CLAIMS

WHAT IS CLAIMED IS:

1. A consumable composition comprising a recombinant single variant of an alpha casein protein, wherein the single variant provides at least one dairy-like property to the consumable composition selected from the group consisting of adhesiveness, stretch, texture, mouthfeel, melt, browning, hardness, creaminess, taste, smell, and flexibility, wherein the recombinant single variant is not an animal-derived casein and has not been physically dissociated from a casein micelle; wherein the dairy-like property is provided substantially from the recombinant single variant casein protein; and wherein the consumable composition is comparable to a dairy-derived consumable composition in at least one of the dairy-like properties.

2. The consumable composition of claim 1, wherein the consumable composition comprises one or more dairy-like properties selected from the group consisting of adhesiveness, stretch, firmness, viscosity, tackiness, chewiness, resilience, springiness, mouthfeel, melt, hardness, creaminess, and flexibility.

3. The consumable composition of any one of claims 1-2, wherein the casein content of the consumable composition comprises substantially the recombinant single variant of the alpha casein protein.

4. The consumable composition of any one of claims 1-3, wherein the consumable composition lacks any additional caseins other than the recombinant single variant of the alpha casein protein.

5. The consumable composition of any one of claims 1-4, wherein the composition is free from any animal-produced proteins.

6. The consumable composition of any one of claims 1-4, wherein the composition lacks any other animal-derived dairy proteins.

7. The consumable composition of any one of claims 1-6, wherein at least one dairy-like property is comparable to or improved as compared to a milk-derived consumable composition; wherein the milk-derived consumable composition is identical to the consumable composition in all ingredients except the milk-derived consumable composition comprises milk, one or more milk-derived proteins or a milk-derived ingredient instead of or in addition to the recombinant single variant of the alpha casein protein.

8. The consumable composition of any one of claims 1-7, wherein the recombinant single variant is an alpha casein protein that comprises at least one non-native post-translational modification.

9. The consumable composition of any one of claims 1-7, wherein the recombinant single variant is an alpha casein protein that lacks one or more post-translational modifications of a native alpha casein protein.

10. The consumable composition of claim 9, wherein the single variant of the alpha casein protein is not phosphorylated.

11. The consumable composition of any one of claims 1-10, wherein the single variant of the alpha casein protein is an alpha-s1 casein protein.

12. The consumable composition of any one of claims 1-11, wherein the composition comprises a full-length alpha casein protein.

13. The consumable composition of any one of claims 1-12, wherein the single variant of the alpha casein protein comprises an amino acid sequence of a bovine, caprine or ovine alpha casein protein or any one of SEQ ID NOs.: 2, 3, 14, 15, 26, 27, 29, 30, 32, 33, 35, 36, 38, 40, 41, 43, 44, 46, 47, 49, 50, 52, 53, 55 or 56 or a sequence with at least 70%, 80%, 85% or 90% identity to any one of SEQ ID NOs.: 2, 3, 14, 15, 26, 27, 29, 30, 32, 33, 35, 36, 38, 40, 41, 43, 44, 46, 47, 49, 50, 52, 53, 55 or 56.

14. The consumable composition of any one of claims 1-13, wherein the single variant of the alpha casein protein comprises one or more non-native amino acids at the N-terminus.

15. The consumable composition of claim 14, wherein the single variant of the alpha casein protein comprises a non-native methionine at the N-terminal position.

16. A dairy product analogue comprising the consumable composition of any one of claims 1-15, wherein the analogue is selected from the group consisting of a cheese analogue, a yogurt analogue, a cream analogue, and an ice cream analogue.

17. The dairy product analogue of claim 16, further comprising one or more of (a) a plant-derived oil; (b) a plant-derived starch; (c) a sugar; and (d) a salt.

18. A cheese analogue comprising the consumable composition of any one of claims 1-15.

19. The cheese analogue of claim 18, wherein the cheese analogue is a mozzarella analogue, a cheddar analogue or a parmesan analogue.

20. The cheese analogue of claim 18 or claim 19, wherein the cheese analogue is a low-moisture cheese analogue.

21. The cheese analogue of claim 18 or claim 19, wherein the cheese analogue is a soft cheese analogue.

22. The cheese analogue of claim 18 or claim 19, wherein the cheese analogue is a hard cheese analogue.

23. The cheese analogue of claim 18, wherein the cheese analogue is a mozzarella cheese analogue and wherein the alpha casein is a bovine alpha S1 casein.

24. The cheese analogue of any one of claims 18-23, wherein a stretch of the cheese analogue is comparable to or improved relative to a stretch of a dairy-derived cheese or dairy-derived cheese analogue.

25. The cheese analogue of any one of claims 18-24, wherein the cheese analogue has a comparable or greater melt area/time as compared to the melt area/time of a dairy-derived cheese or dairy-derived cheese analogue.

26. The cheese analogue of any one of claims 18-25, wherein a stretch of the cheese analogue is improved relative to a stretch of a plant-derived cheese analogue.

27. The cheese analogue of any one of claims 18-26, wherein a melt of the cheese analogue is improved relative to a melt of a plant-derived cheese analogue.

28. The cheese analogue of any one of claims 18-27, wherein an adhesiveness of the cheese analogue is reduced relative to an adhesiveness of a plant-derived cheese analogue.

29. The cheese analogue of any one of claims 18-28, wherein the cheese analogue comprises from about 5% to about 30% single variant of the casein protein w/w.

30. A yogurt analogue comprising the consumable composition of any one of claims 1-15.

31. The yogurt analogue of claim 30, wherein the alpha casein is a bovine alpha S1 casein.

32. The yogurt analogue of claim 30 or claim 31, wherein an emulsification of the yogurt analogue is comparable to or improved relative to an emulsification of a plant-derived yogurt analogue.

33. The yogurt analogue of any one of claims 30-32, wherein firmness, tackiness, or viscosity of the yogurt analogue is comparable to or improved relative to a plant-derived yogurt analogue.

34. The yogurt analogue of any of claims 30-33, wherein the dairy product analogue is a beverage.

35. The cheese analogue of claim 23, wherein the mozzarella cheese analogue exhibits an extensibility of at least 160 mm, wherein the extensibility is analyzed by heating the mozzarella

cheese analogue in an oven at 90°C for 10 min in an extensibility rig and measuring the extensibility on a texture analyzer as the distance to failure.

36. The cheese analogue of claim 35, wherein the extensibility of the mozzarella cheese analogue is at least about 200 mm.

37. The cheese analogue of claim 35, wherein the extensibility of the mozzarella cheese analogue is between about 200 mm to about 300 mm.

38. The cheese analogue of claim 23, wherein the mozzarella cheese analogue exhibits an adhesiveness of between 0.1-3.0 g*sec, wherein the adhesiveness is analyzed using a TA.XT Plus Texture Analyzer equipped with a TA-18 ’A” ball probe, and wherein the adhesiveness represents the force required to remove the mozzarella cheese analogue from the ball probe.

39. The consumable composition of any one of claims 1-15, wherein the consumable composition lacks any dairy proteins other than the recombinant single variant of the alpha casein protein.