



Immune+TM

Immunoglobulin for
Health and Vigour

IMMUNOGLOBULINS

Immunoglobulins (Ig) are glycoproteins produced by plasma cells (or B lymphocytes) in response to antigens.

Major functions of Ig

- bind to invading pathogens
- activate specific functions
- prevent infection and disease caused by pathogens.

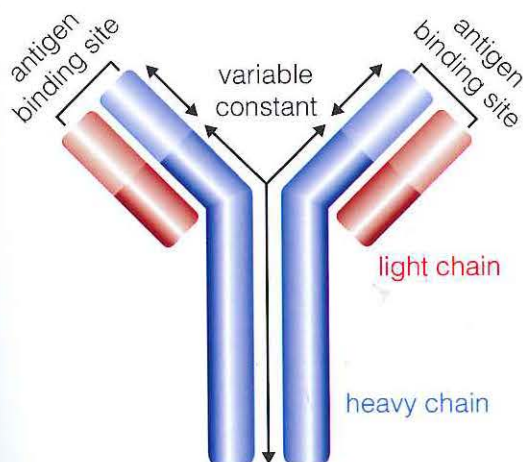


RIDDET INSTITUTE RESEARCH ON IMMUNOGLOBULINS

The Riddet Institute has developed a novel process for the separation and purification of immunoglobulins (Immune+™) from lamb's blood.

Research carried out at the Riddet Institute has found that feeding the freeze-dried ovine serum Ig to the normal and pathogen infected rat has a number of health benefits:

- Superior growth performance
- Selectively enhanced immunity
- Selective alteration to the composition of gut microbiota (up regulating good bacteria and preventing bad pathogens)
- Selective modulation of the gut mucin concentration - improved gut barrier function.



WHY Immune+™

- Completely natural Immune+™ is extracted from New Zealand lamb/sheep (raised in clean and green New Zealand pastures).
- Cheap consistent supply of raw material (New Zealand lamb/sheep population is very large - 70-80 million are processed annually)
- BSE (Bovine Spongiform Encephalopathy) free
- Special value placed on lamb products by the world market, all make Immune+™ extracted from New Zealand lamb blood an attractive package almost impossible for any other country to duplicate
- Proven to retain biological activity in the digestive tract.

APPLICATION IN COMPANION ANIMALS FOOD

- Fortifying pet food with Immune+™ for superior dental health and immunity in cats
- Proven in a cat trial at the world class Feline Research Unit, Massey University (Patent pending).

WHAT'S ON OFFER

The Riddet Institute is seeking expressions of interest for commercial partnership with end users who may like to use ovine Ig as an ingredient in their food product range for production and companion animals.

New Zealand meat companies have expressed interest in large scale production of ovine Immunoglobulin should there be interest from end users.



DEEP DIVE INTO Immune+™

HEALTH BENEFITS IN HUMANS

IMMUNITY BOOSTING¹⁻²

- For athletes
- For weight trainers/body builders
- For immunocompromised patients (with HIV).

HELP TO ACHIEVE PEAK STRENGTH, FITNESS AND VIGOUR¹⁻²

- Help in increasing the energy level
- Supporting healthy gut function by promoting good bacteria and preventing pathogens
- Prevention of diarrhoea (infants to elderly)
- Supporting gut barrier function (mucin)
- Speedy recovery after antibiotic treatment¹⁻²
- Reducing total Cholesterol and LDL in hypercholesterolaemic patients³
- Protein Supplementation³
- Senior (elderly) nutrition³
- Helping to improve the absorption of vitamins and minerals¹⁻²
- Supporting oral health.

1 Casadevall A et al., (2004). Passive antibody therapy for infectious diseases. *Nat Rev Microbiol*, 2, 695–703.

2 Casadevall A & Scharff MD. (1995). Return to the past: the case for antibody-based therapies in infectious diseases. *Clin Infect Dis*, 21, 150–161.

3 Balan P (2011). Effects of orally administered ovine serum immunoglobulin in the normal and *Salmonella enteritidis* - challenged growing rat [PhD thesis]. Massey University.

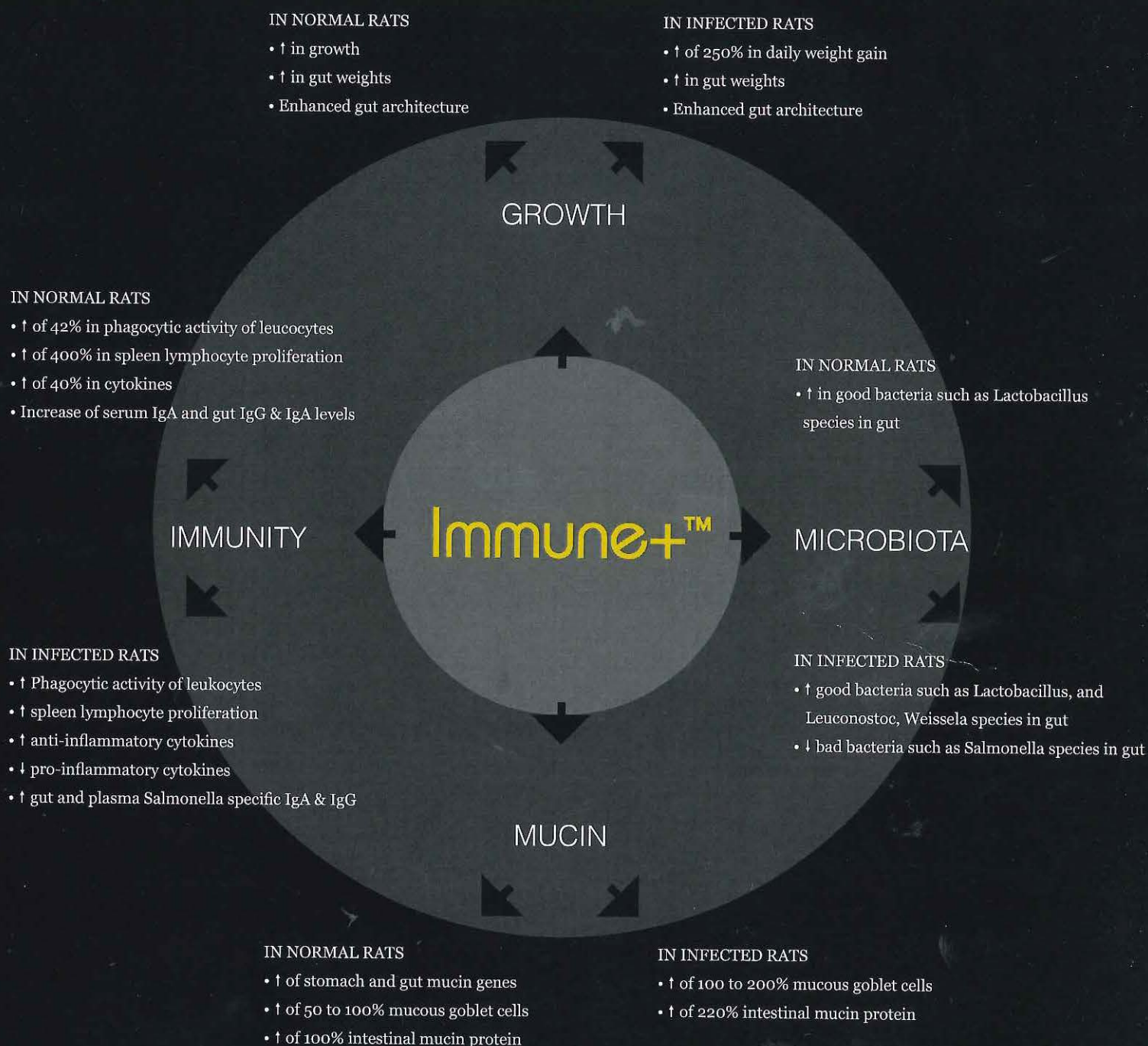
HEALTH BENEFITS IN ANIMALS

- Improving feed intake, body weight gain, intestinal growth³⁻¹²
- Boosting health during weaning³
- Supporting good bacteria and preventing pathogen growth (prophylactic for diarrhoea)^{3,5,8,9,10}
- Resistance to infection by enhancing the gut mucosal barrier^{3,5,7,8,9,10}
- Supporting overall immunity (gut and peripheral)^{3,4,8,9}
- Improving oral health³
- Helping to improve the absorption of vitamins and minerals³
- Speedy recovery after antibiotic treatment³

- 3 Balan P. (2011). Effects of orally administered ovine serum immunoglobulin in the normal and *Salmonella enteritidis* - challenged growing rat [PhD thesis]. Massey University.
- 4 Balan P et al., (2010). Immunomodulatory effects of ovine serum immunoglobulin in the growing rat. *Animal*. 4, 1702-1708.
- 5 Balan P et al., (2012). Orally administered ovine serum immunoglobulins modulate the Level of lactobacillus and enterobacteria in the growing rat (Submitted for publication).
- 6 Balan P et al., (2011). Dietary supplementation with ovine serum immunoglobulin is associated with increased gut mucin secretion in the growing rat. *Animal*. 5, 1916-22
- 7 Balan P et al., (2011). Dietary supplementation with ovine serum immunoglobulin attenuates acute effects on growth, organ weights, gut morphology and intestinal mucin production in the growing rat challenged with *Salmonella enteritidis*. *Animal*. 5, 1570-78.
- 8 Balan P et al., (2011). Immunomodulatory effects of ovine serum immunoglobulin in growing rats gavaged with *Salmonella enteritidis*, *J Nutr*. 141, 950-956.
- 9 Balan P et al., (2012). Ovine serum immunoglobulin supplements prevent the release of mucosal proinflammatory mediators in the growing rat challenged with *Salmonella enteritidis* (Submitted for publication).
- 10 Balan P et al., Stimulatory effect of ovine serum Ig on multiplication of lactic acid bacteria under in vitro condition (Manuscript).
- 11 Balan P et al., (2012). Recovery of intact IgG in the gastrointestinal tract of the growing rat following ingestion of an ovine serum immunoglobulin (Submitted for publication).
- 12 Balan P et al., (2009). Orally administered ovine serum immunoglobulins influence growth performance, organ weights, and gut morphology in growing rats. *J Nutr*. 139, 244-49.



RIDDET INSTITUTE RESEARCH ON IMMUNOGLOBULINS: RODENT MODEL

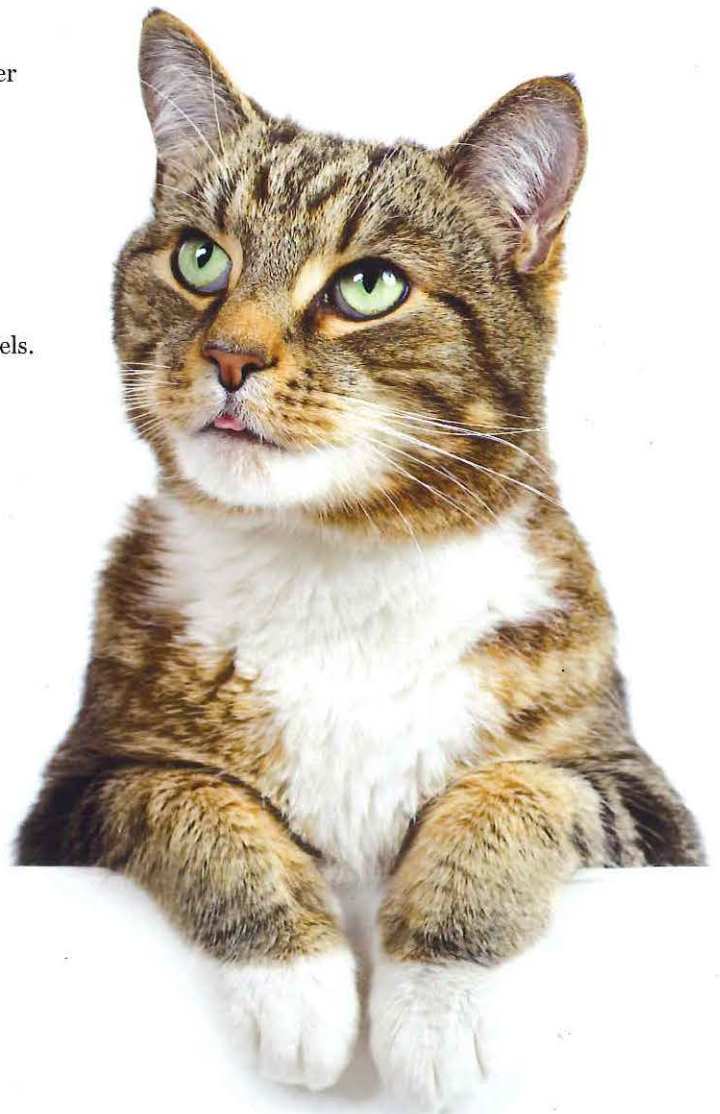


RIDDET INSTITUTE RESEARCH ON IMMUNOGLOBULINS IN CATS

- Recently Riddet Institute, has successfully completed a cat study to evaluate the effects of Immune+™ supplementation on dental health and immunity in cats
- Trial was carried out in the world class feline research unit, Massey University, New Zealand
- Total of 30 cats were used in the trial and the study was conducted for 7 weeks
- Two experimental diets were investigated:
 - > (1) commercial dry biscuits (control) and
 - > (2) commercial dry biscuits sprayed with an Immune+™ (treatment)
- Plaque scores and immune profiles were tested before and after the treatment.

Very positive result

- Immune+™ supplementation resulted in
 - > a huge reduction in dental plaque
 - > Significant reduction in salivary and serum IgA and IgG levels.



ABOUT RIDDET INSTITUTE



RIDDET INSTITUTE CO-DIRECTORS



Distinguished Professor
Paul Moughan
PhD DSc, FRSNZ



Professor Harjinder Singh
PhD, FRSNZ, FIAFoST

The Riddet Institute is a national Centre of Research Excellence. The institute has world-class competency in the areas of biomaterials science and digestive physiology relating to nutrient absorption and metabolism. The institute is a partnership between Massey University, University of Otago, The University of Auckland, AgResearch and Plant & Food Research. It is funded by New Zealand government and also earns income from the domestic and international food industry.



RESEARCH TEAM FOR Immune+™

Distinguished Professor
Paul J Moughan
PhD DSc, FRSNZ, FRSC



World leading nutrition scientist with over 300 peer-reviewed publications and 3 patents. Professor Moughan is a highly cited researcher.

Dr Prabhu Balan
M Pharm, MSc, PhD



Experienced pharmacologist and immunonutritionist.

Dr Shane M Rutherford
PhD



Experienced biochemist and nutritionist. Dr Rutherford has published over 75 peer-reviewed publications.

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