination of assuring low risk of foodborne illness and contributing to a company's bottom line success.

HACCP, Take Seven

The basic script for HACCP is the seven principles on which the concept is based. Each of these steps is crucial to achieving a successful overall performance.

Principle 1. Conduct a hazard analysis. There are two primary objectives in conducting any hazard analysis, which is described by HACCP plan developers as the heart of the system. These are to conduct investigations that detect hazards, including the source and mode of actual or potential contamination by microbiological, chemical and physical agents, and to review any data generated from scientific studies, government assessments and/or plant production experiences in terms of actual or potential hazards. Frank L. Bryan, Ph.D., M.P.H., drawing on nearly 30 years' experience studying foodborne disease epidemiology as a scientist director with the CDC's Public Health Service, states that it is important that HACCP plan designers and key members of the company's HACCP team use as much data available as possible to identify all known hazards associated with production, processing and/or preparation of the food during the hazard analysis. He notes that this information may come from the following:

- Years of experience with processing the food
- Epidemiological data about foodborne diseases associated with the food and factors that contributed to outbreaks
- Tests done to evaluate the process
- Data from examination of the food for pH, water activity and/or microorganisms
- Measurements of time-temperature exposures at various operations
- Challenge studies to evaluate the outcome of actual or potential contaminants under various conditions to which the product may be subjected
- Observation of daily and periodic operations

- Discussions among persons such as HACCP team members who are experienced with the operations and knowledgeable about potential hazards.

"Lacking any of the following available data can result in hazards being overlooked or underemphasized," says Bryan, now president of Food Safety Consultation and Training LLC, in Lithonia, GA, which specializes in HACCP system development.

Because the hazard analysis is crucial in determining the extent of hazards and properly identifying critical control points (CCPs), it is important that food manufacturers pay thorough attention to this step, adds Stier. "Conducting a hazard analysis is one principle of the HACCP system that planners often fail to properly apply. All too often, especially with operations in developing nations, HACCP planners tend to leap beyond this first principle and begin to create CCPs without doing a proper hazard analysis. The team needs to evaluate the products, processes and ingredients and determine what are hazards that are reasonably likely to occur. Once they have done this, the controls for those hazards may be established, be they CCPs or prerequisite programs."

At Kraft Foods North America, hazard analysis is a two-pronged step, explains Larry Cohen, Kraft's Food Safety Program Manager. In 1995, Cohen aided in the revamp of the entire Kraft Foods HACCP program, creating a comprehensive document and an audit process for the company's global operations. In this way, he says, Kraft Foods is able to put the HACCP concept into practical use whereby all food plants worldwide are able to efficiently address implementation issues and share solutions.

"We break the hazard analysis into two parts. First, we look at the ingredients and the packaging materials of each product at each plant," says Cohen, "and second, we look at the actual process, including an allergen assessment. For each step, whether the ingredients/packaging supplies or the processing hazard analysis, we identify the biological, chemical and physical hazards and mechanisms for their control. You can then utilize a hazard evaluation summary to assist in identifying whether those mechanisms fall under prerequisite program (QCP) or are CCPs."

By identifying what type of materials are going into the process in terms of the ingredients and packaging supplies, as well as each step in the processing of the product itself, says Cohen, the company gains a comprehensive hazard analysis that enhances its ability to effectively implement HACCP. "By focusing on these two key areas, you can better determine whether an ingredient, package or process is controlled by a CCP or by a prerequisite quality program," Cohen states. "This enhances your ability to institute appropriate and effective control steps.

"For example, let's say that you've identified all of the ingredients, raw materials and packaging supplies that go into making a certain product. You've also identified all of the processing steps that go into making this product, including whether there is water added, air blown onto the product, and so on, and you've done a processes evaluation in which you have identified the hazards that come into play at each processing step. If the ingredient is microbiologically sensitive, you may determine that it is prudent to require a certificate of analysis (COA) from the supplier that says that it is pathogen-free--that would be a control mechanism, or prerequisite QCP."

"You may also consider that sensitive ingredient in terms of the second part of the hazard analysis to make further determinations," he continues. "When reviewed against the processing hazard analysis, you may determine that you will be processing this ingredient to eliminate the pathogen risk, such as by pasteurization or another time-temperature mechanism, which may be a scientifically based CCP. You've got this information in one hazard analysis flow diagram, and then doing the processing piece it is the actual act of each process flow, so you receive the milk, you pasteurize the milk, and then determine what type of hazards and their corresponding controls."

This approach, says Cohen, provides an integrated view of potential food safety and quality problems that might be faced in any given process. "As part of the hazard analysis for ingredients and packaging supplies, every ingredient that goes into a product is written in the HACCP plan and then you can then identify what risks are associated with each ingredient. If any of the ingredients are identified as known allergens, for example, or if packaging supplies contain a release agent that might be considered an allergen, the manufacturer is able to determine the best control mechanism, whether as a prerequisite control point or CCP. By putting that ingredient hazard analysis flow diagram into the process hazard analysis, you will be able to see at what, if any, point in the manufacture of that product you can control identified physical, chemical or biological hazards as CCPs or identify other key programs that are used for control of hazards that are not identified as CCPs."

Principle 2. Determine the CCPs in the process. If the hazard analysis is thorough, the company greatly enhances its ability to identify true CCPs--which typically should be fewer than the number of quality control points (QCPs) identified. Ensuring that you've identified the correct CCPs in your processing operation can be a challenging task, even for veteran implementers of HACCP, if the definition of a CCP is incorrect. Pepsi's Roberts notes that there is still confusion in the industry concerning what constitutes a CCP versus what constitutes a quality control point. "The mistake many people make is that they confuse a CCP with a quality control point. A CCP is defined as the most effective point in the process at which control, when applied, will prevent, eliminate or reduce a food safety hazard to or below an acceptable level of safety, whether that is an FDA or USDA action level or the company's own food safety standard. This is much different than the definition of a QCP, which is a state of monitoring for control purposes that does not necessarily prevent or eliminate a food safety hazard at the actual point in the process."

Roberts adds that a HACCP decision tree is particularly useful to food companies to differentiate CCPs from QCPs. "It is essential to distinguish the difference between a control point and a critical control point. HACCP decision trees are well defined, and if people take the time to go through the flow chart, they are better able to ensure that a CCP is distinguished at the specific point in the process that the hazard is actually being reduced or eliminated before it enters the public domain.

"Step one of the HACCP decision tree is to define the process," he continues. "If one defines the process appropriately--considering all the factors such as the process flow, time-temperature parameters, what the stages of the process are designed to do, the product composition, and so on--it will be very easy to follow that process step-by-step to understand what is a CCP, or what

is critical in the process to reduce or eliminate the hazard, as opposed to a QCP, which is a state of monitoring for control purposes."

When too many CCPs are identified, it becomes difficult to manage the process, which makes both the process itself and the HACCP system ineffective. Tom Sauer, Eastern Wisconsin Quality Assurance Manager with Land O'Lakes Dairy Foods, has worked for several dairy and dairy product manufacturers with strong HACCP programs during his 20-year career. He adds that CCPs also should be limited to points at which hazards can be reduced, controlled or eliminated that are within the control of the plant, which is a way to further hone in on true CCPs. "I've seen individual plants within a single company that, even though they were almost identical operations-wise, each had a different number of CCPs in their HACCP programs. Each plant ran its own prerequisite programs and conducted its own hazard analysis, which explains the variation. However, many of the CCPs were actually QCPs.

"Typically, Land O'Lakes has two CCPs--heat treatment and metal detection--that are applied at all of its processing plants because these are measures that we control within our own facility," Sauer continues. "That's not to say that we don't have QCPs, which are points at which we don't have direct control. For example, checking for antibiotics in milk as the raw material comes into the plant could be a CCP--in other words, it is a go/no-go system because if a sample tests positive for antibiotics, then you don't use the milk. But, since we have no control over the addition of the antibiotics, we just don't accept it from the supplier if it doesn't meet our specification. In this case, it is not a CCP. At the end of the day, you can't make everything a CCP because then you run into the problem of monitoring it. If you make something a CCP, you've got to monitor it and be able to verify it or your HACCP program is not going to do what it is designed to do--provide the company with assurance of food safety."

Sauer notes that while prerequisite programs, including GMPs, sanitation, chemical control, pest management, recall and traceability, allergen control and supplier specifications, provide excellent mechanisms for control of QCPs, they do not require the corrective action component of a true CCP. "With a metal detection CCP, for instance, you would keep a log sheet and a chart as part of the required documentation. If there is a blip on the chart, which indicates that something has set off the metal detector, and there is no corresponding notation on the log sheet, you've got a CCP issue and you've got to put product on hold. As such, you've got to be able to take corrective action to get the line running again."

Ultimately, adds Roberts, establishing appropriate CCPs involves knowing the definition of both QCPs and CCPs as the manufacturer sets up process control criteria. Keeping a product at a certain temperature at a particular processing point might be critical to assuring that your process delivers a certain quality aspect, but if it does not reduce or eliminate a hazard that could be present in the product, it is not a CCP. It is a matter of distinguishing between what is there to control the process as opposed to what is there to eliminate or reduce a known or perceived hazard in the product or process. Temperature is a control mechanism that illustrates this concept, he says.

"For example, if cooking must occur at a certain temperature for a specific period of time at a certain step in your process to destroy or eliminate pathogens in your product, then this cooking

temperature at this stage in your process is a CCP," explains Roberts. "If, on the other hand, it is designed to foster a reaction pertaining to the product, such as to cook a meat product to tenderize it, it is not a CCP, it is a QCP. If refrigeration or pH is used to a level to prevent microbiological growth, that's a CCP; but if the refrigeration is used to maintain the product's texture (such as chocolate in high temperature areas) then, in this case, refrigeration is not a CCP."

These examples, he says, show where the same mechanism--cooking or refrigeration temperature--can be used at different stages in the process for entirely different reasons. "One is a QCP related to product quality or physical characteristics of the food, as opposed to a CCP to control, eliminate or prevent microbiological growth, or chemical or physical adulteration of the product. It is very important that people make the distinction between those two attributes when looking at the process. In other words, take the case of high temperature at a stage in processing a meat product. What role does the temperature play? Is it to prevent pathogen growth, or is it to cook the meat to a tender texture, which has nothing to do with a hazard?"

Frank Bryan cautions that issues also can arise when companies identify too few CCPs. "Prerequisites have been used by some companies to minimize the number of CCPs that must be monitored and records kept for review by agencies that verify the operations and validate the systems. For example, in some plants, many critical operations are classified as prerequisites and only metal detection, which is automatically monitored is considered a critical control point. Refrigeration practices or cleaning equipment and associated operations, for example, are excluded as CCPs. True, these operations are basic to GMPs, but rapid cooling of heated foods is a critical operation that prevents growth of surviving foodborne pathogens and those that contaminate product post-heating. Cleaning and disinfecting of equipment, such as a slicing machine, used in contact with cooked foods are crucial for minimizing contamination."

Bryan suggests the following rules be used to select or evaluate a CCP:

1. There is a high or moderate risk of a disease outcome resulting from failure of an operation to prevent or minimize contamination, kill microorganisms of concern, or inhibit significantly or delay growth of bacteria or molds of concern. Low risk situations do not call for CCPs. Hence, the hazards must be reasonably expected to occur.

2. Actions are taken that either eliminate, exclude, prevent, significantly minimize, reduce or delay a hazard or several hazards. (The hazard or hazards may have been introduced from ingredients, at the operation under consideration, or at preceding operations.)

3. Criteria for control or critical limits have been established and preventive or control measures carried out at this operation. More than one operation may be involved in the control of a hazard, and more than one hazard may be affected at any one critical control point. Some hazards may be controlled by the criteria, but others may not.

4. Effective procedures are used to monitor the CCP to determine whether food safety criteria (i.e., disease prevention and control) are met or critical limits satisfied.

5. The CCP is monitored during, just after, or occasionally just before the operation, as applicable to the process or situation. (Ideally, the monitoring is continuous and automatically adjusted to maintain control or exclude unacceptable product.)

6. Prompt corrective actions are taken when criteria are not met. CCPs usually are at operations that have contributed to the source and spread of contaminants or to survival and/or propagation of pathogens or toxins and where effective control actions can be taken.

Principle 3. Establish critical limits for preventative measures associated with each identified CCP. Establishing the critical limits that you think you should have in place for each preventative measure can be one of the more daunting tasks of HACCP program implementation, says Kraft Foods Section Manager, Microbiology and Food Safety Mark Carter, who is a member of the company's Worldwide HACCP Committee. Not only must the processor identify why the critical limit is necessary, but he also must determine how to effectively measure it and verify that it has been measured properly.

A HACCP critical limit established by the food processor may differ from official public health and regulatory requirements, but it must be effective for its intended purpose of reducing, preventing and eliminating food hazards. Often, a processor or foodservice operator will use a more stringent standard. The key is to select criteria that is specific to the product and the process and that the critical limit can be measured and verified that hazards are indeed minimized or eliminated.

Some critical limits will be scientifically based and others will be processing based, he says, and in either case, the ability to verify these measurements is paramount. "Scientifi-cally based critical limits are those for which there is data that shows if you achieve a certain log kill using a particular control mechanism you will reduce a pathogen or eliminate spores in the product," says Carter. "Or, scientific data shows that there is a certain temperature to which you have to cook the product for a specified period of time to eliminate certain vegetative pathogens. A critical limit also can be determined in terms of process capability. For example, there are set limits that govern how a pasteurizer works. If pasteurization is a CCP in your process, you have to verify that the pasteurizer reaches a certain temperature for a certain amount of time and then verify that critical limit is being measured correctly."

He adds that establishing critical limits is especially important for processes for which there may not be preexisting data. "If you have a new process for which you need to validate a cook step, which is also a kill step in your process, you will need to conduct some challenge studies or perform some other processing data collection to make sure that you are able to reach those critical parameters. This is where you build safety into your system."

Principle 4. Establish CCP monitoring requirements and monitor the CCPs. HACCP monitoring involves examining critical operations as they are occurring during food processing, with particular attention to CCPs. The goal of any monitoring activity is to ensure that the food characteristics meet food safety specifications and that production, processing, preparation or storage approaches have been done safely as prescribed in the HACCP system. To attain this

assurance, results from monitoring activities must show that the intended preventive or control measures are being carried out and are effective.

"If you have set your CCPs and critical limits properly, you will be able to establish effective monitoring requirements," says Sauer. In general, he says, the processor should consider instituting specific tasks when monitoring for HACCP, including identifying what is monitored and specific sites that are monitored, how and with what instruments or methods the monitoring is conducted, who performs the monitoring, when and at what frequency the monitoring is done, and how the monitoring results are documented. "In terms of who performs the monitoring, for example, Land O'Lakes has fine-tuned its HACCP training to require all plant personnel who are an integral part of monitoring and verification activities to be HACCP certified. Those who work at CCPs in the operation, such as a pasteurizer operator, must receive HACCP training so that corrective actions can be made promptly if a problem occurs."

Essentially, HACCP monitoring centers on ensuring whether the criteria at CCPs have been met, adds Kraft Foods' Cohen. "Processors should look at CCP monitoring in terms of their specific minimum requirements as determined by a scientific basis. For example, if the CCP is milk pasteurization, you will have identified a minimum time-temperature equivalent as the critical limit by use of a recording chart. Other critical limits might be monitored by alarm system, such as a kick-off in metal detection, or by parameters that are used in the process defined as the acceptable minimum level for food safety--whether a biological, physical or chemical CCP.

"Once you've established how you will monitor--whether it is a time-temperature chart recorder, a metal detection device, visible allergen residue, etc.--you set that monitoring up in reference to the critical limit, such as how frequently that activity needs to be conducted during the run and determine how it is going to be verified," continues Cohen. "In the case of milk pasteurization, the pasteurizer operator monitors the time-temperature recording and verifies that the system is working properly, by performing cut-in/cut-out temperatures and comparing recording thermometer reading to the indicating thermometer, verifying the integrity of the pasteurizer timing pump seal, and finally, reviewing and signing pasteurizer records (at least daily)."

Principle 5. Establish corrective actions to be taken when monitoring indicates that there is a deviation from an established critical limit. The ability to quickly take corrective action in the event that monitoring results show that either the CCP criteria have not been met or that a process deviation has occurred gives the food company a significant advantage in achieving food safety control, says Jerry Roberts of PepsiCo. The key is to make sure that corrective actions are communicated clearly to staff in the HACCP plan. "The industry has learned over the years that you invite disaster if you haven't clearly identified each CCP corrective action," he advises. "The danger is that if the CCP is out of control, whoever is running the process will not know what to do, and likely with all good intention, may take action to the best of their capability. However, that action may not be the appropriate way to address the HACCP concern.

"It is critical at every stage at which there is a CCP to identify and document quite clearly the corrective action that must be taken, as well as to identify the person or persons who have the authority and capability to take action. Without the corrective actions spelled out, people will tend to do "band-aiding," which does not get to the root cause of the deviation, effectively

correct the cause of the deviation and assess if the CCP is under control before continuing the production. The corrective actions must also be specific to guide employees to identify, retain and control potentially unsafe products produced during the CCP deviation. It also is imperative to ensure that all executed corrective actions are documented and the records maintained. "Ultimately, if you have a failure at the CCP and it is not adequately corrected, the company's assets and business are at risk," says Roberts. "When it comes to HACCP, we cannot leave it up to ad hoc response; corrective action has to be a defined and structured response. It's that simple."

Douglas Peterson, president and CEO of Foodboss LLC, a Modesto, CA-based HACCP management and certification training consulting firm, adds that, based on his experience reviewing client companies' HACCP records, this is where many tend to fail in the execution of the HACCP system. "I find that people tend to document problems, not corrective actions. As such, they have more difficulty translating the identified problem into a corrective action. In other words, what do I do to fix the problem and how do I document that? None of the rest of the HACCP principles matter if it doesn't lead to something that makes your system better, and that's what corrective actions do."

"There is a saying, 'If you walk by a problem once, it is a problem, but if you walk past it twice, then it's a fixture.' In other words, human nature is such that if you don't take a corrective action, the problem becomes part of the scenery. Documenting corrective actions in a way that is clear to everyone helps ensure that product failures have been completely addressed and the potential for food safety issues is reduced."

Principle 6. Establish procedures for verification that the HACCP system is working effectively. A successful HACCP program provides the food company with data that shows that each CCP is delivering against expectation. To ensure that all CCPs are verified adequately, HACCP expert Frank Bryan advises that companies conduct a broad range of verification activities, including:

- Making observations at all processes designated as CCPs as to whether the control action is effective and that monitoring is being done effectively with correct monitoring instruments
- Questioning the operator or monitoring person about their procedures
- Measuring with agency instruments time-temperature exposures of operations designed to inactivate hazards or prevent proliferation or accumulation of bacteria or concentration of hazardous substances
- Evaluating the functioning, maintenance and calibration of devices used to monitor CCPs
- Measuring product pH, water activity or other characteristics that have food safety relationships, if applicable
- Collecting samples at CCPs (rather than of end-products) and testing them for microorganisms or chemical residues of concern at that stage of the operation

Additionally, says Bryan, the process should be evaluated to determine whether previously unnoticed hazards exist or have occurred because the process has been modified, new ingredients have been added to the product formulation, or new equipment has been introduced to the plant.

Verifying that your CCP is correct, agrees Mark Carter of Kraft Foods, is essential to ensuring that the food safety parameters are working. "Typically, when you establish procedures for verification you are looking at the measurement systems that will give you proof that the HACCP system is performing the way it is supposed to, as well as evidence that the CCPs are being monitored correctly. Ideally, the measurement system that you put in place becomes that verification that it is performing as it should.

"Let's say you have a product that has to be made below a certain pH to reduce or eliminate pathogens, which makes the measurement of pH a CCP," he says. "You need to verify that your measurement system for that CCP is correct, both from a systems standpoint--such as whether the equipment that you're using to measure pH is working properly--and from a statistical standpoint, which means that you have taken enough samples to make the verification results statistically significant based on the level of confidence you want to reach. The measurement system you're using at the CCP will impact your ability to take immediate corrective action if the process is out of control, so your ability to verify that measurement system is very important."

Principle 7. Establish documentation of all procedures and records appropriate to these principles and their application. HACCP requires the food company to keep detailed records of CCPs and other HACCP-related activities, including proof of monitoring, and corrective action and process verification documentation. Most companies have in-house policies directing that these CCP records are maintained for a specific period of time, whether in print or in a computerized database system, notes Cohen.

The key to obtaining useful information is to maintain the right documentation, he says. "Essentially, the company has to document the hazard analysis, the CCP determination and the critical limits and it has to keep records of all CCP monitoring activities, any deviations, the corrective actions taken and modifications made to the HACCP system. Typically, there is an inspection of these various records by a supervisor to make sure everything is correct, and there also may be an audit of those records conducted by the quality assurance department to verify that CCP records are in fact in place. It is important that someone audit these records on frequencies and based on what they are able to control, whether it be a week's worth or a month's worth of data"

Companies that maintain and manage an effective system for documentation may also find that they can use the collected data to trend their CCP records. "For example, when looking at all of the metal detection records, you will see how many kick-offs occurred for a certain machine in a certain plant over time, and whether there were any misses recorded and how many times the line went down. The plant can trend this historical data gathered from recording sheets to show that there is a reoccurring problem with some aspect of the metal detection CCP, or conversely, show that the system is working very well over time."

Now Playing: HACCP Success

At the end of the day, the HACCP system is about achieving continuous performance to meet food safety goals in the processing of foods and beverages. Food manufacturers and foodservice operations that most effectively apply the seven HACCP principles follow a common script:

- The corporate culture promotes and supports the proper design, implementation and improvement of the HACCP system in its operations.
- Company management supports and provides proper HACCP certification and training to supervisors and line workers to assure that monitoring is effectively performed and that appropriate corrective actions are taken.
- The company ensures that monitoring and verification is done using proven science-based methods with state-of-the-art instruments and equipment.
- The company validates and reviews its HACCP system using auditing protocols, not only to demonstrate control but to continuously make system improvements that increase the level of food safety assurance across all processing operations.

As the food industry refines the HACCP approach, incorporating innovative technologies and systematic management strategies, companies will realize both greater production efficiencies and assurance of safe and wholesome products. The ticket to HACCP success, of course, ultimately comes down to whether your company is ready for its close-up.