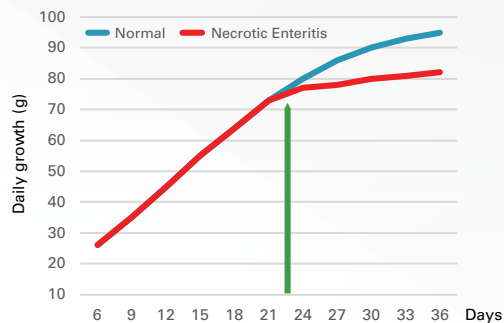
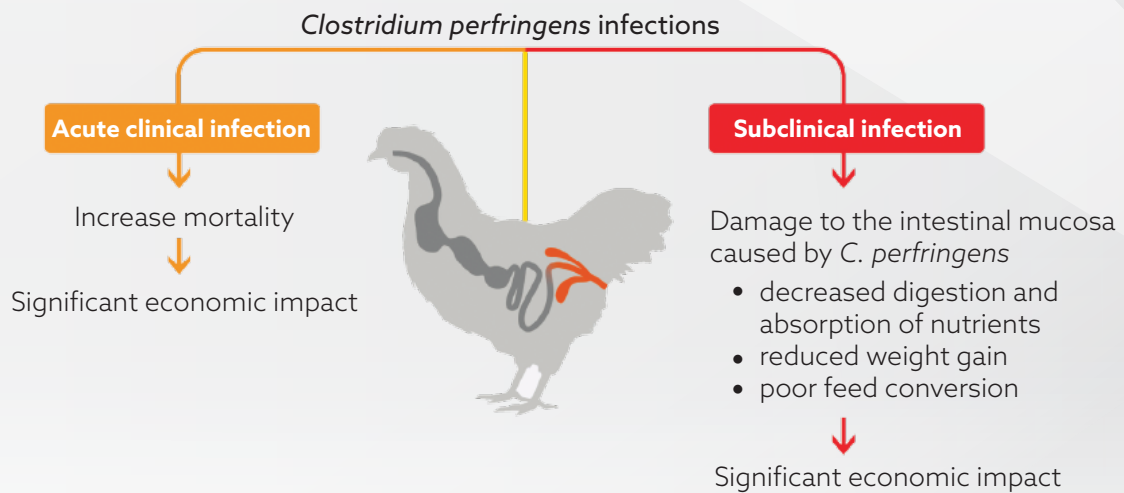




START EARLY, FINISH STRONG

Controls Clostridium perfringens effectively

MANIFESTATION OF CLOSTRIDIAL ENTERITIS



Graph 1. The effect of Clostridial enteritis infection on the daily gain of broilers



Figure 1. Typical wet litter due to Clostridial enteritis

Poultry producers see signs of specific growth retardation around the 23rd day of poultry age (Graph 1) or even earlier. Litter quality changes and becomes wetter, leading to increase moisture levels and more watery zone around the droppings (Figure 1).

Consequences of poor litter quality are increased foot pad lesions, hock lesions and breast blister resulting in higher levels of rejections at the processing plant.

CLOSTAT™

CLOSTAT™, THE ACTIVE PROBIOTIC THAT PREVENTS CLOSTRIDIAL PROLIFERATION

Prevention of Clostridial enteritis can be done by using CLOSTAT™. CLOSTAT™ contains a unique strain of *Bacillus subtilis* PB6 that was isolated from the gut of healthy chickens. CLOSTAT™ has a targeted effect against *C. perfringens* (Figure 2). Numerous research and field research trials have demonstrated that CLOSTAT™ is a reliable solution for Clostridial infections.

Figure 2. The effect of CLOSTAT™ on *C. perfringens* inhibition



(a) Competitor probiotic* and CLOSTAT™ cultured in MRS Agar.

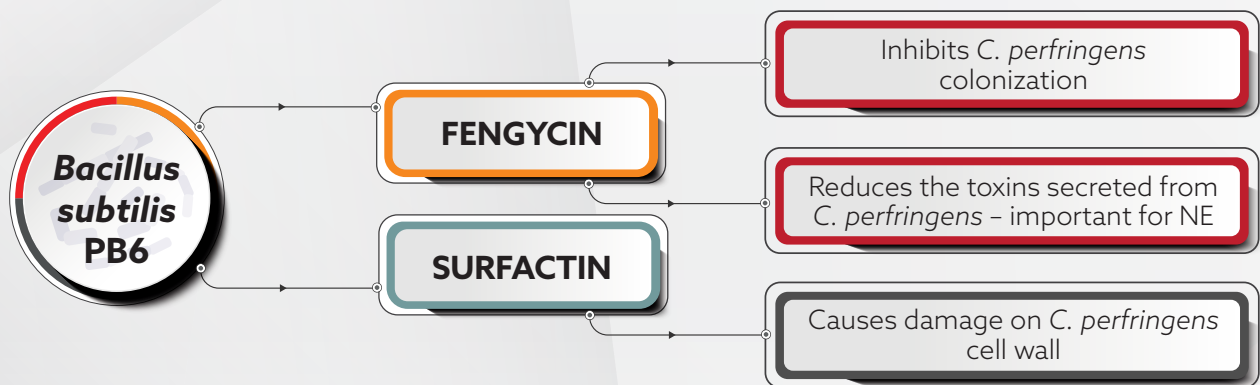


(b) Competitor probiotic* and CLOSTAT™ cultured in Tryptone Soy Agar supplemented with 0.6% yeast extract.

Competitor probiotic* failed to inhibit the growth of *C. perfringens*, at the selected conditions.

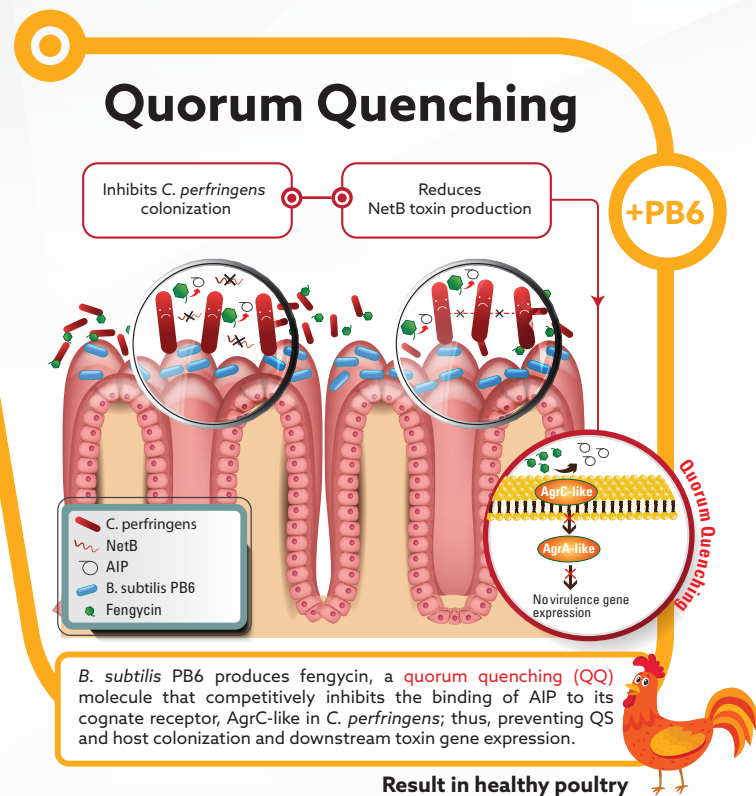
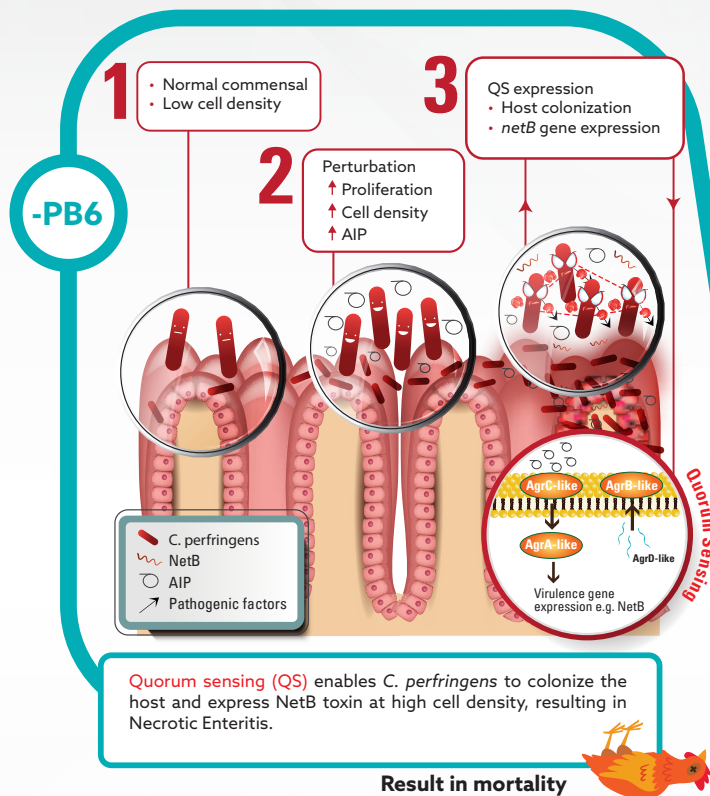
*Competitor probiotic composed of 15 different types of microorganisms (i.e., *Bacillus* spp., *Lactobacillus*, *Streptococcus* spp., *Enterococcus*, *Saccharomyces cerevisiae*, and *Aspergillus oryzae*).

CLOSTAT™ MODE OF ACTION



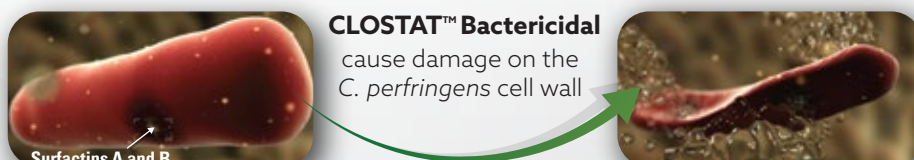
FUNCTION OF FENGYCIN

It is hypothesized that fengycin outcompetes Auto Inducing Peptide (AIP), the quorum-sensing signal that initiates host colonization and toxin production by *C. perfringens* at high cell density. The binding of fengycin to the AgrC-like receptor inhibits colonization and toxin production by *C. perfringens*.



FUNCTION OF SURFACTIN

The *B. subtilis* PB6 in CLOSTAT™ has been found to secrete one or more biocidal proteins that are inhibitory towards certain strains of pathogenic bacteria, such as *Clostridium* spp. These proteins disrupt the membrane of bacteria, causing leakage of the cell contents and ultimately killing the pathogenic bacteria without harming the beneficial gut microflora.



Probiotic that actively kills pathogenic bacteria specifically NetB toxin-producing *C. perfringens* through secretion of five different antimicrobial peptides.

CLOSTAT™ HIGHLIGHTS

CLOSTAT™ is compatible with common feed additives and most coccidiostats used in the feed industry, and is heat stable under normal commercial pelleting conditions.

Exceptional customer service with best in class technical, laboratory and customer support from our dedicated teams and well equipped laboratory.

- Clostridium Test Kits
- Farm and facility audits to identify gut health issues
- Feed and premix analysis to ensure recovery of CLOSTAT™

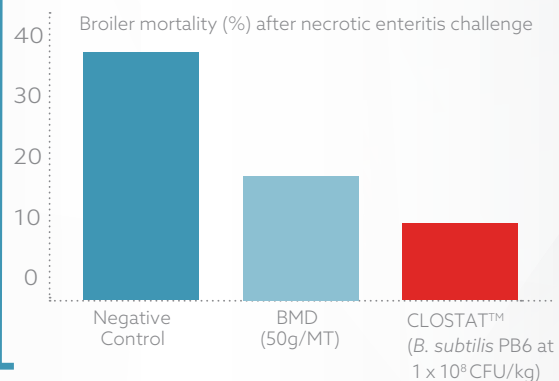
NECROTIC ENTERITIS CHALLENGE TRIAL

Ref: WP-07-00045

A 27-day experiment was conducted, all birds were challenged on day 14 with a mixed coccidial inoculum and afterwards they received an infection with *C. perfringens* to induce necrotic enteritis.

In the control group, the infection caused mortality up to 36% confirming the challenge stress exposed to the birds (Graph 2). Addition of *B. subtilis* PB6 at 1×10^8 CFU / kg of feed, reduced the mortality towards 9.4%, whereas BMD (50 g/MT) lowered the mortality towards 17.2%.

Graph 2. Effect on broiler mortality in necrotic enteritis challenge test



COMMERCIAL TRIAL IN ASIA

CLOSTAT™ trial in replacing AGP in a commercial broiler was conducted in Asia.

Table 1. CLOSTAT™ trial in replacing AGP in a commercial broiler in Asia

Group	Average Body Weight (kg)	Feed Conversion Rate (FCR)	Performance Index* (PI)
CLOSTAT™	2.73	1.61	407
Enramycin	2.53	1.57	389

*Performance Index compare the live-bird performance of flocks which includes live weight, age, liveability and feed conversion efficiency.

Ref: TD-16-00037

Graph 3. This trial shows that CLOSTAT™ is able to maintain flock performance (Performance Index*) without the use of AGP.

