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White Paper

Food Traceability -
The carrot and the stick!

By Eamonn O'Mahony, President, SoftTrace

For many resource strapped food processors in these economically challenging times, meeting evolving traceability demands is seen as a daunting task and product traceability remains a contentious issue in the industry. Undoubtedly, the implementation of a traceability software system represents a significant up-front investment. Yet, a fully integrated, electronic traceability system can provide significant benefits that extend beyond simply meeting regulatory and customer requirements. Traceability software, built on a central database technology, is capable of capturing, organising and tracking all relevant data quickly, with minimal effort and without the risk of human error. By implementing a real-time traceability solution, companies are better able to monitor and leverage key information to achieve tangible levels of performance improvement in areas such as production efficiency and streamlining, labour costs, yield management and product value optimisation.

How confident can you be that implementing a traceability software solution really does deliver quantifiable returns and how might they be calculated? That's the purpose of this document. Here we examine key areas for potential return and then, using realistic data, make our way through a worked example.

About the Author

Eamonn O'Mahony is President of SoftTrace and Director of Product Development. He has 25 years' experience in the design and development of software solutions for the Food, Dairy and Pharmaceutical industries. Eamonn's expertise lies in the areas of quality management and traceability and he is directly responsible for the on-going design and enhancement of the SoftTrace suite of software modules to meet current and emerging customer needs.

Introduction

The shopping trolley is one of the most potent weapons on the face of the earth

(David Byrne, Former EU Commissioner)

A number of factors are driving the current increase in traceability implementation in the food industry: food safety concerns, stringent regulatory requirements, high consumer expectations, retail mandates and diminishing customer loyalty. Throughout the industry there is an overriding need to minimise risk and overcome potential crises with minimal loss and damage.

All too frequent food scares mean that consumers are worried about their food and demanding safety guarantees. EU and US regulations are multiplying the pressure exponentially. Retailers are imposing increasing demands on their suppliers and direct commercial pressure on every player in the food industry to have traceability information literally at their fingertips.

Meeting today's quality, traceability and product safety challenges demands a previously unprecedented level of data integration and information management throughout all operational areas. An electronic traceability chain can provide levels of traceability that are impossible to achieve with paper systems or electronic data islands that use paper to bridge the gaps.

Large numbers of processors continue to use standalone LIMS (quality) systems that are isolated from raw materials receiving, raw materials release to production, production monitoring and packing. Many are heavily reliant on paper records and the net result is duplication, errors and islands of information. The traceability challenge increases significantly for food processors with several steps in their production processes where one processing step may impact multiple products. Manual records make traceability an overwhelming proposition – especially within a restricted time frame.

For many resource strapped food processors in these economically challenging times, meeting evolving traceability demands is seen as a daunting task and product traceability remains a contentious issue in the industry. Undoubtedly, the implementation of a traceability software system represents a significant up-front investment. Yet, a fully integrated, electronic traceability system can provide significant benefits that extend beyond simply meeting regulatory and customer requirements. Traceability software, built on a central database technology, is capable of capturing, organising and tracking all relevant data quickly, with minimal effort and without the risk of human error. By implementing a real-time traceability solution, companies are better able to monitor and leverage key information to achieve tangible levels of performance improvement in areas such as production efficiency and streamlining, labour costs, yield management and product value optimisation.

To meet the unique and highly specialised requirements of the food industry, any solution to the traceability challenge must manage critical aspects of the business, contribute to controlling product cost and improving supply chain efficiencies as well as track ingredients and finished products, maintain quality, provide full traceability in minutes, integrate with the existing IT infrastructure and, ultimately, result in cost savings.

How confident can you be that implementing a traceability software solution really does deliver quantifiable returns and how might they be calculated?

That's the purpose of this document. Here we examine key areas for potential return and then, using realistic data, make our way through a worked example. Specifically, the example used in this paper examines the economic value that can be realised by introducing the SoftTrace Quality Management and Traceability software suite into a medium sized Dairy processing plant, including internal costs of implementation and key areas for potential return such as laboratory costs, waste product disposal, production costs etc. The conclusion is that implementation costs can be recovered by significant savings in the following areas:

- Milk purchases
- Traded milk control
- Quality management
- Production control
- Effluent management
- Product value optimisation
- Direct labour overheads

The Carrot and Stick

Making a profit is a challenging task in today's economic climate, particularly in areas of the Food industry producing commodity products with a limited shelf life. Many resource strapped food processors view increasing traceability demands as an unwarranted expense being imposed on the industry by regulators and pressure from their retail customers to reduce the depth of product recalls and the time taken to perform them. Meeting the traceability challenge is seen as an overwhelming task – especially in the case of small and medium enterprises who do not immediately perceive the financial benefits of sanctioning a capital investment in software to improve traceability performance.

The decision to implement a fully integrated, electronic traceability system is basically a carrot and stick scenario:

THE STICK is the potential cost of a food scare: namely a wide scale product recall, loss of retailer and consumer confidence, loss of brand equity and legal action.

THE CARROT is the upfront savings from improved productivity, cost reductions and added value along the supply chain. Real-time reporting provides the key manufacturing information needed to minimise waste, reduce downtime, maximise yields, control inventory and improve plant performance. Key areas for potential return include laboratory costs, waste product disposal costs, production costs, labour costs and so on. Add to this the manifest benefits of regulatory compliance, meeting product quality and safety goals, preserving brand image, maintaining customer and consumer confidence.

FULL ELECTRONIC TRACEABILITY can ultimately save millions or mean the difference between survival or loss of business in the event of a crisis. Minimising the depth of a recall can save vast amounts of money, reputation and brand equity.

The compliance, traceability and competitive benefits of full electronic integration of raw material usage, physical tracking and traceability data are obvious. **The ruinous consequences of ignoring existing traceability gaps are equally obvious.**

Existing technologies, designed in direct collaboration with the Food industry, are transforming traceability from a burdensome expense to a mission critical solution capable of contributing significantly to improving the bottom line.

Traceability: the Business Benefits

Traceability software provides significant benefits that extend beyond simply meeting regulatory and customer requirements. In many of today's food processing facilities access to accurate, real-time data is a serious problem with the potential to have a detrimental effect on quality, production and inventory management.

Financial benefits can be quickly realised via real-time reporting of laboratory and factory floor data. Full data integration and real-time reporting provides the key manufacturing information needed to minimise waste, reduce downtime, maximise yields, control inventory and improve plant performance.

Superior Plant Management

Yield losses can be considerable in certain food manufacturing processes. The cost of yield losses is significantly higher than the raw material costs, or the lost revenue, given the costs of waste disposal, complaints handling etc. Paper based traceability systems cannot support an analysis of manufacturing performance to identify the source of problems such as incorrect equipment settings. By implementing a fully integrated, electronic traceability system food companies are better able to monitor every step in the supply and production chain and gain insights into process and manufacturing performance:

- Determine daily production costs and yields.
- Easily establish a daily mass balance.
- Determine the real-time process adjustments needed to achieve yield improvements.

- Monitor yield variation on an individual unit basis.
- Link yield with suppliers for preferential purchase decision making.
- Reduce ingredient losses.
- Track costs, usage, delivery and invoice data.
- Monitor and control environmental load.
- Achieve full production traceability by dispatch.
- Monitor and control waste.
- Establish optimal production levels.
- Achieve reduced recall expenses.

Reduced Overhead Costs

Through automating data collection, recording and analysis, one medium sized Dairy processor calculated it would save 2.5 people per production line or around €232,875 over 3 years. A fully integrated quality and traceability database eliminates unnecessary overhead costs by automating labour intensive tasks and facilitating increases in production without incurring the expense of additional resources. Resource deployment can potentially be optimised across the following functional areas:

- **Laboratory:** via automatic data capture from laboratory instruments.
- **Production:** via automatic production data capture and record keeping.
- **Dispatch:** via computerised picking and specification overlay.
- **Quality Assurance:** via instant access to traceability records and a significant reduction in the amount of time spent on audits by personnel across all departments.

Optimised Product Values

Process manufacturing tends to produce product of variable grades and customers order against their own specifications. An effective traceability system will identify product characteristics at the sub-lot or pallet level. The ability to match customer's specifications against the characteristics of available pallets means that higher specification product can be sold to other customers for higher values. A fully integrated quality and traceability database provides the real-time quality data necessary to reduce manufacturing costs, enhance quality performance and access a full profile of the quality and grade of all product inventories to sub-lot and pallet level:

- Match customer quality specifications with available pallet quality attributes.
- Optimise inventory allocation to sales orders for maximum returns.
- Reduce losses as a result of product downgrades.
- Reduce rework.
- Increase right first time percentages.
- Obtain real-time alerts on impending quality issues.

Improved Inventory Management

Real-time inventory data on raw materials, work-in-progress and finished goods provides the ability to accurately forecast and report production, consumption and fulfillment. This allows food companies to adjust inventories and material orders to optimal levels. Accurate materials planning and ingredient throughput improves end-product shelf-life. Rapid turnover of raw materials, ingredients and finished product reduces the likelihood of spoilage, helps companies to deliver higher quality products to customers and streamlines planning and production activities.

Improved Delivery Performance

Some food industry QA tests require several days to complete and often additional time to confirm borderline results. Companies lacking reliable traceability procedures hold finished product whilst waiting for test results. Companies confident of their traceability system can hot ship (transport product while the laboratory completes quality checks) so that the final grade is confirmed before the delivery reaches the customer's door. This can reduce delivery lead times up to a third, and also minimise warehousing capacity.

Share Price Performance

A company's ability to respond to a food safety crisis can impress equity analysts. During the first few days of a crisis, analysts rapidly decide if the company will recover and their hunch is often surprisingly accurate. The share price of companies that subsequently recover initially falls around 5% compared to an 11% fall for those that don't recover. 50 trading days later, shares in those that don't recover remain around 5% down and fall around 15% during the next year. Shares in those companies that do recover gain about 5% during the subsequent 50 trading days. This is because analysts positively re-assess the company's ability to handle difficult challenges.

Do the Math!

As well as demonstrable traceability, brand protection and improvements in product quality and delivery – an electronic, fully integrated traceability system provides instant access to internal logistical and quality related information and significantly improves production efficiency.

As implementation of a traceability software system represents a significant, up-front investment, it is important to analyse the benefits alongside the risks that can be managed by it and the business benefits it can deliver. Based on a cost/benefit analysis, food manufacturers need to seek a balance between present and future costs and implement a traceability system that best meets their company needs. Generally, being able to trace to sub-batch level will increase the system cost. Less traceability detail will reduce the cost but also increase the risks associated with a widespread product recall.

How confident can you be that implementing a traceability software solution really does deliver quantifiable returns and how might they be calculated?

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Traceability ROI Workshop

SoftTrace invites you to contact us to arrange a consultative workshop which you can use to assess your company's potential savings. After the workshop, SoftTrace will provide your company with a full report on the costs and savings that can be achieved at your facility.

Assumptions

The following calculations are derived from an actual SoftTrace installation. The core assumptions for these calculations are based on the conditions that existed prior to the implementation of SoftTrace. Net Present Value (NPV) compares current and future monetary value taking inflation and returns into account. In this example, the NPV calculation used is (AMOUNT / 1+CostofCapital).

Core Assumptions		
Review Period for Savings	Years	3
Cost of Capital used for Capex Submissions	%	10%
QA & Laboratory Staff Costs per Individual	€	
Production Operator Staff Costs per Individual p.a.	€	
Cost of Hardware Required by Client	€	
Cost of Internal Implementation Resources	€	
Current Yield Loss	%	2%
Cost of Yield Loss Per Annum	€	
Cost of Customer Complains Per Annum	€	
Waste Product Disposal per Week	Tonnes	22
Cost of Disposal per Tonne of Waste	€	20
Weekly Cost of Downgraded Product	€	
Recovered Value of Out of Spec Product	%	50%
% Customer Complaints (Product Consistency)	%	20%

Implementation Costs

The software, hardware and implementation costs for the project are outlined on this page. Also included are the costs of internal resources allocated to the project by the client. The overall costs of the project, including on-going support over a 3 year period are outlined. This has been calculated at its Net Present Value.

Initial Implementation Costs

Hardware & Network
Software
Systems Admin Module (30 Users)
Professional Services
(Project Management, Implementation, Configuration, Training)

Internal Implementation Time

Module	No. People	Per Person	Salary Cost
Mats Inwards (time resources)	1	20%	
LIMS (time resources)	1	20%	
In-Process (time resources)	1	20%	
Prod. Planning (time resources)	1	20%	
Inventory (time resources)	1	20%	
IT Support	1	20%	
			Total

Recurring Costs

	% Yearly	€
Support Contract (20% software costs)	20%	

Total Costs

	Year 1	Year 2	Year 3	Total
Hardware				
Software				
Professional Services				
Internal Labour				
Support				

Net Present Value

Some of the information has been removed from this page.

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Manning Levels

- Savings in this area were achieved via the introduction of automatic data capture
- Reduction of manning levels in the specific area was offset by redeployment of staff to other areas.
- The plant operates 5 production lines
- The manning level reductions were determined on 1 line, with a factor of 3.5 applied over the 5 lines
- The annual attrition rate in the plant is approximately 10%
- There were no subsequent job losses in the plant

Shift Premium 15%

Category	No. Staff	Staff Costs	Total	Year 1	Year 2	Year 3	Total
Laboratory	**0.5**						
Quality Assurance	**0.5**						
Dry Goods Preparation	0.5						
Production - Filling Line	0.5						
Production - Packing	0.5						
	2.5						
Overall Total							

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Summary – Single Line

Line Unspecific
(saving unrelated to line in bold text)

Line Specific
(saving is per line)

Summary – 5 Lines

Headcount Savings are per single line
– for 5 lines a factor applied 3.5 times single line

Line Unspecific
(saving related to line in bold text)

Line Specific Savings for 5 lines - projected

Net Present Value Calculation

Inventory Related Savings

Yield Management

The savings here were achieved by addressing the following factors:

- Monitoring milk purchases and reconciling milk composition
- Monitoring and reducing wastage in the production process
- Optimising production efficiencies
- Monitoring and controlling losses to the effluent plant

Actual Current Loss				2.0%
Minimum Savings: [20% of current loss]				0.4%
Annual Cost of Current Yield Loss			€	
Saving			€	

	Year 1	**Year 2**	**Year 3**	**Total**
Actual				
NPV				

Customer Complaints

- 20% of customer complaints were, according to the client, consistency related
- The savings in this area have been achieved by identifying product characteristics at sub-lot level
- Profiling product against customer specifications means that all dispatched product meets the required quality profile with a resultant reduction in returns

Projected Savings:

Annual cost of complaints		€	(client information)
Saving	20%	€	

	Year 1	**Year 2**	**Year 3**	**Total**
Actual				
NPV				

Waste Disposal - Environmental

- 22 tonnes of product were disposed of each week
- The cost per tonne for disposal was €20
- Monitoring of losses in milk intake and production led to a 50% reduction in the quantity of product disposed of and a resultant saving in disposal costs

Projected Savings:

Annual cost of waste disposal		€22,800		
Saving	50%	€11,440		
	Year 1	**Year 2**	**Year 3**	**Total**
Actual	11,440	11,440	11,440	34,320
NPV	10,400	9,455	8595	28,450

Quality Returns / Downgrades etc.

- The weekly cost of downgraded product sold at a loss was €
- Product was downgraded because it did not meet the manufacturing specification
- Profiling the product against customer specifications allowed at least 50% of previously downgraded product to be sold at full price
- These calculations deal with the current loss of value from downgraded product. There is no allowance here for the use of product profiling to optimise value by selecting product against premium specifications

Projected Savings:

Annual cost of downgrades		€		
Saving	50%	€		
	Year 1	**Year 2**	**Year 3**	**Total**
Actual				
NPV				

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Summary Calculations

This summary calculation is based on the following elements (detailed on previous pages):

	Year 1	Year 2	Year 3	Total
Manning Levels				
Inventory				
Yield Management Customer Complaints Waste Disposal Environmental Quality Returns / Rejections	10,400	9,455	8,595	28,450

Utilisation Savings
(not specifically costed – there is a significant gain in improving the plant overall utilisation, but unquantifiable currently)

Total NPV of Projected Savings

Net Cost of Project (NPV)
Including SoftTrace & internal staffing projected costs

Payback Period	**€**
Total Discounted Net Savings	
No. Years in Time Horizon	3
Average Total Discounted Savings per year	
Investment in Solution Overall*	
Payback Period (Years)	0.9
Payback Period (Months)	**10**

Return on Investment Calculation	**€**
Total Discounted Net Savings	
Investment in Solution Overall*	
Final ROI	**350%**

** Includes SoftTrace costs plus costs of implementation*

Handling Quality & Traceability Data

To achieve full end-to-end traceability it is crucial to create the physical and operational conditions necessary for enforcing validation and quality rules and maintaining the traceability data chain. It means using available technology to seamlessly integrate traceability data, make it error proof and ensure that it can be effortlessly accessed in real-time.

Food industry players can effectively meet the emerging mandate and have traceability information literally at their fingertips by

- Reassessing their handling of quality and traceability data for strategic and competitive success.
- Focusing on areas such as quality, materials, process and inventory management to achieve optimal data integration in a single, central database.
- Fully integrating quality and supply chain systems.
- Eliminating “data islands” and closing the traceability gap between process automation and business systems.
- Using readily available technology to meet legislative and consumer demands, enhance product quality, guarantee customer satisfaction and increase operational efficiency and profits.

That’s the subject of the SoftTrace White Paper “Handling Quality & Traceability Data for Strategic and Competitive Success”. Why not request a copy at www.soft-trace.com

Traceability and Quality Management Software for the Food Industry

The SoftTrace suite of Quality Management and Traceability software modules has been designed specifically to meet the unique needs of the Food industry and manage quality throughout the entire manufacturing process. SoftTrace supports best practice to insure that quality and validation rules are adhered to and that the data chain from a traceability and quality point-of-view is always maintained:

- Full integration of all quality, manufacturing and business data in a single Quality Management and Traceability system.
- Full traceability from raw material receiving to finished product dispatch and the customer.
- Enhanced rapid response, product recall, crisis management and brand protection capabilities.
- Demonstrable compliance with national and international regulations.
- Increased customer confidence and satisfaction.
- A competitive edge in a commodity market.
- A comprehensive quality platform for process optimisation, product value optimisation, waste and cost reduction.
- Increased operational efficiency and profits.
- Lot specific inventory management and increased inventory management efficiencies.
- Elimination of paper based records.

The SoftTrace modules add up to a plant-wide data collection and management system that provides full product traceability and effortless, instant access to all data – forward and backward – from any point in the traceability data chain.

- Integration between SoftTrace Raw Materials and LIMS creates an unbroken traceability chain from the farm and active ingredient sources to quality control and release into the manufacturing process.
- SoftTrace In-Process extends the traceability chain from raw material receiving and active ingredient inventory to the in-process batches, bulk finished product and finished goods inventory. It captures in-process quality control data live on the plant floor. It integrates bulk finished goods and packing line data to provide a vital link between the bulk finished goods, their packing and manufacture. It provides instant access to detailed quality information on the batches of bulk finished product and packed finished product units.
- Full integration of SoftTrace In-Process and Inventory Management secures the production traceability chain by linking the process control sheets, packing, quality and inventory records. It provides a profile of the quality and grade of all finished goods to individual pack level. Traceability to the customer is maintained to unit level within the batch – completing the traceability chain from source to customer.

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