Factors impacting the acceptance of traceability in the food supply chain in the United States of America

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Summary

Global demands for increased food safety and quality assurance programmes, increased global competition, changing government rules and regulations, political and trade barriers, bioterrorism, and identity preservation requirements in global markets are affecting the world's food supply chain. To satisfy changing market demands, all suppliers in the food supply chain must adapt to these global issues. Total asset visibility must be maintained in production, in process, in storage, and in transit.

Keywords


Introduction

Since 2001, a plethora of new words have entered and dominated the global agricultural marketplace. Traceability, tracking, product integrity and quality assurance have become an important part of today's global food supply chain. Global events, including the attack on the World Trade Center in 2001 and the discovery of foot and mouth disease (FMD) in the United Kingdom (UK) the same year, have impacted global consumer concerns about existing food safety protection policies. In the past four years many countries have experienced the largest recalls of meat and vegetables in their history.

Today, global consumers are demanding a source-verified and disease-free food supply. Their call for enhanced traceability establishes the need for both operational deficiency identification and trace-back and trace-forward capabilities in a co-mingled environment. Recent global food-borne illness outbreaks underscore the importance and significance of traceability to the global food industry.

Changing consumer attitudes have resulted in demands for greater food safety on the retail market.

Global trends indicate rapid mergers and the consolidation of retail supermarket chains. These retailers will continue to force consumer demands on the supply chain. Food safety will continue to be a dominant issue driven by consumer preference for product integrity. Retail power will continue to increase, thereby having a major impact on the retail value chain. Suppliers will be compelled to comply with the demands brought on by consumers and global commerce. Industries face many challenges in meeting these demands.

In drafting this paper the author has used the food supply chain in the United States of America (USA) as a case study. This is not to exclude other countries, as it is abundantly clear that there is a parallel, urgent need in all other countries for full traceability of food products from the farm to the table. Similarly, there are several tracking systems on the market but Global Track technology has been used as an example here because this is the one best known to the author.
Traceability challenges facing the global market place

Global standards for traceability are just now beginning to evolve in the market place. Success for any global programme relies on the standardisation of data and the form in which it is presented. These standards will allow item identification for the global tracking and tracing of all food products. Standardisation will allow the items to move effectively and efficiently throughout the whole supply chain.

The Uniform Commercial Code Council, Inc. (UCC), now known as GS1, with their global trade item numbering system, is leading the way on both the North American and European continents in achieving standardisation. Electronic transfer of information continues to be at the forefront of this technology approach. The UCC has joined together with EAN (European Article Numbering) international to form EPC Global Inc., a consortium of supply chain partners working towards standardised information sharing.

Prior to the development of EPC Global Inc., there was no neutral body to develop globally recognised standards or method for collecting and communicating such information. The consortium has developed a system for bringing the benefits of electronic tagging to the global supply chain – the EPC Global Network. Prior to the development of the Network, there was no vehicle for sharing and communications within the global supply chain. With the creation of the Network, there is now a medium within which information can be collected, utilised, and communicated across supply chains, across industry and around the world. Standardised global trade unique identifiers now allow items to be individually verified when tied into the EPC Global Network, resulting in a network of information that traces individual product movement in real time.

An example of the value of this global technology to the food supply chain is exhibited in Figure 1. GTR-DATASTAR, a US-based company uses this format in their patent pending Global Track technology. The illustration highlights the tracking of live animals throughout the supply chain, focusing on co-mingled environments. This technology was designed to be a fully distributed supply chain product tracking system, as well as a surveillance tool for rapid disease detection and mitigation. In addition, it provides critical decision support tools including mapping and geographic displays, satellite imaging and epidemiological data.

The Global Track system will utilise the EPC Global Network, it was designed to track sources of a product throughout the supply chain utilising both electronic tag components (RFID: radio frequency identification) or existing barcodes. This dynamic system allows for the flexible use of these two tracking components, as well as optical scanning technology. The Global Track system architecture employs a distributed web services model that provides the scalability, reliability and performance that is required for implementation on a global basis.

The system allows for the sharing of data throughout the supply chain and has a standard interface for the data collection and query system. If a partner is collecting the necessary data, the Global Track service will interface with the partner system to accomplish the tracing of co-mingled product, as in the cases of a food processor or cattle harvest plant. In cases where a supply chain partner does not have the capability to provide the necessary data, Global Track technology collects the data and identifies sources of the co-mingled product. The technology was designed to be flexible and work with supply chain partners to accomplish tracing requirements in the most efficient means possible. Global technology systems with the capability of utilising standardised systems like EPC Global Network and Global

![Diagram](image.png)

**Figure 1**

The EPC Global network: a vehicle for data sharing and communications within the global food supply chain

Source: GTR-DATASTAR, 2005
Track are becoming critical in both the food safety and disease detection and mitigation areas.

The need to provide immediate real-time individual product information anywhere in the world is critical. Adoption of real-time electronic incident management and control systems for food safety and disease detection and mitigation is critical to the global economy. While the technology is available in the USA, acceptance is another issue.

Factors impacting the acceptance of traceability in the supply chain in the United States of America

Consumer demand has sparked the growth of quality assurance programmes in the European food sector. Food scares, outbreaks of food-borne illnesses and animal diseases, concerns over food produced through biotechnology and concerns over the humane treatment of animals in food production have all created a demand for food with known and documented characteristics and certifiable attributes (1).

In the USA new foreign trade demands brought on by the European Union changes, coupled with a more educated consumer, affect the entire food industry. These events highlight the need for traceability in the supply chain. Currently, the USA is suffering great economic penalties in both the beef and poultry export markets due to the existence of transboundary diseases. Since January 2004 the USA has experienced outbreaks of bovine spongiform encephalopathy (BSE), avian influenza, Newcastle disease, severe acute respiratory syndrome, and monkeypox. During the past three years, these occurrences have caused the largest red meat recalls in the history of the country. Each time, the companies and government agencies involved were unable to trace the total amount of meat or number of live animals involved in the recall. These serious events did not go unnoticed by US consumers and global inspection agencies. Food safety has swiftly become an important global issue with international trade and public health implications for the entire protein industry.

Corporate and producer resistance

Major corporations in the USA still see traceability as 'nice to have, but not necessary' due to perceived added costs. Firm resistance to both government-sponsored and mandated private sector programmes is strong. A good example is the county-of-origin labelling (COOL) mandate included in the 2002 USA Farm Bill. The labelling programme was to be voluntary until 30 September 2004, and then mandatory thereafter for fresh red meat, seafood, produce, and peanuts.

However, on 27 January 2004, President George W. Bush signed a law delaying the implementation of mandatory COOL rules for all covered commodities except wild and farm-raised fish and shellfish until 30 September 2006. Seafood was the only commodity held to the mandate, perhaps because this industry did not have the strength of major corporations or red meat industry lobbyists. In November 2005 the US Congress once again delayed mandatory COOL for two more years as a result of pressure from the meat processing industry and many producer organisations. Any legislation relating to mandatory traceability, record keeping, and certification procedures has been fiercely attacked by various industry groups, corporations, and producers.

Government-proposed identification and traceability system

The impact of the discovery of BSE in Washington state in 2003 and the inability of the government agencies to effectively locate all the potential cattle involved caused consumer groups to challenge the effectiveness of existing food safety procedures in the beef industry. These challenges, along with major red meat recalls forced government officials to pay greater attention to traceability in the country's supply chain.

As a result of this pressure, the US Department of Agriculture put forward a proposal for a National Animal Identification System (NAIS) in April 2004. From the start, industry groups debated issues for and against the development of the proposed system. Implementation of the NAIS system divided the animal industry into three groups: those endorsing a government-run programme, those who want a privatised industry programme, and those who want no programme at all (producers and suppliers).

The US Secretary of Agriculture Mike Johanns (7), responding to livestock industry concerns, said that NAIS should be a public-private partnership and that it would be established over time through the integration of three key components: premises identification, animal identification, and animal tracking. Currently, premise identification, the
first step in the programme, is underway. It is strictly voluntary and not mandatory. There are no current mandatory requirements for the implementation or enforcement of the NAIS programme. The programme is currently scheduled to come into effect in 2009. Industry concerns about confidentiality, private versus government data storage, and cost, will continue to hamper the success of this programme; it will continue to struggle unless a common ground is established by all parties, mandatory tracing requirements are put in place, and critical data are standardised, which will include ensuring that data can be used over secure shared networks.

Steve Krut, Executive Director of the American Association of Meat Processors, outlines many of the problems facing the industry as follows: ‘There is no question that the public demands an ID system, and our worldwide trading partners will call for the same. Government will do the job if we as an industry are not up to the task. We will most likely be displeased with their solutions and costs. For almost 40 years, the tire industry has had to identify every tire produced, show where it was sold or installed, and have dealers record every serial number. If that meant crawling under cars or trucks to get the numbers, it had to be done, recorded and sent in and maintained. Nearly every apple or piece of fruit sold at retail has a small sticker that identifies the lot or source. Only a skeptic would believe that an animal worth US$ 500 or US$ 1,500 could not be, or should not be traced as to its location’ (5).

Need for traceability within the agriculture industry

Thus far, the author has reviewed some of the events that have impacted the food supply chain in the USA and it is clear that the principal problems that exist are as follows:

- current secure food supply systems, including production, manufacturing and processing, do not provide the level of assurances for quality and security that are required in today’s environment
- current practices and processes do not provide a database of relevant information or traceability, accountability and reliability from raw product through process management to the consumer
- the latest system of standardisation, integration and technology applications using a multi-disciplinary approach has not been used
- the current processes lack the rapid early detection monitoring techniques and risk mitigation technology that would provide immediate notification and response action in the case of an event.

These deficiencies in the system have a negative impact on the safety of the supply chain and some of the changes needed to improve this situation have been outlined below.

Rapid access to information

Key decision-makers throughout the food supply chain require rapid access to integrated information decision support tools to prevent, respond and mitigate the spread of animal diseases and food-borne incidents in the USA. The requirements to provide a safe and secure food supply to the people, government and businesses of the USA necessitate the consolidation of the current fragmented approach to planning and response systems currently practised in the US food industry.

Ability to trace forward and backward

Mandatory traceability and tracking requirements will greatly enhance the detection and prevention of, and response to, the potential introduction into the food supply chain of foreign animal diseases and food-borne pathogens by terrorist activities or natural events.

Accept all data feeds

Immediate verification from production to consumption of critical food items using seamless technology is now a necessity for food safety.

The need for these changes to occur and the reasons why an effective traceability system is of such economic significance to the industry and the country are discussed in the next section.

Economics of traceability and value to the supply chain

Like all countries, the USA has a vested interest in employing mandatory tracking and traceability components in its food supply chain. According to an Institute of Food Technologists press release, the chain includes more than 200,000 companies that contribute to the nation's food supply. In addition, there are more than 900,000 restaurants with 12 million employees and approximately 100 million head of cattle being raised in 49 states. Food-related businesses comprise 13% of the US gross national product and 18% of the US employment base. Agriculture supply chain activities amount to more than US$ 1 trillion annually and exceed US$ 50 billion in exports (4). Economic devastation and the lack of control caused by FMD in the UK should have been a wake-up call
for government regulators and industry leaders in the USA. Immediate disease detection and mitigation programmes, as well as the ability to isolate exotic pathogens, all rely on the capability to rapidly trace forward and backward in the supply chain. Fairfield (3) noted the following impact of an outbreak of FMD on the grain and feed industry: ‘The current value of US meat, dairy, and poultry products is approximately US$ 87 billion. About one million US jobs are directly related to the production of these products. According to estimates, a 10% value output reduction, related to FMD or another livestock disease, results in a loss of approximately 418,000 jobs throughout the US economy’. Financially, meat recalls and false alarms of BSE have had a major impact on stock market reaction. Events caused by product contamination and BSE concerns have seen shareholder value disappear in a matter of hours. In one confidential case such an event resulted in a US$ 120 million shareholder value loss for a major protein supplier in two hours.

In another example, a false FMD rumor from a Kansas sale yard ran rapid through the market place in 2001, causing the cattle futures to drop dramatically and major companies relying on beef to lose valuable shareholder equity. The following reflects the next-day market indicators of several major companies impacted by the false scare: Tyson Foods, Inc. down 2.6%; Smithfield Foods down 26 cents; ConAgra shares down 1%; Outback Steakhouse, Inc. down 3.1%; Wendy’s International down 7 cents (8).

The announcement of BSE in Washington state in 2003 caused major economic loss to the largest protein suppliers in the USA. These corporations saw both their Moody’s and Standard & Poor’s unsecured bond ratings downgraded. In addition, the cost of insuring their debt in the derivatives market increased; one major protein company jumped from 45 basis points to 85 basis points (Reuters, New York, 29 December 2003). Leading USA protein suppliers were put under a negative credit watch.

One would think, with all the losses experienced by the announcement of BSE, the largest meat recalls in the history of the country, declining shareholder value, class action litigation, and negative brand impact that the message had been heard. Instead corporations, associations, and producer groups still battle against the need for mandatory traceability in the US supply chain.

**Agroterrorism**

The term ‘secure supply chain’ has taken on a whole new meaning to everyone involved in supplying food products to the US market, both domestic and global. Vertically integrated US supply chains allow for easy contamination of food products or the dispersion of airborne diseases by terrorists. Protecting the nation’s food supply from potential terror attack is just starting to be seriously addressed by the Food and Drug Administration. Foreign animal and plant diseases, normally a natural occurring problem, are now a matter of national security.

Food defence for both pre- and post-harvest of food products is fast becoming a national ‘buzz’ word in the market place. Many entry points in the protein supply chain allow for an easy introduction of a pathogen by a terrorist. The US food supply chain is experiencing new and old pathogens at a rapid pace. Cupp, Walker, and Hillison (2) in their article ‘Agroterrorism in the US: key security challenge for the 21st Century’, emphasise the high likelihood of terrorist acts interrupting the production, processing and distribution of agricultural products. The following are findings that the authors cite in their research:

- the average distance one pound of meat travels from farm to table in the USA is 1,000 miles, presenting a large number of entry points located over a large geographical area. Some of the entry points are regulated or supervised by government agencies, but others are not, for example, stockyards, processing plants, and slaughterhouses are relatively open;

- in the live beef market, three packers hold 72% of the market;

- almost 70% of the beef cattle that are finished for slaughter in the USA are located in a 200-square-mile area;

- four meatpacking centres process about 80% of the animals in the USA sent to slaughter.

This information illustrates the immediate need for traceability programmes to handle crisis management in the protein supply chain. One event could impact the entire protein supply chain due to the demographics and vertical integration of the industry – the results would be devastating.

The need to isolate the problem and rapidly trace it backward or forward in the supply chain is mission critical. It is also important to protect and certify those in the supply chain who are free from the problem. Immediate certification of regional disease-free areas, free from product contamination or disease issues, will allow that portion of the US-global supply chain to proceed in the case of a disaster, hopefully with minimal negative economic impact. The US protein industry needs mandatory traceability; its survival in both the US and global market place may depend on it.
Conclusion

John Lawrence, Director of the Iowa Beef Center, clearly defines consumer sentiment on a global basis: “We have traditionally operated on a “trust me” basis, but we are now entering a “prove it” world” (6). Participation of the USA in global markets, consumer demand at home, and food defence against terrorism all back up the need to ‘prove it’. No longer will international consumers and foreign government agencies operate on a ‘trust me’ basis when it comes to agricultural trade.

Verification from production to consumption, auditing and third party certification, confirmation of testing procedures, agroterrorism prevention, rapid disease detection and mitigation technology must become a vital part of the food supply chain in the USA. Markets demand it – lives may depend on it. Will US industries and producers be proactive and adopt the changes needed for traceability in the supply chain, or will they wait until the next major event happens before they act? Unfortunately, the history of the USA shows that it takes a major event to make a change.

Facteurs intervenant dans l’acceptation de la traçabilité pour les produits de la chaîne d’approvisionnement alimentaire aux États-Unis d’Amérique

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Résumé
La demande mondiale de renforcement des programmes de contrôle de qualité et de sécurité sanitaire des aliments, l’essor de la concurrence à l’échelle planétaire, l’évolution des règles et réglementations gouvernementales, les barrières politiques et commerciales, le bioterrorisme et les impératifs de la préservation de l’identité des produits sur les marchés mondiaux ont des répercussions sur la chaîne d’approvisionnement alimentaire au niveau mondial. Pour répondre à l’évolution de la demande des marchés, tous les fournisseurs de la chaîne d’approvisionnement alimentaire doivent s’adapter à ces questions de portée mondiale. Il faut assurer une visibilité totale des ressources lors de la production, la transformation, le stockage et le transit.

Mots-clés
Factores que influyen en la aceptación de la rastreabilidad en la cadena de suministro alimentario de los Estados Unidos de América

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Resumen
La demanda que en todo el mundo se deja sentir para que se instituyan más programas de seguridad sanitaria y garantía de calidad de los alimentos, la intensificación de la competencia mundial, la evolución de las normas y reglas de los gobiernos, las barreras políticas y comerciales, el terrorismo biológico y los requisitos para preservar la identidad de los alimentos en los mercados mundiales están influyendo en la cadena de suministro alimentario de todo el planeta. Para satisfacer las nuevas demandas del mercado, todos los proveedores de la cadena deben adaptarse a esta cambiante coyuntura mundial. Es preciso mantener la visibilidad total de los recursos en la producción, el tratamiento, el almacenamiento y el tránsito de los artículos alimentarios.

Palabras clave

References


