A fresh approach to labelling

How innovation in labelling can help build confidence in freshness

A white paper

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This paper has been commissioned by Cryolog, a French company that develops original solutions for the traceability of temperature-sensitive products. Their innovative label makes it possible for consumers to check at a glance whether storage conditions have maintained the product's freshness.

How innovation in labelling can help build confidence in freshness

1: What's it about?

In July 2008, the G8 summit in Japan planned to concentrate on climate change. Instead, it led with statements from a series of world leaders about food. Around the world, events have been changing the perceptions of consumers and in the food industry; the credit crunch of 2008 will be remembered as the catalyst.

The starting point for consumers is one of complacency. Food will be there, it will be cheap and fresh. If you can't eat it all, just throw it away. Simultaneously, a global epidemic of obesity has seen more people overweight (1bn) than are malnourished (0.8bn)[1].

Consumers' used to food price deflation are now finding out about inflation. Their belief in assured food security is changing to a realisation that the world needs to find a new approach to production. A tendency to excessive waste of food in their homes is now being seen as unacceptable. There is also a growing awareness of the need for sustainability. Issues such as food miles, local production, animal welfare and nutrition are all debated in the media, in schools and around the kitchen table.

This paper is about communication by retailers to consumers about food freshness.

It considers this challenge in the context of the social change as excessiveness and waste start to be better understood. It considers market drivers such as cold chain investment, store waste and the credit crunch. The challenges of cold chain failures, consumption changes and the use of date codes are analysed. It looks at some innovations in packaging and talks about a particular group of 'smart' labels called "Time Temperature Indicators". The labels help raise consumer awareness and make their life simpler. Finally, it recommends actions and lists the benefits.

You will be reading this because you are involved in supplying fresh food. You may be working as a buyer or in quality. You may be in marketing or working in stores. You will be interested in short life fresh foods.

A product is not of high quality because it is hard to make and costs a lot of money. The quality can only be measured by what the consumer gets out of it. For a short life product, a key measure is always going to be its freshness. Consumers need confidence in freshness.

'Sell by' and 'use by' dates work well for many, but there is also room for improved and innovative solutions.

[1] "Food Matters – Towards a strategy for the 21st Century" UK Government, Cabinet Office, July 2008.

2: Market drivers

Decision making in the food business is driven by its customers. They go to the shops where they can get what they want at the right price. Their store and product choice decides who owns and runs the shops, the factories and the farms that supply them. To be successful, the retailers constantly improve their price and quality offer by improving efficiencies through innovations in their supply chains and stores.

"Think back a generation, to the days when you often had to scurry between shops in the rain, lugging your shopping. When fresh vegetables and fruit were anything but fresh, and usually bruised. When convenience food was usually frozen or came in a tin. Luxury then was a bottle of wine that didn't taste like anti-freeze - but probably cost a mint. It was a crisp apple - if you could find one. It was the ability for a mum on a tight budget to give her family a joint of roast beef on Sunday, and not worry about the cost. Good food - fresh, healthy food. Choice. Good service. These things were the preserve of those with money, those who could afford to pay extra. Thankfully, this world has disappeared."

Sir Terry Leahy, CEO Tesco Stores Ltd. February, 2008

2.1 Consumer power

A revolution in retailing has seen consumer choice dominating a change in the way food is purchased and consumed. The world's leading retailers have driven private label development in multi tier strategies and improved the shopping experience. The benefits for consumers are improved food affordability, greater choice, high standards of food safety and convenience.

As people's lives have become busier, so the importance of convenience has increased. The weekly shop is a must for many and their fresh food has to last.

2.2 Cold chain investment

There are greatly improved cold chains starting at farms and factories, continuing through distribution and into store refrigeration. At home, consumers have seen improved performance from their own fridges, mostly driven by legislation on energy conservation. Refrigeration accounts for 25% of home energy[2] use so these changes have significantly helped reduce family's bills.

These improvements have been translated into better freshness performance for fresh foods which has helped people have the confidence to shop less often.

This means a weekly shop is realistic. Improved confidence from consumers has seen the market for high value fresh chilled foods expand rapidly. There's more choice and more flexibility.

[2] Steven James, University of Bristol. Bulletin of the International Institute of Refrigeration - No 2003-5

2.3 Store waste

Any shopper knows that a trip around the supermarket aisles at the end of the day can yield bargains as unsold fresh foods are offered at discount. However, every bargain represents a loss for the store. Retailers have reduced store waste through a combination of four approaches being applied every day, in every store:

a) Stop stocking products that don't sell

b) Have realistic stock levels on a daily basis

c) Extend store life (up to 'sell by' date) though production improvements

d) Use improved merchandising, pricing or packaging to sell products quicker

2.4 The credit crunch

The UK Government has identified food waste not only as a contributor to greenhouse gas emissions, but also as a key target to help to combat the negative effects of the credit crunch on families. During 2008 they have communicated strongly on extraordinary figures from the Waste and Resources Action Programme (*WRAP, which helps individuals, businesses and local authorities to reduce waste and recycle more, making better use of resources and helping to tackle climate change*). Their report "The food we waste;" said that up to a third of food bought in the UK is thrown away.

The major supermarket retailers have welcomed the campaign and committed to work with WRAP to identify ways they can help their customers reduce the amount of food thrown away. This might be through providing more information (recipes, how to store food better etc), the types of products sold (ranges of portion sizes, resealable packaging etc), the way food is sold (e.g. "half price" rather than "two for one" on food that goes off quickly) and so on.

At Sainsburys we are passionate about reducing our own waste as a business, as well as encouraging customers to reduce food waste at home. By providing delicious recipe ideas, for example on our 'Try' tip cards and online at sainsburys.co.uk, we hope to inspire customers to use up food in imaginative and creative ways. Hints and tips on storing food can be found on-pack and online to help customers use up all their food safely and efficiently. We are also committed to providing smaller sized meals and ingredient packs for single portions and children.

We look forward to supporting WRAP in their bid to encourage people to 'Love Food, Hate Waste' and will work together to provide inspiring solutions for our customers.

Sainsburys, "Love Food, Hate Waste" WRAP website, July 2008

3 Challenges

As the market drivers provide impetus for change, there remain a number of challenges for business. In particular, cold chains don't always work the way they should. Suppliers, hauliers, stores and consumers may all inadvertently allow products to warm up affecting their true freshness potential. The way consumers prepare and eat food is changing and the use of date codes can be problematic.

3.1 Cold chain problems

Actual product life in a fruit or vegetable is determined by its rate of respiration. Effectively, once harvested, the product will 'breathe out'. Good post harvest controls are able to slow down this process. In a typical cold chain, a product can be cooled five times, transported four times and held in a different chiller six times within one week before it actually gets to the shelf[3]. The supply chain, representing a significant percentage of product life, can be unpredictable. With so many different steps there is great scope for failure with a resulting negative impact on freshness.

The most challenging part for many retailers has been their own in-store refrigeration performance. After all, the actual store environment makes effective refrigeration a challenge. The fridges have no doors to close. There are hundreds, even thousands of 'hot' people walking past the chilled shelf every day. Set temperatures too cold and you can freeze products. Too warm and you can affect the freshness offer. They are designed only to maintain temperatures, not to reduce them. Older chill cabinets can have difficulty achieving temperatures below 10°C, especially when tightly loaded or incorrectly positioned in the store.

The cold chain problems don't end in the store. Once a product is purchased it could be out of refrigeration for hours even though most consumers get the shopping straight home and into their fridge. However, if those products have warmed up, their fridge will have to work hard to cool it down; something it's not designed to do.

Consumers tend to fear food safety issues such as pesticides, additives and genetic modification. However, food safety experts consider biological hazards to be far more significant. The incidence of food borne illnesses remains high and for the most part the cause is never identified. The growth of micro-organisms in domestic fridges is certainly a cause. Younger consumers in particular lack understanding of good hygienic kitchen practice[4].

[3] Refrigeration and Food Safety, Robert Heap, IIR Bulletin 2007-6

[4] De Boer M, McCarthy M, Brennan M, Kelly AL, Ritson C. Public understanding of food risk issues and food risk messages on the island of Ireland: The views of food safety experts. *Journal of Food Safety, 2005*.

3.2 Changes in buying and eating food

People buy more than they eat. The retailers themselves drive volume with a range of promotional mechanisms. Some argue that unnecessary demand is being created, especially when there may be only one or two days difference between the 'sell by' and 'use by' date codes. One mechanism in particular, 'Buy One, Get One Free', means a consumer ends up with more product than they might have normally bought.

With more flexible lifestyles, people may take unplanned opportunities to eat out during the week. They find they didn't consume the food they had bought the week before and throw it away. They forget what they've bought. They lack the confidence or cooking knowledge to use up leftovers.

The retailers are looking at their approach to driving sales and how they can improve communication. However, they also consider the consumer should take responsibility for their own buying.

3.3 Date codes

Date codes provide communication to consumers, both for their information and for their safety. The technical life of each product will depend on recipe, ingredients, manufacturing and storage conditions. Within that life, there are both 'sell by' and 'use by' dates. The former is there to help the stores manage their stock. The latter is a legal requirement to help consumers reduce food safety risks.

The methodology for setting date codes is defined in quality management systems. Put simply, at constant temperatures, this is the expectation of freshness for a particular product. Real conditions are variable and protocols for testing shelf life do reflect that.

The consumer may not take the time to read the label and even if they do may not be quite sure what the actual date is.

In July 2008, market research (commissioned by Cryolog) was undertaken in Manchester by the local company, One Voice Research[5]. 56 shoppers were interviewed.

On the subject of date codes, two useful points came out.

- 1 in 3 either had some doubts or did not trust the use-by date
- 1 in 4 didn't know the date.

[5] (www.onevoiceresearch.co.uk).

4 Innovation in packaging

As a part of their Retail Innovation programme, WRAP published their "Survey of packaging with potential to reduce food thrown away at home" in 2007. They identify six areas of interest (of which this paper will concentrate on the development of the "Temperature - Time indicators"):

a) **In home storage solutions**

b) **In store environments that raise awareness**

c) **Temperature - Time Indicators (TTI's)**

d) **Shelf life extension without preservatives, (i.e.: gas flushing, anti microbial films)**

e) **Portion size packaging**

f) **Improvements in resealing**

4.1 Temperature - Time Indicators (TTI's)

Innovative packaging technology offers both a new approach and an opportunity to add value to differentiate a private label quality offer. The development of smart labels to indicate freshness provides a simple tool.

Broadly, the TTI's fall into two types: those where the chemical 'clock' starts ticking the moment the active constituents are laid down during label production (retailer or supplier activated) and those where the consumer either pulls a tab or breaks a miniature vial to mix the chemicals and start the process (consumer activated).

The technology for TTI's has been available for some time, but there only two types that are retailer or supplier operated and have made it to commercial reality for food products in Europe. These are the *(eO)* ® label from Cryolog and the 'OnVu' label from Freshpoint with Ciba.

There has also been the FreshCheck indicator from the TEMPTIME Corporation, now principally being developed for pharmaceuticals. Vitsab Inc and Timestrip make consumer activated versions.

WRAP, describing the Cryolog label, (eO) ®

"The key feature of this TTI is that the colour change represents a pH change due to microbial growth of food grade micro-organisms within the gel itself, so the indicator should accurately track what is happening microbiologically within a food product...

A second advantage is that the colour change, unlike other TTIs, is abrupt at the end point from green to red and does not transition with time. This means that consumers should not sort through food items having this TTI to find the one with the least colour change, i.e. the freshest, nor would they be in any way confused over whether the end point had been reached.

Cryolog have worked extensively with departments in the "Institut Pasteur" on the development of both these indicators so there is sound science behind them... Cryolog's TTI should be especially accurate for fresh meat and fish products where the principal degradation process determining shelf-life is microbial spoilage".

..."These TTIs, if they live up to their expectations of significant improved accuracy, have a good chance of being adopted by retailers keen to offer longer shelf-life on perishable products but without compromising aspects of food safety."

"Survey of packaging with potential to reduce food thrown away at home" July, 2007

5 Solutions

Leading retailers across Europe are now proactively addressing the challenge of improving their communication to consumers on food safety and waste for chilled foods. Their programmes include the following:

a) Reviewing their promotions,
b) Looking at portion sizes,
c) Developing recipes for using up leftovers,
d) **Improving their packaging**

Consumers are looking for more natural foods with less salt, sugar or preservatives. There are technical innovations that enable longer shelf life with improved outcomes for both food safety and waste. For example, oxygen scavenging through the introduction of absorber sachets and improvements in modified atmosphere gas flushing.

However, the opportunity to improve customer communication represents a key and fundamental solution for consideration by retailers. A simple and effective approach is to use TTI's to help consumers improve their understanding of freshness while the retailer reinforces their brand loyalty.

During market research in July 2008 (*see 3.3*), 56 shoppers in Manchester were shown the Cryolog *(eO)* ® label on a pack of sandwiches. 84% considered the label to be useful or essential. 88% said they would choose a pack with the label over one without.

Their comments included the following*: "Good, especially for my in-laws who cannot see the dates." "A lot easier than boring labels." "Peace of mind for Fresh Foods." "Much better idea than guessing."*

6 Opportunity

Cryolog, the makers of the *(eO)* ® label, offer partnerships with retailers to explore ways to improve customer communication on the freshness of short life products using the freshness indicator label.

In these partnerships, the key activity will be to jointly develop a relevant market approach, working with both stores and marketing teams using the following approach:

a) Identification of suitable products within their range

b) Support and advice for consumer communication on the *(eO)* ® label

c) Objective and detailed jointly funded trials

d) Consumer research to measure outcomes

7 Benefits

For the retailer:

a) Support brand loyalty through a simple, effective and innovative communication tool that discourages consumption of product that is not fresh

b) Create differentiation on a quality offer on private label products by creating a new benchmark for freshness communication

c) Increase sales by adding value to fresh products and encouraging a buying reflex

d) Support their 'due diligence' legal position by using modern technology to improve food safety

For the store:

a) A useful tool to build awareness of cold chain disciplines within teams

b) Support the relationship between the store and consumer by stepping beyond a promise of freshness towards a guarantee

For the customer:

a) Reinforce confidence in freshness

b) Support their own efforts to reduce waste through improved awareness of how they look after fresh products after purchase

c) Improved food safety outcomes through the identification of spoiled products

RETAILER QUESTIONS AND ANSWERS FOR THE *(eO)* ® LABEL

Q1	**There seems to be a basic contradiction between the *(eO)* ® label and the sell by date. What do customers think of it?**
A	The 'Use By Date' remains the legal consumption limit of products. The responsibility of a food retailer towards consumers is no different if the (eO) label is used. The label is calibrated to still be "green" at the end of the 'Use By Date', not before. The calibration is made in response to the target temperature for the particular product. The advice to the customer is always to follow the use by date. Customers find it a simple way to tell freshness at a glance. Leclerc, one of the largest retailers in France, operates nearly 600 stores. Recently, they put the label on their private label sandwich range in 38 stores. During the three month trial they saw a sales uplift of 9.6% against the national brand. Trials have shown that consumers like the label. In June 2008, French retailer, Auchan, asked 473 customers for their views following a three month trial on counters in two stores. Offered a list of 6 descriptions, they could tick as many as they liked. Apart from the expected strong support for 'useful', reassuring', 'innovative' and 'amazing', there were some negative responses as well. 7% said they weren't interested. However, none at all said they found the label 'complicated'. *Note: (eO) ® assures storage conditions in terms of time and temperature, but cannot guarantee the quality of the product at the start point, which remains the responsibility of the retailer.*
Q2	**What are the key features of the *(eO)* ® label?**
A	a) The label is very accurate because the reaction is microbiological. It can be calibrated to a particular period, even just a few hours. b) Only the impacts of cold chain breaks combined with time are taken into consideration. The label doesn't change of colour to the slightest increase in temperature, it is in relation to how long and how warm it gets. c) When the colour change does happen, it takes place over 10% of the labels' target life. For example, a 5 day label at 5 degrees would change from green to red in 12 hours. d) It can be applied using standard labelling machines
Q3	**How does the label actually work?**
A	The label contains a microbiological gel that reproduces the effects of time passing and temperature on the freshness of the product. The gel turns from green to red when the product is no longer fresh.
Q4	**Should a product be consumed when the label is red?**
A	The label tells you if the product is fresh. If it turns red, the advice is not to consume the product.

Q5	**How do you calibrate a particular *(eO)*® label?**
A	First of all, the type of product is assessed: Meat, poultry, delicatessen, fish, prepared meals, sandwiches, dairy, pre-packed fruits and vegetables. Then, the target storage conditions for temperature and humidity. Also, the type and degradation rates of the following characteristics are assessed: **Sensory**: flavour, colour, smell, taste **Nutritional**: vitamins, antioxidant, omega, etc. **Sanitary**: Listeria monocytogenes, Bacillus cereus, etc. Calibrations can range from a few hours to 15 days at temperatures from 4°C to 8°C.
Q6	**How are *(eO)*® labels stored?**
A	Cryolog delivers frozen labels to stop the reaction. They must then be stored at -20°C and can be used indefinitely.
Q7	**How are the labels stuck on the product?**
A	Delivered by rolls of 250 to 2000 labels, they can be stuck manually (with a labeling gun), semi-automatically or automatically. No special equipment is required.
Q8	**What other retailers have used the *(eO)*® label and on what products?**
A	Leclerc (France) – Sandwiches and Poultry portions Monoprix (France) – Chicken portions Edeka (Germany) – Minced beef Auchan (France) – Deli Counter
Q9	**Using the *(eO)*® label for products packed from a meat or fish counter seems a useful option. Does in store application offer any particular problems?**
A	Cryolog offer full store support during trials. A range of training aids have been developed to support staff. In addition, there is a full range of in store communication that has been prepared. However, sales uplift from a counter in response to the introduction of the label is difficult to measure. During work with other retailers, it has been found that stores can give the concept a lot of support. Customer reaction has been very positive (Q1). However, when the label is used on pre-packaged products, there is a definite 'wow' effect which is missing from counter sales.
Q10	**There are so many different short life chilled products. It seems there is a potential confusion for consumers if they saw the *(eO)*® label on one part of a range but not on others. For example, on minced beef but not minced pork or lamb. How can this be avoided?**
	A trial needs to start somewhere. The label has not been in commercial use long enough to answer this question definitively. For the present, it is a matter of finding out how it best adds value within a particular range.

Q11	**There are already a great number of different pieces of information on packs. How is it possible to justify adding more?**
A	The proliferation of labels has been a feature of recent years. Different logos and claims can be vague, meaningless or unverified and the resulting confusion from consumers is a well documented side effect. In 2004, Consumers International, a global federation of consumers groups, looked at this issue and recommended that all pack labels should be clear, relevant and substantiated. In the case of TTI's, the best way to find out whether that challenge can be met is to undertake a properly managed trial and ask consumers what they think.
Q12	**How do Cryolog assure the performance and safety of the *(eO)*® label?**
A	The label was initially developed with the support of the "Institut Pasteur" in Paris. Quality Assurance is now managed by the fully accredited laboratory at 'Adria Normandie'. (www.adria-normandie.com)
Q13	**What are the other options for Time Temperature Indicators?**
A	The label closest to the *(eO)*® and currently seen on consumer products in Europe is the "OnVu" label made by Freshpoint in partnership with Ciba Speciality Chemicals (www.onvu.com). As the label is applied, an ultraviolet light source activates the label. Over time and in relation to temperature, a pigment in the ink changes colour to inform the consumer about freshness.
Q14	**What happens if a consumer brings a product back to store for a refund because the label has changed to red before the 'use by' date? It is well known that domestic fridges are often not cold enough.**
A	So far, retailers have not found this to be a problem. However, if it did happen, customer service staff could give the consumer a fact sheet on the cold chain from store to plate. Whether a refund is also given would be up to the individual store's policy.