Example 1

[0025] [Relationship between generation of burnt deposit and protein and calcium to be used]

Relationship between generation of burnt deposit and types of protein and calcium to be used was studied in a composition comprising L-arginine (KYOWA HAKKO BIO Co., Ltd.). The fluidal composition was prepared with water to have the compounding ratio shown in Table 1, heated by steam injection (145°C, 5 sec.), then homogenized at 45 MPa, and cooled down. A skim milk powder produced by Meiji Dairies Corporation (protein content: 34 w/w%), a milk protein concentrate (MPC) produced by Fonterra Japan Limited (protein content: 80 w/w%), a calcium slurry as calcium phosphate produced by MARUO CALCIUM CO., LTD. (containing 21 w/w% as calcium phosphate), and a whey calcium produced by Fonterra Japan Limited (containing 30 w/w% as calcium) were used.

[0026]

[Table 1]

		Compounding ratio [w/v%]						
		1-A	1-B	1-C	1-D	1-E	1-F	1-G
	L-arginine	1.0	1.0	1.5	2.0	1.0	1.0	2.0
Source of protein	Skim milk powder	2.8	2.8	2.6	2.8	-	-	-
	MPC	2.8	2.8	2.6	2.8	-	-	-
	Sodium caseinate	4.2	-	3.9	3.0	6.5	6.5	6.5
Calcium	Calcium phosphate	-	-	0.05	-	1.2	-	1.2
	Whey calcium	-	1.6	-	-		1.6	
pH adjuster	Citric acid	~~4.3~~0.43	~~4.3~~0.43	~~6.5~~0.65	~~8.5~~0.85	~~4.3~~0.43	~~4.3~~0.43	~~8.5~~0.85
		Result						
		1-A	1-B	1-C	1-D	1-E	1-F	1-G

	Burnt deposit	Found	Found	Found	Found	None	Found	None
	Flavor	Good	Good	Good	Good	Good	Good	Good
	pH	7.13	7.05	7.02	7.02	7.08	6.96	7.10
	Comprehensive evaluation	×	×	×	×	○	×	○

[0027]

According to this, when 1% or more of L-arginine, the micellizing protein and the water-soluble calcium were used, generation of burnt deposit was found regardless of the presence of the non-micellizing protein.

[0028] [Study on amount of the arginine added]

Subsequently, the fluidal composition was prepared with water to have the compounding ratio shown in Table 2, heated by steam injection (145°C, 5 sec.), then homogenized at 45 MPa, and cooled down.

[0029]

[Table 2]

		Compounding ratio [w/v%]					
		2-A	2-B	2-C	2-D	2-E	2-F
	L-arginine	0.5	1.5	2.0	3.5	4.0	4.5
Source of protein	Sodium caseinate	7.1	7.1	6.5	5.0	4.3	4.3
Calcium	Calcium phosphate	1.2	1.2	1.2	1.2	1.2	1.2
pH adjuster	Citric acid	~~2.3~~0.23	~~6.5~~0.65	~~8.5~~0.85	~~15.0~~1.50	~~17.0~~1.70	~~19.5~~19.5
		Result					
		2-A	2-B	2-C	2-D	2-E	2-F
	Burnt deposit	None	None	None	None	None	None

	Flavor	Good	Good	Good	Good	Good	Poor
	pH	6.68	7.25	7.10	7.05	7.10	7.12
	Comprehensive evaluation	○	○	○	○	○	×

[0030]

According to this, when the content of L-arginine was less than 4.5%, generation of burnt deposit was not found, meanwhile when the content of L-arginine was 4.5% or more, burnt deposit was not found but flavor was impaired in a case.

[0031] [Study on pH]

Subsequently, the fluidal composition was prepared with water to have the compounding ratio shown in Table 3, heated by steam injection (145°C, 5 sec.), then homogenized at 45 MPa, and cooled down.

[0032]

[Table 3]

		Compounding ratio [w/v%]				
		3-A	3-B	3-C	3-D	3-E
	L-arginine	2.0	2.0	2.0	2.0	2.0
Source of protein	Sodium caseinate	6.5	6.5	6.5	6.5	6.5
Calcium	Calcium phosphate	1.2	1.2	1.2	1.2	1.2
pH adjuster	Citric acid	~~8.0~~0.80	~~8.5~~0.85	~~9.2~~0.92	~~10.0~~1.00	~~10.9~~1.09
		Result				
		3-A	3-B	3-C	3-D	3-E
	Burnt deposit	None	None	None	None	Found
	Flavor	Poor	Good	Good	Good	Good

CLAIMS

1. A liquid nutritional composition which comprises an arginine and a non-micellizing protein, wherein pH is 6.0 to 7.3, heating treatment was made, and burnt deposit is prevented by adding an insoluble calcium compound, and its flavor is preferable.

2. The liquid nutritional composition according to Claim 1, wherein a protein source in the composition is only the non-micellizing protein, and a calcium source in the composition is the insoluble calcium compound.

3. The liquid nutritional composition according to Claim 1 or 2, wherein less than 4.5 g of arginine is contained in 100 ml of the composition.

4. The liquid nutritional composition according to any one of Claims 1 to 3, wherein the non-micellizing protein is sodium caseinate and/or potassium caseinate.

5. The liquid nutritional composition according to any one of Claims 1 to 4, wherein the insoluble calcium compound is calcium phosphate and/or calcium carbonate.

6. The liquid nutritional composition according to any one of Claims 1 to 5 which is any of a beverage, an enteral nutrient and an oral liquid composition.

7. A method for manufacturing the liquid nutritional composition comprising an arginine, pH 6.0 to 7.3 having preferable flavor without burnt deposit, which includes a step of preparing a fluid composition comprising a non-micellizing protein, an insoluble calcium compound, arginine, an acidic pH adjuster and water, and a step of heating the fluid composition.

8. The method according to Claim 7, wherein a protein source in the composition is only the non-micellizing protein, and a calcium source in the composition is the insoluble calcium compound.

9. The method according to Claim 7 or 8, wherein less than 4.5 g of arginine is contained in 100 ml of the composition.

10. The method according to any one of Claims 7 to 9, wherein the non-micellizing protein is sodium caseinate and/or potassium caseinate.

11. The method according to any one of Claims 7 to 10, wherein the insoluble calcium compound is calcium phosphate and/or calcium carbonate.

12. The method according to any one of Claims 7 to 11, wherein the composition is any of a beverage, an enteral nutrient and an oral liquid composition.

13. A method for preventing burnt deposit caused by heating the liquid nutritional composition comprising an arginine, a protein source, a calcium source and an acidic pH adjuster, wherein a non-micellizing protein is wholly or partially used as a protein source in the composition, and an insoluble calcium compound is wholly or partially used as a calcium source in the composition.

14. The method according to Claim 13, wherein the non-micellizing protein is sodium caseinate and/or potassium caseinate.

15. The method according to Claim 13 or 14, wherein the insoluble calcium compound is calcium phosphate and/or calcium carbonate.

CLAIMS

1. An appertized liquid nutritional composition, comprising 1.0 g or more but less than 4.5 g of an arginine in 100 ml of the composition, only sodium caseinate and/or potassium caseinate as a protein source and an insoluble calcium compound whose solubility to water at 20°C is below 0.05 g/ml is solely added as a calcium source, and having pH from 6.0 to 7.3.

2. The liquid nutritional composition according to Claim 1, wherein the insoluble calcium compound is calcium phosphate and/or calcium carbonate.

3. The liquid nutritional composition according to Claim 1 or 2, wherein the liquid nutritional composition is any of a beverage, an enteral nutrient and an oral liquid composition.

4. A method for manufacturing a liquid nutritional composition comprising 1.0 g or more but less than 4.5 g of an arginine in 100 ml of the composition, and having pH from 6.0 to 7.3, wherein the method includes:

a step of preparing a fluid composition comprising only sodium caseinate and/or potassium caseinate as a protein source, only an insoluble calcium compound whose solubility to water at 20°C is below 0.05 g/ml as a calcium source, the arginine, an acidic pH adjuster and water, pH being from 6.0 to 7.3; and

a step of heating the fluid composition.

5. The method according to Claim 4, wherein the insoluble calcium compound is a calcium phosphate and/or calcium carbonate.

6. The method according to Claim 4 or 5, wherein the composition is any of a beverage, an enteral nutrient and an oral liquid composition.

7. A method for preventing burnt deposit caused by heating a liquid nutritional composition comprising 1.0 g or more but less than 4.5 g of an arginine in 100 ml of the composition, a protein source, a calcium source and an acidic pH adjuster, wherein

a pH of the composition is from 6.0 to 7.3,

only sodium caseinate and/or potassium is used as a protein source in the composition, and

only an insoluble calcium compound whose solubility to water at 20°C is below 0.05 g/ml is used as a calcium source in the composition.

8. The method according to Claim 7, wherein the insoluble calcium compound is calcium phosphate and/or calcium carbonate.