MADGETECH
WE BUILD DATA LOGGERS

Data Logging 101: An Introduction to

HACCP Compliance

for the Poultry and Egg Processor

This booklet has been provided courtesy of:

MADGETECH
WE BUILD DATA LOGGERS

Simplifying How the World Measures & Records Data

MadgeTech, Inc. is a global company, based in New England and founded on old-fashioned principles, customer service, quality, and trust. MadgeTech's President, Norman Carlson, started the company in 1996 and charted the growth of the product lines and services while maintaining those solid core principles.

Our 'Can Do' team of engineers and technical staff consistently incorporate new and innovative ideas into our data loggers. In short, we push the envelope, raising the bar in innovation and quality. Our competitors have praised us by adopting many of our ideas as their own. Over time, MadgeTech has become the industry standard in the data logger market.

MadgeTech continuously develops new, cutting-edge products, creating solutions for our customers around the world in industries across the board. Our growing network of distributors has expanded our presence to markets far beyond our home-headquarters in New Hampshire, our products are now sold in over 100 countries around the world.

Our employees are committed to quality and customer satisfaction. Behind the full range of MadgeTech's products and services is the cumulative expertise of experienced engineers, manufacturing and electronic professionals and technicians. Our knowledgeable sales team can offer technical advice to assist in selecting the right product for each application, as well as providing after-sales support.

MadgeTech is dedicated to providing customers with reliable, affordable products, hassle-free ordering, and excellent service, saving customers time and money. It is our goal to earn your trust in meeting your needs and providing innovative solutions. The products and services that bear the MadgeTech name come with quality assurance and the best support in the industry today.

Norman E. Carlson,

Founder & President

Data Logging 101:
An Introduction to HACCP Compliance

Contents

Introduction to HACCP Compliance

What is involved in a producer of the poultry industry or egg industry being HACCP compliant?

A good place to start is to look closely at the term "HACCP." The acronym HACCP stands for Hazard Analysis and Critical Control Points. It is an approach to maximizing food safety through identifying biological, chemical, and physical hazards that may occur during the various production processes that could render the food product unsafe, and designing measures to reduce these hazards to an acceptable threshold.

The Food Safety and Inspection Service (FSIS) of the United States Department of Agriculture lists the following seven principles that guide HACCP.

Seven Principles that Guide HACCP

Reference the FSIS website[1].

Overview of the Seven Principles of HACCP

In conducting a hazard analysis, the processing plant's team in charge of HACCP must consider each step in the production process and determine the food safety hazards that exist. Measures can then be designed to enable the plant to limit these hazards.

The FSIS defines a "critical control point" as "A point, step, or procedure in a food process at which control can be applied and, as a result, a food safety hazard can be prevented, eliminated, or reduced to acceptable levels[2]." The plant's HACCP team should determine and list every such CCP in the plant's production process.

The FSIS defines a "critical limit" as "the maximum or minimum value to which a physical, biological, or chemical hazard must be controlled at a critical control point to prevent, eliminate, or reduce to an acceptable level[3]." Critical limits are quantifiable values; some of the most common critical limits in poultry and egg processing relate to time and temperature.

The plant's HACCP team must determine what monitoring procedures it will put in place for the purpose of measuring each critical limit of each critical control point. Sufficient monitoring procedures will specify "how the measurement will be taken, when the measurement is taken, who is responsible for the measurement and how frequently the measurement is taken during production[4]."

Corrective actions are those procedures that the processing plant will follow when there is deviation from a critical limit. In putting together its HACCP plan, the plant's HACCP team must determine what actions will be taken in the case of any such deviation from a critical limit.

Record keeping is a critical element of an HACCP compliant plant. HACCP compliant record keeping will include such things as the plant's written HACCP plan, information about the plant's HACCP team, the plant's hazard analysis, the identified critical control points, the critical limits established, monitoring and verification procedures, record keeping procedures, flow charts, and corrective actions that will be implemented for deviations[5]. Verification of the plant's HACCP plan will ensure that the HACCP works and provides product safety as intended.

A description of the food product, its intended use, and who its intended consumers are should also be included in a complete HACCP plan.

Critical Control Point

"A point, step, or procedure in a food process at which control can be applied and, as a result, a food safety hazard can be prevented, eliminated, or reduced to acceptable levels[2]."

Data Logging Technology

There are various measurement methods that can be used to establish and monitor critical limits to maintain an accurate record keeping system. For example, there are strip chart recorders which rely on moving parts, thermometers which rely on employee diligence, and there are also data loggers which are modern electronic recorders which do not rely on moving parts or constant employee attentiveness.

A data logger is an electronic measurement instrument that records environmental parameters such as temperature, humidity, pressure, pH and more, over time. The data is available in graphical and tabular formats, which are date and time stamped. These records can be saved electronically or printed to provide to auditors or other regulatory bodies.

Temperature monitoring is especially critical for regulatory compliance of USDA and FDA regulations. Data loggers can be designed into HACCP plans to easily maintain compliance with such regulations. As each HACCP plan is unique to each plant, the data logging solution is dependent upon the end users application and requirement. Certain requirements can include:

- **What environmental parameter needs to be measured? (Examples: Temperature, Humidity, pH, etc.)**
- **What measurement range does the data logger need to measure? (Examples: Smokehouse temperatures, refrigerators, coolers, etc.)**
- **Does it need to be waterproof?**

Data loggers are designed for a wide variety of uses. Data loggers can have internal sensors to measure ambient environmental parameters, while others have external sensors that may be inserted into product for internal measurement. They have different operating environments, which is important to keep in mind when finding a data logger for a certain application. For instance, to measure temperatures within an oven, the data logger must also be able to withstand the temperatures within the oven. Certain models may be waterproof or provide a certain level of water protection, while others may not be exposed to any condensing environment. Some additional data logger features include:

- **High and Low Alarms**
- **LCD screens to see current readings and statistics**
- **LED Status Indicators**
- **Password Protection**
- **Push button start**
- **Wireless Data Transmission**

As precision measurement instruments, data loggers do require maintenance. This typically includes battery replacement, O-ring replacement and at least annual recalibration to a traceable source. To provide accurate data, the data logger being used should always be certified and calibrated to a known standard.

When using data loggers, in most cases there will be software required. The data logging software allows for further analysis of data collected from the data logger. The program is also typically used to start the data logger and perform other communications. When choosing a data logger, it is important to also learn about the software program. Certain software programs include features that can help analyze data for poultry processors. They include:

- **Cooling Flags to address USDA Appendix B**
- **Lethality Equations for F0 and PU**
- **Minimum, Maximum, Average Statistics**

A PC is required to use a data logger. A traditional data logging system consists of a data logger, communication cable and software. The software is installed on the PC, and the communication cable is connected to the PC and data logger. The data logger is started through the PC prior to being deployed. Configurations can include setting the required high and low alarm, reading rate (frequency the device will take a reading; for example, 1 second, 1 minute or 1 hour) and more. The device is then placed in the process and after completion, the data logger is reconnected to the cable, and the data is downloaded.

Wireless data loggers are becoming more prevalent to the poultry processing industry as well. These data logging systems are typically designed so that data loggers are placed remotely in locations such as coolers, freezers, warehouses, etc. Wireless receivers are placed throughout a plant and the data loggers send to the wireless receivers which ultimately send the data back to a central location. Data can be viewed through a PC from one or multiple locations. Alarms are common with wireless systems, which provide a great benefit to processors, as plant employees can be immediately notified of deviations.

Data loggers are a new technology and tool that can assist processors in complying with regulations in a simple, cost-effective manner. From cooking to cooling and shipping to storage, data loggers can be used throughout the entire production process.

Calibration and Record Keeping

A critical piece of any HACCP plan is monitoring and record keeping of critical limits, which makes reliable calibration and maintenance of devices used for the monitoring and record keeping crucial.

Modern data loggers for monitoring and record keeping of product and process data are still in use today measuring, monitoring, and allowing for record keeping of quantifiable data, including temperature, humidity, pH, and other measurables. Standard thermometers for measurements of temperature and hygrometers to measure humidity are two such devices, and calibration and recordkeeping with these and other data logger forerunners require a much more intensive regimen by designated plant personnel, with a greater likelihood of deviation likely to the calibration process, than is available with the use of state-of-the-art data loggers. Data loggers provide a cost-effective means of extremely accurate data collection and recordkeeping, over long periods of time and under harsh conditions, with far less requirements for human supervision and involvement than has previously been available to participants in the poultry and egg industries.

Proper calibration of a data logger ensures its accuracy, and most data logging companies provide services to ensure accurate and consistent calibration of its data loggers.

Each certificate indicates the date and conditions of calibration. These certificates provide the documentation needed to satisfy most requirements, certifying that a product has been properly calibrated. The calibration certificate also provides traceability.

HACCP Compliance as Relating to the Poultry Industry in the United States

The USDA has jurisdiction over ensuring food safety regarding poultry processing in the United States. As part of this, HACCP systems are required by poultry processing plants that are subject to USDA inspection, and is codified in 9 C.F.R. Part 417[6].

The HACCP team for any establishment in the poultry processing industry in the United States must be well-acquainted with the requirements of this section of the Code of Federal Regulations, as compliance with its sections is required. The HACCP plan must comply with the provisions of 9 C.F.R. Part 417, and must be signed and dated by the designated responsible establishment individual. The HACCP plan must be thus signed and dated upon initial acceptance, upon any modification to the plan, and at least any annual, upon reassessment[7].

As per section 417.6, An establishment's HACCP system may be found inadequate if the plan does meet the requirements set out in 9 C.F.R. 417, the establishment's personnel are not performing the tasks specified in the HACCP plan, the establishment fails to take corrective actions when needed, HACCP record keeping does not meet the requirements of section 417.3, or adulterated product is produced or shipped[8].

Section 417.7 specifies that development of the establishment's HACCP, as well as modification and reassessment of the HACCP plan, may only be performed by an individual who has been sufficiently trained on the seven principles of HACCP as applied to poultry product processing[9].

Section 417.8 mandates that the USDA's FSIS will verify the adequacy of HACCP plans relating to the poultry processing industry[10].

To assist poultry processing establishments meet the HACCP requirements of 9 C.F.R. Part 417, FSIS created generic models for each of the processes in a poultry processing plant. FSIS has indicated that the generic models can be used as starting points for putting together plant-specific HACCP plans. The FSIS-created generic models are very useful tools, and include things such as sample process flow diagrams, sample forms for HACCP elements such as hazard analysis and the HACCP plan, and sample logs for recording data relating to reprocessing inspection, chilling, thermometer calibration, room temperature, antimicrobial intervention monitoring, and corrective actions. The diagrams and forms FSIS includes in the generic models can be used as starting points for creating plant-specific diagrams and forms. The FSIS generic models include lists of references to assist an establishment ensure its hazard analysis is complete. The generic models show an HACCP team for a hypothetical poultry establishment working its way, step by step, through the HACCP process as required by 9 C.F.R. Part 417. These generic models can be found on the FSIS website. Anyone faced with creating a HACCP plan should refer to the FSIS generic model to guide the process.

An important element of any HACCP plan is the collection, monitoring, verification, and recording of data to determine whether the processes in place are succeeding in meeting critical limits, and to detect when any deviation has occurred that will require corrective action. Modern data loggers are an excellent way to meet these requirements of a HACCP plan. Some of the quantitatively measurable data that may need to be collected and recorded per the HACCP plan include temperatures, time, and pH, and data loggers represent the state of the art manner in such data collection, monitoring, verification, and recording.

Some Common Regulatory Compliance Issues Facing Poultry Industry Participants

Slaughter

Scalding

The FSIS issued in May 2010 the third edition of the Compliance Guideline for Controlling Salmonella and Campylobacter in Poultry[11].

In this compliance guideline, the FSIS makes certain recommendations in regard to poultry scalding. The FSIS makes this recommendation: "A higher, more alkaline pH (9.0 ± .2) is best for reducing Salmonella and Campylobacter in the water (Humphrey and Lanning, 1987). Making the pH more acidic (3-4) is also effective at decreasing Salmonella (Okrend, et al., 1986). Plants should monitor the pH in scald tanks as frequently as necessary to determine the pH highs and lows occurring during operation. Once plants are able to maintain a desirable pH, less monitoring is needed[12]."

The FSIS states that "scalding temperatures higher than 116.6 °F (47 °C) should be sufficient to control Salmonella growth[13]."

Critical Control Point

During processing, the outer layer of the carcass is required to be washed down. The pH of the wash–down water should be maintained at either above or below the optimum pH for Salmonella growth (6.5 - 7.5) while the water temperature is required to be higher than 116.6 °F. The FSIS Compliance Guideline references a time versus temperature chart for different types of poultry[14].

Data Logging Solution

Temperature: Thermocouple based data loggers may be used to measure and record the temperature as well as the duration in which the poultry carcass has been scalded. Thermocouples are temperature sensors that can be used to measure a wide range of temperatures, specifically in applications that involve moisture or water. Thermocouples provide a fast response time that allows the user to be able to capture temperature changes occurring over very short periods of time.

pH: pH-based data loggers can be used to measure and record the pH of water tanks as well as line systems. Many data loggers are equipped with a visual LCD which provides current pH readings, allowing the user to add chemicals to maintain the proper pH at all times.

Chilling

The Code of Federal Regulations provides poultry chilling requirements with which poultry processors must comply. 9 C.F.R. Part 381.66 contains specific requirements for temperature thresholds for chilling and procedures in various circumstances. A poultry processor will of course need to be well-acquainted with the specific requirements and thresholds indicated in this regulatory section, and ensure that its facility's HACCP plan be structured to meet these requirements and thresholds[15].

One specific requirement is that poultry that is slaughtered and eviscerated in the processing facility must be chilled immediately after processing, with certain exceptions, so that the internal carcass temperature is no more than 40 °F and is reached within specified times. These times are as follows: if under 4 pounds, within 4 hours, if 4 to 8 pounds, within 6 hours, and if over 8 pounds, within 8 hours[16].

Part 381.66 requires that eviscerated poultry to be shipped from the processing facility must maintain a temperature of no more than 40 °F, with certain specified exceptions. Poultry to be held at the processing facility in packaged form for more than 24 hours must be held in a room where the room temperature does not exceed 36 °F. Previously chilled poultry must maintain a temperature of no more than 40 °F until removed from vats or tanks used for chilling for immediate packaging. Poultry must be chilled to a maximum of 40 °F before being packed, with certain exceptions[17].

Part 381.66(b)(4) states that giblets must be chilled to a temperature of no more than 40 °F within two hours from the time of removal from inedible viscera, except that when giblets are cooled with the carcass, the size and time thresholds of Part 381.66(b)(2) apply[18].

Part 381.66(e) requires that when air chilling ready-to-cook poultry, internal carcass temperature must reach an internal temperature of no more than 40 °F within 16 hours[19].

Critical Control Point:

For poultry that is not immediately cooked after slaughter, product must be cooled to an internal temperature of 40 °F or less within a certain time frame. It may reach up to 55 °F during processing, but must be returned to below 40 °F.

Data Logging Solution:

Data loggers with internal sensors can be kept inside the coolers for proper verification of cooler and freezer temperatures. Data loggers with external sensors such as an RTD probe or a thermocouple probe can be inserted into the product so that the device records the internal temperature of the product. This can address several chilling needs, as many regulations require the internal temperature of the product to be kept at a specific temperature. The only way to monitor internal temperatures is by using a probe.

Cooking

In June 1999 the FSIS issued an updated Compliance Guidelines for Meeting Lethality Performance Standards for Certain Meat and Poultry Products[20]. A poultry industry participant is advised to determine from time to time whether the FSIS has updated its guidelines for lethality performance standards.

In the June 1999 update, the FSIS stated as follows [quoted from the Compliance Guidelines]:

"1. Cooked poultry rolls and other cooked poultry products should reach an internal temperature of at least 160 °F prior to being removed from the cooking medium, except that cured and smoked poultry rolls and other cured and smoked poultry should reach an internal temperature of at least 155 °F prior to being removed from the cooking medium. Cooked ready-to-eat product to which heat will be applied incidental to a subsequent processing procedure may be removed from the media for such processing provided that it is immediately fully cooked to the 160 °F internal temperature.

2. Establishments producing cooked poultry rolls and other cooked poultry products should have sufficient monitoring equipment, including recording devices, to assure that the temperature (accuracy assured within 1 °F) limits of these processes are being met. Data from the recording devices should be made available to FSIS program employees upon request[21]."

Critical Control Point:

Ready to eat chicken must reach lethality performance of 7 log (sub) 10 to meet the codified standards.

Data Logging Solution:

Data loggers can be used to measure the internal temperature of products through the cooking cycle. For small ovens a simple solution would be a thermocouple based data logger. The data logger itself is kept outside of the oven, while the thermocouple probe is run inside the oven and is inserted into the product. The wire is very small and the door gasket seals over the wire. Some thermocouple data loggers will provide an LCD with the current reading and statistics such as minimum, maximum and average. Some thermocouple loggers also feature alarms so that users can be notified once the thermocouple has reached a user specified temperature; for example, the temperature to which the product is required to be cooked to reach lethality.

Certain data loggers feature stainless steel housings and are completely waterproof. Typically these models can be placed directly into the product and into the oven or smokehouse. They can also be taken directly into coolers to address USDA Appendix B.

A new data logging technology is emerging that not only covers monitoring and recording, but also transmits the data in real time to a host PC that users can view. While product is cooking, users can see the entire cooking temperature profile. These types of data loggers are robust enough to withstand smokehouse temperatures and may also be moved directly into coolers. The benefit of wireless data logging is that users are notified immediately once the product has reached lethality temperature. Users now know that (1) they have a record of their product and it has met lethality, and (2) the product can be removed from the smokehouse and placed into the cooling phase, allowing for faster turnaround.

Re-heating of Ready-to-Eat Foods

The United States FDA publishes and updates the Food Code. The Food Code provides guidance for various levels of government to create their own food safety rules to be consistent with federal regulations[22].

Critical Control Point:

Section 3-403.11 of the Food Code provides guidance for specific temperatures and times to which "potentially hazardous food" and "ready-to-eat" food should be reheated (e.g., for hot holding, "ready-to-eat" food (in specified processed, packaged, and inspected form) must be heated to no less than 135 °F). The full text of this section of the Food Code may be found here: http://www.fda.gov/Food/GuidanceRegulation/RetailFoodProtection/FoodCode/ucm374275.htm.

Data Logging Solution:

Digital thermometers are commonly used to verify ready-to-eat food temperatures. These thermometers typically use an RTD probe, providing a fast response time and an accurate reading. To ensure time durations have been met, using a data logger with LCD read out provides users with the same comfort of an instant read thermometer. Data loggers with LCD displays are also available with RTD connections so an external probe can still be utilized, but also a record that can be printed and saved.

http://www.fda.gov/Food/GuidanceRegulation/RetailFoodProtection/FoodCode/ucm374275.htm

Cooling

In June 1999 the FSIS issued an updated Compliance Guidelines for Cooling Heat-Treated Meat and Poultry Products (Stabilization)[24]. A poultry industry participant is advised to determine from time to time whether the FSIS has updated its guidelines for stabilization.

In these Compliance Guidelines, the FSIS stated the maximum internal temperature of cooked poultry products "should not remain between 130 °F and 80 °F for more than 1.5 hours nor between 80 °F and 40 °F for more than 5 hours[25]."

Critical Control Point:

If a cooling deviation occurs, an establishment should assume that their process has exceeded the performance standard for safely controlling the growth of contaminants and take corrective action.

Data Logging Solution:

Data Loggers can be used to measure the internal temperature of product throughout the cooling cycle. For small freezers/refrigerators, a simple solution is to use a thermocouple based data logger. The data logger itself is kept outside of the cooler, while the wired thermocouple probe is run inside the cooler and can be inserted into the product. The lead wire is very small and the door gasket seals over the wire, preventing temperature discrepancies. Some thermocouple data loggers provide an LCD with the current reading as well as minimum, maximum and average statistics.

Certain data loggers feature stainless steel housings and are completely waterproof. Typically these models can be placed directly into the product and into the oven or smokehouse. They can also be taken directly into coolers to address USDA Appendix B Compliance Guidelines.

A new data logging technology is emerging that not only covers monitoring and recording, but also transmits the data in real time to a host PC that users can view. While product is cooling, users can see the entire cooling temperature profile. These types of data loggers are robust enough to withstand smokehouse temperatures and may also be moved directly into coolers. The benefit of wireless data logging is that users can track that the product is being cooked and cooled to proper temperatures within certain required regulatory time frames and take action at critical control points when necessary to ensure compliance.

Storage

Cooler and Storage Monitoring

Critical Control Point:

To address holding temperature requirements, it is important to monitor the environmental parameters of any area that product is stored, which can include coolers, refrigerators and freezers. Thermometers can be used, but require an employee to manually check the temperatures. A data logger can replace a thermometer and save company time, while still providing the same information.

Data Logging Solution:

Certain data logging systems are available with wireless capabilities. They are typically more expensive than stand alone data loggers, but the benefit is that all of the data is transmitted back to a central PC for viewing; there is no need to retrieve data loggers to download the record. Many systems have various features which can include an access portal, in which multiple employees can view the data, as well as alarming capabilities via email and text, In case any of the storage areas exceed a set temperature range.

Incoming Material and Ingredient Storage

Critical Control Point:

Section 3-202.11 of the Food Code provides guidance for receiving temperatures of "potentially hazardous food" (e.g., raw eggs must be received in refrigeration equipment that maintains an ambient air temperature of no more than 45 °F). The full text of this section of the Food Code may be found here: http://www.fda.gov/food/guidanceregulation/retailfoodprotection/foodcode/ucm186451.htm.

Data Logging Solution:

To always ensure incoming goods are being kept at the proper temperature throughout shipping, using a data logger is a perfect solution. When the truck arrives, one can check the temperature of the product being received at that time, but how does one know the truck maintained that temperature for the entire transit duration? A simple data logger can provide that information. Many basic, low cost data loggers are available for the cold chain industry. Most are equipped with a user programmable high and low temperature alarms. At the vendor's site, the data logger is programmed to take a reading at a certain interval (e.g., 1 minute, 15 minutes, etc.) and record temperatures throughout the entire transit cycle. Upon receipt at the customer's site, the data logger provides an instant out of range indication by viewing the LED. If the product was exposed to temperatures outside the safe range, the customer can download the data from the data logger to view the entire temperature over time profile.

HACCP as Relating to the Egg Industry in the United States

Jurisdiction over regulation of eggs in the United States is shared at the federal level by the USDA and the FDA, with the FDA having primary jurisdiction over shell eggs, and the USDA having primary jurisdiction over egg products. Therefore, participants in the commercial egg industry should be familiar with regulations affecting eggs carried out by both the FDA and the USDA.

The primary threat to public health from shell eggs and egg products has been identified as the hazard of Salmonella contamination. As such contamination may exist on the outside of an egg's shell or inside the egg itself, a number of measures will be necessary throughout the process of egg production, from farm to table, to minimize these risks. Use of a sufficient HACCP plan can minimize these hazards.

In 2009 a new federal regulation governing the production, storage, and transportation of shell eggs was published in the Federal Register and codified in the Code of Federal Regulations at 21 CFR Part 118. It represents an attempt to further minimize incidences of contamination of the public food supply by Salmonella Enteritidis (SE) via eggs. Egg producers regulated by Part 118 must follow the SE contamination prevention measures specified in Part 118. A written Part SE prevention plan is required under Sec. 118.4. Part 118 also mandates a regimen of testing, recordkeeping, and corrective measures for positive tests of Salmonella. One of the prevention measures required is in regards to refrigeration, found at Sec. 118.4(e), and specifies as follows:

(e)Refrigeration. You must hold and transport eggs at or below 45 °F ambient temperature beginning 36 hours after time of lay. If the eggs are to be processed as table eggs and are not processed for the ultimate consumer within 36 hours from the time of lay and, therefore, are held and transported as required at or below 45 °F ambient temperature, then you may then hold them at room temperature for no more than 36 hours just prior to processing to allow an equilibration step to temper the eggs[26].

This requirement can be met with an effective HACCP plan. The critical limit (recall the seven principles of HACCP) is 45 °F ambient temperature, to not be exceeded during the specified times. Data loggers are an excellent resource to ensure that this critical control limit is being met. Ambient temperatures over time intervals can be accurately monitored and recorded through the use of data loggers, with minimum human supervision. In addition, the recordkeeping requirement specified by Sec. 118.10 can easily be met through the use of data loggers.

Egg temperatures throughout the entire production process are critical to limiting microbial growth and contamination, as are temperatures and pH of water used for egg washing, and storage environment humidity. Regulations setting thresholds that must be met by egg industry participants must therefore by followed in a HACCP plan, with critical control points, critical limits, and corrective actions defined, and a strong regimen of monitoring, verification, and monitoring clearly stated and followed.

A new law passed in 2011, titled the FDA Food Safety Modernization Act ("FSMA"). This law, to be phased in over time made large changes to food companies regulated by the FDA. Part of the FSMA requires companies who process FDA-regulated food products to create and implement HACCP plans[27]. Implementation of the FSMA does not appear to be going smoothly[28].

It is unclear at this time exactly where implementation of the provisions of this new stand. Participants in elements of the egg industry that are regulated by the FDA are strongly advised to reach out to the FDA, industry experts, and legal advisors specializing in such matters such as those behind the website www.defendingfoodsafety.com, in order to procure the most current information on what this new law will mean to their businesses and the status of the law's implementation.

Some Common Regulatory Compliance Issues Facing Egg Industry Participants

Egg Shipping

Critical Control Point:

When shipping and holding eggs, 21 C.F.R. Part 118 specifies that eggs must be held and transported at no more than 45 °F ambient temperature commencing 36 hours after the time the eggs were laid[29].

Data Logging Solution:

Data loggers designed for low cost shipping applications are common. The data loggers have internal temperature sensors, allowing them to be placed within a small container or box. Additional wiring is not required. The data logger can be started at the time of packaging, either via a PC, or in some cases, through a push start button on the device. Visual LEDs are a common feature available so that visual verification of required temperatures is established throughout transit as well as upon receiving the product. The data loggers can then either be shipped back to the sender to be downloaded or can be downloaded at the final destination.

Egg Pasteurization

The FSIS has provided the following Exposure Assessment for the pasteurization of shell eggs: http://www.fsis.usda.gov/oppde/rdad/FRPubs/04-034N/Exposure_Assessment_Part_1B.pdf. Also, see http://www.fda.gov/food/guidanceregulation/guidancedocumentsregulatoryinformation/eggs/ucm170615.htm

The Exposure Assessment provides detailed data on the effectiveness of pasteurization of shell eggs achieved at various combinations of time and temperature. Please see the lengthy analysis and data included in the Assessment[30]. Also, see http://www.fda.gov/food/guidanceregulation/guidancedocumentsregulatoryinformation/eggs/ucm170615.htm.

Critical Control Point:

Eggs required to be pasteurized in accordance with the Final Rule: Prevention of Salmonella Enteritidis in Shell Eggs During Production, Storage, and Transportation, are required to achieve at least a 5-log reduction.

Data Logging Solution:

Data loggers are available for monitoring pasteurization processes and certain data logging software programs support features such as lethality equations. For pasteurization a data logger that can be placed with the eggs, and run through the process would provide the most accurate temperature data. Data loggers are available in the shape of eggs, which are designed to fit in egg cartons and thermally respond to temperature the same way an egg does. Once the process is complete and the data is downloaded into the software, customers can program in the lethality equation applicable to the facility's process. The log reduction is automatically calculated based on the data provided from the device. By utilizing a data logger for this process, validation of the process can be achieved as well as continual verification.

Summary

Hazard Analysis and Critical Control Points (HACCP) as a means to maximize safety in the food supply through a systematic approach of determining and preventing biological, chemical, and physical hazards has been adopted by many food production industries. HACCP is mandatory for regulated poultry producers in the United States, and is a central component of a strong food hazard prevention program for participants in the shell egg and egg product industries. Creation of customized HACCP plans for a poultry industry or egg industry company require a strong knowledge of the seven principles of HACCP as applied to each step of the production process of the particular company, as well as an assessment of the critical control points in the process and the critical limits at each step in the process that must not be exceeded. Data loggers naturally lend themselves as an optimal way for monitoring many of the various measurable data points, as well as alerting the food producer in a timely manner that a deviation has occurred in the process so that corrective action may be taken. Lastly, the recordkeeping necessary for an HACCP plan is made much easier and less labor intensive with the computerized automation data loggers can provide.

It is critical that producers in the poultry, shell egg, and egg product industries keep current with changes in requirements and regulations, both at the federal and state level. Such regulations and requirements are always subject to change. For example, the codification in 2009 of 21 CFR Part 118 added new requirements that regulated egg industry participants must comply with. In addition, individual states may have their own regulations that impose additional requirements to producers in those states.

Suggested References

Relating to Poultry Regulations

http://www.fsis.usda.gov/wps/wcm/connect/a70bb780-e1ff-4a35-9a9a-3fb40c8fe584/HACCP_Systems_Validation.pdf?MOD=AJPERES
http://www.fsis.usda.gov/oa/fr/95033f-a.htm
http://www.fsis.usda.gov/oa/fr/95033F-b.htm
http://www.gpo.gov/fdsys/pkg/CFR-2012-title9-vol2/xml/CFR-2012-title9-vol2-sec381-66.xml
http://www.fsis.usda.gov/oa/background/keyhaccp.htm
http://www.foodsafety.unl.edu/haccp/haccp/principles/principles.html

Relating to Egg Regulations

http://www.fsis.usda.gov/wps/portal/fsis/topics/food-safety-education/get-answers/food-safety-fact-sheets/egg-products-preparation
http://www.eggsafety.org/producers/food-safety-programs
http://www.fsis.usda.gov/oppde/rdad/FRPubs/04-034N/Exposure_Assessment_Part_1B.pdf
http://www.thepoultrysite.com/articles/166/care-and-incubation-of-hatching-eggs
http://www.defendingfoodsafety.com/articles/food-safety-regulations/
http://www.gpo.gov/fdsys/pkg/PLAW-111publ353/pdf/PLAW-111publ353.pdf
http://www.defendingfoodsafety.com/tags/haccp/

Endnotes

1 http://www.fsis.usda.gov/oa/background/keyhaccp.htm
2 http://www.fsis.usda.gov/oa/background/keyhaccp.htm
3 http://www.fsis.usda.gov/oa/background/keyhaccp.htm
4 http://www.foodsafety.unl.edu/haccp/start/7principles.html
5 http://www.foodsafety.unl.edu/haccp/haccp/principles/principles.html
6 http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr;sid=5ffd2f9d1646ff3a693495649d554e91;rgn=div5;view=text;node=9%3A2.0.2.4.41;idno=9;cc=ecfr
7 http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr;sid=5ffd2f9d1646ff3a693495649d554e91;rgn=div5;view=text;node=9%3A2.0.2.4.41;idno=9;cc=ecfr
8 http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr;sid=5ffd2f9d1646ff3a693495649d554e91;rgn=div5;view=text;node=9%3A2.0.2.4.41;idno=9;cc=ecfr
9 http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr;sid=5ffd2f9d1646ff3a693495649d554e91;rgn=div5;view=text;node=9%3A2.0.2.4.41;idno=9;cc=ecfr
10 http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr;sid=5ffd2f9d1646ff3a693495649d554e91;rgn=div5;view=text;node=9%3A2.0.2.4.41;idno=9;cc=ecfr
11 http://www.fsis.usda.gov/PDF/Compliance_Guide_Controling_Salmonella_Campylobacter_Poultry_0510.pdf
12 http://www.fsis.usda.gov/PDF/Compliance_Guide_Controling_Salmonella_Campylobacter_Poultry_0510.pdf
13 http://www.fsis.usda.gov/PDF/Compliance_Guide_Controling_Salmonella_Campylobacter_Poultry_0510.pdf
14 http://www.fsis.usda.gov/PDF/Compliance_Guide_Controling_Salmonella_Campylobacter_Poultry_0510.pdf
15 http://www.gpo.gov/fdsys/pkg/CFR-2011-title9-vol2/pdf/CFR-2011-title9-vol2-part381-subpartI.pdf
16 http://www.gpo.gov/fdsys/pkg/CFR-2014-title9-vol2/xml/CFR-2014-title9-vol2-sec381-66.xml
17 http://www.gpo.gov/fdsys/pkg/CFR-2011-title9-vol2/pdf/CFR-2011-title9-vol2-part381-subpartI.pdf
18 http://www.gpo.gov/fdsys/pkg/CFR-2011-title9-vol2/pdf/CFR-2011-title9-vol2-part381-subpartI.pdf
19 http://www.gpo.gov/fdsys/pkg/CFR-2011-title9-vol2/pdf/CFR-2011-title9-vol2-part381-subpartI.pdf
20 http://www.fsis.usda.gov/oa/fr/95033f-a.htm
21 http://www.fsis.usda.gov/oa/fr/95033f-a.htm
22 http://www.fda.gov/Food/GuidanceRegulation/RetailFoodProtection/FoodCode/ucm374275.htm
23 http://www.fda.gov/Food/GuidanceRegulation/RetailFoodProtection/FoodCode/ucm374275.htm
24 http://www.fsis.usda.gov/oa/fr/95033F-b.htm
25 http://www.fsis.usda.gov/oa/fr/95033F-b.htm
26 http://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfCFR/CFRSearch.cfm?CFRPart=118&showFR=1
27 http://www.defendingfoodsafety.com/2011/01/articles/food-safety-news/what-does-the-new-food-safety-modernization-act-mean-to-your-business/
28 http://www.defendingfoodsafety.com/articles/food-safety-regulations/
29 http://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfCFR/CFRSearch.cfm?CFRPart=118&showFR=1
30 http://www.fsis.usda.gov/oppde/rdad/FRPubs/04-034N/Exposure_Assessment_Part_1B.pdf

Disclaimer

This publication is meant to provide poultry and egg industry producers with the basics of HACCP. It is not intended as an in-depth guide to HACCP or regulatory requirements. We hope we have pointed readers of this publication in the right directions to find further information needed to take their knowledge to the next level. Nothing in the publication is intended as or may be taken as legal advice. For all such matters the appropriate regulatory authorities are the final word on the topics discussed herein, and provide the appropriate source for the ultimate understanding on any questions regarding these topics.

MadgeTech, Inc
6 Warner Road, Warner, NH 03278
T: (603) 456-2011 F: (603) 456-2012
info@madgetech.com
www.madgetech.com

Rev. 3 - 8.14.2014