

Maintaining Food Safety through Quality

Source verification is the ability to trace products from their initial components through a production and distribution system to the end user.

— Dr. Charles R. Hurburgh, Jr.



IOWA STATE UNIVERSITY
University Extension

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... and justice for all

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**HOW CAN
WE ACHIEVE
GLOBAL FOOD
SAFETY AND
ENHANCE
MARKETING
EFFICIENCY?**

FOOD SAFETY. . .

FOOD SAFETY IS A WORLDWIDE ISSUE AFFECTING MILLIONS OF PEOPLE WHO SUFFER FROM DISEASES CAUSED BY CONTAMINATED FOOD.

An estimated 76 million cases of foodborne disease occur each year in the United States. Policy makers are looking to enhanced quality management systems for tracing food back to its source.

This report will give producers, researchers and consumers a summary of efforts by Iowa State University Extension in food safety, quality management systems and traceability of grain and livestock products.

QUALITY MANAGEMENT SYSTEMS

Quality Management Systems protocol is thorough knowledge of what you started with, what you did with it and where you shipped it. It includes documentation of all processes as well as products to achieve more consistent quality and safety.

Recently, food safety protection has been integrated with quality management systems. Traceability is a key element of food safety quality management systems.

WHY IS IT IMPORTANT?

Understanding measurement and recording systems that identify and track the best ingredients and suppliers is key to preventing food safety problems and meeting budget requirements. Traceability in food and feed supply chains is fast becoming an economic consideration as well as regulatory protocol. With databases that trace the flow of inbound materials through the plant to final products, processors and handlers can more easily meet regulatory tracking requirements related to product safety.

HISTORY

Since 2000, Iowa State University has been researching quality management systems in the bulk grain, meat and milk supply chains. ISU Extension is positioned as a leader in this research and its practical applications for business.





Firms that have an audited quality management system are good candidates for direct marketing arrangements – producer to end user.

— Dr. Charles R. Hurburgh, Jr.

IN GRAIN MARKETING,

QUALITY MANAGEMENT SYSTEMS ARE A PATH TO FOOD SAFETY.

Quality management systems solve the problem of tracing a food input back to the source. They improve inventory management.

The ISO 9000 series of quality management standards is now augmented with food safety requirements in the ISO 22000 series. Iowa State University Extension, through the Iowa Grain Quality Initiative and the Iowa Beef Center, conducted research and developed programs

based on these new standards.

QUALITY MANAGEMENT SYSTEMS Quality Management Systems (QMS) have great potential to expand markets and improve efficiency of food production systems. While ISO 9000 is the most clearly recognizable QMS, industry specific systems have been used effectively as a transition and educational process in the introduction of statistically-based process controls. The largest producer-owned grain handling firm in Iowa, Farmers Cooperative Elevator, took



Our quality management plan has been to date a great success and without ISU we would not be anywhere close to having this program moving in such a positive direction.

— Tom Miller, FC
Vice President of
Operations

a lead in 2002 in applying QMS for agricultural marketing, and now agricultural input supply. Other firms are now also utilizing QMS systems.

The ISO certification added the dimension of upper management review of performance data generated in statistical controls. The initial estimate of \$2 profit per \$1 invested in the QMS has remained.

The company restructured its operations to prepare for expanding the QMS within its grain business and its feed and input supply businesses. Traceability has emerged as a major concern in all food markets; one of the QMS statistics is an index of traceability, to measure how precisely grain from the farm can be tracked to individual food lots sold by second and third stage processors. Relatively simple processes have

sharpened traceability beyond what most participants thought possible.

DISTANCE EDUCATION COURSE

A distance education course was developed to introduce quality management systems to the grain handling industry.

TRAINING MODULE

FDA has the responsibility for protecting the nation's food supply and tracing incidents of adulteration of food by bioterrorism or natural causes to their source. A training module for the FDA Bioterror Record Maintenance rules is hosted on the Iowa Grain Quality Initiative website. Agribusinesses in Iowa (elevators and feed mills) are affected by these rules.

TRACEABILITY CONFERENCE

A conference on Agricultural and Food Traceability was held in Des Moines, Iowa, on June 9-11, 2009 in conjunction with a workshop sponsored by the European Union TRACE (Tracing Food Commodities in Europe) group.

Conference participants discussed the state-of-the-art traceability systems for bulk agricultural commodity goods. Conference content was directed towards addressing four major questions for businesses: Why adopt traceability? What are the risks and rewards of traceability? What factors will affect the development

of a traceability system for my business?
What management and other tools are available to assist me in implementation of a traceability system?

TRACEABILITY AT THE GRAIN ELEVATOR

A dynamic simulation model was created that tracks individual grain lots in the outbound load from a grain bin following funnel flow. The data model allows elevators to capture all information related to all incoming, internal and outgoing grain lot activities and stores data in separate tables according to different grain activities.

EVALUATION FRAMEWORK

The Scorecard Matrix provides an evaluation framework for traceability and identity-preserved compliance. This methodology is based upon auditing towards ISO 9000 or 22000 certification. The scorecard compares actual performance to the required contractual or government-mandated requirements.

It also points to areas of strength and weakness within the traceability component of a QMS or other controlled marketing program.

Cost-benefit research enhances the ability to evaluate various production purity levels (and associated costs) to their

particular market price. This method reveals particular areas of strength and weakness in projected market demands. The spreadsheet can be used as a forecast tool to evaluate trends and determine what purity level of production would be most appropriate.

GIS-BASED AGRICULTURAL GEO-TRACEABILITY MODEL

This project was designed to provide information for specific production practices (IP, organic, etc.), visualize traceability data in a clear and intuitive way on maps and make use of GIS to document activities.





GRAIN TO MILK

An analysis of the traceability systems of the three bulk commodities that could affect milk safety — corn, feed, and milk — was conducted to analyze the internal traceability system of each respective entity, the external traceability system among all entities, and the information exchange and communication between each entity. A model/map for tracing these commodities was created to identify gaps in the internal and external traceability systems.

After identifying gaps, quality control and quality management strategies were developed to help close the gaps and strengthen the traceability system.

The study showed that once the dairy processor developed specific objectives to serve as the foundation for the traceability system, even small changes could yield timely results in quality control.

**GRAIN PRODUCTS ARE
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HOW HAS IOWA STATE
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IN ANIMAL MARKETING,

QUALITY MANAGEMENT SYSTEMS PROGRAMS WERE USED TO HELP FARMERS (niche market producers, a Midwest cooperative of pork producers, and other livestock producers) improve their management techniques and cost-control skills and increase market access.

NICHE MARKET PORK SYSTEM

The project team met with Niman Ranch staff and producers to learn more about their production systems and challenges they face. They needed a tracking system that was simple and helpful for documenting management practices. Sow Group Tracker software, a spreadsheet-based planning tool, was developed to help identify breeding dates and the subsequent



management dates based on the animal's life cycle. It prints a calendar identifying the management event dates and helps identify sows that are non-productive. The program helped the producers lower their costs of production by more efficiently managing their sow herd, labor, facilities and other resources.

VALUE ADDED CATTLE MARKETING

Packers are paying premiums for fed cattle that are in USDA Process Verified Programs (PVP) for age and source verification. Country of Origin Labeling (COOL) became mandatory September 30, 2008. The National Animal Identification System (NAIS) is a voluntary animal health surveillance program. Natural, grass-fed and organic beef programs are producing at higher volumes. All these programs offer opportunities for cattle that have some level of documentation to support claims made by the seller, but the many reporting requirements are confusing to most producers.

The Iowa Beef Center leveraged resources from this project and other similar work to prepare and deliver educational materials that describe different marketing access or value added programs and their

New food sources, advances in production and distribution methods, and the growing volume of imports due to consumer demand call for a new approach to protecting our food from unintentional or deliberate contamination.

— David Arvelo, FDA

requirements. These materials were available for all IBC staff who work with producers and were used in partnership with a northwest Iowa auction market operator to educate cow-calf producers about age and source verification. The training included generic documentation forms to help farmers prepare to work with a private sector firm.

PORK PRODUCER MARKET ACCESS

A cooperative of Midwest pork producers established and built a commercial scale packing and processing plant. A portion of the plant is owned by 40 small-scale producers from Iowa, Nebraska, Kansas, Missouri and Minnesota. All producers selling to the plant sign an affidavit stating that they are performing certain specified practices. The cooperative wanted to be sure it could verify the claims that the practices were being carried out. This was easier for the larger firms in the cooperative than the smaller firms.

Additional needs for environmental quality management systems resulted in the Iowa Pork Industry Center leveraging grant resources to develop a Stewardship Management System (SMS), which includes a curriculum and a manual showing producers how to develop a SMS for their farms. All 40 producers took the training to develop their SMS plans. The program focuses on continuous process

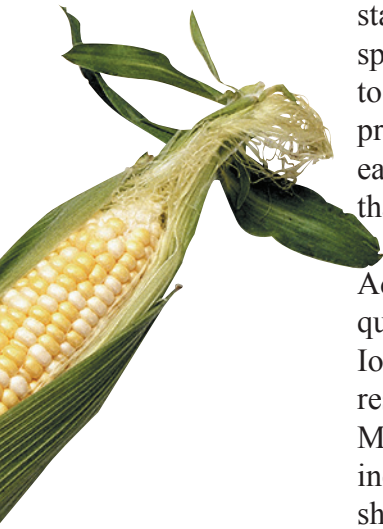


improvement and farmers are seeing cost savings benefits.

MANAGEMENT SYSTEM TEMPLATE

Farmers are grappling with increasingly complex issues in livestock production, compliance with regulations, and marketing access at a time of narrower profit margins.

On an individual basis, the Iowa Beef Center developed a Management System Template, a one-page outline of QMS steps. Agricultural extension staff members were trained in its use and shared it with producers. The template does not replace curricula, but it provides a point of entry to engage farmers in a QMS. The extension staff provided assessment tools for common challenges such as decreasing feed costs, improving low production rates, capturing greater fertilizer value from manure, and reducing health problems.



THE FUTURE. . .

Recent recall events and pending legislation demonstrate the need for quality management systems that connect across the whole production chain for foods. Here are some of the specific actions that we see as important.

1. Create practical QMS application templates and distance training for producers, handlers and processors.
2. Create on-campus instruction in food safety and quality management.
3. Put mathematical analysis of traceability and systems in practical operations terms.

4. Develop cost-benefit spreadsheet templates for industry.
5. Partner with other institutions or entities to develop global traceability systems.
6. Establish Iowa State University as a National Training and Application Center for QMS/food safety in grain and animal-based agricultural products.

Production agriculture can meet food safety challenges in ways that actually improve efficiency and competitiveness.

Contact us if you would like more information or individual application.



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