

Lobster Traceability Pilot Project

Traceability implementation

Suggested guidelines for the lobster industry



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Revision Table			
Version	Title	Description	Date
20140915A	Draft #1	First draft	September 15th, 2014
20141208A	Draft for final internal review	For presentation in Moncton	December 8 th , 2014
20150114A	Draft for first release	For review by Lobster Council of Canada	January 14 th , 2015
20150202A	Released for translation	This document	February 2 nd , 2015
20150206A	Released	Final Version	April 6 th , 2015
20150422A	Released	Page 4&23: Actor changed for participants	April 22 th , 2015

Executive summary

This document is intended as a guide for participants of the Canadian lobster industry who need to implement a traceability system in their manufacturing process. It will demonstrate where particular effort must be made to keep the traceability process alive and where implementation is beneficial for the whole company.

Traceability has already been successfully implemented in the seafood industry in the past. For example: in snow crab and Nordic shrimp.

The traceability of lobster is the most complex of the seafood industry. However, solutions are available to get a good level of traceability.

Here are the top 5 challenges in the lobster industry, as identified by this study:

- Multiple small suppliers
 - Relatively high number of suppliers and consequently high number of data entry at receiving.
- Tracking of lobster throughout complex processes
 - A single finished product can contain lobster from multiple suppliers. (Ex. Meat)
 - Lobster lots are split in many production lines.
- Multiple finished products
 - Compared to other seafood products, lobster is processed to a relatively high number of different finished products.
- Process lobsters in a single day
 - To meet traceability standards, a batch (lot) has to be produced within one day or less.
- Tracking lobsters in holding ponds
 - In general, holding ponds contain lobster from multiple suppliers. Without methodical record keeping and identification, traceability can be lost.

Processors see traceability as a burden. It takes time, costs money, creates paperwork, etc. A good way to turn this “burden” into a benefit is to use it as a lean manufacturing tool.

Traceability systems that are integrated or have that capability are preferable. An integrated system means that you do not have to maintain an individual system, potentially from different suppliers, for inventory, shipping, production management etc.

Accounting systems do not necessarily need to be changed to accommodate traceability.

Electronically labelling each inner/master box and pallet is a step in the right direction. If you can only do one step, this is it. It is accomplished using a combination of consoles, mobile computer devices and label printers.

Secondly, shipping and inventory is generally an area where tracking can be especially beneficial. With the help of consoles and other devices, product tracking can be greatly improved.

After implementation, there are benefits to a traceability system.

For example:

- Ability to follow traceability regulation with less paper work.
- Increased inventory accuracy.
- Improved expedition with customer lists and reports.
- Traceability of the product offers an edge over competitors.
- Productivity monitoring

In addition, it is possible to expand some systems to include production management tools.

Today, consumers are more and more concerned about ecological impacts and sustainability. It is clear that the trend is going toward traceability. It is important to be prepared for these requirements sooner rather than later.

Traceability in the lobster industry

Overview

At the beginning of the pilot project, in the spring of 2011, ten (10) lobster industry participants (brokers, processing facilities, fishermen organisations) were visited to observe their operations and gather information for the project, including details on their processes, expectations and understanding of possible traceability requirements.

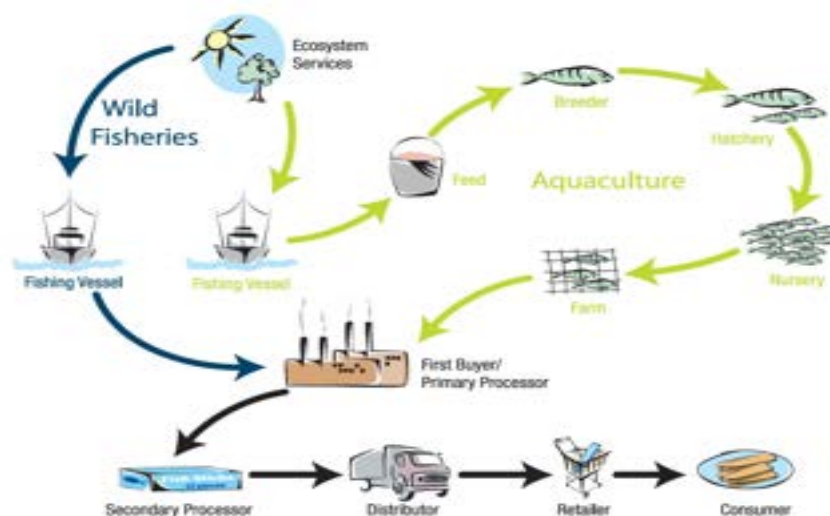
In most cases, processors receive the lobster and the log information on paper from the source (e.g. truck shipment, harvester, fishing zone, etc.). Batches of product are often mixed together during the process and throughout the day of production, meaning the finished product is actually a combination of many harvesters. During the process within the factory, the product goes through the process with virtually no traceability.

In 2011, it was observed that most processors do not electronically link the source of the product to the finished product. While in some cases it may be possible to trace the source via paper recordkeeping, in most case it would be impossible.

What is traceability?

Please find below one of several definitions of Traceability:

Traceability is defined as the ability to systematically identify a unit of production, track its location and describe any treatment or transformation at all stages of production, processing and distribution (Archipelago, 2005).



Who enforces traceability?

- Consumers
- Eco-certification agencies
- Governments
- Retailers
- Distributors

Existing standards and certifications

- CFIA/QMP – Canadian Food Inspection Agency
- EU/IUU – European Catch Certificate
- MSC – Marine Stewardship Council
- BRC – British Retail Council
- GS1 – System of Standards
- Bioterrorism Act
- FDA – Food and Drug Association
- GAA – Global Aquaculture Alliance
- SQF – Safe Quality Food
- And more...

Project scope

- Determine if traceability can be implemented into lobster industry
- Determine business drivers and objectives for traceability
- Determine traceability requirements
- Determine cost of implementing traceability
- Address implementation challenges

Project contributors

Proponent:

- Lobster Council of Canada (LCC)

Conductor:

- Canadian Council of Fisheries and Aquaculture, Ministers Traceability Task Group (CCFAM)

Leader:

- Department of Agriculture, Aquaculture and Fisheries of New-Brunswick

Current supply chain overview

Harvesters

As expected, the processes on the fishing vessels are focused on the catch. There is no record keeping that would support traceability other than sales receipt information related to the catch, which is recorded at the wharf or processing plant.

Buyers

At the wharf, the processes focus on getting the lobster catch to the processing plant. Again, there is minimal record keeping beyond catch receipts related to payment for the harvesters.

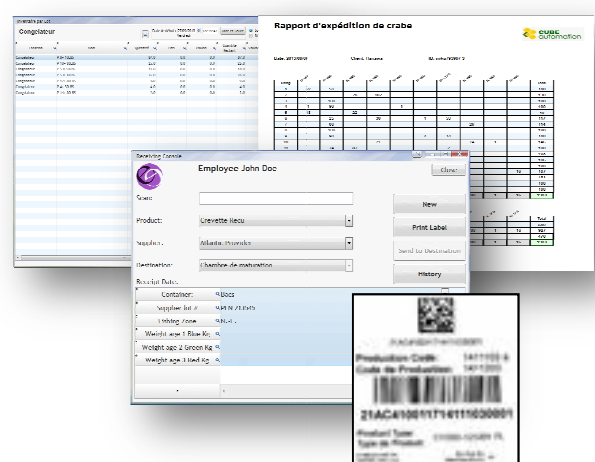
Processors

Most of the traceability burden relies on the processor's shoulders. Experience from implementing computerized lobster traceability is summarized in this document.

From:



To:



Brokers/Exporters

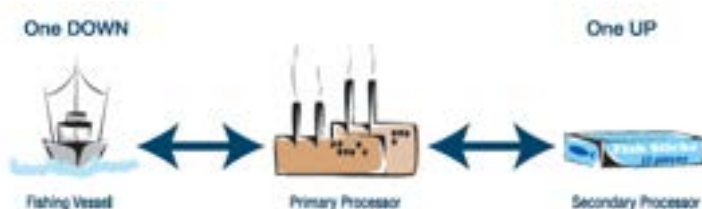
The tasks of the brokers/exporters are typically administrative, involving brokering sales and arranging local and global distribution, usually between the processor and end user. These types of processes will not impact traceability in the lobster supply chain since there are no critical tracking events that are directly accountable to the broker/exporter, except for keeping records of who they buy from and who they sell to.

Five main requirements for traceability

The following are the five (5) main requirements of traceability:

One-up, one-down traceability

- Maintaining records of where, when and from whom the product was received
- Maintaining records of where, when and by whom the same product was relocated, processed, etc. (e.g. during processing)
- Maintaining records of where, when and to whom the shipment of that same product was sent



Lot sizing and sourcing

- Lot size should be limited to no more than a single day's production
- All consumer products must be linked back to a production lot
- All lots must be linked back to one or more harvesters
- A partial batch cannot be frozen at the end of the day to be completed later



Standardized product labelling

- The inclusion of a Global Trade Item Number (GTIN) data structure, such as Universal Product Code (UPC)
- Providing both machine-readable and human-readable information
- The inclusion of Lot Numbers
- The inclusion of Serial Numbers
- The inclusion of Global Location Numbers (GLN)



Electronic data storage

- Traceability information must be transferable via email.
- Product traceability must be verifiable at any time via third-party audit.



24/4 hour traceability

- Provide full information on where the product originated.
- Provide the current location of all other products from the same lot.
- The US Food and Drug Administration (FDA) require that information be provided within 24 hours.
- Third party certifiers, such as the British Retail Council (BRC) and NSF-Cook and Thurber, require the information within 4 hours.

Top five challenges for lobster traceability

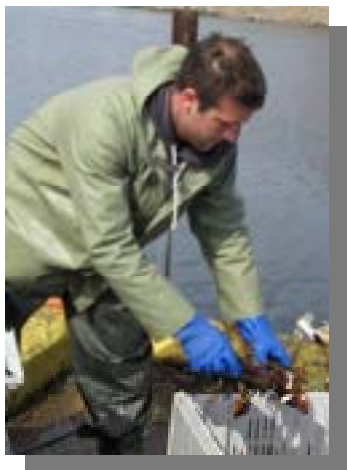
Multiple suppliers

- A single processor can receive lobster from dozens of harvesters, each day. Multiple harvesters translate to multiple data entry at the processor receiving's traceability station.
- Gathering all receiving info at the facility is time-consuming and often neglected over time.



Recommendation: Wharf Receiving Connectivity

- Receiving data can be partly or fully collected directly at the wharf.
- This makes receiving at the processor facility faster.
- A federal pilot project by Fisheries and Oceans Canada was prototyped with success in the past.



Tracking of lobster throughout complex processes

Grading, meat extraction and blast freezer areas are the most likely to lose track of lobster.

- Labelling is key
- For example: before processing a batch, before sending it to freezer, before shipping it, a barcode must be scanned to inform the system of the process status. Even inside the facility process.

Multiple finished products

Unlike other seafood products, Nordic shrimp for example, Lobster is processed into many finish products. For example: tails, claws, bullets, whole cooked, meat etc. This adds to the complexity and thus need more work station traceability. Consequently it increases the implementation cost.



Lobster product versus traceability:

- Whole lobster (Live, cooked or frozen):

Live lobsters can be traced in different ways:

- Regional: if the fishing zone and product landing location is recorded, retailers could trace back to the day of landing and what region it came from.
- From sea to your dinner plate: if each lobster is tagged on the boat by the harvester, customers could trace individual lobsters to individual harvesters. This system has been used in Quebec since 2012. The customer can go on a website, type in the identification code and get information on the fisherman and even see a short video introducing the fishermen.

- Meat:

- The meat is almost always a composite of many sources. Thus traceability could be achieved up to a batch of production within a particular day.

- Tail and claws:
 - If the information continues to the butchering table and beyond, the ability to trace could be down to a particular batch. This would help reduce the source to a few harvesters by whom the lobsters have been processed.

Process a lobster batch in a single day

- Traceability standards require that a batch must be processed within the same day
- A partial batch cannot be frozen at the end of the day to be completed later

On some occasions, due to a surplus or lack of sub-product like claws or meat, they are put in cold storage to be processed the next day. This is contrary to the traceability requirement that batches must be limited to the quantity produced in one day.

Additional information on batches (lot):

The size of an individual batch is important in reducing risk and liability for individual companies. A batch is the minimum amount of product that may need to be removed from the supply chain in the event of a recall. In general, the smaller the batch size, the lower the amount of product at risk for food safety or security issues. Best practices recommend limiting batch sizes to at most a single day's production.

In the lobster industry, sourcing for batches refers to processors tracking the lobsters used within each batch back to the harvesters who supplied them. While it is permitted that one batch may contain lobster from multiple harvesters (multi-source batching), the processor must maintain control over the identification of all sources. That is, they must be able to link all products back to a fisher or group of fishers, via their batching process.

Keep track in holding ponds

Some producers are equipped with ponds where live lobsters are stored for extended periods of time. If records of where the lobsters come from are not kept methodically, then traceability back to the harvester is practically impossible.



One option to track lobsters at this stage of the process is to identify each crate using waterproof labels or RFID tags. This identification should help retrieve all the information necessary about the supplier. At reception, the catch from the harvester is often sorted to remove weak or cull lobsters. In this case, the same principle of traceability applies. Weak or cull lobsters sent to production shall be identified. Keeping lobsters from the US, local wharfs and other Canadian locations separated is suggested.

Implementing traceability

Traceability on the plant floor

Traceability is suitable for small to large facilities. Know your client and markets; determine which certification(s) you must comply with.

Know your facility and process using:

- Accurate floor plans
- Detailed process diagrams
- Suppliers, products, clients lists, etc.

Equipment for traceability system consists of a combination of:

- Computerized consoles
- Mobile computer
- Label printers
- Barcode scanners
- Scales
- Central Database

This equipment, precisely located in the facility, increases operational swiftness.

Critical tracking event (CTE)

Throughout the manufacturing process, there are points where traceability data should be captured. These points are called Critical Tracking Events (CTE). Coined by the Institute of Food Technologists (IFT).

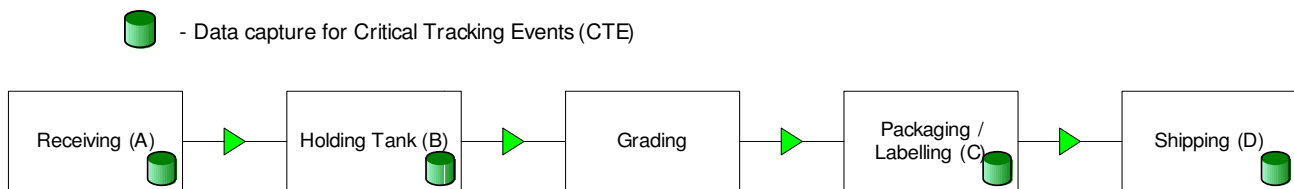
"CTEs are those instances when products or ingredients are moved between premises, is processed or is determined to be a point where data capture is necessary for effective tracing."

Typical traceability system overview

The design of a traceability system starts by understanding how the lobster is processed. For the processing plants, it begins at the reception of the lobster and continues thru the production line to become a finished product being shipped to customer. The design begins by mapping the process to create a diagram. Some examples can be seen below. This task can be complex if there are multiple products created at the plant. Emphasis has to be put on the manufacturing steps where the lobsters are processed, ingredients are added and lobster product is moved, stored or packaged. Those steps have the potential to become a Critical Tracking Event (CTE).

The green database icons in the process diagrams below indicate points where typical traceability data is captured. These points are called Critical Tracking Events (CTE).

Live lobster

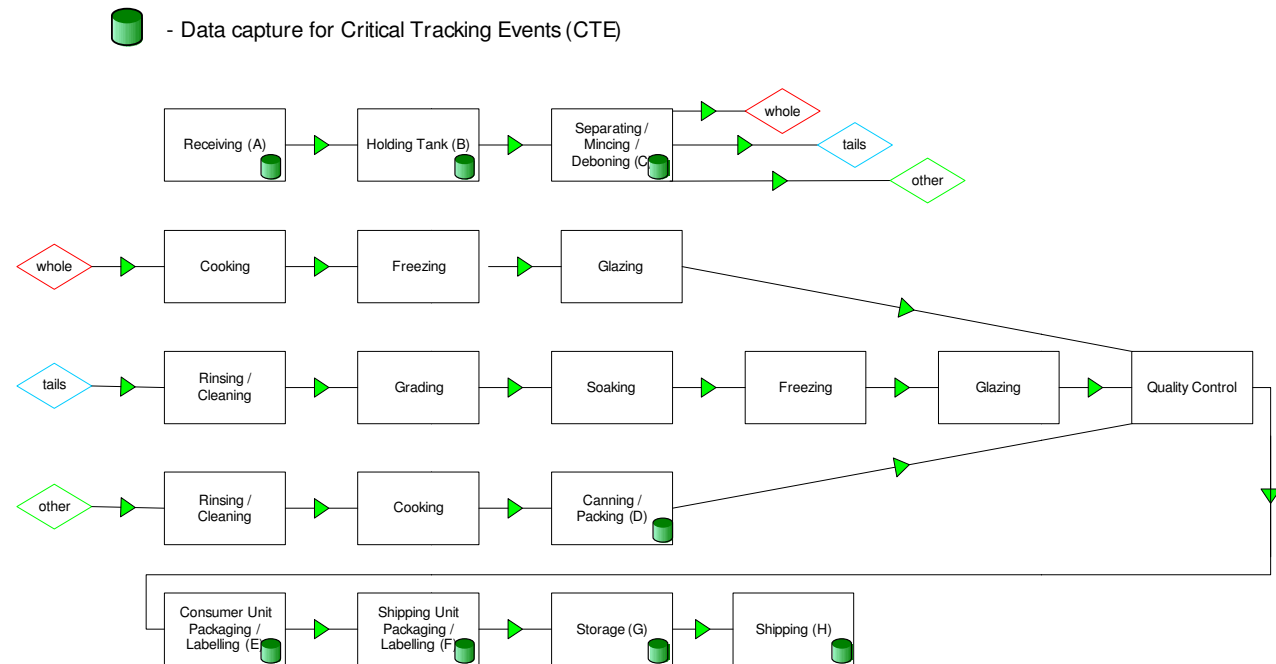


Traceability station description

- Receiving
 - Live lobster reception from harvester
 - Date and Time of arrival
 - Batch weight
 - Harvester's name
 - Fishing Zone
 - Attribute batch #
 -
- Holding Tank
 - Live lobster storage
 - Determine batch location in the live storage
 - Date and Time of entry/exit
- Packaging/Labelling
 - Lobster crate/master box weighting and labelling
 - Product name and weight
 - Processor's name
 - Processing date
 - Unique barcode

- Shipping
 - Pallet identification and storage/inventory management
 - Pallet content
 - Pallet location in storage
 - Unique barcode

Processed lobster



Traceability station description

- Receiving
 - Live lobster reception from harvester
 - Date and Time of arrival
 - Batch and Weight
 - Harvester's name
 - Fishing zone
 - Attribute batch #

- Holding tank
 - Live lobster storage
 - Determine batch location in the live storage
 - Date and Time of entry/exit
 - Separating/Mincing/Deboning
 - Lobster process
 - Each lobster batch must be assigned to a production line before being processed. Generally using a barcode scanner or by selecting product type on a computer.
- Canning/Packing
 - Lobster process
 - Each lobster batch must be assigned to a production line before being process. Generally using a barcode scanner or by selecting product type on a computer.
- Inner Packaging
 - Consumer Packaging
 - Most of the time, one computerized labelling station is required per production line.
- Master Packaging
 - Shipping Packaging
 - Most of the time, one computerized labelling station is required per production line.
- Storage
 - Palletizing and inventory
 - Computerized labelling station for pallet identification and storage management.
- Shipping
 - Delivery preparation and pallet reconfiguration
 - Sometimes, special/partial orders requires to build-up custom pallets.
 - Using a barcode scanner, the employee can scan removed boxes from existing pallet and recreate the pallet for shipping.
 - In many cases, Storage and Shipping traceability stations can be combined if facility layout permits it.

A Basic computerized traceability system includes:

- A computer for traceability software installation and data collection.
- A traceability station at receiving.
- At least one computerized labelling station in the production area for inner/master boxes and pallet identification.
 - Typically more than one station is required.
- A traceability station in the shipping area.

A more complex process might require other stations, for example:

- A traceability station directly on the wharf.
- A traceability station before freezers.
- Multiple labelling stations.

Hardware for traceability

The following are typical tools to record Critical Tracking Events in the seafood industry. Please see appendix A for hardware example.

Consoles:

Station for employees to record Critical Tracking Events (CTE). They are generally installed in a strategic location to enable employees to record events efficiently. They are the basis of a paperless system.

Data entry methods: Touch screen, Keyboard, Barcode Scanner.

Tracking methods: Labels and Barcodes. Radio Frequency Identification (RFID)

Scales:

Scales can be used in conjunction with consoles to record the weight of products; for example, at the receiving department of processors.

Hand-held devices:

Handheld devices like bar code scanners are used to read labels. They are available in many models for different applications. For example, product transfers in and out of freezers, shipping, etc.

Mobile devices:

Tablets and portable printers can be used throughout the factory. Using a wireless network, they could become a valuable tool for traceability at the wharf.

Printers:

There are many models of printers on the market for labelling. Most commonly used are small desktop printers.

Central database:

A central database is necessary to record information and data entries done along the process for traceability. This database is software, usually installed on a dedicated computer (Server). Consoles and other devices communicate to the database to store or retrieve information.

Access points:

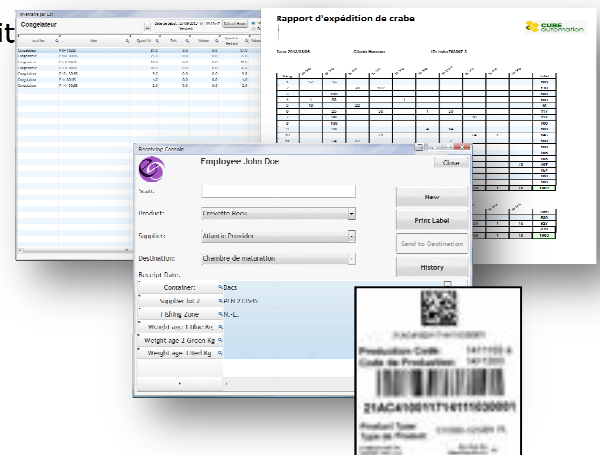
Once the information and data are stored on the central database, users like plant managers and production supervisors need to be able to retrieve and work with the information. A point of access is a computer with traceability software installed to review and work with the information stored on the central database. This can sometimes be done by installing and configuring software on existing computer.

Traceability Software

The software needs to be able to easily keep track of critical information.

Here are the main requirements for traceability software:

- One-up, one-down traceability Ability
- Uniform labelling
- Traceability 24/4 hour
- Data storage



Implementing traceability software does not necessarily mean you have to change your accounting software package. It is possible for the traceability software to exchange data with other existing software.

Traceability implementation steps

Implementation of a traceability system can seem like a daunting task when considering everything that is needed for a single project. Starting slow, one small step at a time, is a good way to reach your goal.

Step 1: Labelling Each Package

If you only do one step, this is it!

Here's an example of information found on labels:

- Product name and weight
- Processor's name
- Processing date
- Unique barcode

Equipment consists of a combination of:

- Computerized consoles
- Mobile device and computers
- Label printers

Step 2: Inventory and Shipping

Packaging for shipping:

- Most of the time, one computerized labelling station is required per production line.

Palletizing and inventory control:

- Computerized labelling station for pallet identification and storage can also be necessary.

Shipping:

Computerized station for delivery preparation and pallet reconfiguration is also typically needed at the shipping area of the facility.

Special/partial orders requires to build-up custom pallets. Using a barcode scanner, the employee can scan removed boxes from existing pallet and recreate pallet for shipping.

In many cases, storage and shipping traceability stations can be combined if facility layout permits it.

Here are some of the advantages:

- Improved expedition with customer list and reports.
- Increased inventory accuracy
- Reduced palletizing error
- Potentially reduce labelling labour



Step 3: Computerized Receiving

This is one step that is more difficult than the others.

- It is difficult to do per boat.
- Wharf receiving connectivity is recommended to make it faster at the processor's facility.

Step 4: Plant Floor Product Tracking

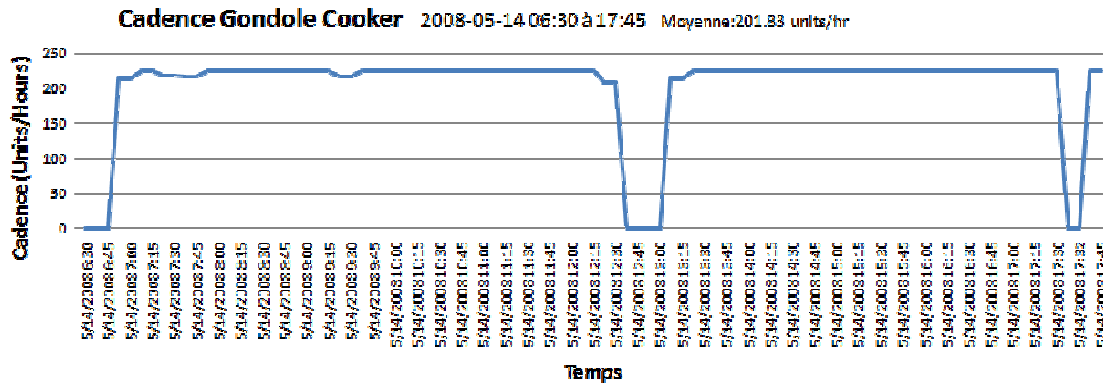
This is one step that is more difficult than the others. It requires a combination of traceability knowledge, factory production/process knowledge and experience.

- Can require process modifications.
- Opportunities for productivity monitoring

Step 5: Productivity/Bonus Monitoring

In lobster and other seafood process like snow crab, a bonus system has been implemented with great success. Productivity had increased significantly. A bonus system can be added to traceability systems.

Productivity monitoring on the plant floor has been implemented in many facilities. Usually key equipment is monitored. Based on the facts received, management can make decisions and take action to maximise plant productivity. Through user feedback and on site observation, once the management of the facility is done, productivity monitoring becomes an indispensable tool.



Step 6: Paperless Quality Control

As the demand for safe, quality food increases, the requirement for quality control increases as well. The quantity of information to collect, store and archive can quickly become a burden, if it's not a problem already.

Quality control test results can be entered directly into a database using a console or mobile device, making it a virtually paperless system.

Here are some of the advantages:

- Ability to follow regulation with less paper work
- Easy report and statistics
- Produces quality report in minutes

Pilot project observation and other industry challenges

Observation and recommendation

The baseline for traceability is hard to define and always moving. Many grey areas exist in the different traceability definitions. Current processes and automation levels observed are not fully ready to support traceability (but not too far off either).

Traceability as seen by processors

Traceability at the processing plant appears to be a burden. It takes time to maintain and costs money. One way to make it easier for the processors is to electronically capture data at the wharf. It was tested and was generally appreciated by the industry participants. Information was exchanged between the wharf and the processor electronically or via a barcode applied to the product.

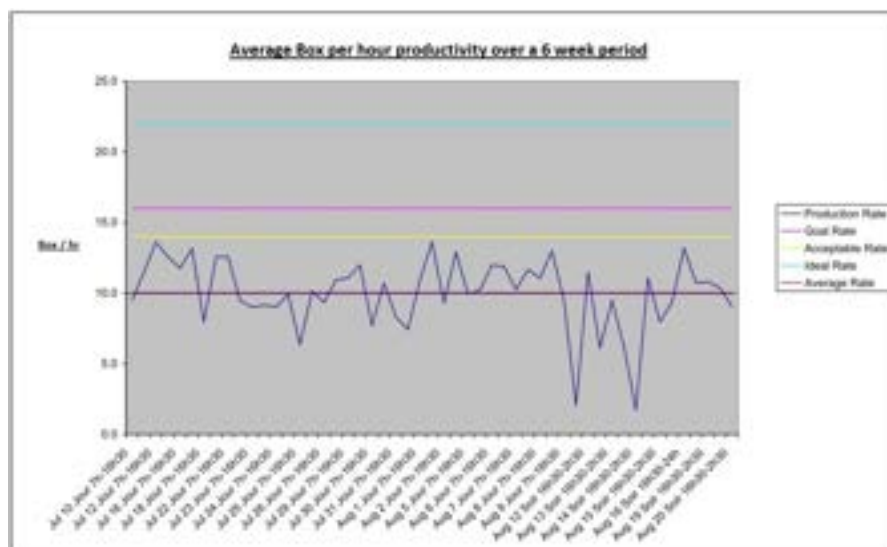
Some processors went a step further, taking the opportunity to adding a bonus system while implementing traceability and found it to be a success. The increase in productivity and savings using the bonus system compensates, in a way, for the "burden" of traceability.

A traceability system can cost between \$30,000 and \$200,000. It has an average complexity to implement.

A good way to ensure a benefit is to use the system as a lean manufacturing tool.

This can allow you to:

- Gather production data seamlessly
- Reduce paperwork
- Improve receiving, shipping and inventory
- Manage plant operations by facts and statistics
- Gain productivity edge over the industry



Traceability self-assessment

The evaluation sheet in appendix B can be helpful to determine your strengths and weaknesses towards traceability implementation.

A rating of 1 represents the lowest score, 2 is below the minimum requirement, 3 is adequate and 4 is over requirement.

To meet basic traceability requirements, you must answer yes (at least rating #3) to each statement while keeping required information in a computer, not only paper.

Rate your process and administration procedures against the five main requirements for traceability (Page 9).

Conclusion

Here are the top 5 challenges in the lobster industry, as identified by this study:

- Relatively high number of suppliers and consequently high number of data entry.
- A single finished product can contain lobster from multiple suppliers.
- To meet traceability standards, a batch (lot) has to be produced within one day.
- Tracking of lobster throughout complex processes.
- Tracking lobsters in holding pond.

Pros of implementing an electronic traceability system:

- Ability to follow traceability regulation with less paper work.
- Increased ability to meet requirements for sustainable fisheries and eco-responsibility.
- Traceability of the product offers an edge over competitors.
- The system can be expanded to provide an excellent tool for factory management.
 - Example: Production management.
 - Example: Assist accounting.
- Some traceability software can provide basic production report and statistics.
- Produces traceability report in minutes.
- Improved reception with supplier list & reports
- Improved expedition with customer list and reports.
- Uniform labels and coding.
- Less time spent in audits.

Indirect benefits:

- Reduction in data entry and labelling error.
- Reduction of palletizing error.
- Increase in inventory accuracy
- Possible reduction in labelling labour
- Increase in feedback to employees helps correct potential issues on the spot.

Cons of implementing an electronic traceability system:

- The initial cost can be significant.
- Additional electronic devices to be maintained.
- Additional items to purchase like labels, ink etc. (Consumables)
- Period of adaptation necessary for employees.
- Employees not familiar with computers and software may need additional training.
- Can be seen as a burden by employees. Especially if there was no prior system in place.

Processors are seeing traceability as a burden. It takes time, costs money, creates paper work, etc.

A good way to turn this "burden" into a benefit is to use it as a lean manufacturing tool.

This can allow you to:

- Gather production data seamlessly
- Reduce paperwork
- Improve receiving, shipping and inventory
- Manage plant operations by facts and statistics
- Gain productivity edge over the industry

Systems that are integrated or have that capability are preferable. An integrated system means that you do not have to maintain individual system, potentially from different suppliers, for inventory, shipping, production management etc.

Accounting systems do not necessarily need to be changed to accommodate traceability.

A traceability system can cost between \$30,000 and \$200,000. It has an average complexity to implement.

Today, consumers are more and more concerned about ecological impacts and sustainability. It is clear that the trend is going toward traceability. It is important to begin preparing for these requirements sooner rather than later.

Labelling each package is a step in the right direction. If you can only do one step, this is it. It is accomplished using a combination of consoles, mobile devices and label printers.

Secondly, shipping and inventory is generally an area where tracking can be especially beneficial. With the help of consoles and other device products, tracking can be greatly improved.

Appendix A: Hardware example

Consoles:



Scales:



Hand-held Devices:

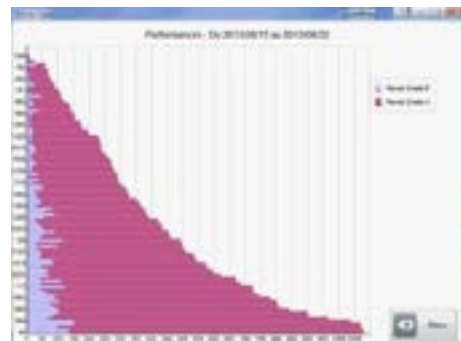
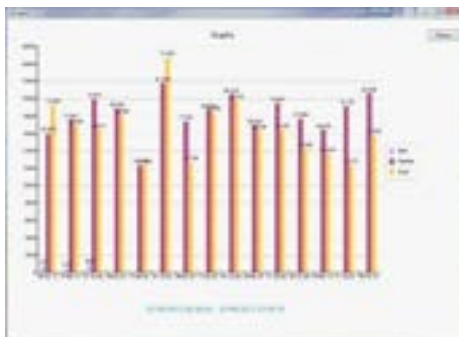
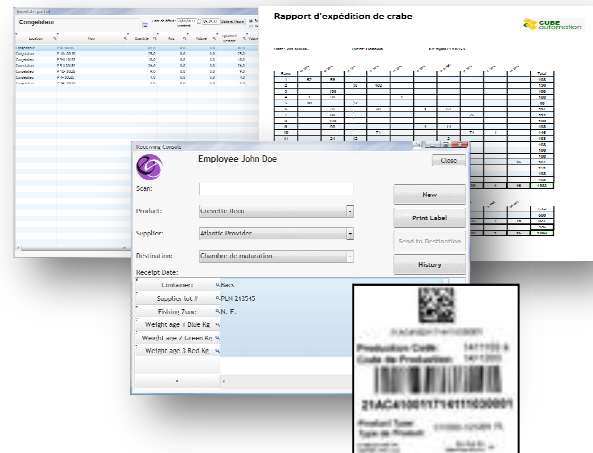


Mobile devices:



Printers:



Traceability Software:A screenshot of the software interface showing a list of data. The table has columns for 'Date', 'Produit', 'Quantité', 'Unité', 'Statut', and 'Détails'. The data is organized in a grid, with a 'Filtres' (Filters) button at the bottom right.

Appendix B: Self-assessment grid

Traceability Requirements	Rating			
	1	2	3	4
One-up, one-down traceability				
➤ Maintaining records of where, when and from whom the product was received				
➤ Maintaining records of where, when and by whom the same product was relocated, processed, etc. (e.g. during processing)				
➤ Maintaining records of where, when and to whom the shipment of that same product was sent				
Lot sizing and sourcing				
➤ Lot size should be limited to no more than a single day's production				
➤ All consumer products must be linked back to a production lot				
➤ All lots must be linked back to one or more harvesters				
Standardized product labelling				
➤ Inclusion of a Global Trade Item Number (GTIN) data structure, such as Universal Product Code (UPC)				
➤ Providing both machine-readable and human-readable information				
➤ Inclusion of Lot Numbers				
➤ Inclusion of Serial Numbers				
➤ Inclusion of Global Location Numbers (GLN)				
24/4 hour traceability				
➤ Provide full information on where the product originated				
➤ Provide the current location of all other products from the same lot				
Electronic data storage				
➤ Traceability information must be transferable via email				
➤ Product traceability must be verifiable at any time via third-party audit				

Rating of 1 represents the lowest score, 2 is below minimum requirement, 3 is adequate and 4 is over requirement.

To meet basic traceability requirements, you must answer yes (at least rating #3) to each statement while keeping required information in a computer, not only paper. Rate your process and administration procedures against the five main requirements for traceability (Page 9).

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