Innovations to combat cross-contamination risks in dairy processing

The impact of food and drink allergies in the UK is rising, and the risks associated with factory-level ingredient cross-contamination and cross contact are real. Yet, smart design in metal detection is helping dairy businesses to minimise hygiene challenges at this critical point in the line, both for allergens and foodborne pathogens.

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It is too easy to dismiss today's heightened awareness of food allergies and intolerances as being driven more by fashion than fact. This is especially true given the trend in recent years for celebrities and their fans to avoid lactose, for example, as a lifestyle and 'healthy eating' choice rather than because of any evidence of intolerance or allergy.

Fashion has played a more substantial role, however, when it comes to our more exotic eating habits in recent years, especially among the middle classes. Figures suggest that more consumers are now exposing themselves to risk from a greater number of allergens in foreign foods which, only a few years ago, might never have made it on to their plate.

Challenges are on the rise

Data confirms that the challenges around allergy in the UK are real and on the rise. The most recent estimate from Allergy UK puts the proportion of the UK adult population suffering from at least one allergic disorder at 44%.

That this is a growing problem is borne out by the equivalent estimate for the child population, which stands at 50%. Milk proteins and lactose – a type of sugar found in milk and dairy products – are among the most common food allergens, with a reported two in 100 children under the age of four allergic to milk.

Compared with these figures, the 1-2% of adults and 5-8% of children believed by the organisation to have a food allergy might sound relatively low. Yet these conditions can be among the most serious. The latest statistics from the Anaphylaxis Campaign, for people at risk of severe allergies, show that between 2011 and 2016, the number of UK hospital admissions with anaphylactic shock as the primary diagnosis rose by just under 20%. Over the same period, the number of admissions triggered by allergies of all kinds increased by 36%.

Is your system sanitary?

For the food and drink supply chain, reducing the risk of consumer exposure to allergens starts with the greatest care being taken in the sourcing of all ingredients, auditing suppliers, and so on.

However, the benefits of carefully managing allergen content can be nullified at the factory stage by cross-contamination.

The risks here are especially acute given that only tiny amounts of an allergen can trigger a serious reaction in a sufferer. For this reason, larger manufacturers will, where possible, segregate production areas handling known allergens such as nuts.

For smaller manufacturers, this option may not be available. In this case, the emphasis must fall on hygiene and good process practices. In fact, where potential allergens are present, or could be present, in some sets of ingredients but not in others, cleaning must go well beyond normal hygienic requirements. Even where heat processing is involved, allergens can still survive high temperatures.

Equipment cleaning protocols should be formalised and included in staff training. Every cleaning process needs to be verified and documented. As part of a validation process, regular tests, including swabs of Critical Control Points, should be scheduled to ensure these areas are allergen-free.

Product residues, potentially including allergens, can be especially troublesome in gravity metal detection systems for powders and particulates. This might be the case, for example, in a dairy using different types of dried or frozen ingredients with a role in flavouring, thickening or fortification.

The Gravity Ultra+ metal detector now features a retractable reject unit for easier deep cleaning.

But liquids, semi-liquids and slurries in pipeline systems can pose problems of their own. Take the example of hazelnuts, used as a popular flavour in yogurts.

Manufacturers may not be able to justify running a dedicated process and filling line, including contaminant detection, for this one variant. Consequently, it will be essential to ensure that no small fragments of nut are left to potentially contaminate nut-free flavours.

Overall, a significant number of dairies are using a wider range of non-dairy ingredients. These can take the form of fruit pieces or compotes, texturising and colouring agents, vitamin and mineral fortification or 'sprinkles' for yogurts. As a result, dairy manufacturers are having to be more circumspect about contaminant detection.

At the same time, there may be good reasons for including in-process metal detection, rather than relying on conveyor-based systems for finished, packaged product. Where ingredients have been assessed as higher-risk, it makes sense to screen them at an upstream point in the process. The costs associated with ejecting contaminated product at the far end of the processing and packing operation are likely to be appreciably higher.

Identifying weaker hygiene links

Efficient product changeovers are critical to productivity. For factory managers facing regular changeovers of this sort, it is essential for processing, filling and packing lines to be designed to facilitate both quick and deep cleaning.

When it comes to specifying in-process metal detection, this means that contact surfaces on conveyor, pipeline and gravity systems should

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be as smooth and crevice-free as possible. This is partly to ensure that no traces of product, allergens or bacteria are left, but also to reduce the risk of cleaning agents not being fully rinsed away.

High-pressure cleaning may well be deployed for fast, effective washdown, and the casing of the metal detector should be sufficiently robust to withstand this. When selecting a system, care should be taken to identify equipment with an ingress protection (IP) rating appropriate to the washdown regime being applied.

In addition to these general criteria for the whole system, special attention should be paid to the reject unit. Ideally, this will be detachable (easily detached, but quickly and securely reattached, too) to allow thorough cleaning.

Hygiene of personnel

Of course, there are many other potential sources of cross-contamination in a food and drink factory. Good Manufacturing Practice (GMP) provides plenty of guidance on the hygiene and behaviour of personnel, and will be second nature to most dairy processors and factories.

Care in sourcing ingredients could be nullified at the dairy processing stage by cross-contamination.

But the potential role of operators in spreading allergens by moving ingredients around the floor in unsealed containers, running allergenic products at the start of the shift rather than the end, not changing or cleaning protective equipment, for example, needs to be driven home where the risks are especially high.

Unlike labelling anomalies, which will probably show up as soon as product reaches the retailer, unnotified allergen content or harmful pathogens (just like undetected metal contamination) will usually only surface once items are on-shelf and in the hands of the consumer.

At that point, product recall costs are much higher but can, in any case, be dwarfed by the massive but less immediately tangible costs of damage to the manufacturer's brand reputation.

Purchasing the best metal detection equipment for the job may constitute only one portion of a much bigger picture for a complex dairy business with multiple product lines. Yet, it provides evidence that your company is taking the threat of contamination from allergens and pathogens seriously, and will make a real and valuable contribution to reducing those risks.

Addressing allergen and pathogen hazards

Fortress Technology have two new metal detection innovations – a gravity unit for bulk and dried ingredients and pipeline system for liquid lines. Both directly address the requirement for thorough, verifiable and efficient cleaning in factories to combat the risk of contamination by allergens and foodborne pathogens.

Like other freefall gravity metal detection systems for powdered and granular foods, the Gravity Ultra+ incorporates a flap-type reject mechanism. Until recently, integrating a deep-clean capability for this particular feature has been especially problematic.

In the case of the Gravity Ultra+, the reject unit is retractable and can be placed on a carriage for fast removal and effective cleaning away from the line.

Meanwhile, the interior of the metal detector aperture is engineered to offer as few opportunities as possible for dry product to accumulate and bacteria to develop. At the same time, it is built to withstand high-pressure washdown.

The Pipeline Ultra+ takes a similar approach to hygiene for liquids and pumpable products, featuring smoother surfaces than previous systems. Fast and efficient washdown is further facilitated by the inclusion of a control panel set flush against the machine plate and a pipe-and-connector cabinet with a smoother profile.

Compared with previous models, the IP69K-rated Pipeline Ultra+ has cut the external surface area of the metal detector by around 60%.

Both Ultra+ configurations are available across the Fortress Stealth, Phantom and Interceptor ranges. The aim in both cases is to provide open and smooth surfaces, which not only permit better and more consistent hygiene levels but also help to reduce downtime. ■