

severity of disease caused by these strains may be no less than that caused by recognized “enterohaemorrhagic” STEC serogroups such as O157 and O111. More widespread use of PCR- or enzyme-linked immunosorbent assay-based screening tests for the presence of STEC of any serogroup in animal samples will undoubtedly result in increased detection of similar non-O157 outbreaks in the future. This will provide more accurate data on the epidemiology of human STEC disease.

## O174

### Effect of lactic acid bacteria on the quality of beef hamburger under different storage conditions

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Meat products and meat preparations are very sensitive to external factors such as temperature and are good substrates for microbial growth and biochemical processes that occur during storage. The aim of this work was to study the effect of a selected lactic acid bacteria formulation (LAB) on the microbiological characteristics and colour of beef hamburgers stored at different temperatures. Two batches of hamburgers (average weight of about 100g) were prepared: one with the addition of LAB (*Lactococcus lactis* ssp. *lactis*, strain 340; *L. lactis* ssp. *lactis*, strain 16; *Lactobacillus casei* ssp. *casei*, strain 208 and *Enterococcus faecium* strain 614 in a ratio lactococci:lactobacilli:enterococci of 2:1:1; level of inoculum 10<sup>7</sup> cfu g<sup>-1</sup>) and one without (NO LAB), in three replicates done in three different days. For each batch, a subset of samples was stored under proper conditions (4°C) and the other at 40°C (temperature abuse conditions, to mimic inadequate storage conditions after purchase by consumer) both for 5 hours. After 5 hours, each subset was further divided into two subgroups: one maintained at 4°C and the other at 10°C. All hamburgers were evaluated on day-0, day-1, day-3, and day-5 for the following microbiological parameters (*Staphylococcus* spp., enterococci, *Lactococcus* spp., *Lactobacillus* spp., total mesophilic aerobes, *Pseudomonas* spp., total coliforms) according to standard methods; moreover colorimetric measurements were performed with Colorimeter - Digital Color Picker for iOS 10, under a 6500K light, with the CIELAB system, by taking three readings for each sample. The arithmetic means within each sampling was computed, subsequently all data (geometric mean for microbiological

data) were elaborated with GraphPad InStat, 3.0b and GraphPad Prism 6.0d for Mac OS X. Two way analysis of variance (ANOVA) followed by the Tukey's multiple comparisons test was performed. On day-5, all batches with LAB kept at abuse temperature and stored at 4°C had a higher blue-yellow, green-red and lightness coordinates compared to the batches made without LAB maintained at the same conditions. On day-5 *Pseudomonas* spp. (PS103) counts were significant lower ( $p < .05$ ) in all batches made with LAB; *Staphylococcus* spp. (BP) counts were significant lower ( $p < .05$ ) in batches made with LAB in abuse conditions.

In conclusion, the application of the proposed LAB formulation maintains hamburgers quality standards and can be a potential tool to increase their shelf-life.

## O175

### Former food products safety: stereomicroscopy and computer vision for evaluation of packaging remnants contamination

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Valorisation of former foodstuffs products (FFP) as feed ingredients is part of a long-term strategy for sustainability. Processing methods to convert FFP in to feed ingredients do not usually include packaging materials pre-removal. Feed processors routinely remove the packaging from surplus food mechanically. Although, the treatment in the plant removes most of the packaging, small amounts of wrapping materials can remain in the resulting feed. In this respect, the aim of this study was to investigate the safety features of selected FFP intended for animal nutrition produced from different confectionery products. In six FFP samples, both mash and pelleted, the presence of undesired ingredients which can be identified as remnants of packaging materials has been evaluated by two different methods. The first analysis has been done by stereomicroscopy, according to published methods, based on separation of every particle that is not native to the matrix by bare eye examination. In the second one, stereomicroscopy coupled with a computer vision system (IRIS Visual Analyzer VA400), has been tested in order to evaluate the presence/absence of packaging remnants in feed materials. Results obtained have been presented as percentage of

packaging material in feed, expressed as w/w in the case of the stereomicroscopic method and as a colour spectrum representing the proportion of each colour on the FFP surface, within a fixed scale of 4096 colours, in the case of computer vision system (CVS). The visual pattern recorded for each sample with CVS was processed using Statistical Quality Control (SQC) model. The stereomicroscopy approach revealed that the contamination level was below to 0.08% (w/w), within the tolerance level established by BMELV. Of note, the packaging remnants were observed mainly from the 1-millimeter sieve mesh fractions. Computer vision system, through the SQC model, revealed the possibility to rapidly detect the presence of packaging remnants in FFPs when combined with stereo-microscope. Concluding, even though the validated method (RIKILT) remain the most assured for detection and quantification of packaging materials in FFPs, it results laborious and ineffective regarding the smallest packaging remnants. In comparison, the use of CVS coupled with stereomicroscopy has shown a big potential in a rapid qualitative analysis also in low contaminated ex-food and could be considered effective in defining further analysis or investigations in FFP.

## O176

### Camelina cake in laying hens diet to enrich eggs with omega-3 fatty acids

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The aim of the trial was to evaluate the inclusion of 7.5% of camelina cake in the diet of laying hens on performance, egg quality characteristics, fatty acids composition and lipid oxidative stability. Thirty-two 26-weeks old Hy-Line Brown laying hens coming from the same flock were divided in two homogenous groups and allocated in enriched cages (8 replicates per treatment) at the Experimental Station (Centro Zootecnico Didattico Sperimentale) of the University of Milan in Lodi. After an adaptation week, the trial lasted 8 weeks. Diets were formulated to meet requirements suggested for the genetic line and were isoproteic and isoenergetic. Performance were recorded weekly and two eggs per replicate were sampled on day 0, 28 and 56 of the trial. On the same samples, two yolks per replicate were pooled for fatty acid composition. Samples of two eggs per replicate were also collected at the end of the trial to evaluate egg quality characteristics and oxidative stability during egg shelf life (day 9, 21 and 28 from laying); for this aim, pooled yolk were analyzed

for TBARS content. Data were analyzed by MIXED procedure by SAS. No differences were observed for hens' body weights and eggs production during the trial, whereas feed intake and feed efficiency, expressed as feed intake over egg weight yield, were lower at week 6 and overall the experiment, respectively. No differences were detected for egg quality characteristics between treatments. Dietary camelina reduced by 3.5% saturated fatty acids and increased by 49%  $\alpha$ -linolenic acid in egg yolk. No differences between treatments were evidenced for quality of eggs and TBARS yolk content during eggs shelf life. Inclusion of 7.5% of camelina cake in laying hens' diets could reduce production costs and increase nutritional properties of eggs.

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## O177

### Dietary administration of olive mill wastewater extract to improve broiler performance and oxidative status in chicken meat

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Olive oil extraction generates high amounts of by-products considered as potential pollutants. By-products are treated as industrial wastes or combustible material, heavy-metal absorbers and biofuel feedstock. One important alternative, considering the relatively high content in polyphenols, is the use of by-products from the olive oil industry as sources of nutrients for animals.

An olive mill wastewater polyphenols extract (OPE), obtained from aqueous waste through the use of a filtration system with progressive permeability membranes, was used as a supplement in a grower diet fed to broilers from 22 to 49 days of