**Claims**

1. A fermentation process, comprising:

a) mixing a grain flour and a sugar in an aqueous medium to form a mixture;

b) inoculating a probiotic bacterium and/or yeast in the mixture to form a culture; and

c) fermenting the culture to form a fermented culture;

wherein the grain flour is about 5 % w/v to about 30 % w/v of the mixture;

wherein the sugar is about 1 % w/v to about 20% w/v of the mixture.

2. The fermentation process according to claim 1, wherein the fermentation step is performed at about 25 °C to about 50 °C.

3. The fermentation process according to claim 1 or 2, wherein the fermentation step is performed under stirring of about 100 rpm to about 800 rpm.

4. The fermentation process according to any one of claims 1 to 3, wherein the fermentation step is performed for at least 24 h.

5. The fermentation process according to any one of claims 1 to 4, wherein the grain flour is selected from teff flour, wheat flour, oat flour, rice flour, corn flour, barley flour, sorghum flour, rye flour, millet flour, triticale flour, amaranth flour, buckwheat flour, quinoa flour, sugar cane fibre/bagasse or a combination thereof.

6. The fermentation process according to any one of claims 1 to 5, wherein the grain flour is oat flour, wherein the oat flour is derived from simple oat, germinated oat or a mixture thereof.

7. The fermentation process according to any one of claims 1 to 6, wherein the sugar is selected from a monosaccharide, disaccharide, oligosaccharide, polysaccharide, or a combination thereof.

8. The fermentation process according to any one of claims 1 to 7, wherein the sugar is derived from an animal source or a plant source.

9. The fermentation process according to any one of claims 1 to 8, wherein the sugar is selected from glucose, fructose, trehalose, inulin, molasses, honey, or a combination thereof.

10. The fermentation process according to any one of claims 1 to 9, wherein the sugar in the fermented culture is less than about 50% relative to the mixture.

11. The fermentation process according to any one of claims 1 to 10, wherein the probiotic bacterium is about 0.2 % w/v to about 2% v/v of the mixture.

12. The fermentation process according to any one of claims 1 to 11, wherein the probiotic bacterium is inoculated at about $10^7$ CFU per mL of the mixture.

13. The fermentation process according to any one of claims 1 to 12, wherein the probiotic bacterium and/or yeast is selected from *L. fermentum, L. bulgaricus, L. acidophilus, L. brevis, L. plantarum, L. rhamnosus, L. caucasicus, L helveticus, L. lactis, L. reuteri and L. casei. B. infantis, B. bifidum, S. thermophiles, E. faecium*, *L. amylovorus, L. paracasei, S. cerevisiae, S. boulardii,* or a combination thereof.

14. The fermentation process according to any3
one of claims 1 to 13, wherein the probiotic bacterium is *L. fermentum.*

15. The fermentation process according to any one of claims 1 to 14, wherein a pH of the fermented culture after at least 24 h is about 4.

16. The fermentation process according to any one of claims 1 to 15, further comprising a step of pasteurising the grain flour, sugar, or the mixture thereof.

17. The fermentation process according to any one of claims 1 to 16, further comprising a step of storing the fermented culture.

18. The fermentation process according to claim 17, wherein the fermented culture is stored at about 4 °C.

19. The fermentation process according to claim 17 or 18, wherein the fermented culture is stored for at least 10 days.

20. The fermentation process according to any one of claims 1 to 19, further comprising a step of freeze drying the fermented culture.

21. The fermentation process according to any one of claims 1 to 20, wherein a viable count of probiotic bacterium in the culture after inoculating is about 6 log CFU/mL to about 7 log CFU/mL.

22. The fermentation process according to any one of claims 1 to 21, wherein a viable count of probiotic bacterium in the culture after fermenting is about 7 log CFU/mL to about 8 log CFU/mL.

23. The fermentation process according to any one of claims 1 to 22, wherein a viable count of probiotic bacterium in the fermented culture after storing is about 7 log CFU/mL to about 8 log CFU/mL.

24. The fermentation process according to any one of claims 1 to 23, wherein the fermented culture has a β-glucan content which is substantially not altered when compared to the mixture.

25. The fermentation process according to any one of claims 1 to 24, wherein the fermented culture comprises glucose of about 5 g/L to about 7 g/L, fructose of about 9 g/L to about 10 g/L, lactic acid of about 2 g/L to about 4 g/L, and acetic acid of about 0.6 g/L to about 0.7 g/L.

~~26. A probiotic composition, comprising:~~
~~a) a grain flour;~~
~~b) a sugar; and~~
~~c) a probiotic bacterium;~~
~~wherein the grain flour is about 5 % w/v to about 30 % w/v of the composition;~~
~~wherein the sugar is about 1 % w/v to about 20% w/v of the composition.~~

~~27. The probiotic composition according to claim 26, wherein the grain flour is oat flour.~~

~~28. The probiotic composition according to claim 26 or 27, wherein the sugar is selected from glucose, fructose, trehalose, inulin, molasses, honey, or a combination thereof.~~

~~29. The probiotic composition according to any one of claims 26 to 28, wherein a viable count of probiotic bacterium in the composition is about 7 log CFU/mL to about 8 log CFU/mL.~~

~~30. The probiotic composition according to any one of claims 26 to 29, wherein a viable count of probiotic bacterium in the composition after exposure to gastric and/or intestinal conditions is about 7 log CFU/mL to about 8 log CFU/mL.~~

~~31. The probiotic composition according to any one of claims 26 to 30, wherein a viable count of probiotic bacterium in the composition before exposure to gastric and/or intestinal conditions is substantially the same as after exposure to gastric and/or intestinal conditions.~~

~~32. The probiotic composition according to any one of claims 26 to 31, further comprising glucose of about 5 g/L to about 7 g/L.~~

~~33. The probiotic composition according to any one of claims 26 to 32, further comprising fructose of about 9 g/L to about 10 g/L.~~

~~34. The probiotic composition according to any one of claims 26 to 33, further comprising lactic acid of about 2 g/L to about 4 g/L.~~

~~35. The probiotic composition according to any one of claims 26 to 34, further comprising acetic acid of about 0.6 g/L to about 0.7 g/L.~~

~~36. The probiotic composition according to any one of claims 26 to 35, further comprising phenolic compounds selected from gallic acid, 4 hydrooxybenzoic acid,~~

~~chlorogenic acid, catechin, vanillic acid, caffeic acid, p-coumaric acid, ferulic acid, sinapic acid, quercetin, or a combination thereof.~~

~~37. The probiotic composition according to claim 36, having a total phenolic content of about 0.6 mg GAE/g to about 0.8 mg GAE/g.~~

~~38. The probiotic composition according to claim 36 or 37, wherein the gallic acid content of about 3 µg/g to about 5 µg/g.~~

~~39. The probiotic composition according to any one of claims 36 to 38, wherein the 4-hydroxybenzoic acid content of about 0.7 µg/g to about 0.9 µg/g.~~

~~40. The probiotic composition according to any one of claims 36 to 39, wherein the catechin content of about 1.8 µg/g to about 2.6 µg/g.~~

~~41. The probiotic composition according to any one of claims 36 to 40, wherein the vanillic acid content of about 0.2 µg/g to about 0.7 µg/g.~~

~~42. The probiotic composition according to any one of claims 36 to 41, wherein the caffeic acid content of about 0.6 µg/g to about 0.9 µg/g.~~

~~43. The probiotic composition according to any one of claims 36 to 42, wherein the p-coumaric acid content of about 0.45 µg/g to about 1.5 µg/g.~~

~~44. The probiotic composition according to any one of claims 36 to 43, wherein the ferulic acid content of about 0.5 µg/g to about 0.8 µg/g.~~

~~45. The probiotic composition according to any one of claims 36 to 44, wherein the sinapic acid content of about 1.5 µg/g to about 2.3 µg/g.~~

~~46. The probiotic composition according to any one of claims 36 to 45, wherein the quercetin content of about 5.2 µg/g to about 5.6 µg/g.~~

~~47. The probiotic composition according to any one of claims 26 to 46, having an antioxidant activity of at least 60 nmol TE/mg.~~

~~48. The probiotic composition according to any one of claims 26 to 47, further comprising β-glucan at about 2 g/100 g DW to about 3 g/100 g DW.~~

~~49. The probiotic composition according to any one of claims 26 to 48, having an absence of dairy product.~~

~~50. Use of the probiotic composition according to any one of claims 26 to 49 as a fermented beverage or a freeze dried powder which is reconstitutable in an aqueous medium.~~