Claims

1. A spray-dried composition comprising 5 to 50 weight percent (wt. %) of a prebiotic, 10 to 65 wt.% of a probiotic, and 30 to 80 wt. % of a coating material,
wherein the prebiotic is selected from the group consisting of a polysaccharide, an oligosaccharide, a polyol, whey protein, and any combinations thereof;
wherein the probiotic is from a genus selected from the group consisting of *Lacticaseibacillus, Lactobacillus, Lactiplantibacillus, Levilactobacillus, Ligilactobacillus, Limosilactobacillus, Bifidobacterium, Enterococcus, Streptococcus, Pediococcus, Leuconostoc, Bacillus, Escherichia*, *Saccharomyces,* and any combinations thereof;
wherein the coating material has at least two different polymers selected from the group consisting of a polymer of acrylic acid and/or acrylates, shellac, alginic acid and its salts, and any combinations thereof.

2. The spray-dried composition according to claim 1, wherein the probiotic is present in 10 to 60 wt. %, preferably 10 to 50 wt. %, more preferably 10 to 40 wt. %, and even more preferably 10 to 30 wt. %.

3. The spray-dried composition according to claims 1 or 2, wherein the prebiotic is selected from the group consisting of soluble soy polysaccharides, maltodextrin, inulin, oligofructose, fructo-oligosaccharides, galacto-oligosaccharides, pectic oligosaccharides, xylooligosaccharides, soya bean oligosaccharides, isomaltooligosaccharides, glucooligosaccharides, arabinoxyloligosaccharides, raffinose, palatinose, lactosucrose, resistant starch and polydextrose, plant-derived and fungal-derived polysaccharides, mannitol, xylitol, sorbitol, lactulose, lactitol, maltitol, trehalose, lactose, whey protein isolate, whey protein concentrate, and any combinations thereof.

4. The spray-dried composition according to claim 3, wherein the prebiotic is the polysaccharide, preferably the prebiotic comprises soluble soy polysaccharides and/or maltodextrin.

5. The spray-dried composition according to any one of claims 1 to 4, wherein the genus of the probiotic is *Lacticaseibacillus* or *Lactobacillus.*

6. The spray-dried composition according to claim 5, wherein the probiotic is *Lacticaseibacillus rhamnosus*.

7. The spray-dried composition according to any one of claims 1 to 6, wherein the polymer of acrylic acid and/or acrylates is selected from the group consisting of poly(ethylacrylate-co-methyl methacrylate), poly(methacrylic acid-co-methyl methacrylate), poly(methacrylic acid-co-ethyl acrylate), poly(methyl acrylate-co-methyl methacrylate-co-methacrylic acid), and any combinations thereof.

8. The spray-dried composition according to claim 7, wherein the polymer of acrylic acid and/or acrylates is selected from the group consisting of poly(ethylacrylate-co-methyl methacrylate) with an approximate ratio of 2:1 to 1:1 of ethyl acrylate to methyl methacrylate, poly(methacrylic acid-co-methyl methacrylate) with an approximate ratio of 1:1 to 1:2 of methacrylic acid to methyl methacrylate, poly(methacrylic acid-co-ethyl acrylate) with an approximate ratio of 1:1 of methacrylic acid to ethyl acrylate, poly(methyl acrylate-co-methyl methacrylate-co-methacrylic acid) with an approximate ratio of 7:3:1 of methyl acrylate to methyl methacrylate to methacrylic acid, and any combinations thereof.

9. The spray-dried composition according to any one of claims 1 to 8, wherein the prebiotic is distinct or different from the coating material.

10. The spray-dried composition according to claim 9 with one of the following compositions:

(i) *Lacticaseibacillus rhamnosus GG* is present in 15 to 22 wt. %, soluble soy polysaccharides are present in 9-11 wt. %, sodium alginate is present in 33-35 wt. %, and shellac is present in 36-39 wt.%;

(ii) *Lacticaseibacillus rhamnosus GG* is present in 15 to 22 wt. %, soluble soy polysaccharides are present in 33-35 wt. %, poly(ethylacrylate-co-methyl methacrylate) 2:1 is present in 18-20 wt. %, and shellac is present in 27-30 wt.%; and

(iii) *Lacticaseibacillus rhamnosus GG* is present in 15 to 22 wt. %, soluble soy polysaccharides are present in 9-11 wt. %, maltodextrin is present in 33-35 wt.

%, poly(ethylacrylate-co-methyl methacrylate) 2:1 is present in 9-10 wt. %, and shellac is present in 27-29 wt.%.

11. The spray-dried composition according to any one of claims 1 to 10, wherein at least one of the following conditions are fulfilled:

(i) a majority of the particles in the spray-dried composition has a rough surface;

(ii) the spray-dried composition is prepared by a two-fluid nozzle;

(iii) wherein a majority of the particles in the spray-dried composition has a smooth and dimpled surface; and

(iv) the spray-dried composition is prepared by a three-fluid nozzle.

12. The spray-dried composition according to any one of claims 1 to 11 with a water activity of less than 0.6, preferably 0.55 or less.

13. A method of preparing a spray-dried composition, the method comprising:
providing at least one solution comprising 5 to 50 weight percent (wt. %) of a prebiotic, 10 to 65 wt.% of a probiotic, and 30 to 80 wt. % of a coating material,
wherein the prebiotic is selected from the group consisting of oligosaccharides, polysaccharides, polyols, whey protein and any combinations thereof,
wherein the probiotic is from a genus selected from the group consisting of *Lacticaseibacillus*, *Lactobacillus*, *Lactiplantibacillus*, *Levilactobacillus*, *Ligilactobacillus*, *Limosilactobacillus*, *Bifidobacterium*, *Enterococcus*, *Streptococcus*, *Pediococcus*, *Leuconostoc*, *Bacillus*, *Escherichia*, *Saccharomyces*, and any combinations thereof;
wherein the coating material has at least two different polymers selected from the group consisting of a polymer of acrylic acid and/or acrylates, shellac, alginic acid and its salts, and any combinations thereof; and
spray drying the at least one solution to obtain the spray-dried composition.

14. The method according to claim 13, wherein the probiotic is present in 10 to 60 wt. %, preferably 10 to 50 wt. %, more preferably 10 to 40 wt. %, and even more preferably 10 to 30 wt. %.

15. The method according to claims 13 or 14, wherein at least one of the following conditions is fulfilled:

(a) the prebiotic is selected from the group consisting of soluble soy polysaccharides, maltodextrin, inulin, oligofructose, fructo-oligosaccharides, galacto-oligosaccharides, pectic oligosaccharides, xylooligosaccharides, soya bean oligosaccharides, isomaltooligosaccharides, glucooligosaccharides, arabinoxyloligosaccharides, raffinose, palatinose, lactosucrose, resistant starch, polydextrose, plant-derived and fungal-derived polysaccharides, mannitol, xylitol, sorbitol, lactulose, lactitol, maltitol, trehalose, lactose, whey protein isolate, whey protein concentrate, and any combinations thereof;

(b) the prebiotic is the polysaccharide, preferably soluble soy polysaccharides and/or maltodextrin;

(c) the genus of the probiotic is *Lacticaseibacillus* or *Lactobacillus*, preferably the probiotic is *Lacticaseibacillus rhamnosus*; and

(d) the prebiotic is distinct or different from the coating material.

16. The method according to claim 15, wherein the polymer of acrylic acid and/or acrylates is selected from the group consisting of poly(ethylacrylate-co-methyl methacrylate), poly(methacrylic acid-co-methyl methacrylate), poly(methacrylic acid-co-ethyl acrylate), poly(methyl acrylate-co-methyl methacrylate-co-methacrylic acid), and any combinations thereof.

17. The method according to claim 16, wherein the polymer of acrylic acid and/or acrylates is selected from the group consisting of poly(ethylacrylate-co-methyl methacrylate) with an approximate ratio of 2:1 to 1:1 of ethyl acrylate to methyl methacrylate, poly(methacrylic acid-co-methyl methacrylate) with an approximate ratio of 1:1 to 1:2 of methacrylic acid to methyl methacrylate, poly(methacrylic acid-co-ethyl acrylate) with an approximate ratio of 1:1 of methacrylic acid to ethyl acrylate, poly(methyl acrylate-co-methyl methacrylate-co-methacrylic acid) with an approximate ratio of 7:3:1 of methyl acrylate to methyl methacrylate to methacrylic acid, and any combinations thereof.

18. The method according to claims 13 to 17, wherein spray drying the at least one solution is performed with a two fluid nozzle, preferably, the at least one solution comprises an aqueous solution.

19. The method according to claims 13 to 17, wherein spray drying the at least one solution is performed with a three fluid nozzle, preferably the at least one solution comprises an aqueous solution and a solution with an organic solvent.

20. A food product comprising the spray-dried composition according to any one of claims 1 to 12 or prepared by the method according to any one of claims 13 to 19.