SYNBIO®

SACCO system
Supporting food culture & life

TECHNICAL INFORMATION

IDENTIFICATION
16S rDNA gene sequence analysis
RAPD method

SAFETY
Included in EFSA QPS list
(EFSA Journal 2017)

Absence of investigated antibiotic resistance genes
(EFSA Journal, 2018, 16(3):5206)

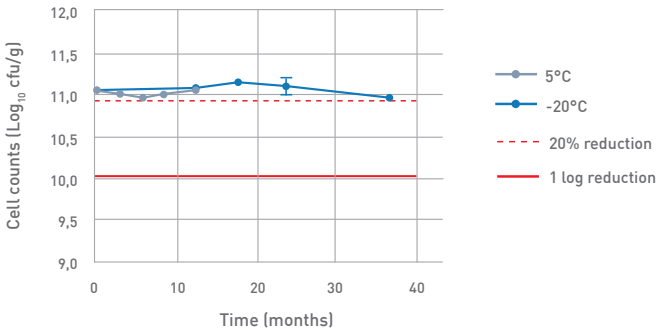
BSE/TSE free

GMO free

Colorant free and hypoallergenic
(list of allergens in compliance with Reg. UE 1169/2011)

SHELF LIFE
18 months at temperature <-18°C
12 months at temperature 5±3°C

STABILITY (Log_{10} CFU/g)
Stability studied both on the blend and on the dosage form (sachet)

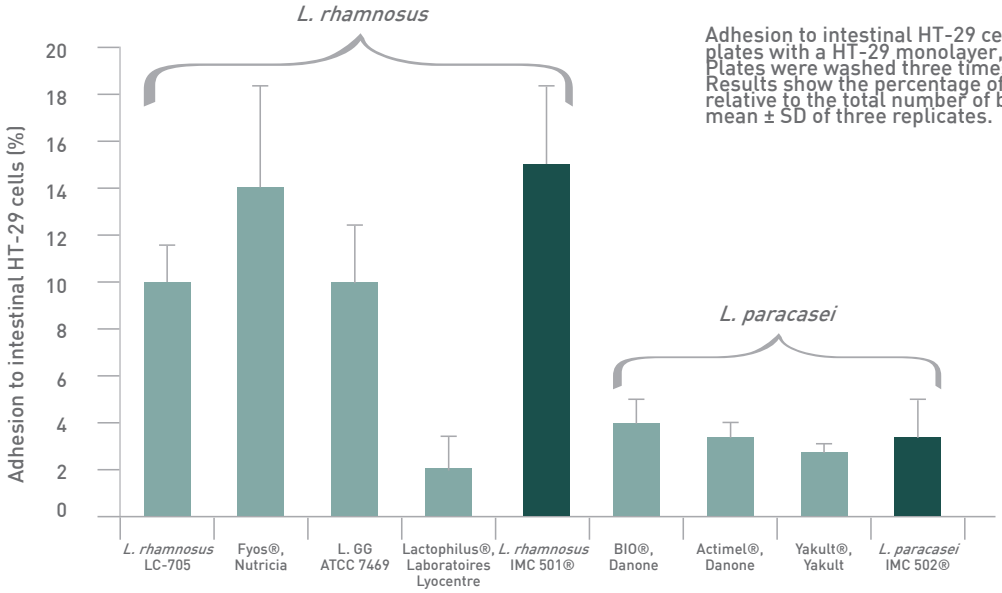


L. rhamnosus IMC 501® STRAIN DEPOSIT NUMBER
DSM 16104

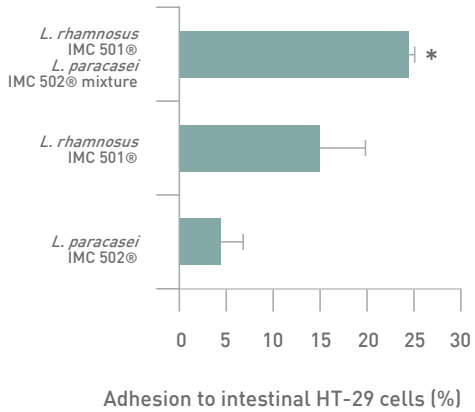
L. paracasei IMC 502® STRAIN DEPOSIT NUMBER
DSM 16105

CHARACTERISTICS

- Bile and acid tolerance >95%
- Survival in the GI tract
- Adheres to epithelial intestinal cell line HT-29.
  SYNBIO® strains, *L. rhamnosus* IMC 501® and *L. paracasei* IMC 502®, showed comparable or superior adhesion to human intestinal HT-29 cells, compared to other commercial strains, in vitro.



Adhesion to intestinal HT-29 cells. Bacterial cultures (1E9 CFU) were added to plates with a HT-29 monolayer, and incubated at 37 C for 2 h. Plates were washed three times with PBS to collect non-adhering bacteria. Results show the percentage of bacterial cells adhered to the HT-29 monolayer, relative to the total number of bacterial cells added. Each value represents the mean ± SD of three replicates.



- antimicrobial activity against pathogens, especially vs *Candida albicans*

Bacterial strain	Inhibition of growth* of				
	E. coli (ATCC 11775)	*S. aureus* (ATCC 25923)	*C. albicans* (ATCC 10261)	*C. perfringens* (ATCC 13124)	*S. mutans* (ATCC 20523)
L. rhamnosus IMC 501®	+++	++	++++	+++	+
L. paracasei IMC 502®	+	+++	++++	+++	+

*** Inhibition zone: + <2.0-1.5 cm; ++ <2.0-2.5 cm; +++ <2.5-3.0 cm; ++++ >2.5-3.0 cm;**

Reference: Verdenelli et al., 2009.

SYNBIO® AND HOUSE DUST MITE ALLERGY

Allergies occur when the immune system overreacts to environmental factors that are harmless to most individuals. One of the most prevalent allergies is caused by house dust mites (HDM). Between 65-130 million people are estimated to suffer from HDM allergy worldwide. In recent decades, the incidence of allergies has increased in Western countries, which has been strongly linked to a relative lack of microbial stimulation of the immune system during infancy and excessive hygienic practices during early childhood in Western households . An innovative treatment consists of modulating the gut microbiome through probiotics, prebiotics and synbiotics to prevent allergic disease.

SYNBIO® can alleviate the allergy symptoms caused by house dust mites.

CLINICAL TRIAL
Single arm

- **30** with HDM allergy — Subjects
- **18-41** Years old — Age group
- **15x10⁹** CFU/day — 1:1 *L. rhamnosus* IMC 501 *L. paracasei* IMC 502 Inulin 0,115g/day
- **6** months — Intervention period

RESULTS

- **Susceptibility**

57% of subjects had reduced sensitivity to allergens after the 6 months treatment

- **Allergenic symptomatology and gastrointestinal well-being statistically improved in the synbiotic treatment (P<0.05):**

*statistically significant difference (P<0.05) due to the synbiotic treatment

IMPROVED

- conjunctivits
- dry eye
- lacrimation
- burning eye
- intestinal regularity
- easiness of defecation
- increase in stool volume
- bloating
- allergic cold
- fatigue
- fever
- itchiness
- cough
- nasal obstruction
- rhinorrhoea
- sneezing

- **Health-related quality of life:** all 30 subjects had a global score of 79±4.2 for the Psychological General Well-being Index that corresponded to a "no distress" general well-being after synbiotic treatment.

- **Recovery of probiotic strains from fecal samples:** after 6 months of synbiotic supplementation, *L. rhamnosus* IMC 501® and *L. paracasei* IMC 502® were detected with a frequency of about 93% and 87% respectively, in a sampled subset of 15 subjects.

Reference: Cecchini et al., 2016.

SYNBIO® AND GUT HEALTH

The composition of the intestinal microbiota is greatly related to the health of the host. Oral administration of probiotics is suggested to have a positive effect on people's general wellbeing, specifically, the composition of the intestinal microbiota and resistance against pathogen colonization.

SYNBIO® improves intestinal microbiota and prevents harmful bacteria. Moreover, it exerts a positive effect, in terms of improved bowel habits, on healthy adults.

CLINICAL TRIAL
Double-blinded, randomized, placebo controlled

50 healthy adults
- 25 PROBIOTIC
- 25 CONTROL

23-65 Years old
Age group

1x10⁹ CFU/day
1:1 Daily dose of
L. rhamnosus IMC 501®
L. paracasei IMC 502®

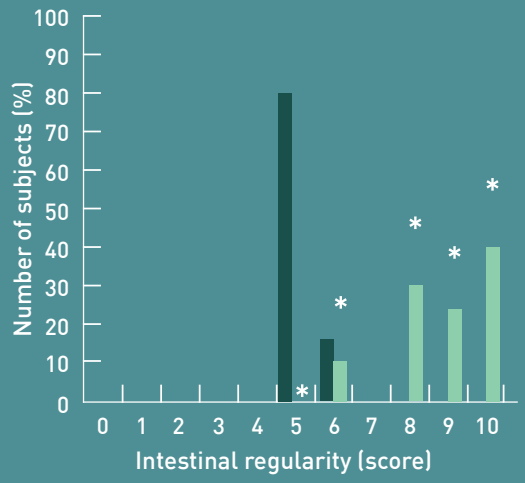
12 months
Intervention period

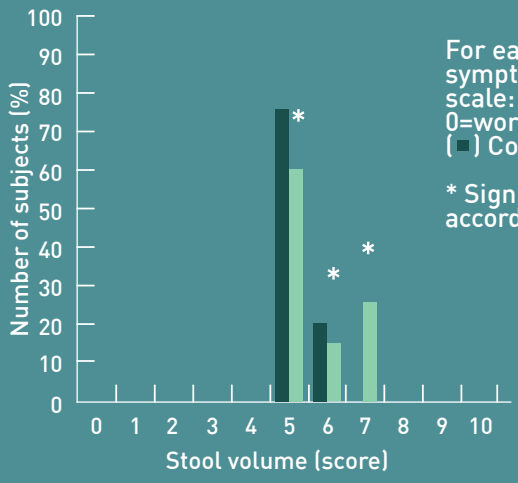
RESULTS

- **improves intestinal microbiota in the probiotic group**
  - ↑ *Bifidobacteria* *Clostridia*
  - ↓ *Lactobacillus* *Enterobacteria*
- **improves bowel habits**

Mean Log CFU/g ± SD

	Lactobacillus		*Bifidobacterium*	
	Culture method	Real-time PCR quantification	Culture method	Real-time PCR quantification
Before consumption	8·5 ± 0·1	9·4 ± 0·3	8·2 ± 0·1	8·5 ± 0·7
After consumption	10·5 ± 0·2	11·1 ± 0·5	10·3 ± 0·2	10·1 ± 0·9
After wash-out	9·4 ± 0·1	9·8 ± 0·6	8·4 ± 0·2	8·4 ± 1·0





For each graph subjects scored their symptoms using a discrete graduated scale:
0=worse, 5=no change, 10=best.
(■) Control group, (■) Probiotic group.

* Significantly different from control group, according to chi-squared test (P<0.005).

Reference: Verdinelli et al., 2011(a).

SYNBIO® AND SPORT - Reduction of oxidative stress

It is well known that intense physical activity induces oxidative stress. Several studies have established that specific strains of probiotics prevent and correct oxidative stress. In vitro studies with both intact cells and intracellular cell-free extracts of *L. rhamnosus* IMC 501® and *L. paracasei* IMC 502® showed an antioxidative effect of these strains through the inhibition of lipid peroxidation.

SYNBIO® displays a strong antioxidant activity: athletes may benefit from the ability of these probiotics to increase antioxidant levels and neutralize the effects of reactive oxygen species.

CLINICAL STUDY
double-blinded, randomized, placebo controlled

24 male athletes
- 12 CONTROL
- 12 PROBIOTIC

26-38 Years old
Age group

1x10⁹ CFU/day
1:1 Daily dose of *L. rhamnosus* IMC 501®
L. paracasei IMC 502®

4 weeks
Intervention period

RESULTS

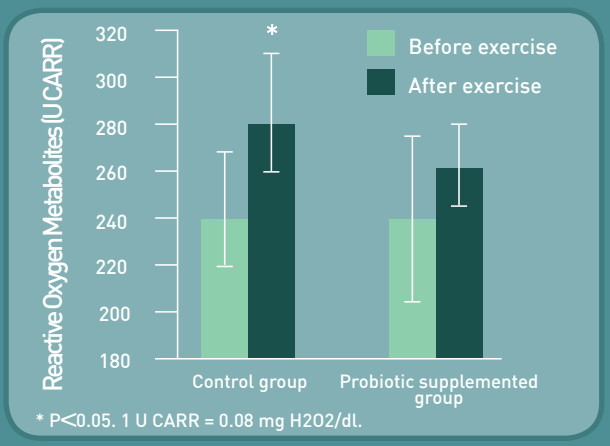
MICROBIAL ANALYSIS:

Lactobacillus count increased significantly in the probiotic group. The SYNBIO® strain was detected in all the subjects within the probiotic group.

CHANGES IN PLASMA REACTIVE OXIGEN METABOLITES

The control group's level of Reactive Oxygen Metabolites (ROMs) at the end of the training was significantly higher than that measured before physical activity ($P<0.05$), while no significant changes in ROMs were observed in the probiotic group. After exercise ROMs levels were higher in the control group compared to the probiotic group $P>0.05$.

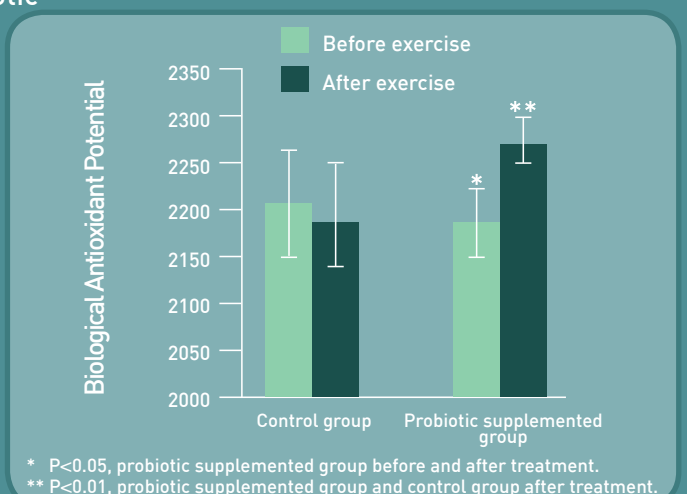
→ SYNBIO® can neutralize ROMs



PLASMA BIOLOGICAL ANTIOXIDANT POTENTIAL

In the probiotic group, the Biological Antioxidant Potential (BAP) increased after supplementation, despite physical activity ($P<0.05$). BAP levels were higher in the probiotic group compared to the control ($P<0.01$)

→ SYNBIO® supplementation increases the plasma antioxidant levels



Reference: Verdinelli et al., 2011(a).

SYNBIO® AND SPORT - Effect on respiratory and gastrointestinal symptoms in athletes

There is a heightened incidence of upper respiratory tract (URT) and gastrointestinal (GI) illness, particularly diarrhea, during intense training and competitions that may have negative consequences for athletic performance. The increase of URT infections in athletes is a demonstrated consequence of exercise-induced changes in the immune system, which create an opportunity for pathogens to establish themselves. Maintaining a healthy GI tract microbiota may possibly prevent the occurrence of infections and reduce their duration.

SYNBIO® supplementation improves GI well-being and reduces cold symptoms.

CLINICAL STUDY
double-blinded, randomized, placebo controlled

160 male cyclists
- 80 CONTROL
- 80 PROBIOTIC

29-41 Years old
Age group

1x10⁹ CFU/day
1:1 Daily dose of
L. rhamnosus IMC 501®
L. paracasei IMC 502®

12 weeks
Intervention period

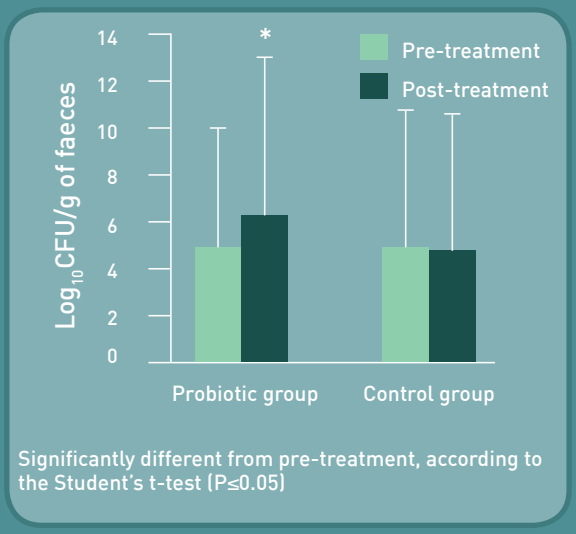
RESULTS

- **Analysis revealed a signifcant increase in the faecal *Lactobacillus* cell counts post-treatment, in the probiotic group compared to the control**
- **Treatment with SYNBIO® significantly improved GI wellbeing and reduced cold symptoms.**

IMPROVED

- intestinal regularity
- stool volume
- stool consistency
- ease of defecation
- borborygmi
- bloating
- flatulence
- constipation
- diarrhea
- abdominal pain and intestinal cramps
- cold frequency
- tiredness

PGWBI Psychological General Well-being Index scores of probiotic group significantly differ from control group: 88.3 VS 80.5 ($P<0.05$)



Significantly different from pre-treatment, according to the Student's t-test ($P \leq 0.05$)

SYNBIO® improved wellbeing in male athletes, making it the perfect probiotic blend for individuals who exercise regularly in order to avoid a decline in GI and respiratory health.

Reference: Verdenelli et al., 2011(b).

REFERENCES

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