Paroiro BAKERY CAFE 85:15

MICROBIOME Korea Research Institute

GLUTEN-DEGRADING PROBIOTIC

Wheat flour foods such as bread, pasta, cereals, and a variety of snacks are popular and loved by almost everyone. Wheat flour, which is chewy, sticky, and crunchy depending on the recipe, is used almost indiscriminately in modern food, and it is one of the most important raw ingredients in the food industry.

Wheat naturally contains an insoluble protein complex called "gluten" along with starch. Gluten is largely composed of two proteins: "glutenin," responsible for the elasticity of dough, and "gliadin," which increases the extensibility and viscosity of dough. When flour is mixed with water, gliadin and glutenin combine to form gluten in a web-like structure. The problem is that when gluten enters our body through wheat, it is not broken down properly during digestion and causes various digestive disorders in the gastrointestinal tract. In particular, of the two proteins, glutenin degrades whereas gliadin ends up sticking to the mucous membrane of the large intestine instead of excreting through feces. This leads to accumulation of stool and generation of harmful toxins that increase harmful bacteria while decreasing the good bacteria in the intestine, disrupting the ideal intestinal microbial balance, a state that is called "dysbiosis." Moreover, studies have linked gluten consumption and various complications or diseases, such as digestive disorders (gas, bloating, heartburn), gluten intolerance, gluten allergy, inflammatory (irritable) bowel disease, leaky gut syndrome, etc.

Microbiome Inc., a company specializing in microbiome technology has developed and released **"Gluten-Degrading Probiotic"** in an effort to alleviate the problems that can occur from gluten and to help you eat wheat flour worry-free. Our probiotic can be easily sprinkled on your dishes, applied during cooking, or can be simply taken with water. It contains four different beneficial lactic acid bacteria, two of which are strains **De-glu MB 0601** and **De-glu GLU70** that have each been patented for its gluten-degrading activity. It also contains 7 types of postbiotics, or heat-treated, dried cultures that provide beneficial metabolites of the lactic acid bacteria

❖Gluten-Degrading Probiotic- 4 Strains

① **De-glu MB0601 :** Researched and developed by Microbiome Inc. and a government-funded biotechnology research institute, it was officially patented as "MB0601 strain with gluten-degrading ability." An average of 70% gluten degradation was confirmed when flour dough was fermented with the strain. In addition, De-glu MB0601 has the effect of enhancing digestion by increasing gastrin, which promotes gastric juice secretion, and increasing pancreatic amylase, a carbohydrate-degrading enzyme.

② **De-glu GLU70 :** It has been patented as "an active ingredient for preventing, improving, or treating gliadin-induced inflammatory bowel disease, having gluten degradation activity." De-glu GLU70 strain was confirmed to effectively degrade gluten in wheat flour and inhibit intestinal inflammation and damage to intestinal epithelial cells caused by gliadin.

③ **5-Strain Probiotic Complex:**

These five strains (*Lactobacillus plantarum* ML-004, *Lactobacillus sakei* ML-036, *Lactobacillus acidophilus* ML-019, *Leuconostoc mesenteroides* ML-035, *Lactobacillus paracasei* ML-117) were isolated from Korean traditional fermented foods. A nationally-recognized test analysis confirmed the antibacterial and antiviral effects of this mixed-strains culture.

④ **Digestive-enzyme producing strain:**

It promotes the secretion of amylase, which breaks down carbohydrates including the starch in flour, and protease, which breaks down proteins. It facilitates the overall breakdown, absorption, and digestion of flour and helps to improve digestive problems caused by bloating or gas when eating flour foods.

❖Gluten-Degrading Probiotic- 7 Postbiotics (Heat-treated, dried cultures)

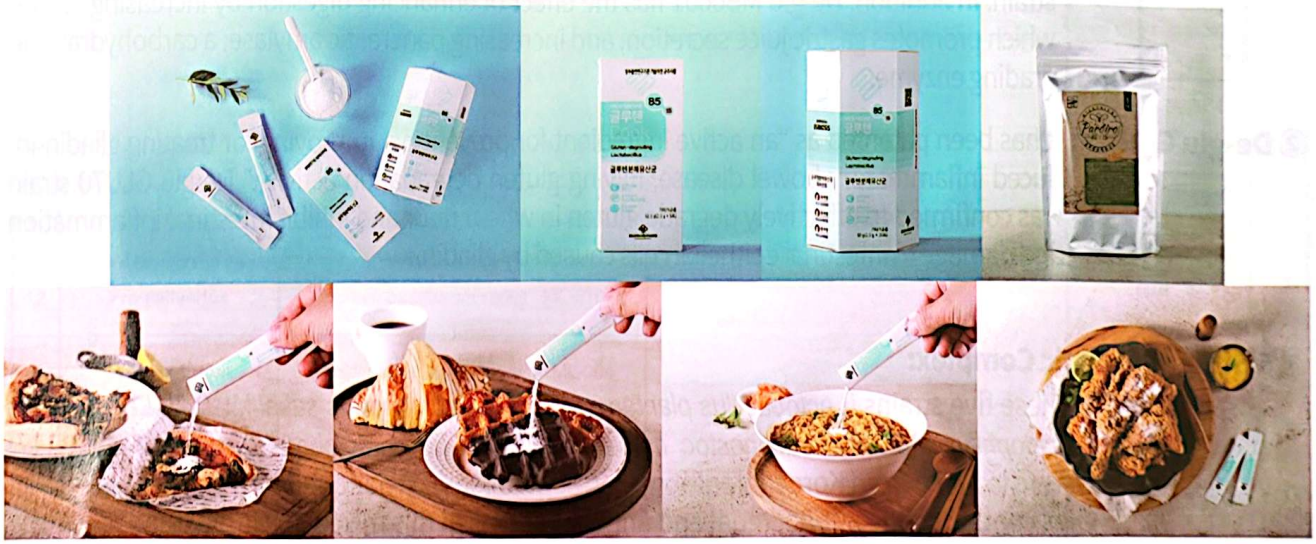
① **De-glu MB1 :** It is a heat-treated, dried probiotic culture developed using the patented strain De- glu MB0601, which degrades gluten and promotes the secretion of gastrin and pancreatic amylase, overall improving the digestion of flour. As a postbiotic, MB1 also contains beneficial metabolites such as organic acids and short chain fatty acids, which help to create a healthy intestinal environment.

② **De-glu MB2 :** It is a heat-treated, dried culture of the patented strain De-glu GLU70 with gluten-degrading ability, and as a postbiotic itself also received a patent for "preventing, improving, or treating gliadin-induced inflammatory bowel disease." It has been confirmed to improve the degeneration and damage of intestinal epithelial cells caused by gliadin and to inhibit intestinal inflammation by increasing anti-inflammatory proteins while decreasing pro-inflammatory proteins.

③ **Dipro-rhamnosus :** It was developed as a heat-treated, dried culture using the rhamnosus strain, which was patented as "novel strain for preventing or treating obesity." Animal experiments showed that the strain has the effect of preventing obesity by converting energy-storing white adipocytes into energy-consuming brown adipocytes, suppressing weight gain, as well as reducing total cholesterol and low-density lipoprotein (LDL) level.

④ **MB201** ⑤ **MB202,** ⑥ **MB203,** ⑦ **MB204 :** These are heat-treated, dried cultures of four strains of lactic acid bacteria isolated from Korean fermented foods. A nationally-recognized test analysis reported 17 types of amino acids, various organic acids and short-chain fatty acids in these cultures.

❖Easy & Various Ways of Application



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Microbiome Inc. Probiotic Ingredient List

[Probiotics(Food Ingredient)]

No.	Product	Strain	Effects/Features	Certification/Reference
1	**KR-050L**	*Lactococcus lactis* KR-050L	<Patent> • Prevention or treatment of inflammation	Patent Research Paper (2)
2	**DS0508**	*Lacticaseibacillus rhamnosus* DS0508	<Patent> • Prevention or treatment of obesity	Patent (2) Research Paper (1)
3	**DS0956**	*Bifidobacterium longum* DS0956	<Patent> • Prevention or treatment of obesity	Patent Research Paper (1)
4	**MB0601**	*Lactiplantibacillus plantarum* MB0601	<Patent> • Gluten-degrading activity • Gastrin (digestive hormone) secretion • Amylase (digestive enzyme) secretion	Patent
5	**GLU70**	*Lacticaseibacillus paracasei* GLU70	<Patent> • Gluten-degrading activity • Prevention of gliadin-induced inflammatory bowel disease	Patent (2) Research Paper (2)
6	**5-Strain Probiotic Complex**	*Lactiplantibacillus plantarum* ML-004 *Lactobacillus sakei* ML-036 *Lactobacillus acidophilus* ML-019 *Leuconostoc mesenteroides* ML-035 *Lacticaseibacillus paracasei* ML-117	• Antibacterial Effects: Over 99% inhibition of Klebsiella pneumoniae, Pseudomonas aeruginosa, Salmonella spp., Escherichia coli, and other bacteria. • Antiviral Effects: Over 99% inhibition of respiratory viruses and rotavirus	Test Report Certificate of Deposit
7	**5-Strain Synbiotic Complex**	*Lactiplantibacillus plantarum* ML-004 *Lactobacillus sakei* ML-036 *Lactobacillus acidophilus* ML-019 *Leuconostoc mesenteroides* ML-035 *Lacticaseibacillus paracasei* ML-117	• Antibacterial Effects: Over 99% inhibition of Klebsiella pneumoniae, Pseudomonas aeruginosa, Salmonella spp., Escherichia coli, and other bacteria. • Antiviral Effects: Over 99% inhibition of respiratory viruses and rotavirus	Test Report Certificate of Deposit
8	**MF01**	*Aspergillus oryzae*	<Patent> • Produces digestive enzymes • Promotes fermentation	Patent
9	**Pro-gasseri**	*Lactobacillus gasseri* ML-001	• Improved bowel function • Provides nutrients for healthy gut environment	
10	**Pro-reuteri**	*Limosillactobacillus reuteri* ML-014		
11	**Pro-helveticus**	*Lactobacillus helveticus* ML-008		
12	**Pro-salivarius**	*Ligilactobacillus salivarius* ML-010		
13	**Pro-plantarum**	*Lactiplantibacillus plantarum* ML-004		
14	**Pro-paracasei**	*Lacticaseibacillus paracasei* ML-003		
15	**ML-131**	*Lactobacillus brevis* ML-131	• Anti-inflammation • Irritable Bowel Syndrome (IBS) relief	
16	**ML-139**	*Lactobacillus curvatus* ML-139	• Improves hypertriglyceridemia, high blood sugar, and cholesterol levels	

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Microbiome Inc. Probiotic Ingredient List

[Postbiotics(Food Ingredient)]

No.	Product	Strain	Effects/Features	Certification/Reference
1	**INF1**	Heat-treated lactic acid bacteria *Lactococcus lactis* KR-050L	<Patent> • Prevention or treatment of inflammation	Patent Research Paper (2)
2	**Dipro-rhamnosus**	Heat-treated lactic acid bacteria *Lacticaseibacillus rhamnosus* DS0508	<Patent> • Prevention or treatment of obesity	Patent (2) Research Paper (1)
3	**OB1**	Heat-treated lactic acid bacteria *Bifidobacterium longum* DS0956	<Patent> • Prevention or treatment of obesity	Patent Research Paper (1)
4	**MB1**	Heat-treated lactic acid bacteria *Lactiplantibacillus plantarum* MB0601	<Patent> • Gluten-degrading activity • Gastrin (digestive hormone) secretion • Amylase (digestive enzyme) secretion	Patent
5	**MB2**	Heat-treated lactic acid bacteria *Lacticaseibacillus paracasei* GLU70	<Patent> • Gluten-degrading activity • Prevention of gliadin-induced inflammatory bowel disease	Patent Research Paper (2)
6	**MB201**	*Lactiplantibacillus plantarum* ML-004	• Contains lactic acid bacteria metabolites (short-chain fatty acids, GABA, organic acids, amino acids)	Test Report Certificate of Deposit
7	**MB202**	*Lactobacillus sakei* ML-036		
8	**MB203**	*Lactobacillus acidophilus* ML-019		
9	**MB204**	*Leuconostoc mesenteroides* ML-035		
10	**MB205**	*Lacticaseibacillus paracasei* ML-117		
11	**5-Strain Postbiotic Complex**	Heat-treated lactic acid bacteria MB201~MB205+ chicory fiber	• Contains lactic acid bacteria metabolites (short-chain fatty acids, GABA, organic acids, amino acids)	Test Report Certificate of Deposit
12	**MB-gasseri**	*Lactobacillus gasseri* ML-001	• Contains lactic acid bacteria metabolites • Improves gut health and bowel function	
13	**MB-reuteri**	*Limosillactobacillus reuteri* ML-014		
14	**MB-helveticus**	*Lactobacillus helveticus* ML-008		
15	**MB-salivarius**	*Ligilactobacillus salivarius* ML-010		
16	**MB-plantarum**	*Lactobacillus plantarum* ML-004		
17	**MB-paracasei**	*Lactobacillus paracasei* ML-003		
18	**6-Strain Postbiotic Complex**	6 strains of mixed heat-treated lactic acid bacteria (#12~17)		
19	**INF2**	*Lactobacillus brevis* ML-131	• Anti-inflammation • Irritable Bowel Syndrome (IBS) relief	
20	**OB2**	*Lactobacillus curvatus* ML-139	• Improves hypertriglyceridemia, high blood sugar, and cholesterol levels	

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Microbiome Inc. Probiotic Ingredient List

[Agriculture]

No.	Product	Strain	Effects/Features	Certification/Reference
1	**Microbiome Farm MB1**	*Lactobacillus plantarum* ML-004	• Microbiome fertilizer for agricultural use • Improves quality of fruits and other agricultural products	Test Report
2	**Microbiome Farm MB2**	*Lactobacillus paracasei* ML-117		
3	**Silage Inoculants**	*Bacillus subtilis* IN-55 *Lactobacillus plantarum* BT-77	<Patent> • Strain, manufacturing method, and solid-state fermentation method for silage production	Patent

[Pets]

No.	Product	Strain	Effects/Features	Certification/Reference
1	**BR301**	*Limosillactobacillus reuteri* BR301	• Antibacterial activity • Excellent anti-inflammatory activity • Mix of beneficial microbes for pets	Patent Research Paper (1)
2	**MBS1**	*Bacillus subtilis* MBS1	<Patent> • Improves feed/nutrient absorption and digestion • Produces digestive enzymes • Increases protein and nutrient content	Patent

[Cosmetics·Hygiene]

No.	Product	Strain	Effects/Features	Certification/Reference
1	**Tremella fuciformis mycelium TFCUV5**	*Tremella fuciformis* TFCUV5	<Patent> • Strain with excellent growth rate and high molecular polysaccharide productivity *Tremella fuciformis polysaccharaide : Highly moisturizing, whitening, skin regeneration effects	Patent
2	**Sophorolipids**	*Candida bombicola* LA-200	<Patent> • Method for high production of sophorolipids using sophorolipid-producing strains *Sophorolipids: Natural (biological) surfactants	Patent
3	**Lactococcus Fermentation Lysate**	*Lactococcus lactis* KR-050L	<Patent> • Anti-inflammation • Modulates skin immunity • Atopic dermatitis relief • Contact dermatitis relief • Psoriasis relief	Patent Research Paper (1) (Atopic dermatitis)
4	**Lactobacillus-Leuconostoc Ferments**	*Lactiplantibacillus plantarum* ML-004 *Lactobacillus sakei* ML-036 *Lactobacillus acidophilus* ML-019 *Leuconostoc mesenteroides* ML-035 *Lacticaseibacillus paracasei* ML-117	• Antibacterial & Antiviral effects • Skin protection • Acne relief • Hair conditioning • Anti-dandruff	Test Report Certificate of Deposit
5	**Lactobacillus Fermentation Lysate**	*Lactobacillus gasseri* ML-001 *Limosilactobacillus reuteri* ML-014 *Lactobacillus helveticus* ML-036 *Ligilactobacillus salivarius* ML-010 *Lactiplantibacillus plantarum* ML-004 *Lacticaseibacillus paracasei* ML-003	• Antibacterial & Antiviral effects • Skin protection • Gut barrier strengthening	

MEDIOGEN CO., LTD PROBIOTIC INGREDIENT LIST

[Probiotics(Food Ingredient)]

No.	Product	Strain	Effects/Features	Certification/Reference
1	**MED-02**	*Limosilactobacillus fermentum* MG4231 *Limosilactobacillus fermentum* MG4244	<Patent> • Human-derived *Lactobacillus fermentum* MG4231 or *Lactobacillus fermentum* MG4244 strain having anti-obesity activity and composition comprising the same	Patent (3) Research Paper (4)
2	**MED-03**	*Lactiplantibacillus plantarum* MG4296 *Lacticaseibacillus paracasei* MG5012	<Patent> • Lactobacillus having blood glucose lowering effect and antioxidant effect	Patent (4) Research Paper (3)
3	**MED-04**	*Bifidobacterium animalis ssp. lactis* MG741	<Patent> • Composition for preventing or treating obesity or non-alcoholic fatty liver comprising *Bifidobacterium animalis lactis* MG741	Patent (2) Research Paper (2)