Research Notes

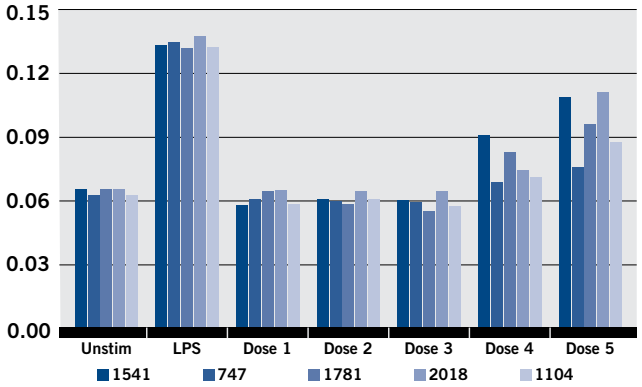
ARM & HAMMER

More is not always better: *Bacillus* dose impact on immune gene expression response

STUDY OVERVIEW

- A lab trial[1] was conducted to assess the effects of increasing doses of *Bacillus* strains on the inflammatory response of intestinal epithelial cells
- Proprietary ARM & HAMMER™ *Bacillus* strains were titrated in one log increments to derive five dose levels and administered to IEC6 intestinal epithelial cell culture
- Strains were tested both with and without exposure to lipopolysaccharide (LPS) as an inflammatory challenge
- Gene expression of the inflammatory cytokine, macrophage inflammatory protein-2 (MIP2), was used as the indicator of inducing an inflammatory response

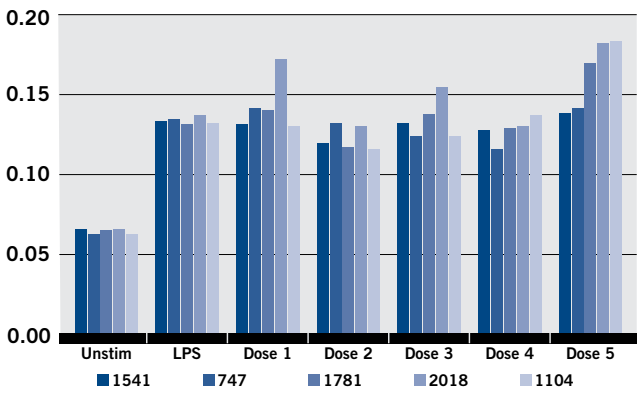
FIGURE 1: Strain-Specific Inflammatory Response, MIP2, 1/ΔCt



RESULTS

- Inflammatory responses were not induced by any *Bacillus* strains when administered at dose levels 1, 2 and 3 in cell culture
- *Bacillus* strains 1541 and 1781 increased inflammatory cytokine gene expression when administered to cell culture at dose levels 4 and 5 (Fig. 1)
- *Bacillus* strains 2018 and 1104 increased inflammatory cytokine gene expression when administered to cell culture at dose level 5 (Fig. 1)
- When combined with LPS, *Bacillus* strains 1781, 2018 and 1104 exacerbated the inflammatory response compared to LPS alone (Fig. 2)

FIGURE 2: Strain-Specific Inflammatory Response with LPS Challenge, MIP2, 1/ΔCt



CONCLUSIONS

- Increasing doses of *Bacillus* generated inflammatory response in intestinal epithelial cells
- In application, greater doses of *Bacillus* do not always result in better responses; rather, the highest dose levels increased inflammatory response in this trial

1 Davis E, Christianson J. Immune Gene Expression Response to Dose Titrations of ARM & HAMMER Proprietary *Bacillus* Probiotics (CERTILLUS™). 2017. Report on file.