Pre-B

300 g / Code FE3415

Pre-B by New Roots Herbal is a formula with 5 prebiotics: resistant starch, xylooligosaccharides, fructooligosaccharides, arabinogalactan and galactooligosaccharides. Prebiotics have been widely studied for their beneficial effects on the gut microbiome. Several clinical studies have shown that prebiotics selectively increase the levels of probiotic species of *Bifidobacterium* and even *Lactobacillus* in the gut. Adults consuming prebiotics show significant increases in the levels of *Bifidobacterium* in their gut microbiota, as well as other butyrate-producing bacteria such as *Ruminococcus*, *Oscillospira* and *Faecalibacterium*.

FORMAT: 300 g

FORMULA

Ingredients: Resistant starch-RS2 (from potato, *Solanum tuberosum*), xylooligosaccharides (from corn starch), fructoligosaccharides (from corn starch), arabinogalactan (from larch tree, *Larix laricina*), galactooligosaccharides (from microbial fermentation of lactose, milk), natural fruit flavour, natural lemon flavour, malic acid, anticaking agent (silicon dioxide), sweetener (steviolglycosides, from *Stevia rebaudiana*).

Nutritional information:	**1 scoop (10g)**
Resistant starch-RS2 (from potato, *Solanum tuberosum*)	3 500 mg
Xylooligosaccharides (XOS) (from corn starch)	1 500 mg
Fructoligosaccharides (FOS) (from corn starch)	1 000 mg
Arabinogalactan (AG) (from larch tree, *Larix laricina*)	1 000 mg
Galactooligosaccharides (GOS) (from microbial fermentation of lactose)	1 000 mg

Cautions: Consult a health-care practitioner prior to use if you are pregnant or breast-feeding, if you are taking medications which inhibit peristaltic movement (e.g. opioids, loperamide); if you have symptoms such as abdominal pain, nausea, vomiting or fever; if you are experiencing a sudden change in bowel habits that has persisted for more than 2 weeks, undiagnosed rectal bleeding or have failed to defecate following the use of a laxative product. Known adverse reactions: hypersensitivity. May cause mild gastro-intestinal discomfort (such as gas, bloating, etc.).

Recommended daily dose: 1 scoop (10 g) daily mixed in 250 ml water or juice. Stir well prior to drinking. Take preferably 2 hours before or after taking medications. Do not exceed the stated recommended daily dose.

Indications and uses:

- Improves bowel movements and constipation.
- Promotes a healthy gut microbiota.
- Improves immune function.
- Mitigates gastrointestinal inflammation.
- Helps to improve lipid profile.
- Helps control blood glucose levels

DETAILS:

Prebiotics, in addition to selectively increasing the levels of probiotic *Bifidobacterium* and *Lactobacillus* species in the gut, inhibit pathogenic microbial species such as *Shigella* and *Escherichia coli*. This mechanism of action is what makes prebiotics ideal for improving gastrointestinal health. Prebiotic supplementation has been shown to relieve diarrhoea in infants and children, as well as to cure chronic constipation in formula-fed babies. In addition to modifying the gut microbiome, prebiotics may also modulate immune markers by influencing inflammatory pathways. These effects have further implications, as prebiotic supplementation has been shown to improve serum levels of "good" high-density lipoprotein (HDL) cholesterol while decreasing levels of "bad" low-density lipoprotein (LDL) cholesterol in diabetic patients and patients with chronic kidney disease [(1)].

INGREDIENTS:

The importance of a healthy gut microbiome in the overall maintenance of physical and mental well-being has been well established. Several clinical studies have established the link between probiotic consumption and its beneficial effects on the gut. In addition to probiotics, prebiotics have been studied extensively for their ability to help beneficial microbes grow, thereby facilitating better health of the individual[1]. According to Rutherford and Gibson in 1995, prebiotics are defined as "non-digestible food components that are resistant to the action of hydrolytic enzymes in the upper gastrointestinal tract, pass into the colon unchanged and beneficially affect the microflora of the host organism by selectively stimulating the growth and/or activity of one or a limited number of bacteria in the colon and thereby improving the health of the host". This definition was later refined to include the fact that prebiotics are selectively fermented and not entirely indigestible[2]. Rather, the most recent definition presented by the International Scientific Association for Probiotics and Prebiotics (ISAPP) in 2017 recognises that **prebiotics are substrates on which beneficial microbes thrive in our gut, and in turn, provide important health benefits for humans**[1]. Prebiotics, for the most part, tend to be non-digestible carbohydrates such as lignin, as well as non-starch polysaccharides including pectins, hemicellulose, cellulose, hydrocolloids such as ß-glucan, gums and mucilages. Prebiotics also include fructooligosaccharides (FOS) and galactooligosaccharides (GOS), which act as substrates for *Lactobacillus* and *Bifidobacterium* species[1,2]. Several clinical studies have been conducted to study the effect of prebiotics alone and in combination with probiotics. Evidence from these studies underlines the importance of prebiotics in supporting a healthy gut microbiome.

Prebiotics and gastrointestinal health:

There is a wealth of evidence demonstrating the beneficial effects of prebiotics on gastrointestinal health. In a randomised, placebo-controlled study of 107 children aged 3-36 months, acute diarrhoea was treated for 72 hours with a combination of 500mg of arabinogalactan, 700mg of xylooligosaccharides (XOS) and 2.5 x 109 CFU of *Lactobacillus paracasei* B21060 twice daily. Treatment showed a significant reduction in the duration of diarrhoea and improved stool consistency[3]. In addition, prebiotic treatment also seems to improve constipation in infants. In a trial involving 36 infants suffering from constipation, a 4-week intervention with fructooligosaccharide (FOS) supplementation (6g for infants weighing 6 to 8.9kg, 9g for infants weighing 9 to 11.9kg and 12g for infants weighing more than 12kg) was carried out. The FOS group showed softer stool consistency, less straining during bowel movements, faster gastrointestinal transit time and increased *Bifidobacterium* species in the gut[4]. Therefore, the substrate function of prebiotics can be used to provide infant formulas that are more gut-friendly and with less gastrointestinal discomfort. This was demonstrated by a study using a partially fermented formula containing GOS and FOS, in a 9:1 ratio, administered with probiotics as part of an infant formula, using breastfed infants as a reference. The group of 200 infants enrolled in the study showed that prebiotic-enriched formula resulted in better stool consistency in infants compared to conventional formula, and stool consistency was closer to that of breastfed infants, with no significant adverse events observed[5]. These studies show the importance of prebiotics in providing a beneficial and sustainable gut environment.

These benefits have also been observed in adult populations. The main mechanism of action of prebiotics is their ability to increase the proliferation of beneficial gut microbial species. Supplementation with 1.4g or 2.8g of **xylooligosaccharides (XOS)** or placebo daily to 32 healthy adults for 8 weeks showed a dose-dependent increase in *Bifidobacterium* counts in stool samples[6]. Similarly, a study of 80 adults for 210 days who were given 2.5, 5 or 10g/day of **fructooligosaccharides (FOS)** showed increased levels of *Bifidobacterium* and *Lactobacillus* compared to control maltodextrin. FOS also appeared to promote the growth of Lactobacillus and **butyrate-producing bacteria** such as *Oscillospira*, *Faecalibacterium* and *Ruminococcus*[7]. **Arabinogalactan** (**AOS**) is another prebiotic that showed beneficial effects on the gut microbiome. Administration of 15g or 30g of arabinogalactan (AOS) to 20 adults for 6 weeks showed a significant increase in total anaerobic counts and increased levels of *Lactobacillus* species regardless of dose. A decrease in faecal ammonia levels was also observed with both doses[8]. A study with potato **resistant starch** showed similar microbiome modulation capabilities. In this study of 42 elderly and 42 middle-aged adults, consumption of 30g/day of resistant potato starch for 12 weeks appeared to reduce levels of pathogenic proteobacteria (*Shigella* and *Escherichia coli*) in older adults, and increase levels of *Bifidobacterium* in both groups of adults. Older adults also showed increased levels of short-chain fatty acid butyrate (SCFA) in faeces[9].

The study with **resistant potato starch** also points to the ability of prebiotics not only to stimulate the growth of beneficial bacteria, but also to inhibit pathogenic bacteria in the gut. This shows promising evidence that prebiotics can be used in other gastrointestinal disorders. In a trial of 103 patients with Crohn's disease, administration of 15g/day of **fructooligosaccharides** (**FOS**) for 4 weeks reduced interleukin-6 (IL-6) levels and increased IL-10 expression

on dendritic cells (immune cells), indicating that FOS may influence cytokine production, resulting in reduced inflammation independent of changes in the gut microbiome, but these observations need to be further confirmed to explore the possible use of prebiotics in patients with Crohn's disease[10].

Prebiotics and immune function:

However, the above-mentioned study on Crohn's disease points to possible immunomodulatory properties of prebiotics. This potential benefit has been tested in other ways with prebiotic supplements. One study compared the effects of three treatments: **xylooligosaccharides** (**XOS**) 8g/day or *Bifidobacterium animalis* subsp. *lactis* 109 CFU/day, or both together, administered to 41 adults for 21 days. XOS supplementation increased the number of bowel movements and increased vitality and patient satisfaction were reported. XOS also increased *Bifidobacterium* levels and plasma high-density "good" cholesterol (HDL) levels, and reduced natural killer (NK) cell and interleukin-10 (IL-10) expression, indicating that prebiotic supplementation was able to modulate markers of immune function[11]. A combination of prebiotics appeared to have a more pronounced effect on immune function. A treatment of 5g/day of XOS or **1g of XOS + 3g supplement of FOS (inulin)** for 4 weeks showed that XOS alone increased *Bifidobacterium* counts and faecal butyrate levels, increased β-glucuronidase and α-glucosidase activity and reduced p-cresol and acetate concentrations. However, supplementation with XOS + inulin decreased lipopolysaccharide (LPS) concentrations and modulated IL-1β and IL-13 gene expression in the blood, which helped in the treatment of the inflammatory effects of a high-fat diet in healthy adults[12]. Another study evaluated the supplementation of 140 colorectal cancer patients with 30g/day of prebiotics containing **FOS**, **XOS**, **polydextrose and resistant dextrin** for 7 days and showed that prebiotic supplementation significantly improved serum immune markers[13].

Prebiotics and lifestyle disorders:

Due to the gut microbiome and immunomodulatory properties of prebiotics, their therapeutic potential against various lifestyle disorders has been proven. A systematic review of 26 trials with a total of 831 participants found that prebiotic supplementation increased satiety and reduced levels of insulin and postprandial blood glucose (blood glucose level after meals)[14]. These results were supported by another meta-analysis of 13 randomised clinical trials involving 513 patients, where prebiotic supplementation reduced total cholesterol, "bad" (LDL) cholesterol and increased "good" (HDL) cholesterol levels in diabetic patients[15]. The cholesterol-regulating properties of prebiotics are also observed with the use of resistant potato starch. In a randomised, placebo-controlled study in which 75 participants received 30g/day of **resistant potato starch** for 12 weeks, an increase in intestinal *Parasutterella* levels along with a reduction in LDL cholesterol levels was observed in the resistant starch supplemented group compared to the placebo group. Other metabolic parameters influenced by prebiotics include toxins associated with chronic kidney disease. Administration of **FOS** (12g/day for 3 months) to 46 non-dialysis-dependent chronic kidney disease patients reduced serum and total levels of p-cresyl sulphate, a uraemic toxin associated with chronic kidney disease[17].

SYNERGY FOR OPTIMAL EFFECTIVENESS

Recent research evidence suggests that supplementing the diet with a combination of prebiotics such as resistant starch, xylooligosaccharides (XOS), fructooligosaccharides (FOS), arabinogalactan (AOS) and galactooligosaccharides (GOS) may support overall health maintenance, as well as other gut, cardiovascular and immune benefits[3,12]

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