

# Food Safety control of products of animal origin: **BOVINE**

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## Public Health Risks related to Bovine Meat Products

The EFSA Scientific Opinion on the public health hazards to be covered by inspection of meat classifies *Salmonella* spp. (non-typhoidal) and *E.coli* O157:H7 as high priority biological hazards. *Listeria monocytogenes*, *Clostridium perfringens*, *Clostridium botulinum* and *Bacillus cereus* are designated as medium-risk biological hazards. In South Africa these threats are also important public health hazards. *Salmonella* spp.: *Salmonella enteritidis* is the most commonly identified *Salmonella* serotype identified in *Salmonella* related diseases, with *Salmonella typhimurium* in second place. <sup>(1)</sup> Invasive *Salmonellosis* associated with HIV-positive humans is a long-standing public health threat. In sub-Saharan Africa, invasive non-typhoidal *Salmonella* is a major cause of bacteraemia in adults and children, with an estimated annual incidence of 175 - 388/100 000 for children aged 3 - 5 years and 1 800 - 9 000/100 000 for HIV-infected adults. <sup>(2)</sup> *Salmonella* bacteria were found in 5% of specimens obtained across South Africa from livestock, poultry, meat at abattoirs, raw materials at feed mills, animal feed, and environmental sources between 2012 and 2014. <sup>(3)</sup>

### E.coli 0157

A study in the UAE on meat imported from South Africa concluded that 29.7% of 47 samples were positive for *E.coli*. <sup>(4)</sup> *E.coli* infection in adult cattle has an estimated prevalence of between 7.5-8%. <sup>(5)</sup> Isolation of multi-drug resistant O157:H7 from cattle in South Africa has also been reported. <sup>(6)</sup>

### Listeria monocytogenes

978 laboratory-confirmed listeriosis cases were reported between January 2017 and March 2018 across South African provinces. The outcome of illness is known for 674 patients, of whom 183 (27%) died. Most deaths were related to individuals with higher risks for a severe disease outcome, such as neonates, pregnant women, the elderly and immuno-compromised persons. <sup>(7)</sup> A 2004 study in which red meat samples were collected from a de-boning room of a high throughput abattoir, showed that 52% (n=26/50) of the samples were positive for *Listeria monocytogenes*. <sup>(8)</sup>

### Clostridium perfringens

Outbreaks of enteritis caused by *Clostridium perfringens* have been linked to inadequately cooked animal derived food products. Affected persons usually have underlying risk factors such as protein malnutrition. <sup>(9)</sup> There is no available data concerning food-borne illnesses caused by *Clostridium perfringens* in South Africa.

### Clostridium botulinum

Botulism is a known pathogen in South Africa affecting domestic livestock. There are very few reports of human food-borne botulism cases – most of these cases are associated with tinned products and not meat. Overall the risk of contracting *Clostridium botulinum* infection from meat products is extremely low. <sup>(10)</sup> According to the NICD "In South Africa there is little public awareness and medical knowledge about botulism", therefore it is possible that cases are under-reported and misdiagnosed leading to inaccurate data. <sup>(11)</sup>

### Bacillus cereus

The NICD carried out a retrospective review of reported food-borne disease outbreaks during the period between 2013 and 2017. Food samples were collected in 132 of 239 cases and were tested for the presence of food-borne pathogens. *Bacillus cereus* was isolated in 13 out of 132 cases – 9.8%. (The same study also isolated the following pathogens from the food samples - *Salmonella* species, *Escherichia coli* species, *Clostridium perfringens*, and *Listeria monocytogenes* at 11.4%, 10.6%, 3% and 3% respectively.) <sup>(12)</sup>

## Public Health Risks Relating to bovine meat in South Africa not discussed in the EFSA Opinion

### Brucella abortus

*Brucella abortus* is a state controlled disease in South Africa. 70% of human cases of brucellosis are due to infection with *Brucella melitensis* and not *Brucella abortus*. Public awareness of zoonotic diseases such as brucellosis is very low in Southern Africa and has contributed to it being under-diagnosed and under-reported such that the true rate of infections in humans is unknown. <sup>(13)</sup>

Transmission of *Brucella* spp. to humans is usually by direct contact with infected animals, carcasses, unpasteurised milk and undercooked meat. High-risk individuals include farmers, veterinarians, abattoir workers and meat handlers. <sup>(14)</sup>

Cattle herds are annually tested for *Brucella*. All animals testing positive are required by law to be branded with a "C" on the right side of the neck. *Brucella* is a controlled disease in South Africa and therefore movement of these animals is strictly under the Red Cross Permit and only to an official quarantine-approved facility. Special procedures must be followed during slaughter of infected animals, namely the use of additional protective gear such as goggles, masks, double latex gloves and aprons. Infected animals are slaughtered last with extra line spacing, slower line speed and extra slaughter labourers. Heads, reproductive organs, lymph nodes, rough offal and udders are condemned. Red offal and carcasses are provisionally accepted for human consumption if the pH drops below 6.3 after overnight chilling. <sup>(15)</sup>

Inspection procedures alone are inadequate to safeguard public health with regards to Brucellosis. It is very unlikely that animals affected with brucellosis will be recognized through clinical signs or post-mortem lesions. <sup>(16)</sup>

*Escherichia coli*

### Mycobacterium bovis

*Mycobacterium bovis* is a state-controlled disease and has zoonotic implications. Humans can become infected from unpasteurised milk and infected meat. The proportion of tuberculosis induced by *M. bovis* among humans is relatively low compared to *M. tuberculosis*. However, *M. bovis* tuberculosis has become increasingly prevalent among human populations subjected to poverty, malnutrition, HIV, and inadequate health care. The global prevalence of human tuberculosis caused by *M. bovis* has been estimated to be 3.1% of all tuberculosis cases. <sup>(17)</sup>

The inspection procedure of tuberculosis carcasses is as follows: If solitary lesions are found, the lesion and associated lymph nodes are removed after a systematic examination of other lymph nodes. If no other lesions are found, then the carcass is provisionally passed after being chilled overnight to determine if there is an adequate drop in pH to below 6,3 which will destroy the pathogen. If more than one lymph node centre is affected then the entire carcass is condemned. All lymphatic tissues must be examined which requires splitting of the carcass. Lesions in unrelated lymphatic systems indicate a pyaemia which requires total condemnation of the carcass. <sup>(15)</sup>

Slaughter of cattle in the rural setting and incorrect meat safety practices lead to poor control of Tuberculosis and are a threat to public health. Rural farmers have no cooling facilities therefore products are usually consumed as soon as the animal is slaughtered – not allowing time for the pH to drop adequately in order to destroy the TB organism.

The poor public health situation is exacerbated by the low sensitivity of the regular visual-only ante-mortem and post-mortem meat inspections to detect TB nodular lesions in carcasses. Subsequently contaminated meat may be approved for human consumption. A study conducted in abattoirs in the Eastern Cape, South Africa showed that the visual evaluation process used by inspectors in the abattoirs is not effective as infected carcasses can appear healthy. <sup>(18)</sup>

However, meat inspection systems play a vital role in the eradication programme for bovine tuberculosis. All forms of identification associated with carcasses bearing tuberculosis-like lesions are recorded to facilitate herd trace-backs and improve disease control. <sup>(19)</sup>



BOVINE TUBERCULOSIS - LUNG AND LYMPH NODE



BRUCELLA INFECTED PLACENTA

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