

Shiga toxin-producing Escherichia coli in beef

Researcher: Prof. Peter Thompson Ph.D.

Team members: Prof. A. A. Adesiyun Ph.D.
Dr. E. Madoroba Ph.D.
Dr. L.O. Onyeka M.Sc.

Research Institute: Department of Production Animal Studies, University of Pretoria

Research focus area: Red Meat Safety, Nutritional Value, Consumerism and Consumer Behaviour

Final report approved: 14 September 2017

Full Title of the project

Prevalence and risk factors of Shiga toxin-producing *Escherichia coli* serotypes in beef at abattoirs and retail outlets in Gauteng

Aims of the project

- To determine the prevalence O157 and non-O157 Shiga-toxin producing *Escherichia coli* (STEC) in beef abattoirs in Gauteng
- To determine the prevalence O157 and non-O157 STEC in beef and beef products at retail outlets in Gauteng
- To identify the important STEC serotypes present in beef and beef products in Gauteng
- To identify risk factors for STEC contamination of carcasses and beef products in Gauteng

Executive summary

Shiga toxin-producing *Escherichia coli* (STEC), particularly the O157 strains, are food-borne zoonotic pathogens of public health importance worldwide. Foods of cattle origin have been implicated in various outbreaks and epidemiological studies have revealed that cattle are major reservoirs of STEC. We conducted cross-sectional surveys from Nov 2015 to Nov 2016, to investigate the prevalence and molecular characteristics of O157 and non-O157 strains of STEC in beef and beef products in the Gauteng province of South Africa.

A total of 265 swab samples of beef carcasses from 12 abattoirs and 399 beef products from 31 retail outlets were screened for STEC using a multiplex PCR. The overall prevalence in abattoir samples was 37% (55/149) in summer and 34% (39/116) in winter. In beef products at retail outlets it was 20% (27/137) in autumn, 14% (18/130) in winter and 17% (22/132) in summer; the highest prevalence was detected in boerewors (35%) followed by mincemeat (21%). The predominant serotypes detected were O113 (19.4%) and O157 (14.9%) in beef products, and O113 (14%) from abattoirs.

Our results demonstrate that STEC is present in South African beef and beef products, and that this may pose a real food-borne disease threat. Further investigation of the epidemiology of the pathogen is required; it is proposed that this take the form of longitudinal studies to investigate the prevalence of shedding of STEC by cattle in the feedlot, following them through to the abattoir to determine factors associated with carcass contamination.

Additional Comments

As this is part of a PhD project, further molecular work is still to be done on the isolates, resulting in further planned publications. The samples also provided material for an MSc student (funded by UP research funds) to work on *Salmonella* contamination – these results will also be made available to RMRDSA once finalized.