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PROGRAMME

P&J LIVE



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Results: Reductions of *S. Typhimurium* were similar ($P > 0.05$) to *E. faecium* (1.83-3.53 vs 1.72-3.65 \log_{10} MPN/g) with the greatest ($P < 0.05$) reductions at 0.25% of the mixer. No differences ($P > 0.05$) were seen in reductions of *S. Typhimurium* or *E. faecium* regardless of wash strategy. Application of 0.25% of the mixer in WAW or WWA wash strategy resulted in the lowest ($P < 0.05$) cell counts than the lower concentration treatments for *S. Typhimurium* (0.16-0.69 \log_{10} MPN/g) and *E. faecium* (-0.41 \log_{10} MPN/g). There were no differences ($P > 0.05$) in survival between *S. Typhimurium* and *E. faecium* after treatment with the triple-wash strategies.

Significance: Results suggest that *E. faecium* could be an acceptable surrogate for *S. Typhimurium* when validating antimicrobial washing systems on tomatoes.

T2-06 Whole Genome Sequencing of Historical Scottish *Salmonella*

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Introduction: *Salmonella* is an established foodborne pathogen. Of over 2500 described serotypes, fewer than 100 are associated with human disease, with *Salmonella* Enteritidis and Typhimurium being most commonly isolated. This project used whole genome sequencing (WGS) to genotypically characterise *Salmonella* isolates from human, food, and animal sources and identify possible relationships.

Purpose: The objective was to characterise >500 *Salmonella* strains isolated between 1988 and 2017 from Scottish human clinical cases, isolates from domestic food animals, plus food and environmental sources.

Methods: DNA sequences from Illumina paired-end sequencing were analysed to derive serotype, markers of pathogenicity and antimicrobial resistance (AMR) genes, and to determine relatedness by core genome MLST and SNP typing (certain serotypes only). Results were compared with those from routine sequencing of Scottish isolates carried out since 2017, and international isolates in the Enterobase dataset (<https://enterobase.warwick.ac.uk>) to allow direct comparison of historic isolates with those identified through current routine sequencing-based surveillance.

Results: The collection of sequenced isolates comprised 60 different serotypes, belonging to 85 different MLST (7 locus) sequence types. At a cgMLST cut-off of 10 allelic differences, 57 clusters of two or more isolates were identified (total 302, range 2 to 57). Changes in cgMLST and SNP profiles were observed over time, but it is possible to demonstrate the persistence of particular clones of *Salmonella* in animals, food and humans throughout the entire study period from the 1994 to the present day.

Significance: This study has demonstrated the persistence of specific *Salmonella* clones in Scotland for up to 27 years. The obtained results improve our understanding of and ability to investigate the sources of foodborne salmonellosis in Scotland, and provide important baseline data to assist the implementation of a "One Health" approach to reduce the burden of disease.

T3-01 Results of a Retrospective Study on the Application of Restrictive Attention Limits and Corrective Measures Applied for Aflatoxin M1 Contamination in Commercial Milk Supply Chains

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Introduction: European Regulation 1831/2006 sets the limit for AFM1 in raw milk to 50 ng kg⁻¹. Nonetheless, the Italian Ministry of Health applied an attention limit (AL) of 40 ng kg⁻¹ since 2013 and single dairy plants voluntarily set the AL to 30 ng kg⁻¹ since 2017.

Purpose: To perform a retrospective study for assessing the effectiveness of the application of a more restrictive AL and consequent management actions on the AFM1 concentration in milk on time.

Methods: We analysed the data obtained from the self-control plan of six commercial dairy plants (67,944 samples) for AFM1 contamination of milk during the years 2004–2008 and 2013–2019. Descriptive statistical parameters were calculated for all the years, as well as the percentages of samples above the EU compliance limit and the

two AL levels. Moreover, a comparison between the AFM1 values of plants with different ALs was performed. After the test for normality and equality of variance, the data were analysed using the Chi-squared test, Mann-Whitney U test, Kruskal-Wallis test and Dunn's multiple comparison test considering significant a $P \leq 0.01$.

Results: An overall decreasing trend during the years were recorded for samples overcoming the EU compliance limit, and the ALs of 40 and 30 ng kg⁻¹. Furthermore, a statistically significant ($P \leq 0.01$) reduction in the proportion of samples above the AL was observed in plants with a 30 ng kg⁻¹ compared to plants with 40 ng kg⁻¹ AL as well as an overall reduction of AFM1 levels for the 2013–2019 period.

Significance: The data demonstrate how the application of restrictive AL and implementation of management actions can significantly decrease AFM1 presence in milk, and consequently human health risks.

T3-02 Plasma Treatment Application for Improving Liquid Retention in Plastic Food Packaging

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Introduction: Exudate released from fresh meat products remains a challenge in meat packaging and presentation. Meat exudate accumulated in plastic packaging trays is unsightly and facilitates the proliferation of pathogenic and spoilage microorganisms, compromising the safety and quality of packaged fresh meat. Absorbent meat pads are primarily used to soak away the excessive meat exudate. Soaked pads are non-recyclable components and restrict recycling of the plastic trays themselves. An innovative and fully recyclable plastic package was developed to act not only as primary packaging but also to scavenge the meat exudate, improving the meat shelf life. This packaging solution improved liquid retention through localized plasma treatment of liquid-holding recesses integrated into the plastic tray.

Purpose: Innovation – developing sustainable packaging solution for the management of exudate in plastic meat trays.

Methods: Design and thermoforming of a PET substrate with capillary recesses, oxygen plasma treatment of the recesses, surface characterization (wettability) of PET surface, liquid retention test of recess samples, evaluation of the longevity of plasma treatment effects.

Results: Localised oxygen plasma treatment improved surface wettability of recesses and led to higher liquid retention by ~2.24 times. The new packaging solution provides a comparable capacity of liquid retention to the conventional absorbent pads while ensuring trays are fully recyclable.

Significance: The developed technology provides a novel, fully recyclable meat tray. This design manages exudate in meat packaging, helping limit the growth of microorganisms on meat surface, thus improving the safety and quality of fresh meat. It also reduces the environmental footprint of plastic packaging, avoiding the difficult-to-recycle plastic waste.

T3-03 Sustainable Solutions for Smart and Active Packaging for Shelf-Life Extension and Spoilage Monitoring of Processed Meats

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Introduction: Polymer molecules extraction from agro-industrial wastes for production of food packaging materials is an effective valorization approach aligning with circular economy concept and contributes positively to accumulation problems of synthetic packaging. However, there is scarce information on exploring "underutilized" natural and sustainable resources for their implementation in innovative food packaging materials production.

Purpose: For the first time, a sustainable, active/smart edible packaging film was fabricated only from unutilized, inexpensive discarded crop residues, and reliably used for preservation and spoilage monitoring purposes of processed meat under refrigerated storage.

Methods: Cellulose and carboxymethyl cellulose (CMC) production from cotton linter, rice husk, and melon rind (MR) was first optimized. MR-CMC (selected as the best matrix for active/smart film fabrication) was loaded with onion scale extract (OSE) as an antimicrobial ingredient and a visual indicator of quality. The well-characterized, glycerol-plasticized film was applied on chill-stored pastrami for ten days, where coated/uncoated samples were evaluated for their aerobic mesophilic population counts (AMC), weight loss, pH, and total volatile basic nitrogen (TVBN).