

SOURCE VERIFICATION FOR IOWA SPECIALTY GRAIN MARKETS^{1/}

DR. CHARLES R. HURBURGH, JR. ^{2/}

Quality management systems, with their associated statistical process controls and product tracking, are not new to world industry, but the concept is a radical departure from the generic commodity mindset that has typified agriculture. Trading undifferentiated commodities at constantly eroding margins provides little incentive for quality beyond that needed for minimal acceptance. A number of powerful and wide-ranging forces are converging to create a climate of change.

- Biotechnology is creating plant and animal products with value that cannot be captured without process control from production to consumption.
- Consumers in affluent nations have increasing ability to include environmental and social values in purchasing decisions, leading to pressures on production processes as well as measurable quality of outputs.
- Precise analytical and production practices have greatly increased expectations of what should and should not be included in food. Measurements in the part per trillion range, or even of individual DNA molecules, enable near zero specifications regardless of their validity in any risk analysis.
- Fewer people are involved in direct food production which has shortened the adoption time for new technologies
- World concepts of quality assurance are in the mainstream of all markets including those of the USA. Requirements for labeling of biotech products are forcing policy decisions in retail chains.
- Reduced margins are forcing a reexamination of operating efficiencies.
- Food safety and terrorist fears have greatly increased the willingness of food marketers to implement tracking systems for security reasons.

Some attributes cannot be measured by either visual inspection (e.g., natural beef) or by chemical analysis (e.g., BST in milk). In other cases, measurement is possible but cost prohibitive. For some consumers it is the process (how it was produced or by whom) that creates value, i.e., organic, animal welfare practices, locally grown, not the grade. Process control and more importantly source verification is necessary to capture the value of the trait. Finally, increased world security concerns are causing more scrutiny of all products intended for food – either commodity or specialty.

What is Source Verification?

Source verification is the ability to trace products from their initial components (for example, from seed) through a production and distribution system to the end user.

^{1/} Prepared for the Iowa-Japan Trade Mission, November 9-14, 2002.

^{2/} Chair, Ag Quality Initiative, College of Agriculture, and Cooperative Extension Service, Iowa State University; Professor of Agricultural Engineering, Iowa State University

Other terms have been used for source verification – tracability, product tracking, process verification and others. Source verification automatically applies to identity preserved products – those that are physically isolated throughout the market – but is also increasingly used for documentation in bulk commodity markets as well. Some examples of soybean products that are or could be source verified are:

- Individual varieties grown by individual farmers (e.g. Vinton 81)
- Specialized bulk products, such as nonGM or large seeded soybeans
- Totally contract controlled products such as health foods, organics, or pharmaceuticals
- General commodity soybeans if some risk factor is present (for example an unapproved GM event)

Source verification is a process. Testing for specific traits and special handling are part but not all of the process. Source verification requires a documentation chain from start to finish, in addition to whatever actual confirmation testing can be done. Source verification functions even when testing is not possible, or when the value of the product is in consumer perception rather than physical attributes. As long as the integrity of the documentation is maintained, the source verification and protection will be intact.

Quality Management Systems

Source verification requires a certified (third party audited) quality management system (QMS). Quality management systems are formalized procedures for requiring discipline and reproducibility in a production process. Discipline and documentation have not been mainstays of traditionally independent minded agriculture. Quality management systems force operators to document what and how processes are done, then prove through records and audit that the process, however described, is consistent. QMS do not require specific or high quality standards, just that desired standards are met. QMS are also a convenient framework under which to introduce environmental and/or safety standards.

The worldwide framework for quality management systems has been the ISO 9000 series of standards. Many manufacturing industries have customized a “front end” for the ISO standards to make them more user friendly for specific situations. This is also happening in agriculture, as in for example the American Institute of Baking Quality Systems Evaluation (QSE) program for flourmills and bakeries. Custom programs can also incorporate other elements such as food safety or environmental protection not addressed by ISO 9000. The USDA is considering starting a process certification similar to but not totally equivalent to ISO 9000 (See www.usda.gov/gipsa).

There are strong reasons for creating a recognized general format for quality management systems.

- Reduction of parochial protectionist trade disputes based on process or measurement methods.
- Discovery through discipline of unrealized efficiencies.
- Confirmation to consumers of both process and quality of food consumed.
- Simplification of interchange among market generated QMS programs, so that users and/or suppliers do not become captives to a specific system and its associated marketing network.

For the producer and the user alike, quality management systems have immediate benefits:

- Operating efficiency and cost savings are created through the detailed study of operations required for QMS. Industrial firms have averaged around \$1.50 - \$2.00 of cost/efficiency gains for every \$1 invested.
- The chain-of-custody documentation that is required for a comprehensive QMS will be a major benefit in marketing sensitive or narrowly focused products, such as genetically transformed pharmaceutical/industrial grains, or specifically fed specialty animals. Some of these products are genuine concerns to general users, and often are very hard to test/validate in the traditional inspect and pay scheme of commodity markets.
- The exhaustive analysis and procedural controls is well suited to reduction in security threats, such as addition of toxic agents or production limiting diseases. For example, white mineral oil is applied for dust control to nearly all grain handled at elevators, and the number of suppliers is very limited. The stringent validation and audit requirements of a QMS, which normally are imposed on suppliers to QMS firms, greatly reduces the chance that a terror agent could be distributed in this way.

For users, buying from QMS producers/handlers is an automatic method of predelivery tracking. The producer and first handler must be involved in source verification if any meaningful tracking and/or quality improvements are to be made.

Quality Management Systems for Grain Markets

The recent security concerns have lead many to believe QMS are needed to provide traceability, chain of custody, and security against food supply threats even in basic staple commodities. Producers listen to whomever pays them for grain – their markets. There are two routes by which QMS are being introduced – at the local level through normal grain markets (that are often owned by producers), and through producer-held companies created to develop markets and coordinate very specialized production.

Development Process – Grain Handler Driven

Several grain companies are developing internal quality management systems. There are examples of ISO certification – Colusa Elevator Company, Consolidated Grain and Barge, Inc., and of other systems such as AIB QSE – Farmers Cooperative Elevator Company, Farmland Industries.

Most of the examples have occurred in Iowa, primarily because State government and Universities recognized the need for source verification somewhat before the general market did. **Firms that have an audited quality management system are good candidates for direct marketing arrangements – producer to end user.**

Transportation and logistics have often prevented direct sales of bulk products; the firms creating source verification are becoming large enough that coordination of source verified bulk shipments is much more feasible than in the past.

The Tables 1 and 2 attached to this paper shows some of the documentation and statistical control charts developed by one firm, Farmers Cooperative Elevator Company, Farnhamville, Iowa, as part of its QMS. These are comparison charts kept to document constant improvements in accuracy of grain analysis.

In the grain industry program, source verification was divided into nine general areas, and specific procedures/controls were created for each.

- Raw Materials
- Process Control
- Process Verification (Statistics)
- Finish Product Acceptability
- Storage and Shipping
- Instrument Accuracy and Calibration
- Personnel Training
- Plant Programs (Safety, etc)
- Quality Policies (Management Commitment)

At this time, there is not an active specialty grain market; the benefits and targets are all based on commodity corn and soybeans. However, firms such as this one are in an excellent position to discuss specialty needs, such as nonGM or other attributes, on a larger scale basis than individual producers might be able to offer.

Part of grain handling source verification is tracking of product from receipt to resale or use. This is important if a special trait is involved, and even more so if some consumer health or safety issue is involved. Logically grain handlers will extend the QMS process back to the producer in measured steps working backward from the scale ticket (receipt document of delivery). A gradual progression of activities moving back from delivery will bring producers to the level for certification without impressing major work with little tangible to offer in exchange. QMS are essentially people training and interaction activities, such as:

1. Identify wagons and trucks, and record container, time and date of deliveries. This would extend tracability to a field or bin if needed.
2. Determine if predelivery sampling and control of delivery timing could improve off harvest merchandizing potential and minimize inventories of off grade grain.
3. Utilize agronomy sales departments to create interaction with producers about data management, possible economies for them, and actual data collection in cases where the grain company is the primary input supplier.
4. Document completely the use of company supplied inputs by producers.
5. Develop an in-company standard data management/documentation protocol to be applied (and trained to) when and if there is a market need requiring QMS and traceability.
6. When premium opportunities exist, always attach some QMS activity requirements to the premium. For a bulk handler, premiums are likely to be incremental at first.
7. Incremental value traits (such as feed ingredient modifications or bulk nonGM) are best suited to grain handler organized QMS.

Development Process – Producer Supply Network

Producers organizing to form supply network corporations have some advantages in the initial stages of specialty grain production and QMS establishment. Members investment in these companies makes the creation of a full QMS system easier to achieve. Time investments are made to support the financial commitments. Investors in these companies, while targeting high value premium grains, are more likely to also recognize operating efficiencies that present themselves in the course of creating a full system QMS. The intangible time-based learning activities are more easily accepted in the investor-owner format. Owner-operators can also benefit from promoting the idea “dealing with the grower”.

Producer networks lack distribution and logistics capabilities. The capital required for marketing to sophisticated users may be hard to obtain. Traits of smaller incremental value will be difficult to administer in this format. Therefore it will be very important for producer networks to understand their strengths and target products carefully.

1. Producer networks will likely target higher value products, and those needing field research to commercialize.
2. There are opportunities to identify cost savings in commodity operations, as well as specialty products.
3. Initially there may be excess documentation, until confidence is established.
4. Purity will be a major concern for the products of producer networks; operations affecting purity will be controlled even in commodity grain.
5. Producer networks will maintain their individually strategic plans, but will utilize standard formats, templates and study guides for their certification programs, each applying each those elements most relevant to the particular product involved.

6. Technical expertise will be needed; any network must have at least one skilled person on staff.
7. There will be opportunities with smaller incremental premiums where the high value skills/procedures of a producer network connect with grain handler programs (such as sale of non biotech soybeans).

This concept is essentially an extension of the organic and container markets now operating for premium soybeans. The addition of increasing food safety and consumer concerns will impress more rigorous documentation and structure, such as is offered by QMS, but these markets will readily adapt to source verified QMS. The key addition will be third party audit and verification.

There are several groups from Iowa, some on this trip that are organizing themselves in this way, or are upgrading their already successful organizations to more formal source verification. An example of the quality management system flow for a grain producer is shown in Figure 3.

The Importance of the Grain Buyer in Source Verification

To capture the market benefits of source verification, the buyer must see value in the closer contact and chain-of-custody documentation that will exist. Some actions that only buyers can impress are:

- Give and demand integrity in all negotiations
- Provide simple, clear, complete, and operationally feasible contract terms with reasonable economics
- Understand and interact with those actually capable of actually producing the product and bypass unneeded negotiators. Repetitive merchandising generally destroys source verification.
- Assume that the physical distribution system can do more than expected.
- Provide clear economics so that the market can pass costs and incentives efficiently. Market practices and baselines change with economic signals but respond poorly to wide ranging demands based on unclear economics.

Source verification and audited quality management systems are opening new direct market channels that require much more openness and transparency.

Third Party Audit

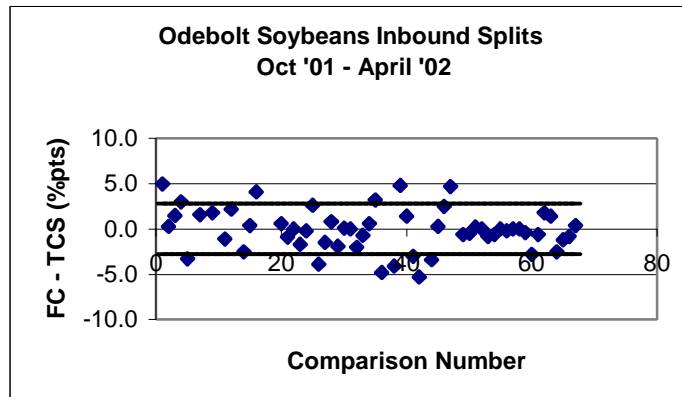
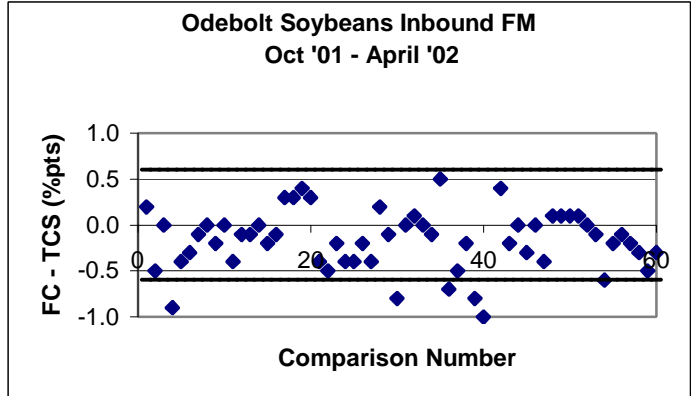
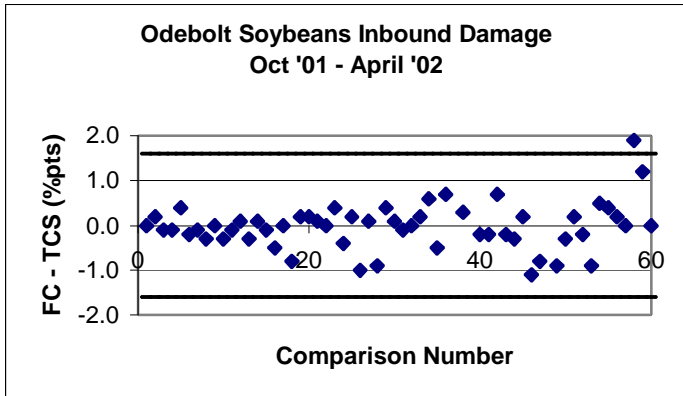
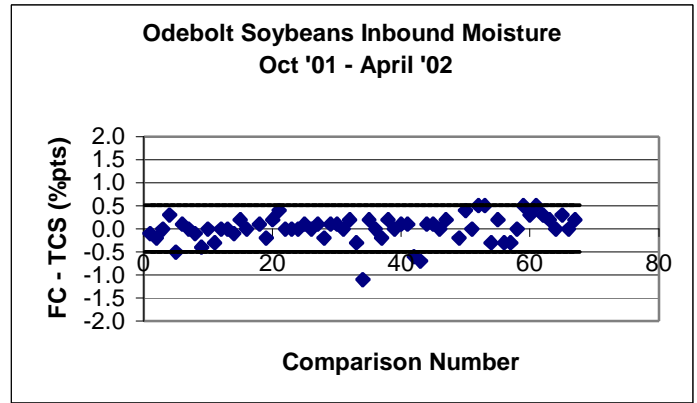
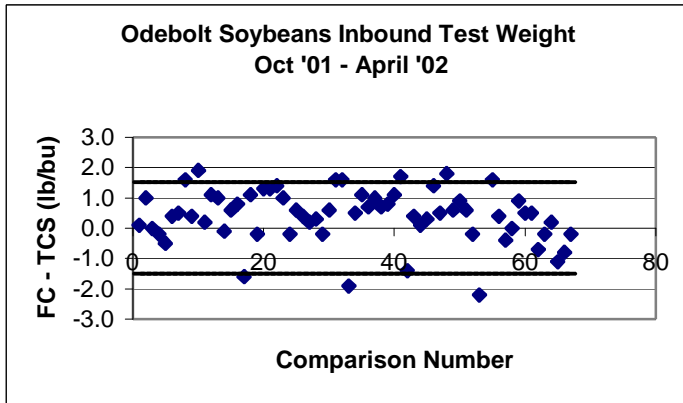
All source verification systems require audit by disinterested third parties. Auditing services are being created. Among them, USDA is now deciding whether it should become a quality management system auditor, most likely to the ISO 9000-2000 standards. USDA will be asking for public comment in January; it will be important to hear from specialty grain buyers as to whether this would be a useful service.

Summary

Producers and grain handlers in Iowa are national leaders in developing source verification programs for grain. These programs allow close contact between producer and user, and provide quality assurance to meet consumer product and safety demands. Source verification requires detailed, documented and audited quality management systems. Direct supply of products in quantities previously thought not feasible will be enabled by source verification.

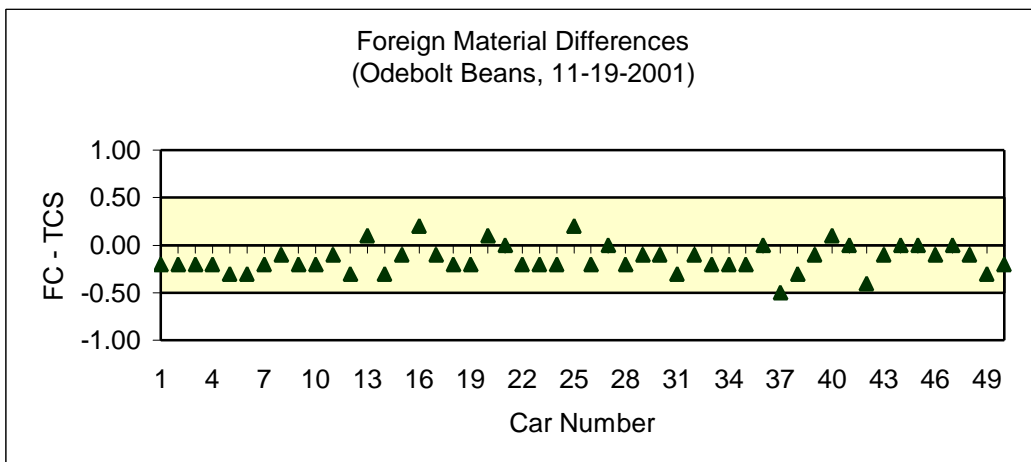
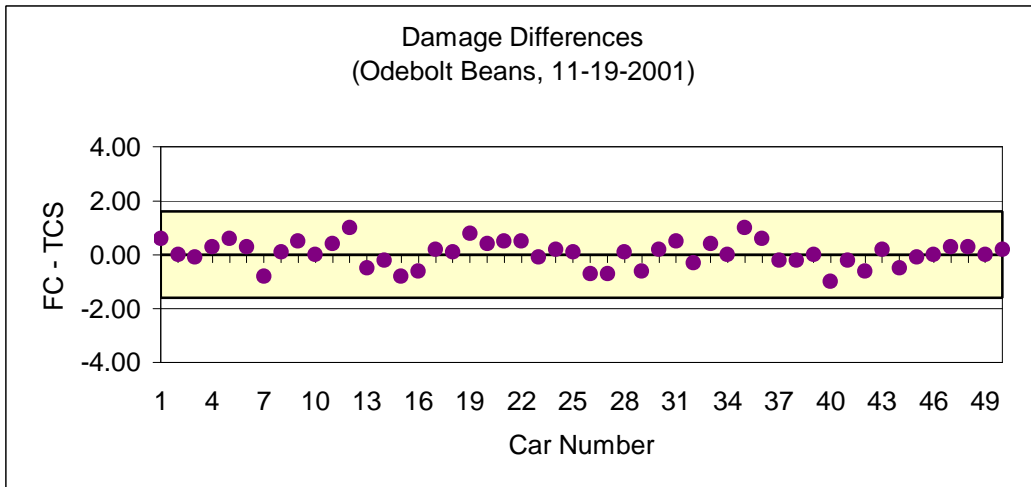
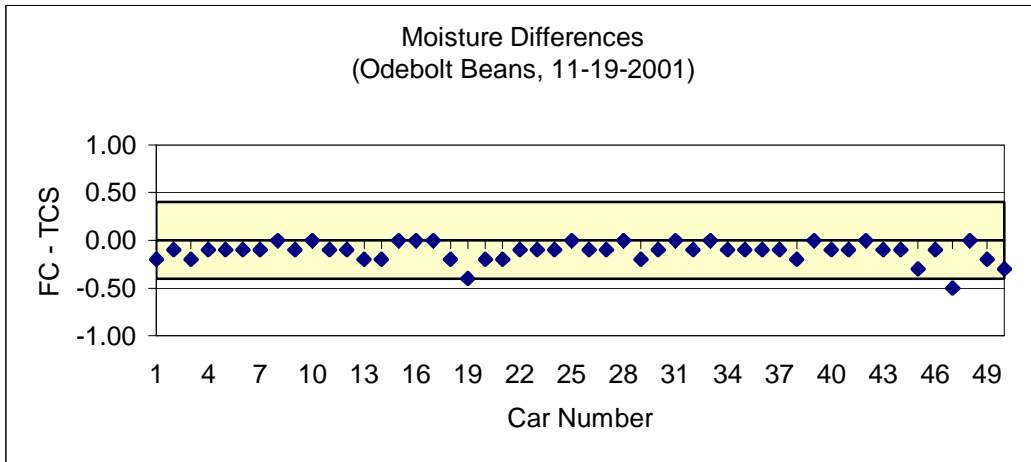
States themselves are not grain growing boundaries but they can be centers of thought and creativity. Source verification and customer service are people issues, not geography issues which means that choice of purchase sources can and will provide benefits.

Figure 1. Example of Control Charts for Grading Inbound Soybeans at a Country Elevator



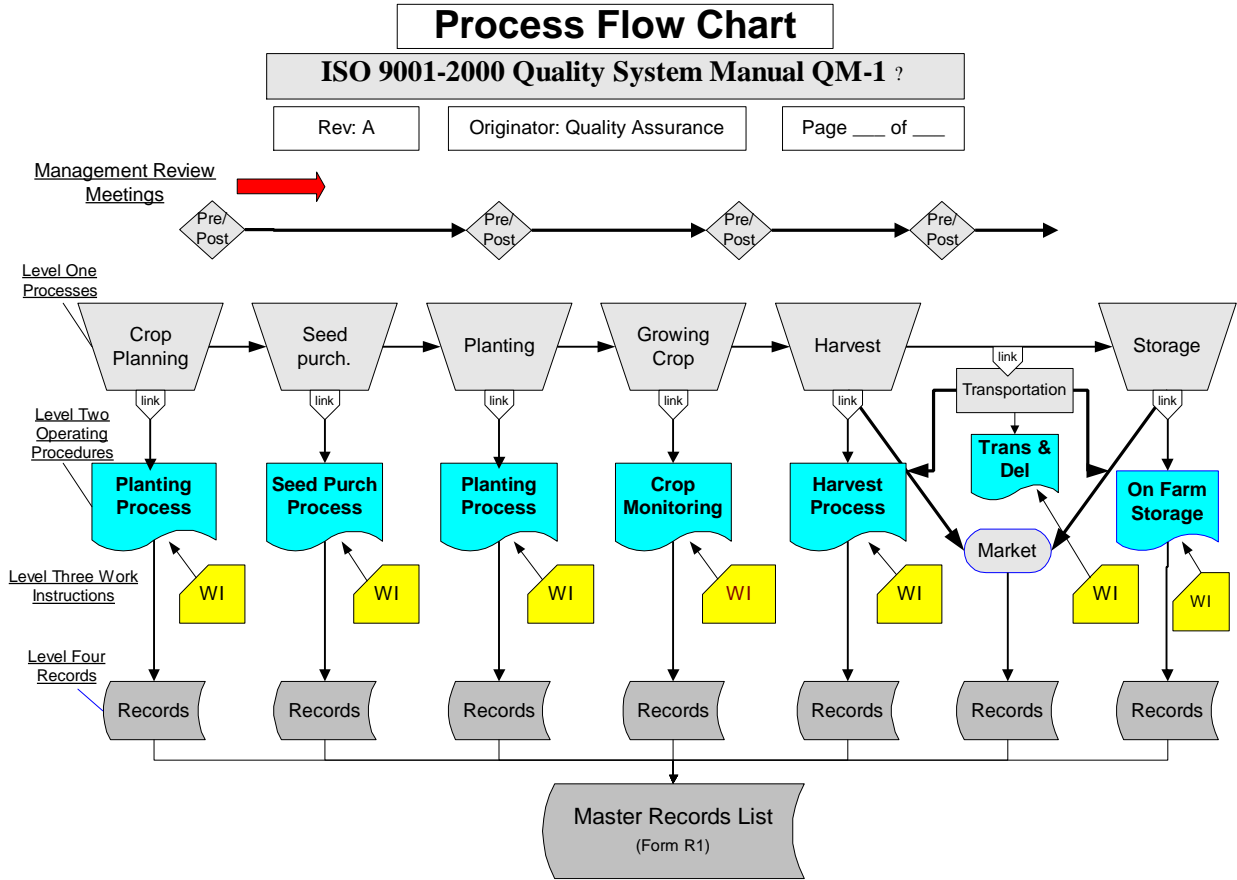
U:\Shared\Famhamville QC data\Inbound QC\Odebolt Inbound QC.xls
 Copyright © 2002 Iowa State University and Farmers Cooperative Elevator Company

Figure 2. Example of Control Chart for Rail Soybean Grades



U:\Shared\Farnhamville QC data\Rail QC\Odebolt\Soybeans\Soybeans Odebolt 2001-11-19.xls
Copyright ? 2002 Iowa State University and Farmers Cooperative Elevator Company?

Figure 3. Typical process flow for a farm-based quality management system



Source: Center for Industrial Research and Service, Iowa State University