

## Meat Safety News Digest

A collection of recent news relevant to the safety of red meat prepared by the Food Safety Program of Meat & Livestock Australia, for SAFEMEAT Stakeholders

### CONTROLS

#### “Biopreservation” of vacuum packaged meats

A recent study has identified bacterial strains with the potential to extend the storage life of fresh, minimally processed vacuum packaged beef and lamb. The strains belong to the bacteria *Lactobacillus sakei*, and extend the storage life of vacuum packaged meat by out-competing other bacteria present on the product. Two species of bacteria were tested in the study; five strains of *L. sakei* and a single strain of the bacterium *Lactococcus lactis*. All of the *Lactobacillus sakei* strains were able to become the dominant population under the test conditions against *Listeria monocytogenes*, *Campylobacter jejuni* and *Clostridium estertheticum* challenge. *Lactococcus lactis* grew poorly and was unsuccessful at inhibiting *Broncothrix thermosphacta* under the challenge conditions. The study demonstrates that *L. sakei* may be of use as a biopreservative in vacuum packaged fresh meat products.

[http://www.sciencedirect.com/science?\\_ob=ArticleURL&\\_udi=B6WFP-4WH8C6P-2&\\_user=1526876&\\_rdoc=1&\\_fmt=&\\_orig=search&\\_sort=d&\\_docanchor=&view=c&\\_acct=C000052220&\\_version=1&\\_urlVersion=0&\\_userid=1526876&md5=a48b9ebd3b62fa403bf3be2bcf2e899b](http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6WFP-4WH8C6P-2&_user=1526876&_rdoc=1&_fmt=&_orig=search&_sort=d&_docanchor=&view=c&_acct=C000052220&_version=1&_urlVersion=0&_userid=1526876&md5=a48b9ebd3b62fa403bf3be2bcf2e899b)

#### Organic acids coupled with beef tenderisers may aid thermal inactivation of *E. coli* O157:H7

In a recent U.S.A. based study, the effect of adding tenderising salts and organic acids to minced beef on thermal inactivation of *E. coli* O157:H7 was assessed. Minced beef was combined with solutions of water, a variety of salts and organic acids, and mixtures of each. Samples of these, along with minced beef without additives, had a defined quantity of *E. coli* O157:H7 (5 strains) added and were stored at refrigeration temperature overnight. The minced meat samples were then cooked to rare and medium-rare, after which numbers of *E. coli* O157:H7 in each product were assessed. The study found that the number of *E. coli* O157:H7 recovered from tenderiser/acid-treated samples were lower overall, and no difference in numbers was detected in the “salt only” treated samples. The work indicates that while meat tenderisers have no effect on the thermal inactivation of *E. coli* O157:H7, the addition of organic acids may decrease thermal survival of this pathogen under common processing conditions.

[http://www.sciencedirect.com/science?\\_ob=ArticleURL&\\_udi=B6T7K-4W7YXN1-5&\\_user=10&\\_coverDate=07%2F31%2F2009&\\_rdoc=10&\\_fmt=high&\\_orig=browse&\\_src=h=doc-info\(%23toc%235061%232009%23998669998%231250049%23FLA%23display%23Volume\)&\\_cdi=5061&\\_sort=d&\\_docanchor=&\\_ct=29&\\_acct=C000050221&\\_version=1&\\_urlVersion=0&\\_userid=10&md5=77488df6f00f23168b923cf5e7659311](http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6T7K-4W7YXN1-5&_user=10&_coverDate=07%2F31%2F2009&_rdoc=10&_fmt=high&_orig=browse&_src=h=doc-info(%23toc%235061%232009%23998669998%231250049%23FLA%23display%23Volume)&_cdi=5061&_sort=d&_docanchor=&_ct=29&_acct=C000050221&_version=1&_urlVersion=0&_userid=10&md5=77488df6f00f23168b923cf5e7659311)

## **Advances in bacteriophage based pathogen control**

Bacteriophage (viruses that prey on bacteria) are already in use as a food additive for controlling *Listeria monocytogenes*. A recent report by the European Food Safety Authority (EFSA) claims that the environmental behavior of bacteriophage makes them well suited for the control of many more food-borne pathogens. The report concludes that milk products and meat are particularly suitable for this form of biocontrol.

Bacteriophage behave as inert particles in the environment and persist longer than their bacterial hosts. Limiting factors in the effectiveness of Bacteriophage-based biocontrol is the temperature and moisture content of the environment they inhabit, and the ability of bacteriophage to prevent recontamination of the food. Foods with high moisture content and environments with low temperatures (particularly refrigeration temperatures) enhance the persistence of bacteriophage. As such, dairy and meat-based foods are being targeted as potential candidates. However, recontamination of foods remains problematic. It is believed that the food characteristics, type of bacteriophage, and the way in which the bacteriophage is applied may hold the key. Research focusing on these areas has been recommended by the EFSA.

<http://www.dairyreporter.com/Safety-Hygiene/Bacteria-eating-viruses-help-fight-food-pathogens-EFSA-study>

## **USA Food Safety and Inspection Service (FSIS) releases a new directive for the control of *E. coli* O157: H7 in cattle at slaughter**

A spike in *E. coli* O157:H7-positive samples in the past year throughout the United States have lead the USA FSIS to issue a new directive to help control this pathogen at slaughter. Multiple positive samples and food recalls associated with *E. coli* O157:H7 have occurred in the USA over the past 12 months, particularly in association with ground beef and beef trim.

The FSIS has identified that ineffective sanitary dressing and a lapse in process control procedures have lead to unsanitary animal slaughter conditions. The FSIS has determined that these procedures are difficult to monitor, and as a consequence, it is likely that critical control points established at these beef slaughter operations may be inadequate.

As of 2002, the FSIS required that *E. coli* O157:H7 be at an undetectable level, and considers the recent spike in positive samples to be evidence that HACCP systems are failing to meet this requirement. The new directive (6410.1) provides information to off-line inspection personnel on how to verify that sanitary dressing and process control procedures are being implemented effectively, and that HACCP systems are being validated.

<http://www.namp.com/images/namp/fsisecoli directive.pdf>

## **Cattle stress from heat and handling appears not to increase shedding of *E. coli***

United States researchers recently tested the effects of heat and handling stress on faecal shedding of *E. coli* and *E. coli* O157:H7. The 2-year study evaluated the stress of 384 (total) head of cattle by respiration rate, panting score and visual assessment. This was measured five times per week in year-1 during the 84-day finishing period, and again in year-2 on days where the temperature humidity index was extremely high. In addition to this, the animals were weighed and temperament to handling scored along with collection of rectal faecal samples. The latter was assessed for numbers of *E. coli* and *E. coli* O157:H7 as a measure of shedding. Concentrations of these organisms did not correlate with heat and handling stress, and the researchers concluded that variation in shedding may be the result of factors other than these stresses alone.

<http://www.liebertonline.com/doi/abs/10.1089/fpd.2008.0222>

## ECOLOGY AND PREVALENCE

### Resident microbial populations enhance biofilm formation by *E. coli* O157:H7

Scientists have demonstrated that the resident microbial populations of a meat processing plant can enhance attachment and colonisation of solid surfaces by *E. coli* O157:H7. The work, conducted in France, collected swab samples from machinery and floors of a meat cutting room, meat boning room and slaughter hall within a meat processing plant. *Staphylococcus* and *Bacillus* species were most commonly isolated, and these were cultured with *E. coli* O157:H7 on polyurethane in meat exudates to form dual species biofilms. In nearly all cases the number of attached (biofilm) *E. coli* O157:H7 was greater when cultured with resident microbes when compared to *E. coli* O157:H7 cultured alone. The work highlights an interesting aspect of meat processing plant microbial ecology, and has implications in regards to cleansing and sanitisation regimes of these environments.

[http://www.sciencedirect.com/science?\\_ob=ArticleURL&\\_udi=B6T7K-4W7YXN1-1&\\_user=10&\\_coverDate=07%2F31%2F2009&\\_rdoc=1&\\_fmt=&\\_orig=search&\\_sort=d&\\_docanchor=&view=c&\\_acct=C000050221&\\_version=1&\\_urlVersion=0&\\_userid=10&md5=0d561874ca6251d63c5fcf1d22b749e7](http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6T7K-4W7YXN1-1&_user=10&_coverDate=07%2F31%2F2009&_rdoc=1&_fmt=&_orig=search&_sort=d&_docanchor=&view=c&_acct=C000050221&_version=1&_urlVersion=0&_userid=10&md5=0d561874ca6251d63c5fcf1d22b749e7)

### Prevalence of *Salmonella* and *E. coli* O157:H7 on different regions of cattle hides

In a USA-based study, the prevalence of *Salmonella* species and *E. coli* O157:H7 on different sites of cattle hides from a feedlot and processing facility was determined. Samples were collected from six different sites on each hide from the feedlot, and four different sites from the processing plant. Sites included the left and right shoulder, left and right ribs (feedlot only), back and belly. The prevalence of *E. coli* O157:H7 ranged from 68 – 92% for feedlot hide samples, and 76 – 79% for the processing plant. The prevalence of *Salmonella* ranged between 49 – 68% for the processing facility, while prevalence on the

feedlot samples was only just detectable. Highest prevalence for both bacterial genera was detected on the belly. The researchers concluded that this region of the animal is the most likely site of natural simultaneous contamination by *Salmonella* species and *E. coli* O157:H7. The work highlights areas on cattle hides that may require greater focus in regards to food-borne pathogen risk management.

<http://www.ingentaconnect.com/content/iafp/jfp/2009/00000072/00000006/art00014>

## RESISTANCE, VACCINATION AND IMMUNITY

### A vaccine to reduce shedding of *E. coli* O157:H7 from cattle

An USA veterinary pharmaceutical company is set to release a vaccine that they claim can reduce shedding of *E. coli* O157:H7 from cattle by as much as 85%. Scientists have completed testing the product and beef cattle will start to be vaccinated as soon as Autumn this year. The vaccine works by preventing *E. coli* O157:H7 access to iron within cattle intestines, effectively suffocating them. Faecal samples from cattle vaccinated with the agent were 85% less likely to contain *E. coli* O157:H7 and those that did shed showed up to a 98% reduction in the numbers of this organism. Vaccination involves a three dose regime and is estimated to cost approximately \$2 (U.S.) a dose.

<http://www.sfgate.com/cgi-bin/article.cgi?file=/c/a/2009/07/02/MND818HANH.DTL>

### Broad distribution of antimicrobial resistance genes identified in *Escherichia coli* recovered from a beef processing plant

Canadian researchers recently tested a large beef processing plant to assess the distribution of antimicrobial resistance genes in resident *E. coli* populations. One hundred and twenty three *E. coli* isolates were analysed including 34 from animal hides, 10 from washed

carcasses, 27 from conveyors, 26 from beef trimmings and 26 from ground beef. A variety of antimicrobial resistance (AMR) genes were tested for using polymerase chain reaction-based DNA methods. Results highlighted variation in the distribution of the tested AMR genes with clustering associated with sample type/location. Overall, the researchers found AMR genes to be widely distributed throughout the meat processing facility and reminded readers of the need for effective cleansing and sanitisation procedures to reduce the risk of contamination and dispersal of high risk pathogens.

<http://www.ingentaconnect.com/content/iafp/jfp/2009/00000072/00000005/art00023>

## TESTING AND CONTAMINATION

### New rapid *E. coli* test approved for use in the USA

A new rapid *E. coli* test utilising magnetic nanotechnology has been approved for use within the USA and internationally. The test promises to be much faster than conventional methods and up to fifty times more sensitive than DNA-based

tests such as PCR. The test has been targeted at sampling of minced beef however it is suited to more broad applications. It is to be sold as an AOAC certified food-safety test following successful performance testing.

[http://www.meatnews.com/news/headline\\_stories.asp?ArticleID=103711](http://www.meatnews.com/news/headline_stories.asp?ArticleID=103711)

### United Kingdom Food Standards Agency reassures public after Bovine Spongiform Encephalitis (BSE) scare

The United Kingdom Food Standards Agency (FSA) has assured the public that any risk to public health from the recent BSE scare is negligible. The statement follows the discovery that meat from three cows reared in the same herd where a cow later tested positive for BSE had entered the food chain. All three cows tested negative for BSE and the specified risk material (carcass parts at greatest risk of harbouring BSE) had been removed. Much of the herd has been voluntarily retained and destroyed according to European Union requirements. However, parts of the animals had already been exported to the Republic of Ireland and France. Although the countries have been notified it is believed that the meat may already have been consumed.

<http://www.food.gov.uk/news/newsarchive/2009/may/bseherd0509>



Produced by the [Food Safety Centre](#) for Meat & Livestock Australia

#### FOR FURTHER INFORMATION PLEASE CONTACT:

Manager, Market Access Science and Technology

Ian Jenson

PH: 02 9463 9264

[ijenson@mla.com.au](mailto:ijenson@mla.com.au)

MEAT AND LIVESTOCK AUSTRALIA, LOCKED BAG 991 NORTH SYDNEY  
NSW 2059

© Meat & Livestock Australia ABN: 39 081 678 364

Care is taken to ensure the accuracy of information in the publication. However, MLA cannot accept responsibility for the accuracy and completeness of the information or opinions contained in the publication. Readers should rely on their own enquiries in making decisions concerning their interests.

Reproduction in whole or in part of this publication is prohibited without the prior written consent of MLA.