Top Gut®

Pigs

The unique probiotic

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PROBIOTICS

Probiotics have been defined as **live microbial** supplements which **beneficially** affect the host animal by improving its **intestinal microbial balance**.

Achieving a balanced gut microbiota is critical to intestinal health because of the effect of bacteria on gut morphology, nutrition, intestinal disease and immune responses.

TOP GUT®

Top Gut® consists out of a unique probiotic ***Clostridium butyricum*** strain, a Gram-positive, strict anaerobic, **spore-forming** bacterium.

TOP GUT® CONSISTS OF SPORES

The spores of *Clostridium butyricum* protect Top Gut®:

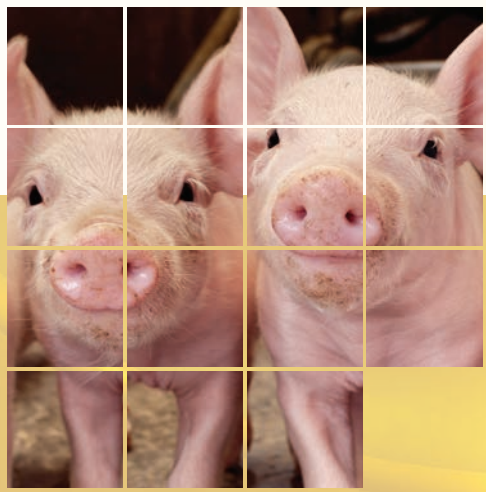
- In the highly acidic upper digestive tract
- During enzymatic digestion
- During antibiotic treatment

In the lower gastro-intestinal tract, the spores:

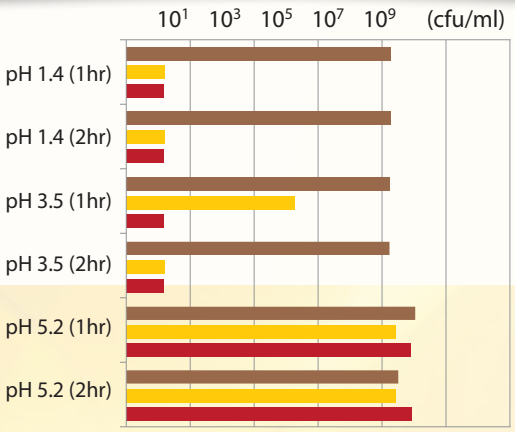
- germinate
- multiply
- temporarily colonize
- execute positive effect

CLOSTRIDIUM BUTYRICUM

Wirtz spore stain (x 1,000), Blue=vegetative cell, Pink=spore



TOP GUT® IS STABLE IN LOW PH



Viability of several bacteria in adult male human gastric acid.

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MODE OF ACTION OF TOP GUT®

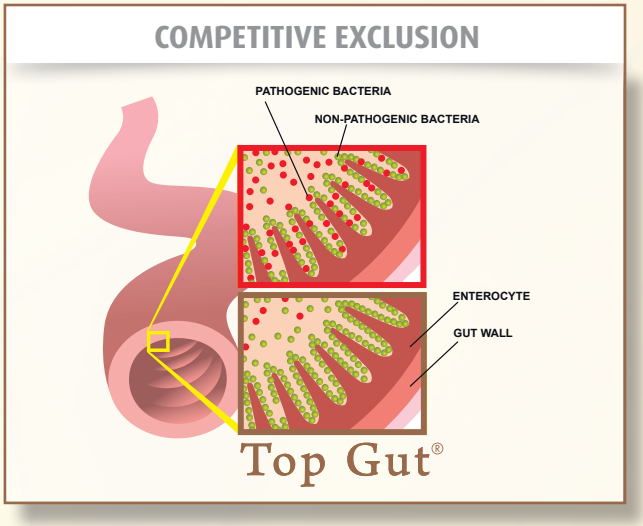
GENERAL

Top Gut® establishes and maintains a beneficial microbial population in the gut. This makes the gut environment less conductive to colonization by micro-organisms that may have a negative impact on animal performance.

MECHANISMS

1. Competitive exclusion

Top Gut® prevents colonization by pathogens through adhesion to the gut epithelium.



Benefits:

- Less colonization by pathogens
- No disruption of intestinal wall

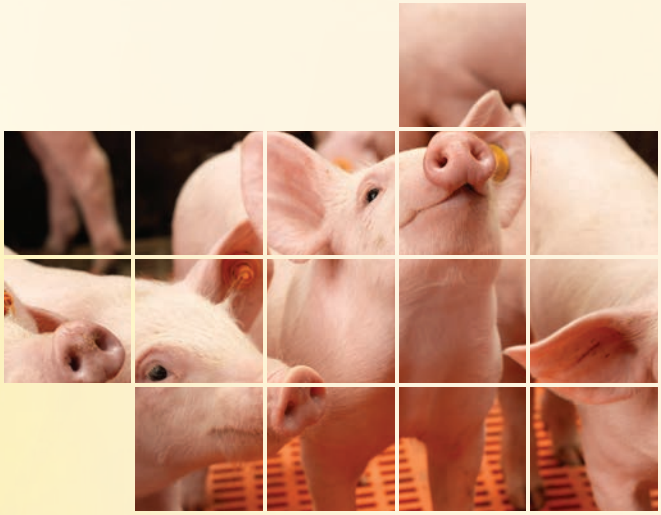
2. Antagonistic activity

Top Gut® demonstrates a direct antagonistic effect against several intestinal pathogens.

ANTAGONISTIC ACTIVITY	
Enterotoxigenic E. coli	Fujita, I. *et al.* (1986). Jpn. Pharmacol.
Candida albicans	Chen, H.Y. (1987). Jpn. J.
Klebsiella spp.	Fujita, I. *et al.* (1987). Jpn. Pharmacol.
Salmonella spp. and Vibrio spp.	Kuroiwa, T., *et al.* (1990). J. Jpn. Assoc.
Clostridium difficile	Kamiya, S. *et al.* (1997). Rev. Med. Microbiol.
Helicobacter pylori	Takahashi, M., *et al.* (2000). J. Med. Microbiol.
Enterohaemorrhagic E. coli	Takahashi, M., *et al.* (2004). FEMS Im. Med. Microbiol.

Benefits:

- Securing a healthy microflora
- Less pathogens in the gut



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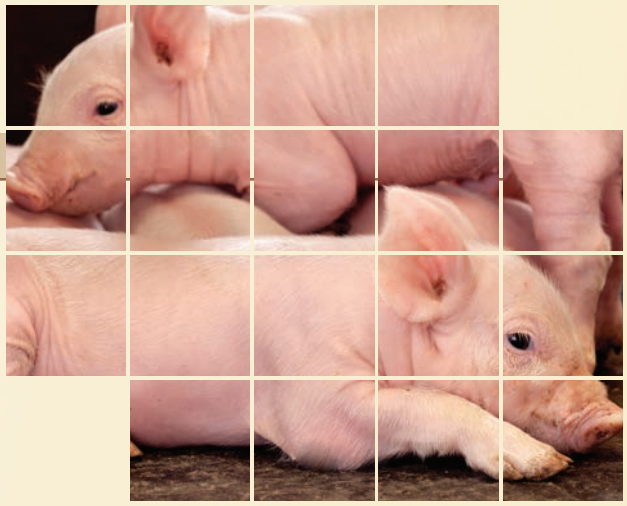
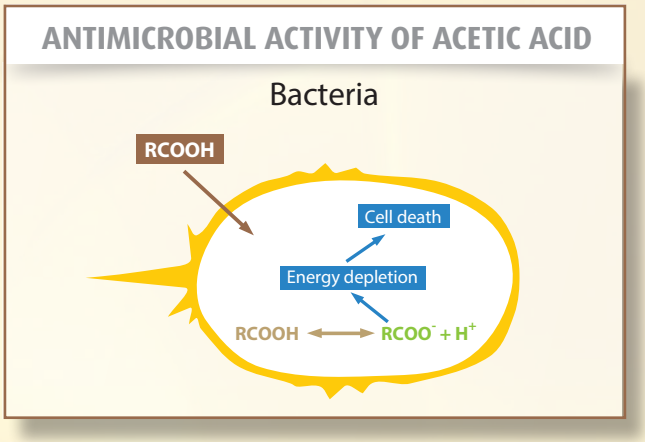
MODE OF ACTION OF TOP GUT®



3. Production of acetic acid

Acetic acid produced by Top Gut® inhibits microbial growth by passing across the cell membrane of pathogens, dissociating and acidifying the cell cytoplasm leading to cell death.

ANTIMICROBIAL ACTIVITY OF ACETIC ACID



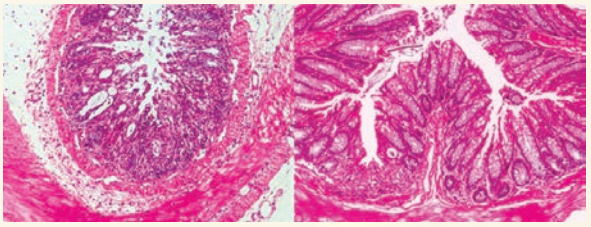
Benefits:

- Reduction of pathogens
- Acetic acid is an extra energy source for commensals

4. Production of butyric acid

Butyric acid produced by Top Gut® possesses anti-microbial activity and shows anti-inflammatory action. In addition butyric acid is the preferred energy source for colonocytes and exerts positive effect on jejunal and ileal epithelial cells.

TOP GUT® PROTECTS THE ANIMAL AGAINST INDUCED COLITIS



Induced colitis-non treated | Induced colitis- treated with Top Gut®

Benefits:

- Improved gut morphology
- Direct inhibition of pathogens
- Less energy loss through inflammation

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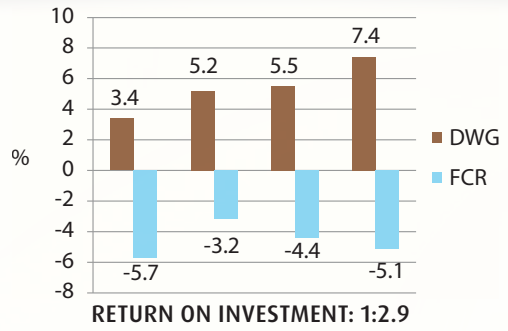
ECONOMICS OF TOP GUT®

INCREASING PERFORMANCE

Top Gut® reduces FCR and increases daily weight gain. The improvement of the growth of the animals is achieved through a natural, physiological way, improving digestion by balancing the gut flora.

TOP GUT® IMPROVES DWG AND FCR IN WEANED PIGLETS



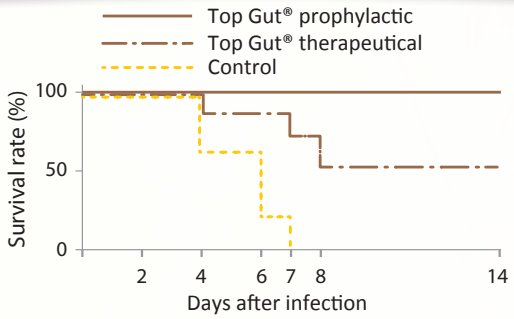
RETURN ON INVESTMENT: 1:2.9

All trials are conducted in piglets kept under optimal management (28-70 days of age).

REDUCING PATHOGENS

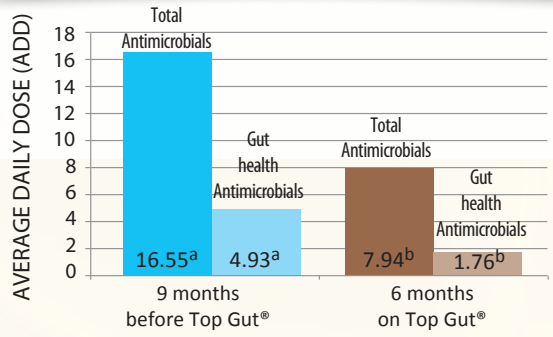
Top Gut® has a consistent stabilizing effect on gut flora. This creates a less favorable environment for pathogens, resulting in decreased mortality and reduced use of antimicrobials.

TOP GUT® INHIBITS INFECTION WITH ENTEROHEMORRHAGIC *E. COLI*



Eight week old mice were infected with EHEC 0157:H7. One group was supplemented with Top Gut® 4 days prior to challenge (10^8 cfu per animal), another group got Top Gut® 2 days post challenge (10^8 cfu per animal).

REDUCTION IN ANTIMICROBIAL USE

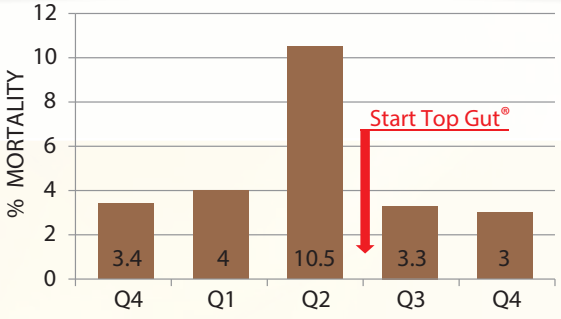


The evolution in antimicrobial use in a (7-30 kg) weaner pig farm infected with severe enteritis by *Enterobacteriacea* 9 months before and 6 months after the first supplementation with Top Gut®.

**ADD is mg active product/kg body weight treated*

different letters mean statistically different at P<0.05

DECREASE IN MORTALITY DUE TO CLINICAL *SALMONELLA* OUTBREAK



A weaned piglet farm which showed a sudden increase in mortality in Q2 due to severe enteritis with isolation of *E.coli* and *Salmonella spp.*, started supplementation with Top Gut® in week 28 as the piglets were not responding to antibiotic treatments. Mortalities dropped to 3.3% in Q3.

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DOSE RECOMMENDATIONS

	cfu *Clostridium butyricum*/ g Top Gut®	Recommended dose of Top Gut®/mton of feed	cfu *Clostridium butyricum*/ mton of feed
Top Gut®	$5^{*}10^{8}$	0.5 kg	$2.5^{*}10^{11}$

STABILITY

Due to its spore-forming ability Top Gut® can resist heat and high pressure, thus surviving the steam conditioning and pelleting process routinely used in the feed industry. As such, Top Gut® remains stable during feed processing, storage and digestion.

Temperature (°C)	Duration (min)	Recovery rate (log, expected: 11.39)
60	1 5 10	11.39 11.39 11.39
80	1 5 10	11.39 11.19 11.17

CONCLUSION

Top Gut®:

- **Is a probiotic complementary feed**
- **Contains spores of *Clostridium butyricum***
- **Produces butyric acid**
- **Prevents intestinal disorders caused by *Salmonella* and *E. coli***
- **Is stable during feed processing, storage and digestion**

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