WHAT IS CLAIMED IS:

1. A process for manufacturing an extruded powdered nutritional product, the process comprising:

providing a dry mixture comprising protein and carbohydrate and a liquid comprising water and fat;

contacting the dry mixture and liquid to produce a slurry;

feeding the slurry into an ultrasonically-assisted extruder to emulsify the fat with hydrated protein;

extruding the slurry to produce pellets; and

drying and grinding the pellets to produce a powdered nutritional product, wherein the powdered nutritional product comprises a free fat level of less than 5% by weight of the powdered nutritional product.

2. The process of claim 1 wherein the ultrasonically-assisted extruder is subjected to ultrasonic energy having a frequency selected from the group consisting of less than about 30 Kilohertz, less than about 20 Kilohertz, and less than about 15 Kilohertz.

3. The process of claim 1 wherein one or more additional components are mixed into the extruded pellets prior to drying and grinding.

4. The process of claim 3 wherein the one or more components are selected from probiotics, prebiotics, vitamins, and combinations thereof.

5. The process of claim 1 wherein the dry mixture additionally includes minerals.

6. The process of claim 1 wherein providing the dry mixture and the liquid comprises the steps of introducing the dry mixture into a preconditioner; and introducing the liquid into a preconditioner, and wherein the powdered nutritional product is a powdered infant formula comprising from about 10% to about 35% fat, from about 5% to about 35% protein,

from about 30% to about 85% carbohydrates, and from about 2% to about 5% water, all by weight of the powdered infant formula.

7. The process of claim 6 wherein the free fat level in the powdered infant formula is from about 1% to about 3% by weight of the powdered infant formula.

8. The process of claim 6 wherein the powdered infant formula comprises from about 25% to about 30% fat, from about 8% to about 12% protein, from about 45% to about 60% carbohydrates, and from about 2% to about 5% water, all by weight of the powdered infant formula.

9. The process of claim 6 wherein the ultrasonically-assisted extruder is subjected to ultrasonic energy having a frequency selected from the group consisting of less than about 30 Kilohertz, less than about 20 Kilohertz, and less than about 15 Kilohertz.

10. The process of claim 6 wherein one or more additional components are mixed into the extruded pellets after drying and grinding.

11. The process of claim 6 wherein the powdered infant formula has a grain level of 4 or less on a grain scale of 1 to 6.

12. The process of claim 1 wherein providing the dry mixture and the liquid comprises the steps of introducing the dry mixture into a preconditioner; and introducing the liquid into a preconditioner, and wherein the powdered nutritional product is a powdered adult formula comprising from about 0.5% to about 20% fat, from about 10% to about 90% protein, from about 5% to about 40% carbohydrates, and from about 2% to about 5% water, all by weight of the powdered infant formula.

13. The process of claim 12 wherein the free fat level in the powdered adult nutritional product is from about 1% to about 2% by weight of the powdered adult nutritional product.

14. The process of claim 12 wherein the powdered adult nutritional product comprises from about 2% to about 5% fat, from about 40% to about 75% protein, from about

10% to about 25% carbohydrates, and from about 2% to about 5% water, all by weight of the powdered adult nutritional product.

15. The process of claim 12 wherein the powdered adult nutritional product has a grain level of 4 or less on a grain scale of 1 to 6.

16. A process for manufacturing an extruded powdered infant formula having a free fat level of less than 5% by weight of the powdered infant formula, the process comprising:

introducing protein and water into a preconditioner;

introducing fat into the preconditioner;

introducing from 0 to about 80 wt.% of a carbohydrate into the preconditioner;

contacting the protein, water, fat, and carbohydrate to produce a slurry;

feeding the slurry into a first ultrasonically-assisted extruder to emulsify the fat with hydrated protein;

introducing the remaining carbohydrate, vitamins, and minerals into a second preconditioner feeding the discharge of the first ultrasonically-assisted extruder to produce a second slurry;

ultrasonically extruding the second slurry to produce pellets; and

drying and grinding the pellets to produce a powdered infant formula, wherein the powdered infant formula comprises from about 10% to about 35% fat, from about 5% to about 35% protein, from about 30% to about 85% carbohydrates, and from about 2% to about 5% water, all by weight of the powdered infant formula.

17. The process of claim 16 wherein the powdered infant formula comprises from about 25% to about 30% fat, from about 8% to about 12% protein, from about 45% to about 60% carbohydrates, and from about 2% to about 5% water, all by weight of the powdered infant formula.

18. The process of claim 16 wherein the powdered infant formula has a grain level of 4 or less on a grain scale of 1 to 6.

19. The process of claim 16 wherein the powdered infant formula includes vitamins and minerals.

20. The process of claim 1 wherein the powdered nutritional product is a powdered infant formula.

21. The process of claim 20 further comprising introducing a dry mixture comprising protein and carbohydrate into a preconditioner and introducing a liquid comprising water and fat into the preconditioner.

22. The process of claims 20 and 21 wherein the ultrasonically-assisted extruder is subjected to ultrasonic energy having a frequency selected from the group consisting of less than 30 Kilohertz, less than 20 Kilohertz, and less than 15 Kilohertz.

23. The process of claims 20-22 wherein one or more additional components are mixed into the extruded pellets prior to drying and grinding.

24. The process of claim 23 wherein the one or more components are selected from probiotics, prebiotics, vitamins, and combinations thereof.

25. The process of claims 20-24 wherein the powdered nutritional product has a grain level of 4 or less on a grain scale of 1 to 6.

26. The process of claims 20-25 wherein the free fat level in the powdered nutritional product is from about 1% to about 5% by weight of the powdered nutritional product.

27. The process of claims 20-26 wherein the free fat level in the powdered nutritional product is from about 1% to about 3% by weight of the powdered nutritional product.

28. The process of claims 20-27 wherein the powdered nutritional product comprises from about 10% to about 35% fat, from about 5% to about 35% protein, from about 30% to

about 85% carbohydrates, and from about 2% to about 5% water, all by weight of the powdered nutritional product.

29. The process of claims 20-27 wherein the powdered nutritional product comprises from about 25% to about 30% fat, from about 8% to about 12% protein, from about 45% to about 60% carbohydrates, and from about 2% to about 5% water, all by weight of the powdered nutritional product.

30. The process of claims 20-27 wherein the powdered nutritional product comprises from about 26% to about 28% fat, from about 10% to about 12% protein, from about 50% to about 55% carbohydrates, and from about 2% to about 5% water, all by weight of the powdered nutritional product.

31. The process of claims 20-27 wherein the powdered nutritional product comprises from about 0.5% to about 20% fat, from about 10% to about 90% protein, from about 5% to about 40% carbohydrates, and from about 2% to about 5% water, all by weight of the powdered nutritional product.

32. The process of claims 20-27 wherein the powdered nutritional product comprises from about 1% to about 10% fat, from about 30% to about 80% protein, from about 7% to about 30% carbohydrates, and from about 2% to about 5% water, all by weight of the powdered nutritional product.

33. The process of claims 20-27 wherein the powdered nutritional product comprises from about 2% to about 5% fat, from about 40% to about 75% protein, from about 10% to about 25% carbohydrates, and from about 2% to about 5% water, all by weight of the powdered nutritional product.

WHAT IS CLAIMED IS:

1. A process for manufacturing an extruded powdered nutritional product, the process comprising:

providing a dry mixture comprising protein and carbohydrate and a liquid comprising water and fat;

contacting the dry mixture and liquid to produce a slurry;

feeding the slurry into an ultrasonically-assisted extruder to emulsify the fat with hydrated protein;

extruding the slurry to produce pellets; and

drying and grinding the pellets to produce a powdered nutritional product, wherein the powdered nutritional product comprises a free fat level of less than 5% by weight of the powdered nutritional product.

2. The process of claim 1 wherein the ultrasonically-assisted extruder is subjected to ultrasonic energy having a frequency selected from the group consisting of less than about 30 Kilohertz, less than about 20 Kilohertz, and less than about 15 Kilohertz.

3. The process of claim 1 wherein one or more additional components are mixed into the extruded pellets prior to drying and grinding.

4. The process of claim 3 wherein the one or more components are selected from probiotics, prebiotics, vitamins, and combinations thereof.

5. The process of claim 1 wherein the dry mixture additionally includes minerals.

6. A process for manufacturing an extruded powdered infant formula having a free fat level of less than 5% by weight of the powdered infant formula, the process comprising:

introducing a dry mixture comprising protein and carbohydrate into a preconditioner;

introducing a liquid comprising water and fat into the preconditioner;

contacting the dry mixture and liquid to produce a slurry;

feeding the slurry into an ultrasonically-assisted extruder to emulsify the fat with hydrated protein;

extruding the slurry to produce pellets; and

drying and grinding the pellets to produce a powdered infant formula, wherein the powdered infant formula comprises from about 10% to about 35% fat, from about 5% to about 35% protein, from about 30% to about 85% carbohydrates, and from about 2% to about 5% water, all by weight of the powdered infant formula.

7. The process of claim 6 wherein the free fat level in the powdered infant formula is from about 1% to about 3% by weight of the powdered infant formula.

8. The process of claim 6 wherein the powdered infant formula comprises from about 25% to about 30% fat, from about 8% to about 12% protein, from about 45% to about 60% carbohydrates, and from about 2% to about 5% water, all by weight of the powdered infant formula.

9. The process of claim 6 wherein the ultrasonically-assisted extruder is subjected to ultrasonic energy having a frequency selected from the group consisting of less than about 30 Kilohertz, less than about 20 Kilohertz, and less than about 15 Kilohertz.

10. The process of claim 6 wherein one or more additional components are mixed into the extruded pellets after drying and grinding.

11. The process of claim 6 wherein the powdered infant formula has a grain level of 4 or less on a grain scale of 1 to 6.

12. A process for producing a powdered adult nutritional product having a free fat level of less than 5% by weight of the powdered adult nutritional product, the process comprising:

introducing a dry mixture comprising protein and carbohydrate into a preconditioner;

introducing a liquid comprising water and fat into the preconditioner;

contacting the dry mixture and liquid to produce a slurry;

feeding the slurry into an ultrasonically-assisted extruder to emulsify the fat with hydrated protein;

extruding the slurry to produce pellets; and

drying and grinding the pellets to produce a powdered adult nutritional product, wherein the powdered adult nutritional product comprises from about 0.5% to about 20% fat, from about 10% to about 90% protein, from about 5% to about 40% carbohydrates, and from about 2% to about 5% water, all by weight of the powdered adult nutritional product.

13. The process of claim 12 wherein the free fat level in the powdered adult nutritional product is from about 1% to about 2% by weight of the powdered adult nutritional product.

14. The process of claim 12 wherein the powdered adult nutritional product comprises from about 2% to about 5% fat, from about 40% to about 75% protein, from about 10% to about 25% carbohydrates, and from about 2% to about 5% water, all by weight of the powdered adult nutritional product.

15. The process of claim 12 wherein the powdered adult nutritional product has a grain level of 4 or less on a grain scale of 1 to 6.

16. A process for manufacturing an extruded powdered infant formula having a free fat level of less than 5% by weight of the powdered infant formula, the process comprising:

introducing protein and water into a preconditioner;

introducing fat into the preconditioner;

introducing from 0 to about 80 wt.% of a carbohydrate into the preconditioner;

contacting the protein, water, fat, and carbohydrate to produce a slurry;

feeding the slurry into a first ultrasonically-assisted extruder to emulsify the fat with hydrated protein;

introducing the remaining carbohydrate, vitamins, and minerals into a second preconditioner feeding the discharge of the first ultrasonically-assisted extruder to produce a second slurry;

ultrasonically extruding the second slurry to produce pellets; and

drying and grinding the pellets to produce a powdered infant formula, wherein the powdered infant formula comprises from about 10% to about 35% fat, from about 5% to about 35% protein, from about 30% to about 85% carbohydrates, and from about 2% to about 5% water, all by weight of the powdered infant formula.

17. The process of claim 16 wherein the powdered infant formula comprises from about 25% to about 30% fat, from about 8% to about 12% protein, from about 45% to about 60% carbohydrates, and from about 2% to about 5% water, all by weight of the powdered infant formula.

18. The process of claim 16 wherein the powdered infant formula has a grain level of 4 or less on a grain scale of 1 to 6.

19. The process of claim 16 wherein the powdered infant formula includes vitamins and minerals.

20. A process for manufacturing an extruded powdered nutritional product, the process comprising:

providing a dry mixture comprising protein and carbohydrate and a liquid comprising water and fat;

contacting the dry mixture and liquid to produce a slurry;

feeding the slurry into an ultrasonically-assisted extruder to emulsify the fat with hydrated protein;

extruding the slurry to produce pellets; and

drying and grinding the pellets to produce a powdered infant formula, wherein the powdered nutritional product comprises a fat free level of less than 5% by weight of the powdered nutritional product.

21. The process of claim 20 further comprising introducing a dry mixture comprising protein and carbohydrate into a preconditioner and introducing a liquid comprising water and fat into the preconditioner.

22. The process of claims 20 and 21 wherein the ultrasonically-assisted extruder is subjected to ultrasonic energy having a frequency selected from the group consisting of less than 30 Kilohertz, less than 20 Kilohertz, and less than 15 Kilohertz.

23. The process of claims 20-22 wherein one or more additional components are mixed into the extruded pellets prior to drying and grinding.

24. The process of claim 23 wherein the one or more components are selected from probiotics, prebiotics, vitamins, and combinations thereof.

25. The process of claims 20-24 wherein the powdered nutritional product has a grain level of 4 or less on a grain scale of 1 to 6.

26. The process of claims 20-25 wherein the fat free level in the powdered nutritional product is from about 1% to about 5% by weight of the powdered nutritional product.

27. The process of claims 20-26 wherein the fat free level in the powdered nutritional product is from about 1% to about 3% by weight of the powdered nutritional product.

28. The process of claims 20-27 wherein the powdered nutritional product comprises from about 10% to about 35% fat, from about 5% to about 35% protein, from about 30% to about 85% carbohydrates, and from about 2% to about 5% water, all by weight of the powdered nutritional product.

29. The process of claims 20-27 wherein the powdered nutritional product comprises from about 25% to about 30% fat, from about 8% to about 12% protein, from about 45% to about 60% carbohydrates, and from about 2% to about 5% water, all by weight of the powdered nutritional product.

30. The process of claims 20-27 wherein the powdered nutritional product comprises from about 26% to about 28% fat, from about 10% to about 12% protein, from about 50% to about 55% carbohydrates, and from about 2% to about 5% water, all by weight of the powdered nutritional product.

31. The process of claims 20-27 wherein the powdered nutritional product comprises from about 0.5% to about 20% fat, from about 10% to about 90% protein, from about 5% to about 40% carbohydrates, and from about 2% to about 5% water, all by weight of the powdered nutritional product.

32. The process of claims 20-27 wherein the powdered nutritional product comprises from about 1% to about 10% fat, from about 30% to about 80% protein, from about 7% to about 30% carbohydrates, and from about 2% to about 5% water, all by weight of the powdered nutritional product.

33. The process of claims 20-27 wherein the powdered nutritional product comprises from about 2% to about 5% fat, from about 40% to about 75% protein, from about 10% to about 25% carbohydrates, and from about 2% to about 5% water, all by weight of the powdered nutritional product.