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**STUDIES ON THE PROTECTIVE ROLE OF
PROBIOTICS AND MILK CALCIUM ON
SALMONELLA TYPHIMURIUM INFECTION IN
MICE**

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degree of Master of Science in Nutritional Science at Massey
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ABSTRACT

The current studies were carried out to evaluate the efficacy of a newly identified LAB strain - DR10™ (*Bifidobacterium lactis*) on host immunity and susceptibility to *Salmonella typhimurium* (*S. typhimurium*) infection in mice. In addition, the effect of elevated milk calcium levels combined with DR10™ was studied in mice infected with *S. typhimurium*.

After initially establishing a murine infection model, the effect and efficacy of DR10™ in preventing *S. typhimurium* infection and stimulating immunity was examined. The results showed that DR10™ could significantly enhance resistance against *S. typhimurium* infection and stimulate a wide range of immune parameters including non-specific and specific immune responses. In another study the *S. typhimurium* infection model was used to examine the effect of milk calcium and the combination of different amounts of milk calcium with DR10™ on host immunity and prevention of *S. typhimurium* infection in mice. These results demonstrated that milk calcium was very effective in reducing the severity of infection and a high amount of milk calcium combined with DR10™ increased the ability of DR10™ to prevent *S. typhimurium* infection.

The findings of the current study were significant in that they demonstrated the effect and efficacy of DR10™ on promoting enhanced resistance to enteric infection and stimulating immunity, provided additional evidence of the role played by the enhanced immune system in protecting against enteric infection, and ascertained the synergism between milk calcium and LAB in the prevention of *S. typhimurium* infection.

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LIST OF ABBREVIATIONS

ACK: Ammonium chloride/potassium
ALCS: Appearance of lethal clinical symptoms
ANL: ANLENE
AKP: Alkaline phosphatase
CFU: Colony forming unit
ConA: Concanavalin
DTH: Delayed type-hypersensitivity
ELISA: Enzyme-linked Immunosorbent Assay
FITC: Fluorescein isothiocyanate
GALT: Gut-associated lymphoid tissue
GHAS: General Health Appearance Score
GIT: Gastrointestinal tract
HBSS: Hank's Balanced Salt Solution
HLA: Human leukocyte antigens
IBD: Inflammatory bowel disease
IgA: Immunoglobulin A
IgG: Immunoglobulin G
IL: Interleukin
LD₅₀: Mean lethal dose
LFA: Leukocyte function-associated antigen
LPS: Lipopolysaccharide
LTA: Lipoteichoic acid
LAB: Lactic acid bacteria
NK: Natural killer
MHC: Major Histocompatibility Complex
MHRC: Milk and Health Research Centre
MLN: Mesenteric lymph nodes
PBL: Peripheral blood lymphocytes
PBS: Phosphate buffered saline

PFC: Plaque forming cell
PP: Peyer's Patches
PHA: Phytohemagglutinin
PMN: Polymorphonuclear
RT: Room temperature
Sal: *Salmonella*
SI: Stimulation Index
SIgA: Secretory IgA
SMP: Skim Milk Powder
SRBC: Sheep red blood cells
S. typhimurium : *Salmonella typhimurium*
T_H: Helper T cell
TNF: Tumor necrosis factor
VLA: Very late antigen
XLD: Xylose-lysine-deoxycholate