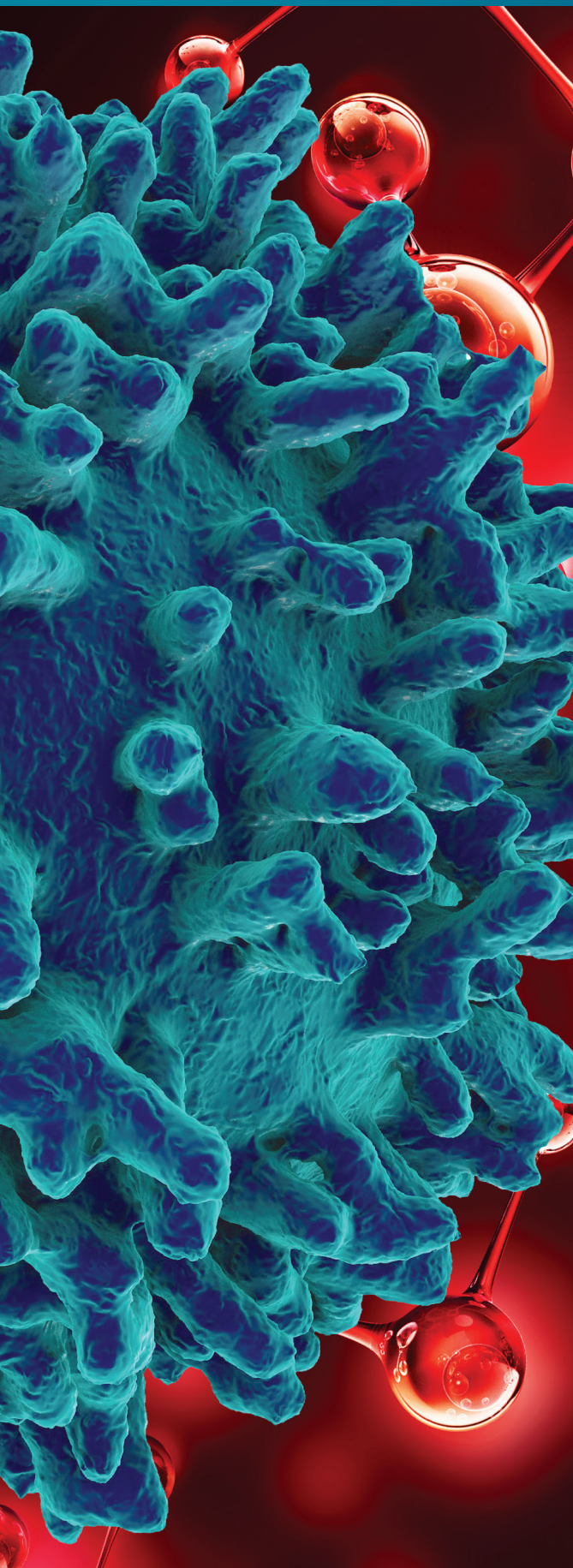




AletaTM
FOR OPTIMAL
GUT HEALTH

KEMIN[®]

Kemin.com/GutHealth



ALETA™ — A SOURCE OF 1,3-BETA GLUCANS

Aleta™ is highly bioavailable, offering a concentration greater than 50% of 1,3-beta glucans. Aleta provides a consistent response in situations of disease and stress — especially those typically addressed with antibiotics.

FEATURES AND BENEFITS

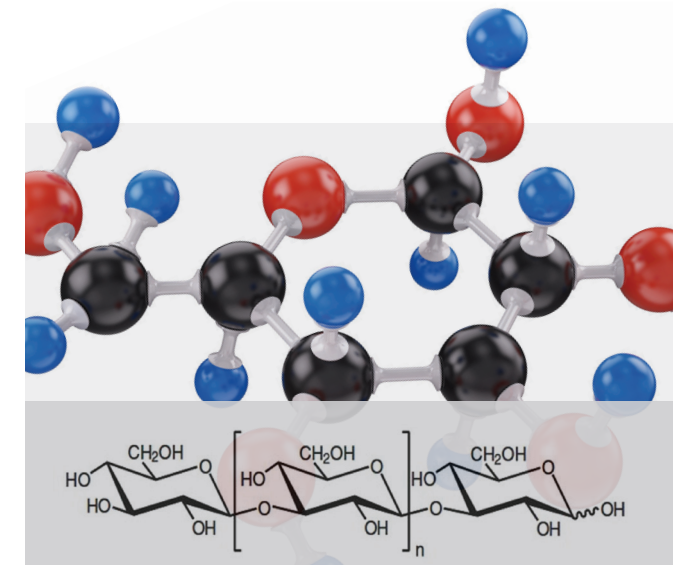
- **Highly concentrated and bioavailable**
- **Beta glucans may enhance host protective immunity**
- **Helps animals maintain performance through challenges**

BETA GLUCANS

Beta glucans are a well-researched class of molecules found in nature. Typically, beta glucans are major cell wall structural components in yeast and some bacteria. Although their primary role is to alert the animal's immune system to fungal pathogens through cell surface receptors, beta glucans have been used more readily in both human and livestock as a way to enhance host protective immunity (mucosal and systemic immunity). In livestock and poultry, the enhancement of host protection can be beneficial when animals are exposed to stressful conditions and diseases. Enhancing protective immunity during a time when young animals are developing their immune system can be beneficial to producers, especially when the animals are very susceptible to diseases early on in life. Minimizing the impact of disease challenges early on in an animal's life can have an effect on their ability to gain weight faster, convert feed more efficiently and may be less likely to spread disease.

UNIQUENESS OF ALETA

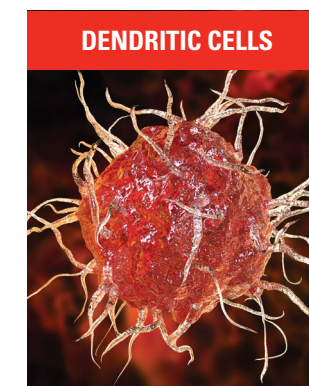
Unlike yeast products, which contain 5% to 25% beta glucans with branched side chains, that vary in location, Aleta contains more than 50% of 1,3-beta glucans in a linear form. In addition, Aleta granules are highly digestible which increases the bioavailability of 1,3-beta glucans, as compared to cell wall products derived from yeast which require extraction, providing dependable and repeatable efficacy.



Aleta is a source of 1,3-beta glucans, a polysaccharide of glucose molecules connected by beta-glycosidic bonds between the 1 and 3 carbons.

SOURCE OF BETA GLUCANS	Aleta™	Yeast
Beta glucan concentration	>50%	5% to 25%
Bioavailability	No extraction required	Extraction required

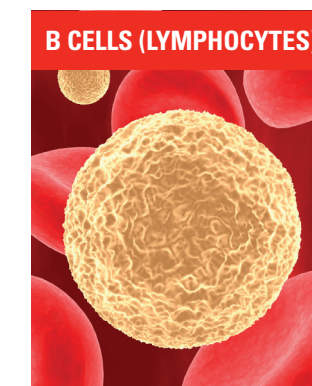
CELLS OF THE IMMUNE SYSTEM



DENDRITIC CELLS
Most efficient of the antigen-presenting cells. Ingest antigens, break them into small fragments, and then present them on their surface membrane where they can be recognized by T cells.



MACROPHAGES
Act as antigen-presenting cells, but also destroy ingested antigens, making them much less efficient than dendritic cells.



B CELLS
Act as antigen-presenting cells and are also effective during secondary immune responses.

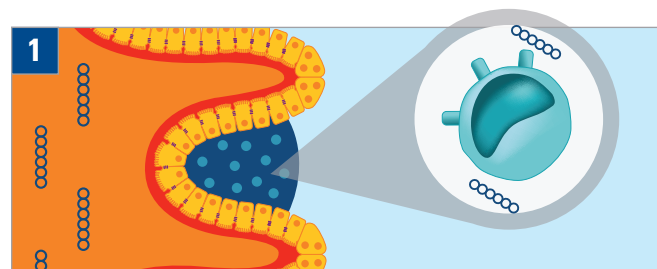
T CELLS
Actively participate in the immune response.

Dendritic cells, macrophages and B cells phagocytose and present foreign antigens to immune cells such as T cells. These interactions initiate the host's protective immune responses.

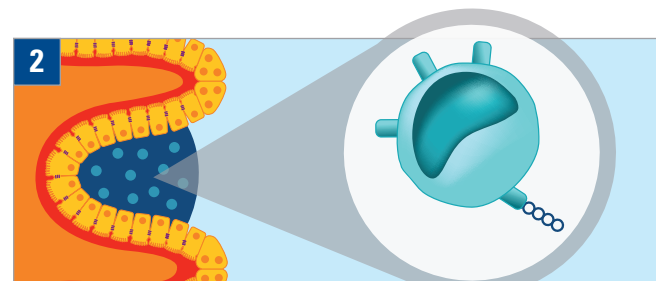
ALETA MODE OF ACTION

The mode of action of Aleta at the molecular level is to activate immune cells and increase their ability to fight off disease. After ingestion, the 1,3-beta glucans reach the small intestine where they are absorbed through Peyer's patches, which are part of the gut-associated lymphoid tissue (GALT). Macrophages and other immune cells (e.g. dendritic cells and T cells) recognize 1,3-beta glucans through a variety of cell surface receptors, such as dectin-1, complement receptor 3 (CR3), and toll-like receptors (TLR). Gastrointestinal macrophages engulf the 1,3-beta

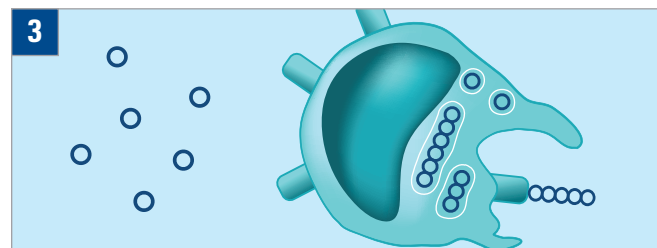
glucans and transport them throughout the body to secondary lymphoid sites (e.g., lymph nodes, spleen, bone marrow, etc.), while simultaneously releasing fragments of 1,3-beta glucans. The recognition and ingestion (phagocytosis) of the 1,3-beta glucans by macrophages also triggers the release of signaling molecules such as cytokines. These signaling molecules can activate other immune cells and promote their recruitment to the infected site. Activated macrophages and immune cells effectively target and destroy foreign cells and disease-causing organisms.



PHASE 1: 1,3-beta glucans are absorbed through Peyer's patches, which are a part of the gut-associated lymphoid tissue (GALT).



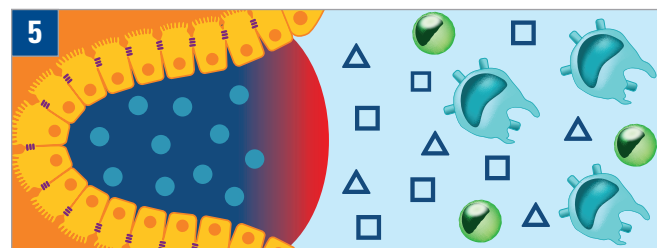
PHASE 2: Immune cells recognize 1,3-beta glucans through cell receptors.



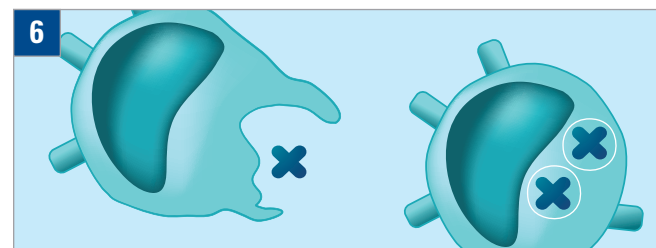
PHASE 3: Immune cells engulf 1,3-beta glucans, transport them throughout the body and release fragments of 1,3-beta glucans.



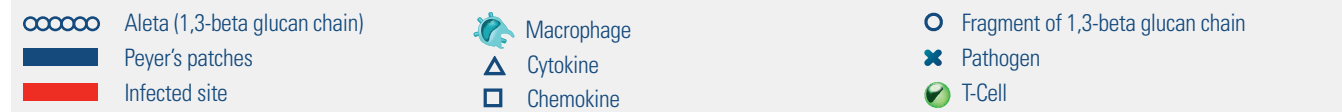
PHASE 4: Recognition and ingestion of beta glucans trigger the release of signaling molecules.



PHASE 5: Signaling molecules activate other immune cells and promote their recruitment to the infected site.

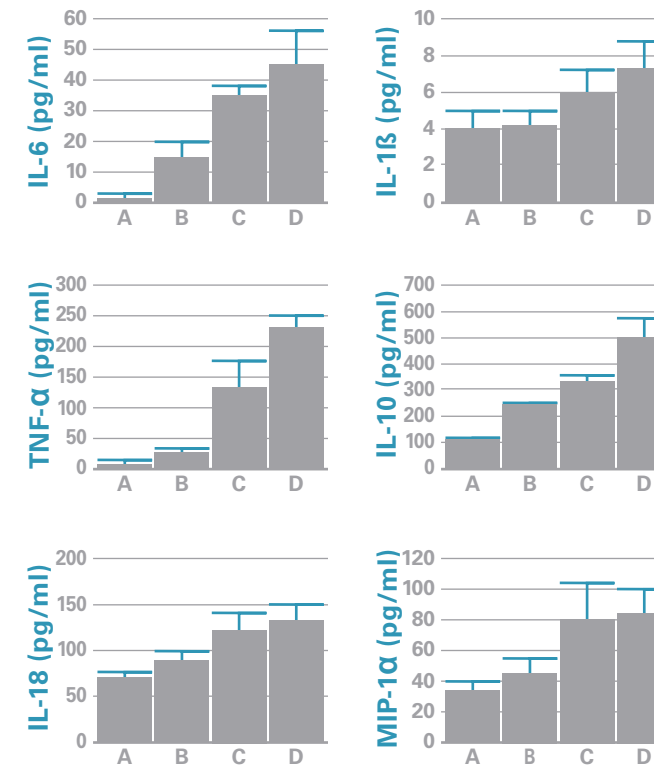


PHASE 6: Activated immune cells target and destroy foreign cells and disease-causing organisms.



Increasing Levels of Aleta Produce Both Pro- and Anti-Inflammatory Cytokines¹

Mice were fed 0-1000 ppm of 1,3-beta glucans from Aleta for seven consecutive days. On day 8, macrophages were isolated from the small intestine by magnetic sorting, cultured for 24 hours and supernatants were collected. Cytokine analysis was performed by luminex multiplex assay.



PPM INCLUSION LEVEL OF ALETA IN DIET

A = Control C = 100 ppm
B = 25 ppm D = 1000 ppm

Error bars indicate standard deviation.

Mice fed Aleta showed increased secretion of multiple cytokines. Pro-inflammatory cytokines include: IL-6 (interleukin-6), TNF-α (tumor necrosis factor-alpha), IL-1β (interleukin-1 beta) and IL-18 (interleukin-18). The anti-inflammatory cytokine shown is IL-10 (interleukin-10). MIP-1α (macrophage inflammatory protein-1 alpha) is a chemokine.

PHAGOCYTOSIS OF ALETA BY MACROPHAGES²

Mouse macrophages were incubated with 0 or 50 μg/ml of 1,3-beta glucan FITC (AG-FITC) marker for two hours. Unbound particles were washed away and macrophages were stained with a macrophage marker (CD11b) and nucleus marker (DAPI) for fluorescent microscopy. The merged image (bottom) shows Aleta phagocytosed by macrophages.



1. Effect of Aleta and 95% Paramylon on Gut and Systemic Immunity in Mice, TD-17-00322.
2. Phagocytosis of Paramylon by Immune Cells in Vitro, SD-17-00050.

ALETA INDUCES MACROPHAGES

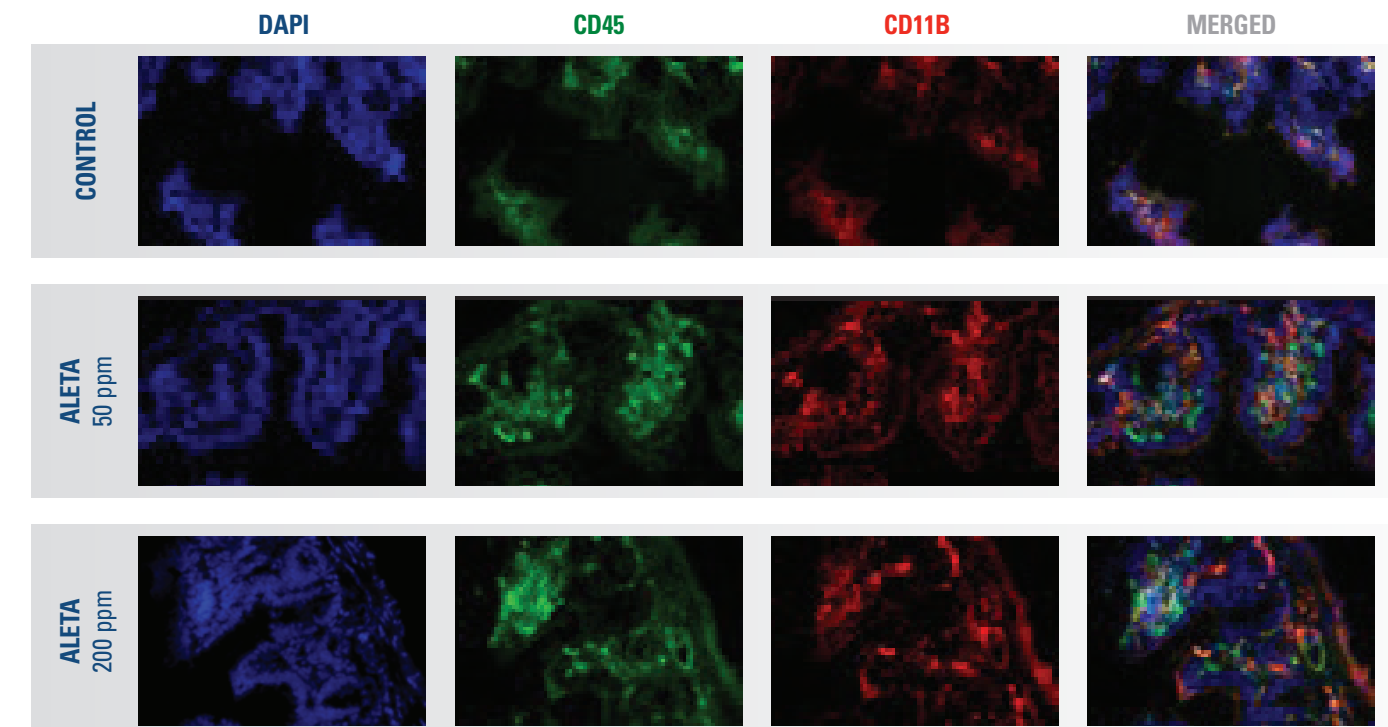
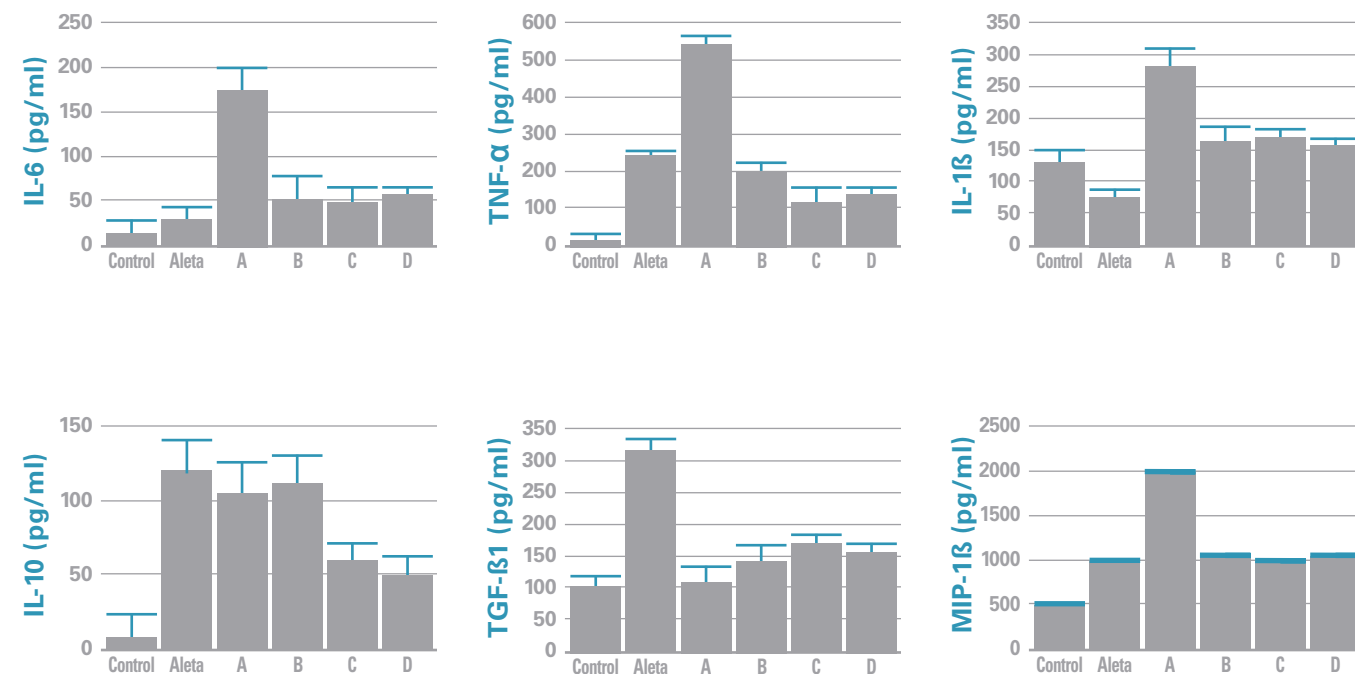
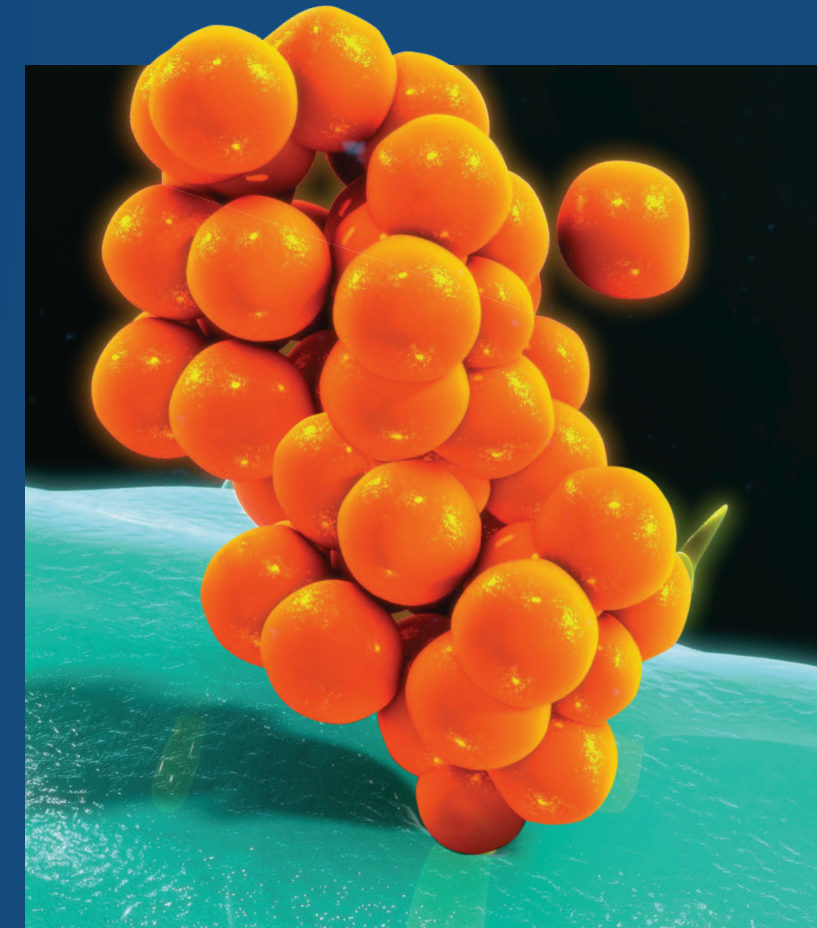
Towards a Balanced Production of Pro-Inflammatory Cytokines, Anti-Inflammatory Cytokines, and Chemokines³

Mouse macrophages were isolated from the intestine and cultured with 10 µg/ml beta glucan containing agents (Aleta, A, B, C and D) for 48 hours. Supernatants were collected and analyzed for cytokines by luminex multiplex assay. Pro-inflammatory cytokines include: IL-6 (interleukin-6),

TNF-α (tumor necrosis factor-alpha) and IL-1β (interleukin-1 beta). Anti-inflammatory cytokines include: IL-10 (interleukin-10) and TGF-β1 (transforming growth factor- beta 1). MIP-1β (macrophage inflammatory proteins-1 beta) is a chemokine. Error bars indicate standard deviation.

ALETA INCREASES RECRUITMENT OF MACROPHAGES TO THE SMALL INTESTINE⁴

Mice were fed 0-200 ppm of 1,3-beta glucans from Aleta for seven days. Intestinal samples were stained with nuclear DNA marker (DAPI), T-cell marker (CD45) and macrophage marker (CD11b). The result of merging the three images shows macrophage-rich intestinal villi in mice fed Aleta compared to those fed the control (right column).





A COMPREHENSIVE APPROACH TO GUT HEALTH

**Strengthening intestinal integrity,
microbial balance and immune function.**

Integrity: Maintaining the strength of the intestinal barrier

Balance: Diversifying the population of microbes

Protection: Supporting immune function

Gut health is a highly complex system including the structural integrity of the intestine, the balance of microflora and the status of the immune system.

Kemin offers a comprehensive platform of industry leading solutions for livestock, poultry and equine.

Kemin offers a range of nutritional solutions for raising healthy animals. We understand your need to raise healthy livestock that gives consumers the nutritional and health benefits they are looking for, while also returning a profit.

Our products and services help you with **nutrition, feed quality, gut health** and **pathogen control**.

[Kemin.com/GutHealth](https://www.kemin.com/GutHealth)

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