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Linear design alongside a multi-level access corridor permitting goods traffic on the ground level, staff and visitors on the first floor and utilities on the top floor, aids both plant management and any subsequent plant extension. This principle was incorporated into a 28,000 tonne per annum cheese plant in Chile and has made the 50 per cent extension of the Arla Taulov plant in Denmark easier, without unduly interfering with existing production, Pederson says.

The sex of blue cheese

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DNA characterisation of strains allowed

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a phylogenic tree to be produced, demonstrating the three different groupings of strains from UK and Danish cheeses, Gorgonzola and Roquefort, possibly originating from core cultures.

This was followed in 2014 by the discovery of the right conditions for sexual reproduction, introducing the ability to create new strains naturally. These strains were spiked into model cheese systems and screened for flavour and potential mycotoxin production. From over 150 strains, 60 were taken further for small-scale production and checked again for mycotoxin production then for sensory properties by panels of at least 20 tasters.

Some of the strains exhibited characteristic flavour profiles of the original groups but other novel strains had mild and unique flavours. At a recent tasting session held at the University of Nottingham's farmer's market, six of the 13 samples tasted better than cheeses using current Stilton production cultures. Milder samples were liked by younger and by more female tasters than the normal Stilton consumer profile.

An artisanal cheese manufacturer sought help in using a local strain of *P. roqueforti*. Local strains were found and characterised and produced good cheese. This opened the door to isolating strains specific to different milks and products and has led to the formation of Myconeos Ltd to deliver novel cultures. Initially four strains have been offered.

In the ensuring discussion, the evolution of different strains and the question of the interaction of the starter flora with moulds was suggested, to increase the possibility of developing characteristic starter combinations for PDO cheeses.

Sheffield Cheesemasters

Following the annual dinner, cheese maker Sophie Williamson described her journey in setting up a new company in urban Sheffield, UK. It began with the gift of a one-day cheese making course one Christmas. Having done the course, she then completed microbiology, professional cheese making and artisan food business start-up courses.

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Commercial production of 'Little Mester' surface mould ripened cheese commenced in October 2017. The cheese was named after the highly skilled self-employed craftsmen who played a key part in the Sheffield cutlery industry in the late 18th century. The cheese

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making uses a microbial coagulant and is matured over three weeks to give a soft creamy centre. With the small scale of production, additional income was provided by cheese wedding cakes, selling in a monthly artisans' market and running cheese and wine events in her dairy. DII

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Keeping a dairy clean

The clarity of cleaning objectives and cheese manufacturing were key topics for the SDT's Summer Symposium in the UK. Andrew Wilbey reports

The Society of Dairy Technology held its cheese meeting and annual dinner at Nantwich on the eve of the International Cheese Show in the UK. Soeren Vonsild, the SDT president, welcomed the participants and commented that while the quantities of imports and exports appeared to be similar, the value of imports was higher, thus resulting in a trade deficit. The UK has the best conditions in the EU for milk production and quality but this has not been adequately exploited, probably due to a lack of trained personnel for the industry. The supply of trained dairy technologists in the UK is only a fraction of that in other European countries and the graduates from the Eden programme is at best 25 per year, against 100 per year in a much smaller country like Denmark, he noted.

Successful cleaning of cheese production areas

Professor John Holah of Holchem presented the first afternoon paper on cleaning, where the objective is to provide a safe and clean working environment. This also implies extending the life of equipment, maintaining plant operating parameters and ensuring organoleptic quality by removing soils, removing residues that might lead to foreign body or pest contamination, removing and/or killing microorganisms plus the removal of allergens and DNA residues.

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The degree of cleaning may vary with the requirement. For instance, if the standard is to avoid loss of sensory quality then the cleaning would not need to be as rigorous than for removal of the 14 allergens defined in EC 1169/2011. If moving from one product to another, then one per cent carryover is accepted as a tolerable threshold but there is more pressure if religious or allergen-free requirements are to be met.

DNA testing is the most sensitive method with a detection limit of 10-12g, but this can create problems. For instance, in a plant producing chicken sausage on a Tuesday morning and then beef sausage on the Thursday afternoon, chicken DNA residues were detected in the beef sausage, despite the plant cleaning. This implies a need for a 14-log reduction to remove detectable traces, compared to a typical 3-log reduction in cleaning plus a 2-log reduction in subsequent disinfection. As with microbial contamination, the more soil on the plant surface at the beginning of the clean, then the greater the residue after the cleaning and disinfection process.

A residue of one per cent should be identifiable visually in open plant (eg, 10kg from a one tonne batch) but much smaller quantities cause allergen and microbial problems. Most microbes are about 1μm in size, less than a typical surface finish Ra value. Gaskets are essential to avoid crevices and make hygienic joints.

Holah says engineers typically have a less well-developed food safety culture and this needs to be changed. Version eight of the BRC standard introduced the concept of a food safety culture, looking for engagement at all levels of an organisation, while the EHEDG guideline 45 provides guidance on the validation of cleaning methods.

Cleaning methods can be difficult to validate and sampling from at least three cleans should be used. Cleaning needs to assume the worst possible scenario and parameters should be revalidated for each change of product or if there is a marked seasonal change in raw materials.

Any allergen-free product must be processed immediately after cleaning and the first product tested for allergens, typically using an ELISA technique. If there is any chance of mishap then products should be labelled "may contain...".

The presentation concluded with an update on the listeria outbreak in South Africa, where of 1,056 reported cases, there have been 214 deaths with the majority in the 15-49 age group and associated with HIV-positive persons. Some incidences have been associated with a meat product made by a company owned by Tiger Brands. This company has now been shut down, advice was given to avoid processed meat and HACCP belatedly was made mandatory for meat han- ▶

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