preparing dryblended powdered nutritional compositions including dry ingredients having a reduced risk of microbial contamination and an acceptable level of microorganisms. Additionally, it would be advantageous if microbes in the dry ingredients could be inactivated using conditions that will not compromise the physical quality and function of the ingredients so as not to deteriorate the final nutritional composition. It would also be advantageous if the dryblended ingredient could be treated for microbial contamination prior to or after introduction into the commercial base powder.

SUMMARY OF THE DISCLOSURE

[0006] The present disclosure is directed to methods of reducing the microbial contamination of dry ingredients for use in dryblended compositions, and to methods of reducing the microbial contamination of dryblended compositions. The methods described herein utilize heat treatment methods that are capable of significantly reducing the microbial content of a single dry ingredient or dryblended composition without substantially altering the nutritional or physical quality of the ingredient or composition. The heat treatment methods are easy to use, safe and provide a dry ingredient or dryblended composition with a high degree of microbial inactivation.

[0007a] In one aspect, there is provided a method of inactivating microbes in a dry ingredient, the method comprising subjecting the dry ingredient to a heat treatment at a temperature of greater than 48°C to no greater than 60°C for a period of from 2 days to 30 days, wherein at least 90% of microbes present in the dry ingredient are inactivated.

[0007b] In one aspect, there is provided a method of preparing a dryblended powdered nutritional composition, the dryblended powdered nutritional composition comprising at least one dry ingredient, the method comprising subjecting the dry ingredient to a heat treatment at a temperature of greater than 48°C to no greater than for a period of from 2 days to 30 days and dryblending the heat treated dry ingredient with a base powder to form the dryblended powdered nutritional composition, wherein at least 90% of microbes present in the dryblended powdered nutritional composition are inactivated.

[0007c] In one aspect, there is provided the method of preparing a powdered nutritional composition, the method comprising dryblending a dry ingredient with a base powder to form a dryblended powdered nutritional composition; and subjecting the dryblended powdered nutritional composition to a heat treatment at a temperature of greater than 48°C to no greater than 60°C for a period of from 2 days to 30 days, wherein at least 90% of microbes present in the dryblended powdered nutritional composition are inactivated.

[0007d] One embodiment of the present disclosure is directed to a method of inactivating microbes in a dry ingredient, the method comprising subjecting the dry ingredient to a heat treatment at a temperature of greater than 48°C to no greater than 60°C for a period of from 2 days to about 30 days.

[0008] Another embodiment of the present disclosure is directed to a method of preparing a dryblended powdered nutritional composition, the dryblended powdered nutritional composition comprising at least one dry ingredient. The method comprises subjecting the dry ingredient to a heat treatment at a temperature of greater than 48°C to no greater than 60°C for a period of from 2 days to about 30 days; and dryblending the heat treated dry ingredient with a base powder to form the dryblended powdered nutritional composition.

[0009] Another embodiment of the present disclosure is directed to a

Claims

1. A method of inactivating microbes in a dry ingredient, the method comprising subjecting the dry ingredient to a heat treatment at a temperature of greater than 48°C to no greater than 60°C for a period of from 2 days to 30 days, wherein at least 90% of microbes present in the dry ingredient are inactivated.

2. The method of claim 1 wherein the dry ingredient is a carbohydrate.

3. The method according to claim 1, wherein the dry ingredient is selected from the group consisting of starch, xanthan gum, cocoa powder, lactose, maltodextrin, sucrose, lecithin, mineral salts, and combinations thereof.

4. The method according to claim 1, wherein the dry ingredient is rice starch.

5. The method according to claim 1, wherein the dry ingredient is a protein.

6. A method of preparing a dryblended powdered nutritional composition, the dryblended powdered nutritional composition comprising at least one dry ingredient, the method comprising subjecting the dry ingredient to a heat treatment at a temperature of greater than 48°C to no greater than 60°C for a period of from 2 days to 30 days and dryblending the heat treated dry ingredient with a base powder to form the dryblended powdered nutritional composition, wherein at least 90% of microbes present in the dryblended powdered nutritional composition are inactivated.

7. The method of claim 6, wherein the dry ingredient is a carbohydrate.

8. The method of claim 6, wherein the ingredient is selected from the group consisting of starch, xanthan gum, cocoa powder, lactose, lecithin, and combinations thereof.

9. The method of claim 6, wherein the dry ingredient is rice starch.

10. The method of claim 6, wherein the dry ingredient is protein.

11. The method of preparing a powdered nutritional composition, the method comprising dryblending a dry ingredient with a base powder to form a dryblended powdered nutritional composition; and subjecting the dryblended

powdered nutritional composition to a heat treatment at a temperature of greater than 48°C to no greater than 60°C for a period of from 2 days to 30 days, wherein at least 90% of microbes present in the dryblended powdered nutritional composition are inactivated..

12. The method of claim 11 wherein the dry ingredient is a carbohydrate.

13. The method of either one claims 11 or 12, wherein the dry ingredient is selected from the group consisting of starch, xanthan gum, cocoa powder, lactose, lecithin, and combinations thereof

14. The method of either one claims 11 or 12, wherein the dry ingredient is rice starch.

15. The method of claim 11 or 12 wherein at least 99% of microbes present in the dryblended powdered nutritional composition are inactivated.

Claims:

1. A method of inactivating microbes in a dry ingredient, the method comprising subjecting the dry ingredient to a heat treatment at a temperature of greater than 48°C to no greater than 60°C, preferably at a temperature of from 50°C to 60°C, for a period of from 2 days to 30 days, preferably for a period of from 2 days to 4 days, preferably wherein at least 90%, more preferably at least 99% of microbes present in the dry ingredient are inactivated.

2. A method of claim 1 wherein the dry ingredient is a carbohydrate.

3. A method according to claim 1, wherein the dry ingredient is selected from the group consisting of starch, xanthan gum, cocoa powder, lactose, maltodextrin, sucrose, lecithin, mineral salts, preferably calcium mineral salts, and combinations thereof.

4. A method according to claim 1, wherein the dry ingredient is rice starch.

5. A method according to claim 1, wherein the dry ingredient is a protein.

6. A method of preparing a dryblended powdered nutritional composition, the dryblended powdered nutritional composition comprising at least one dry ingredient, the method comprising subjecting the dry ingredient to a heat treatment at a temperature of greater than 48°C to no greater than 60°C, preferably at a temperature of from 50°C to 55°C, for a period of from 2 days to 30 days, preferably from 2 days to 4 days, and dryblending the heat treated dry ingredient with a base powder to form the dryblended powdered nutritional composition, preferably wherein at least 90%, more preferably at least 99% of microbes present in the dryblended powdered nutritional composition are inactivated.

7. A method of claim 6, wherein the dry ingredient is a carbohydrate.

8. A method of claim 6, wherein the dry ingredient is selected from the

group consisting of starch, xanthan gum, cocoa powder, lactose, lecithin, and combinations thereof.

9. A method of claim 6, wherein the dry ingredient is rice starch.

10. A method of claim 6, wherein the dry ingredient is protein.

11. A method of any one of claims 6-9, the method comprising the step of dryblending the dry ingredient with a base powder to form the dryblended powdered nutritional composition; and subjecting the dryblended powdered nutritional composition to a heat treatment at a temperature of greater than 48°C to no greater than 60°C, preferably from 50°C to 60°C, more preferably from 50°C to 55°C, for a period of from 2 days to 30 days, preferably for a period of from 2 days to 10 days, preferably from 2 days to 4 days.

12. A method of claim 11 wherein the dry ingredient is a carbohydrate.

13. A method of either one claims 11 or 12, wherein the dry ingredient is selected from the group consisting of starch, xanthan gum, cocoa powder, lactose, lecithin, and combinations thereof.

14. A method of either one claims 11 or 12, wherein the dry ingredient is rice starch.

15. A method of preparing a powdered nutritional composition comprising the step of subjecting the powdered nutritional composition to a heat treatment at a temperature of greater than 48°C to 60°C for a period of from 2 days to 30 days.