

# MiYa-Gold®

*Pigs*

*The unique probiotic*

## PROBIOTICS

**Probiotics** have been defined as **live microbial** feed 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.

## MIYA-GOLD®

**Miya-Gold®** is a **probiotic feed additive** consisting of a unique genus of bacteria: **Clostridium butyricum MIYAIRI 588**. Clostridium butyricum is a gram positive, strict anaerobic, spore-forming bacterium.

### MIYA-GOLD® CONSISTS OF SPORES

**The spores of Clostridium butyricum protect Miya-Gold®:**

- throughout feed production
- in the highly acidic upper digestive tract
- during enzymatic digestion

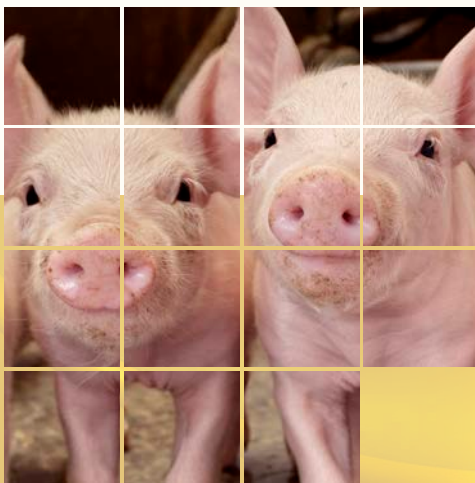
**In the lower gastro-intestinal tract, the spores:**

- germinate
- multiply
- temporarily colonize
- execute positive effect

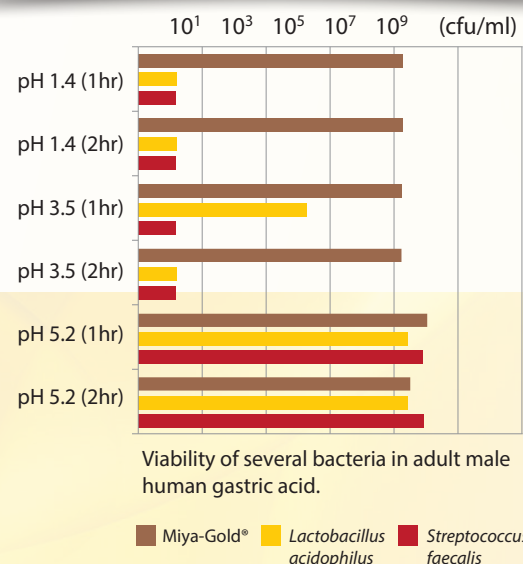
### CLOSTRIDIUM BUTYRICUM



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



### MIYA-GOLD® IS STABLE IN LOW PH



## MODE OF ACTION OF MIYA-GOLD®

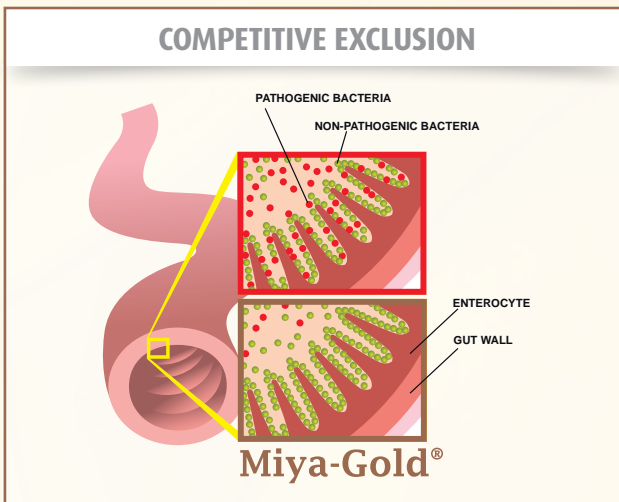
### GENERAL

**Miya-Gold® establishes and maintains a beneficial microbial population in the gut.** This makes the gut environment less conducive to colonization by microorganisms that may have a negative impact on animal performance.

### MECHANISMS

#### 1. Competitive exclusion

Miya-Gold® prevents colonization by pathogens through adhesion to the gut epithelium.



#### Benefits:

- Less colonization by pathogens
- No disruption of intestinal wall

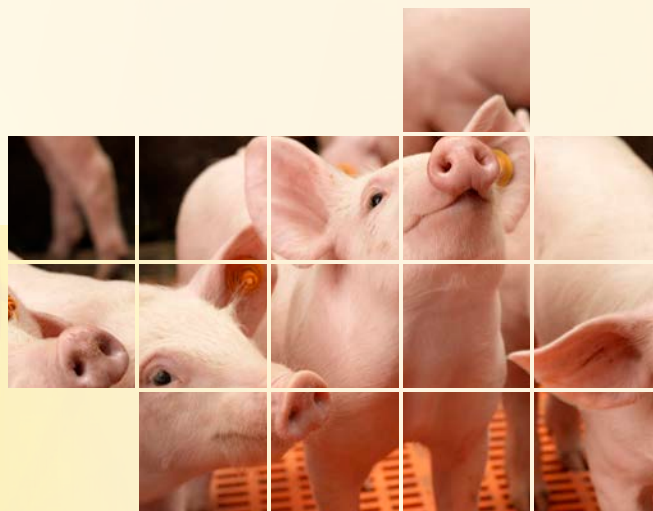
#### 2. Antagonistic activity

Miya-Gold® demonstrates a direct antagonistic effect against several intestinal pathogens.

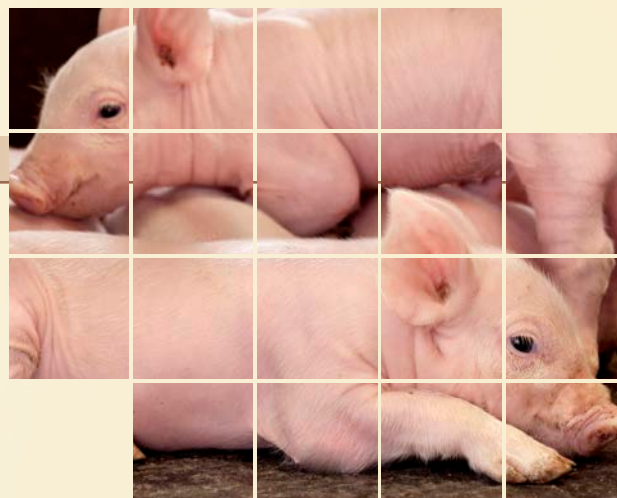
ANTAGONISTIC ACTIVITY	
Enterotoxigenic E. coli	Fujita, I. Et al. (1986). Jpn. Pharmacol.
Candida albicans	Chen, H.Y. (1987). Jpn. J.
Klebsiella spp.	Fujita, I. Et al. (1987). Jpn. Pharmacol.
Salmonella spp. and Vibrio spp.	Kuroiwa, T., et al. (1990). J. Jpn. Assoc.
Clostridium difficile	Kamiya, S. et 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







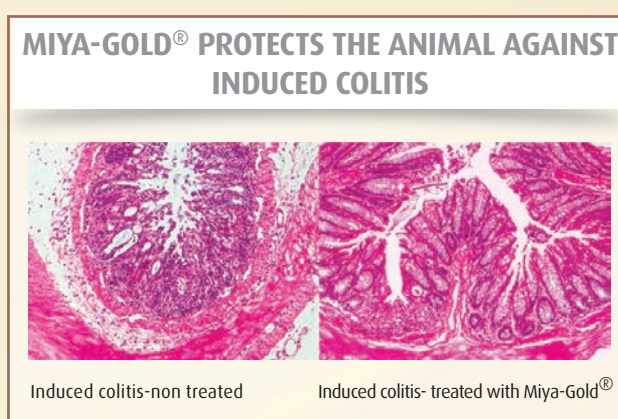
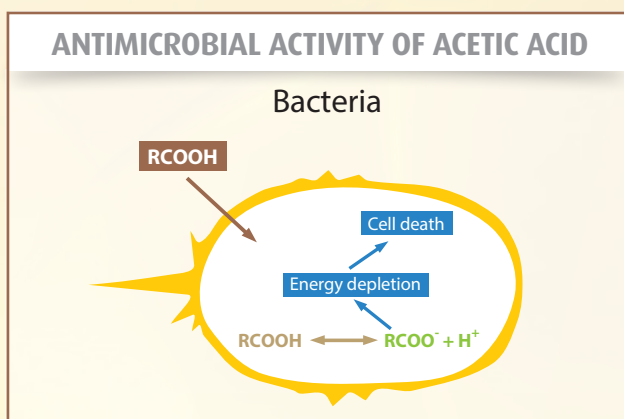
**MODE OF ACTION OF MIYA-GOLD®**

**3. Production of acetic acid**

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

**4. Production of butyric acid**

Butyric acid produced by Miya-Gold® possesses antimicrobial 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.



**Benefits:**

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

**Benefits:**

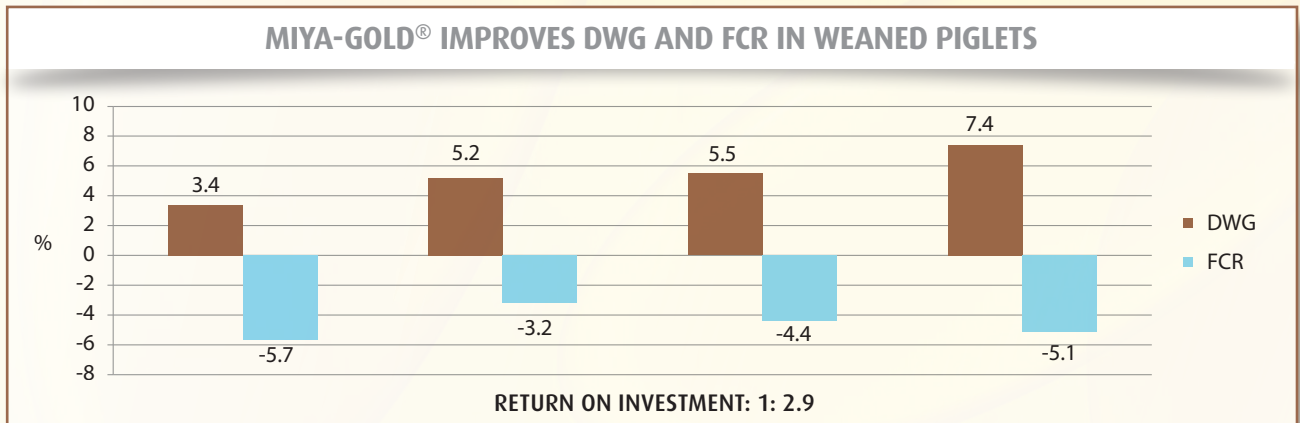
- Improved gut morphology
- Direct inhibition of pathogens
- Less energy loss through inflammation



## ECONOMICS OF MIYA-GOLD®

### INCREASING PERFORMANCE

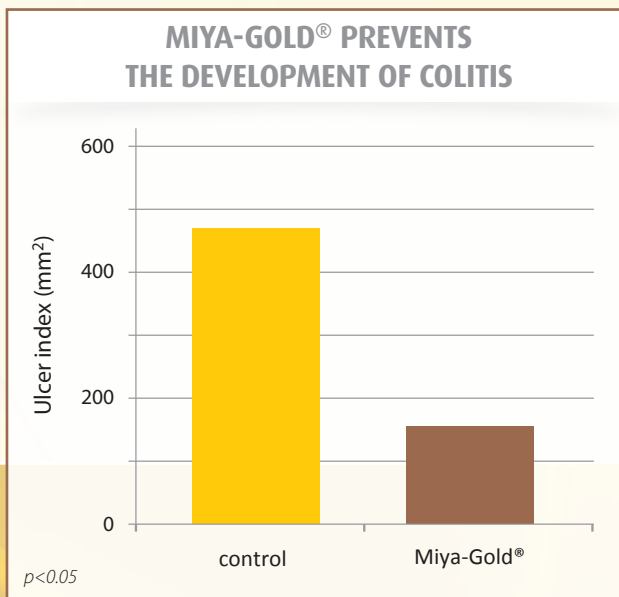
Miya-Gold® reduces FCR and increases daily weight gain. The improvement of the growth of the animals is achieved through a natural, physiological way, improving digestion by balancing the gut flora.



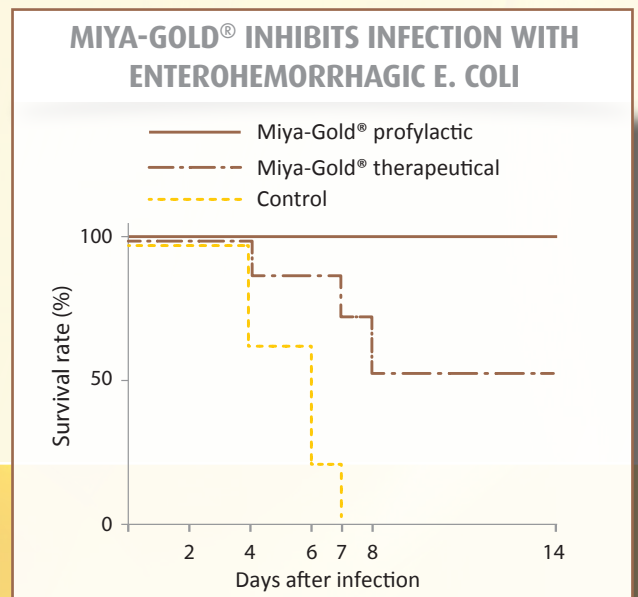
All trials are conducted in piglets kept under optimal management (28-70 days of age).

### PREVENTING ENTERIC DISORDERS

Miya-Gold® supports the animal at time of stress and environmental change. In addition Miya-Gold® protects growing animals from colonization by pathogens.



Colitis was induced by adding dextran sodium sulfate in the drinking water of 10 week old rats. One group was supplemented with Miya-Gold® ( $10^7$  cfu per day) 7 days prior to colitis induction. Ten days after induction the size of colon ulcers were measured.



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

## DOSE RECOMMENDATIONS

Species	cfu Clostridium butyricum/ g Miya-Gold®	Recommended dose of Miya-Gold®/mton of feed	cfu Clostridium butyricum/ mton of feed
Weaned piglets	5*10 <sup>8</sup>	0.5 kg	2.5*10 <sup>11</sup>
Minor porcine species			

## STABILITY

Miya-Gold® can resist heat and high pressure, thus surviving the steam conditioning and pelleting process routinely used in the feed industry. Miya-Gold® has a shelf-life of 24 months.

Temperature (°C)	Duration (min)	Recovery rate (%)
60	1	100
	5	100
	10	100
80	1	100
	5	63
	10	60
95	1	98

Pellet stability of Miya-Gold® at different temperatures.



## CONCLUSION

### Miya-Gold®:

- Is a probiotic feed additive
- Consists of Clostridium butyricum spores
- Increases performance
- Stimulates gut health
- Is heat stable

# Miya-Gold®

*The unique probiotic*

Dodává:

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Vyrábí:

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