

CLOSTAT®

Active Microbial

THE PROBLEM IS IN THE GUT

Hundreds of millions of dollars are spent on interventions to manage disease in livestock. The most impactful animal diseases are often intestinal in nature.

THE INTESTINAL BARRIER IS REGULARLY EXPOSED TO UP TO 10 TRILLION MICROORGANISMS!

Every day, through their environment, animals are exposed to pathogens, including *Clostridia*, *Salmonella* and *Escherichia coli*. This exposure can impact the microbiota of the gastrointestinal (GI) tract.

STRESS + PATHOGENIC BACTERIA = GUT HEALTH CHALLENGE

Under stress events, both the mucosal layer and tight junctions are negatively impacted, often leading to inflammation and reduced integrity of the intestinal barrier. This breakdown in the tight junctions between the epithelial cell membranes allows for intestinal permeability by pathogenic organisms like *Clostridia*, which can make cattle more susceptible to diseases, while also reducing performance and profitability.

THE SOLUTION: ACTIVE MICROBIALS

To optimize animal health, performance and profitability, you must optimize intestinal health.

BENEFITS OF ACTIVE MICROBIALS:

- **Positively impact** intestinal bacterial populations
- **Improve** resistance to disease
- **Decrease** shedding of pathogens
- **Increase** intestinal immunity
- **Lessen** disease symptoms
- **Reduce** *Clostridia* and other pathogenic bacteria
- **Improve** overall health

STRESS FACTORS

- Heat or cold stress
- Diet changes
- Other diseases
- Handling
- Pre- and post-partum
- Changes of cattle in pen or adding cattle to herd
- Limited water supply or low water quality
- Mold mycotoxins
- Overall feed quality



LEARN MORE AT
[Kemin.com/CLOSTAT-US](https://www.kemin.com/CLOSTAT-US)

SELECTING THE RIGHT ACTIVE MICROBIAL

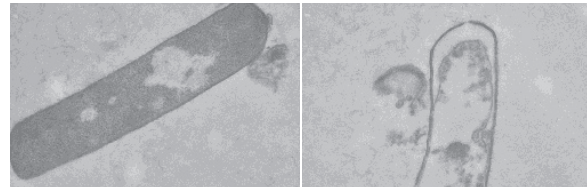
CLOSTAT® contains a unique, patented spore-forming strain of *Bacillus subtilis*, PB6, which was isolated from chickens who had survived a high exposure to *Clostridium perfringens* in the environment.

- 1 MODE OF ACTION:** Does it have an understood and proven mode of action?
- 2 PROVEN PATHOGEN INHIBITION AND EFFICACY:** Does *in vitro* and *in vivo* research prove efficacy against a broad spectrum of pathogens or just a few?
- 3 STABILITY:** What is the product's thermostability and GI tract stability?
- 4 COMPATIBILITY:** Is the product compatible with common antibiotics and organic acids?

MODE OF ACTION

Once the *B. subtilis*, PB6 spores are ingested, they begin to germinate and produce lipopeptide surfactants. These surfactants then break into the *Clostridia* cell wall, causing it to release its cytosol, resulting in death of the microorganism.²

Bacterial transmission electron micrograph: X 29500



C. perfringens before adding PB6

C. perfringens four hours after adding PB6

BROAD SPECTRUM PATHOGEN INHIBITION

A zone of inhibition test examines bacteria sensitivity and resistance to certain compounds. The size of the zone surrounding the common disk on the plate is an indication of microbial susceptibility to the compound.

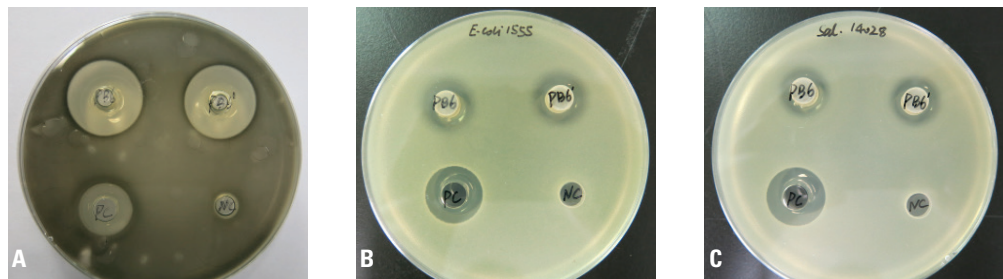


Figure 1: Characteristics of *B. subtilis*, PB6 on A) *C. perfringens* ATCC 13124, B) *Escherichia* CVCC 1555, C) *Salmonella typhimurium* ATCC 14028.

STABILITY AND COMPATIBILITY OF YOUR ACTIVE MICROBIAL

The PB6 in CLOSTAT has been tested both internally and externally to confirm the stability and compatibility of the product under environmental conditions and in different feed matrixes. Kemin Animal Nutrition and Health is dedicated to ensuring customers receive a product they know will perform in their specific situation.

WITH OVER **15 YEARS OF RESEARCH,**
PB6 HAS PROVEN EFFICACY
AGAINST *CLOSTRIDIA* AND OTHER PATHOGENIC SPECIES.²

KEMIN



GUT HEALTH
SOLUTIONS

Twenty-four hours a day, 365 days a year, throughout the entire life cycle and through all stages of life, your livestock are exposed to harmful environmental pathogens.

Feed CLOSTAT active microbial daily to **KNOCK OUT** harmful bacteria and encourage beneficial bacteria while promoting a healthy GI tract.

Kemin.com/GutHealth

References:
1. Vighi, G., F. Marcucci, L. Sensi, G. D. Cara and F. Frati. 2008. Allergy and the gastrointestinal system. *Clinical & Experimental Immunology*, 153:3-6. Doi: 10.1111/j.1365-2249.2008.03713.

2. Lin, et al. 2007. United States Patent 7, 247, 299.

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