

Description

Title of Invention: PACKAGED FOOD OR BEVERAGE, METHOD OF PRODUCING PACKAGED FOOD OR BEVERAGE, USE OF POLYPHENOL IN PRODUCTION OF PACKAGED FOOD OR BEVERAGE, AND ORAL COM- POSITION

Technical Field

[0001] The present invention relates to a packaged food or beverage in which a chicken extract-containing oral composition is sealed in a container. The present invention also relates to a method of producing a packaged food or beverage in which a chicken extract-containing oral composition is sealed in a container. The present invention still also relates to use of a polyphenol in production of a packaged food or beverage in which a chicken extract-containing oral composition is sealed in a container. The present invention still also relates to a chicken extract-containing oral composition.

Background Art

[0002] Chicken extract is considered to be the main nourishment in chicken meat. For example, in Southeast Asia, chicken extract is used as a "traditional medicine" that is beyond categories of food and food ingredients.

Consumer's preference for chicken extract has been increasing, and there is a demand for the development of chicken extract which provides a stronger chicken extract flavor such as umami. Chicken extract is a component extracted by hot water extraction from chicken meat, chicken bone, chicken leg, and/or chicken skin. The chicken extract generates an odor (for example, fishy smell), for example, after a long duration of high temperature and high pressure heating under retort or sterilization conditions, and there is a demand for a technique that reduces the odor arising from the chicken extract.

[0003] Non Patent Literature 1 discloses that the flavor of chicken meat is thermally induced, and that the Maillard reaction, pyrolysis of lipids, and interactions of these reactions are involved in generation of an odor compound from heated chicken meat. According to the disclosure, deterioration of the flavor of chicken meat products and formation of undesirable "warmed over flavor" are mainly due to lack of α -tocopherol in the chicken meat. Non Patent Literature 1 describes the flavor that is produced when chicken meat is reheated after the chicken meat is cooked and refrigerated, but nowhere describes or suggests anything about a flavor that is produced when a component extracted from chicken meat, chicken bone, chicken leg, and/or chicken

skin by extraction is further heated.

Citation List

Non Patent Literature

- [0004] NPL 1: Non Patent Literature 1: Dinesh D. Jayasena et al. "Flavour Chemistry of Chicken Meat: A Review" Asian-Australas. J. Anim. Sci. Vol. 26, No. 5: 732-742, May 2013

Summary of Invention

Technical Problem

- [0005] Products containing chicken extract obtained by extraction from chicken meat are generally produced by heat treating chicken extract. Thus, there is a demand for a technique to reduce an unpleasant odor (for example, fishy smell) caused by heating the chicken extract. In addition, there is a demand for a technique to reduce an odor generated from products containing chicken extract when the products are stored in an environment at 20°C or higher.
- [0006] The present invention aims to provide a packaged food or beverage in which a chicken extract-containing oral composition is sealed in a container, in which an unpleasant odor (for example, fishy smell) generated from the chicken extract is reduced or prevented, and a method of producing the packaged food or beverage. The present invention also aims to provide use of a component capable of reducing or preventing an odor caused by heating chicken extract in production of a packaged food or beverage in which a chicken extract-containing oral composition is sealed in a container. The present invention also aims to provide an oral composition containing chicken extract with less amount of the odor components generated from the chicken extract.

Solution to Problem

- [0007] As a result of various studies on unpleasant odors caused by heating chicken extract, the present inventors found that adding a polyphenol to the chicken extract can reduce or prevent the unpleasant odors caused by heating the chicken extract. Thus, the present invention was achieved.
- [0008] Specifically, the present invention is as follows.
- (1) A packaged food or beverage that is sealed in a container, comprising: an oral composition containing chicken extract and a polyphenol, wherein the polyphenol is at least one selected from the group consisting of a chlorogenic acid-class compound, flavonol, flavone, and flavanol, a concentration of odor components in a head space of the container is 100 ppm or less, and the concentration of the odor components is a total concentration of trimethylamine, butanedione, and 3-methylbutanoic acid.
 - (2) The packaged food or beverage according to (1) above, wherein a total amount of

the chlorogenic acid-class compound, flavonol, flavone, and flavanol in the oral composition is 0.01 mg/g or more.

(3) The packaged food or beverage according to (1) or (2) above, wherein the chlorogenic acid-class compound is at least one selected from the group consisting of 3-caffeoylquinic acid, 4-caffeoylquinic acid, 5-caffeoylquinic acid, 1,5-dicaffeoylquinic acid, 3,4-dicaffeoylquinic acid, 3,5-dicaffeoylquinic acid, and 4,5-dicaffeoylquinic acid.

(4) The packaged food or beverage according to any one of (1) to (3) above, wherein the flavonol is quercetin and/or rutin.

(5) The packaged food or beverage according to any one of (1) to (4) above, wherein the flavone is at least one selected from the group consisting of luteolin, apigenin, a glycoside of luteolin, a glycoside of apigenin, a derivative of luteolin, and a derivative of apigenin.

(6) The packaged food or beverage according to any one of (1) to (5) above, wherein the flavanol is at least one selected from the group consisting of catechin, epicatechin, epigallocatechin, epicatechin gallate, epigallocatechin gallate, galocatechin, catechin gallate, and galocatechin gallate.

(7) A method of producing a packaged food or beverage, including: heating a container sealing a raw material composition containing chicken extract and at least one polyphenol selected from the group consisting of a chlorogenic acid-class compound, flavonol, flavone, and flavanol, wherein an odor caused by heating the chicken extract in the heating is reduced or prevented due to the presence of the polyphenol in the raw material composition.

(8) The method according to (7) above, wherein the odor caused by heating the chicken extract is derived from at least one odor component selected from the group consisting of trimethylamine, butanedione, and 3-methylbutanoic acid.

(9) The method according to (7) or (8) above, wherein a total amount of the chlorogenic acid-class compound, flavonol, flavone, and flavanol in the raw material composition is 0.01 mg/g or more.

(10) The method according to any one of (7) to (9) above, wherein the chlorogenic acid-class compound is at least one selected from the group consisting of 3-caffeoylquinic acid, 4-caffeoylquinic acid, 5-caffeoylquinic acid, 1,5-dicaffeoylquinic acid, 3,4-dicaffeoylquinic acid, 3,5-dicaffeoylquinic acid, and 4,5-dicaffeoylquinic acid.

(11) The method according to any one of (7) to (10) above, wherein the flavonol is quercetin and/or rutin.

(12) The method according to any one of (7) to (11) above, wherein the flavone is at least one selected from the group consisting of luteolin, apigenin, a glycoside of

luteolin, a glycoside of apigenin, a derivative of luteolin, and a derivative of apigenin.

(13) The method according to any one of (7) to (12) above, wherein the flavanol is at least one selected from the group consisting of catechin, epicatechin, epigallocatechin, epicatechin gallate, epigallocatechin gallate, gallocatechin, catechin gallate, and gallocatechin gallate.

(14) Use of a polyphenol for reducing or preventing an odor caused by heating chicken extract in production of a packaged food or beverage in which a chicken extract-containing oral composition is sealed in a container, wherein the polyphenol is at least one selected from the group consisting of a chlorogenic acid-class compound, flavonol, flavone, and flavanol.

(15) The use according to (14) above, wherein the odor caused by heating the chicken extract is derived from at least one odor component selected from the group consisting of trimethylamine, butanedione, and 3-methylbutanoic acid.

(16) The use according to (14) or (15) above, wherein the polyphenol is added such that a total amount of the chlorogenic acid-class compound, flavonol, flavone, and flavanol in the oral composition is 0.01 mg/g or more.

(17) The use according to any one of (14) to (16) above, wherein the chlorogenic acid-class compound is at least one selected from the group consisting of 3-caffeoylquinic acid, 4-caffeoylquinic acid, 5-caffeoylquinic acid, 1,5-dicaffeoylquinic acid, 3,4-dicaffeoylquinic acid, 3,5-dicaffeoylquinic acid, and 4,5-dicaffeoylquinic acid.

(18) The use according to any one of (14) to (17) above, wherein the flavonol is quercetin and/or rutin.

(19) The use according to any one of (14) to (18) above, wherein the flavone is at least one selected from the group consisting of luteolin, apigenin, a glycoside of luteolin, a glycoside of apigenin, a derivative of luteolin, and a derivative of apigenin.

(20) The use according to any one of (14) to (19) above, wherein the flavanol is at least one selected from the group consisting of catechin, epicatechin, epigallocatechin, epicatechin gallate, epigallocatechin gallate, gallocatechin, catechin gallate, and gallocatechin gallate.

(21) An oral composition containing: chicken extract; and at least one polyphenol selected from the group consisting of a chlorogenic acid-class compound, flavonol, flavone, and flavanol, wherein the chicken extract contains histidine, carnosine, and anserine, and the oral composition contains 0.00001 to 10 wt% histidine, 0.00001 to 3 wt% carnosine, 0.00005 to 5 wt% anserine, and a total amount of the chlorogenic acid-class compound, flavonol, flavone, and flavanol in the oral composition is 0.01 mg/g or more.

(22) An oral composition containing: chicken extract; and at least one polyphenol selected from the group consisting of a chlorogenic acid-class compound, flavonol,

flavone, and flavanol, wherein the chicken extract contains cyclophenylalanylphenylalanine (Cyclo(Phe-Phe)), and a total amount of the chlorogenic acid-class compound, flavonol, flavone, and flavanol in the oral composition is 0.01 mg/g or more.

(23) The oral composition according to (21) or (22) above, wherein the chlorogenic acid-class compound is at least one selected from the group consisting of 3-caffeoylquinic acid, 4-caffeoylquinic acid, 5-caffeoylquinic acid, 1,5-dicaffeoylquinic acid, 3,4-dicaffeoylquinic acid, 3,5-dicaffeoylquinic acid, and 4,5-dicaffeoylquinic acid.

(24) The oral composition according to any one of (21) to (23) above, wherein the flavonol is quercetin and/or rutin.

(25) The oral composition according to any one of (21) to (24) above, wherein the flavone is at least one selected from the group consisting of luteolin, apigenin, a glycoside of luteolin, a glycoside of apigenin, a derivative of luteolin, and a derivative of apigenin.

(26) The oral composition according to any one of (21) to (25) above, wherein the flavanol is at least one selected from the group consisting of catechin, epicatechin, epigallocatechin, epicatechin gallate, epigallocatechin gallate, gallic acid, catechin gallate, and gallic acid gallate.

Advantageous Effects of Invention

[0009] The present invention can provide a packaged food or beverage in which a chicken extract-containing oral composition is sealed in a container, wherein an unpleasant odor (for example, fishy smell) generated from the chicken extract is reduced or prevented, and a method of producing the packaged food or beverage. The present invention can also provide use of a component capable of reducing or preventing an odor caused by heating chicken extract in production of a packaged food or beverage in which a chicken extract-containing oral composition is sealed in a container. The present invention can also provide an oral composition containing chicken extract with less amount of the odor components generated from the chicken extract.

Brief Description of Drawings

[0010] [Fig.1A]FIG. 1A is a graph showing the ratio of the amount of trimethylamine generated from the oral compositions each containing chicken extract, and a chlorogenic acid (5-caffeoylquinic acid) or cynarine (1,5-dicaffeoylquinic acid) according to Examples 1 to 8 to the amount of trimethylamine generated from the chicken extract according to Comparative Example 1 which is taken as 100%.
[Fig.1B]FIG. 1B is a graph showing the ratio of the amount of butanedione generated from the oral compositions each containing chicken extract, and a chlorogenic acid (5-caffeoylquinic acid) or cynarine (1,5-dicaffeoylquinic acid) according to Examples

1 to 8 to the amount of butanedione generated from the chicken extract according to Comparative Example 1 which is taken as 100%.

[Fig.1C]FIG. 1C is a graph showing the ratio of the amount of 3-methylbutanoic acid generated from the oral compositions each containing chicken extract, and a chlorogenic acid (5-caffeoylquinic acid) or cynarine (1,5-dicaffeoylquinic acid) according to Examples 1 to 8 to the amount of 3-methylbutanoic acid generated from the chicken extract according to Comparative Example 1 which is taken as 100%.

[Fig.2A]FIG. 2A is a graph showing the ratio of the amount of trimethylamine generated from the oral compositions each containing chicken extract, and apigenin, epigallocatechin gallate, luteolin, or quercetin according to Examples 9 to 16 to the amount of trimethylamine generated from the chicken extract according to Comparative Example 2 which is taken as 100%.

[Fig.2B]FIG. 2B is a graph showing the ratio of the amount of butanedione generated from the oral compositions each containing chicken extract, and apigenin, epigallocatechin gallate, luteolin, or quercetin according to Examples 9 to 16 to the amount of butanedione generated from the chicken extract according to Comparative Example 2 which is taken as 100%.

[Fig.2C]FIG. 2C is a graph showing the ratio of the amount of 3-methylbutanoic acid generated from the oral compositions each containing chicken extract, and apigenin, epigallocatechin gallate, luteolin, or quercetin according to Examples 9 to 16 to the amount of 3-methylbutanoic acid generated from the chicken extract according to Comparative Example 2 which is taken as 100%.

Description of Embodiments

[0011] The present invention provides a packaged food or beverage in which a chicken extract-containing oral composition is sealed in a container, wherein an unpleasant odor generated from the chicken extract is reduced or prevented due to the presence of at least one polyphenol selected from the group consisting of a chlorogenic acid-class compound, flavonol, flavone, and flavanol in the oral composition. The present invention also provides a method of producing a packaged food or beverage, the method including heating a container sealing a raw material composition containing chicken extract and at least one polyphenol selected from the group consisting of a chlorogenic acid-class compound, flavonol, flavone, and flavanol, wherein an odor caused by heating the chicken extract in the heating is reduced or prevented due to the presence of at least one polyphenol in the raw material composition containing the chicken extract.

[0012] The present invention also provides use of at least one polyphenol selected from the group consisting of a chlorogenic acid-class compound, flavonol, flavone, and flavanol

for reducing or preventing an odor caused by heating chicken extract in production of a packaged food or beverage.

[0013] The present invention also provides an oral composition containing chicken extract and at least one polyphenol selected from the group consisting of a chlorogenic acid-class compound, flavonol, flavone, and flavanol.

[0014] Herein, the packaged food or beverage, the method, the use, and the oral composition of the present invention are sometimes simply described as "the present invention". In such a case, a description is given which applies to the packaged food or beverage, the method, the use, and the oral composition of the present invention.

[0015] <Packaged food or beverage, and method of producing the packaged food or beverage >

In one embodiment, the present invention provides a packaged food or beverage that is sealed in a container, containing: an oral composition containing chicken extract and a polyphenol, wherein the polyphenol is at least one selected from the group consisting of a chlorogenic acid-class compound, flavonol, flavone, and flavanol, a concentration of odor components in a head space of the container is 100 ppm or less, and the concentration of the odor components is a total concentration of trimethylamine, butanedione, and 3-methylbutanoic acid. An unpleasant odor generated from the chicken extract is reduced or prevented due to the presence of the at least one polyphenol selected from the group consisting of a chlorogenic acid-class compound, flavonol, flavone, and flavanol in the oral composition containing the chicken extract.

[0016] In the packaged food or beverage of the present invention, a chicken extract-containing oral composition is sealed in a container. There is a head space in the container of the packaged food or beverage.

[0017] The method of producing a packaged food or beverage of the present invention includes heating a container sealing a raw material composition containing chicken extract and at least one polyphenol selected from the group consisting of a chlorogenic acid-class compound, flavonol, flavone, and flavanol, wherein an odor caused by heating the chicken extract in the heating is reduced or prevented due to the presence of the polyphenol in the raw material composition. The odor caused by heating the chicken extract in the heating can be reduced or prevented due to the presence of the at least one polyphenol selected from the group consisting of a chlorogenic acid-class compound, flavonol, flavone, and flavanol in the raw material composition containing the chicken extract. Preferably, the odor caused by heating the chicken extract is derived from at least one odor component selected from the group consisting of trimethylamine, butanedione, and 3-methylbutanoic acid.

The packaged food or beverage produced by the method of producing a packaged food or beverage of the present invention contains an oral composition, and the oral

composition is sealed in a container. The oral composition in the packaged food or beverage contains chicken extract and at least one polyphenol selected from the group consisting of a chlorogenic acid-class compound, flavonol, flavone, and flavanol.

[0018] <Chicken extract>

The chicken extract (hereinafter sometimes abbreviated as "CE") in the present invention is chicken meat extract. The chicken extract for use in the present invention can be, for example, an extract obtainable by heating chicken meat used as a raw material in a liquid. A commercial product may also be used. The raw material may contain bone, cartilage, legs, or the like, but preferably, the raw material does not contain the head or internal organs of the chicken.

[0019] When producing the chicken extract for use in the present invention by extraction, the chicken extract can be produced by a method that is usually used in this field. For example, the chicken extract can be produced by performing normal pressure extraction and/or pressurized extraction using a liquid at a temperature of 100°C or higher, preferably 125°C or higher, and membrane-treating or filtering the resulting extract. Specifically, the extract is obtained by a pre-treatment step (1) in which chicken meat and optionally chicken bone and the like are heated in a solvent to remove water-soluble protein contained in the chicken meat, and an extraction step (2) in which a water-soluble protein-containing solvent is replaced with a fresh solvent after the pre-treatment and heating the chicken meat in the solvent. The solvent is preferably water, ethanol, or a mixture of these, for example.

The chicken extract that can be used may be a liquid extract obtained by the method described above; a diluted solution, concentrate, or dry powder of the liquid extract; or a purified product of any of these. The purified product may be one obtained by, for example, subjecting liquid chicken extract to fractionation by ultrafiltration, membrane treatment, liquid separation operation, or fraction treatment with resin, or the like to increase the purity. After increasing the purity of the chicken extract, the purified product may be formed into powder by freeze-drying or spray-drying, for example.

[0020] Preferably, the chicken extract for use in the present invention contains at least one selected from the group consisting of histidine, carnosine, anserine, and salts thereof. Carnosine is β -alaninyl-histidine, which is a dipeptide of β -alanine and histidine. Anserine is β -alaninyl-1-methylhistidine in which histidine is methylated.

Histidine, carnosine, and anserine can be contained in the form of a salt with an inorganic acid or an organic acid or a salt with an inorganic base or an organic base in the chicken extract for use in the present invention. Such an acid or a base can be selected based on the application of the salt. In view of application to food, beverages, and medicines, the following dietary or pharmaceutically acceptable salts are preferred. Examples of the inorganic acid salt include hydrochloride, nitrate, sulfate, methane-

sulfonate, and p-toluenesulfonate. Examples of the organic acid salt include salts with dicarboxylic acids such as oxalic acid, malonic acid, succinic acid, maleic acid, and fumaric acid, and salts with monocarboxylic acids such as acetic acid, propionic acid, and butyric acid. Examples of the inorganic base include hydroxides, carbonates, and bicarbonates of sodium, lithium, calcium, magnesium, and aluminum and ammonia. Examples of the salt with the organic base include mono-, di-, or tri-alkylamine salts such as salts of methylamine, dimethylamine, and triethylamine, mono-, di-, or tri-hydroxyalkylamine salts, guanidine salt, and N-methylglucosamine salt.

- [0021] When the chicken extract for use in the present invention contains histidine, for example, the amount of histidine in the solid content of the chicken extract is preferably 0.01 wt% or more, more preferably 0.1 wt% or more, and is preferably 10 wt% or less, more preferably 1 wt% or less. In one embodiment, the amount of histidine in the solid content of the chicken extract is preferably 0.01 to 10 wt%, more preferably 0.01 to 1 wt%, still more preferably 0.1 to 1 wt%. When histidine is in the form of a salt, the “amount of histidine” represents the amount of histidine in a free form (i.e. non-salt).
- [0022] When the chicken extract for use in the present invention contains carnosine, for example, the amount of carnosine in the solid content of the chicken extract is preferably 0.001 wt% or more, more preferably 0.01 wt% or more, and is preferably 3 wt% or less, more preferably 0.3 wt% or less. In one embodiment, the amount of carnosine in the solid content of the chicken extract is preferably 0.001 to 3 wt%, more preferably 0.001 to 0.3 wt%, still more preferably 0.01 to 0.3 wt%. When carnosine is in the form of a salt, the “amount of carnosine” represents the amount of carnosine in a free form.
- [0023] When the chicken extract for use in the present invention contains anserine, for example, the amount of anserine in the solid content of the chicken extract is preferably 0.005 wt% or more, more preferably 0.05 wt% or more, and is preferably 5 wt% or less, more preferably 0.5 wt% or less. In one embodiment, the amount of anserine in the solid content of the chicken extract is preferably 0.005 to 5 wt%, more preferably 0.005 to 0.5 wt%, still more preferably 0.05 to 0.5 wt%. When anserine is in the form of a salt, the “amount of anserine” represents the amount of anserine in a free form.
- [0024] Histidine, carnosine, and anserine can be quantitated by high performance liquid chromatography (HPLC), for example.
- [0025] In one embodiment, for example, the amount of chicken extract (in terms of solid content) in the oral composition of the present invention is preferably 0.1 wt% or more, more preferably 0.5 wt% or more, and is preferably 99 wt% or less, more preferably 90 wt% or less. In one embodiment, for example, the amount of chicken extract (in terms

of solid content) in the oral composition is preferably 0.01 to 99 wt%, more preferably 0.1 to 90 wt%, still more preferably 0.5 to 90 wt%. Herein, the amount of chicken extract (in terms of solid content) includes the amounts of histidine, carnosine, and anserine.

[0026] Preferably, the chicken extract for use in the present invention contains cyclophenylalanylphenylalanine (Cyclo(Phe-Phe)). Cyclo(Phe-Phe) is a type of cyclic dipeptide having an amino acid (phenylalanine) as a constituent unit. Cyclo(Phe-Phe) may be in the free form or in the form of a salt. Examples of the salt of Cyclo(Phe-Phe) include those mentioned above for histidine, carnosine, and anserine.

[0027] When the chicken extract for use in the present invention contains Cyclo(Phe-Phe), for example, the amount of Cyclo(Phe-Phe) in the solid content (100 g) of the chicken extract is preferably 1 μ g or more, more preferably 60 μ g or more, still more preferably 75 μ g or more. In other words, the amount of Cyclo(Phe-Phe) in the solid content of the chicken extract, for example, is preferably 0.1×10^{-5} wt% or more, more preferably 6×10^{-5} wt% or more, still more preferably 7.5×10^{-5} wt% or more. In one embodiment, the amount of Cyclo(Phe-Phe) in the chicken extract is preferably 0.1×10^{-5} to 0.01 wt%, more preferably 6×10^{-5} to 0.01 wt%, still more preferably 7.5×10^{-5} to 0.01 wt%. When the Cyclo(Phe-Phe) is in the form of a salt, the “amount of Cyclo(Phe-Phe)” represents the amount of Cyclo(Phe-Phe) in a free form.

[0028] Cyclo(Phe-Phe) in the chicken extract for use in the present invention or in the oral composition of the present invention can be quantified by various methods, such as liquid chromatography-mass spectrometry (LC-MS) or HPLC.

[0029] Preferably, the oral composition of the present invention contains at least one selected from the group consisting of histidine, carnosine, anserine, and Cyclo(Phe-Phe).

When the oral composition of the present invention contains histidine, the amount of histidine in the oral composition is, for example, preferably 0.00001 to 10 wt%, more preferably 0.0001 to 10 wt%, still more preferably 0.0001 to 1 wt%. When the oral composition of the present invention contains carnosine, the amount of carnosine in the oral composition of the present invention is, for example, preferably 0.00001 to 3 wt%, more preferably 0.0001 to 3 wt%, still more preferably 0.0001 to 0.3 wt%. When the oral composition of the present invention contains anserine, the amount of anserine in the oral composition of the present invention is, for example, preferably 0.00005 to 5 wt%, more preferably 0.0005 to 5 wt%, still more preferably 0.005 to 0.5 wt%.

In one embodiment, when the oral composition is liquid, the amount of histidine in the oral composition is preferably 0.0001 to 10 mg/mL, more preferably 0.001 to 9 mg/mL, still more preferably 0.01 to 5 mg/mL. When the oral composition is liquid, the amount of carnosine in the oral composition is preferably 0.00001 to 3 mg/mL,

more preferably 0.0001 to 3 mg/mL, still more preferably 0.0001 to 2 mg/mL. When the oral composition is liquid, the amount of anserine in the oral composition is preferably 0.0001 to 10 mg/mL, more preferably 0.001 to 7 mg/mL, still more preferably 0.01 to 5 mg/mL.

When the histidine, carnosine, and anserine are each in the form of a salt, the “amount of histidine”, the “amount of carnosine”, and the “amount of anserine” in the oral composition represent the amount of histidine in a free form, the amount of carnosine in a free form, and the amount of anserine in a free form, respectively.

When the oral composition of the present invention contains Cyclo(Phe-Phe), the amount of Cyclo(Phe-Phe) in the oral composition, for example, is preferably 0.1×10^{-5} to 0.01 wt%, more preferably 6×10^{-5} to 0.01 wt%, still more preferably 7.5×10^{-5} to 0.01 wt%.

In one embodiment, when the oral composition is liquid, the amount of Cyclo(Phe-Phe) in the oral composition is preferably 0.1×10^{-5} to 0.1 mg/mL, more preferably 6×10^{-5} to 0.1 mg/mL, still more preferably 7.5×10^{-5} to 0.1 mg/mL.

When the Cyclo(Phe-Phe) is in the form of a salt, the “amount of Cyclo(Phe-Phe)” in the above oral composition represents the amount of Cyclo(Phe-Phe) in a free form.

[0030] <Polyphenol>

The polyphenol for use in the present invention is at least one selected from the group consisting of a chlorogenic acid-class compound, flavonol, flavone, and flavanol. The polyphenol may be a commercial product. The polyphenol may be contained in the form of a hydrate. The term “chlorogenic acid-class compound” is a generic term for ester compounds of cinnamic acid derivatives (e.g., caffeic acid and ferulic acid) and quinic acid.

[0031] Preferably, the chlorogenic acid-class compound is at least one selected from the group consisting of 3-caffeoylquinic acid, 4-caffeoylquinic acid, 5-caffeoylquinic acid (chlorogenic acid), 1,5-dicaffeoylquinic acid (cynarin), 3,4-dicaffeoylquinic acid, 3,5-dicaffeoylquinic acid, and 4,5-dicaffeoylquinic acid.

More preferred are 5-caffeoylquinic acid and/or 1,5-dicaffeoylquinic acid.

[0032] Examples of the flavonol include quercetin, a derivative of quercetin, and a glycoside of quercetin. Quercetin may be quercetin hydrate. Examples of the glycoside of quercetin include isoquercitrin and rutin. The flavonol is preferably quercetin and/or rutin, i.e. at least one selected from the group consisting of quercetin and rutin.

[0033] Preferably, the flavone is at least one selected from the group consisting of luteolin, apigenin, a glycoside of luteolin, a glycoside of apigenin, a derivative of luteolin, and a derivative of apigenin. Examples of the derivative of luteolin and the derivative of apigenin include salts formed from metals such as sodium, potassium, magnesium, calcium, zinc, barium, and aluminum, and ammonium; esters and salts thereof obtained

by reaction with alcohols, fatty acids, alkyl halogenides, and the like; phosphorylated compounds having a phosphate group introduced therein; sulfated compounds having a sulfuric acid group introduced therein; alkyl ether derivatives obtained by reaction with alkylene oxides having a carbon chain with about two to four carbon atoms, such as ethylene glycol, propylene glycol, and butylene glycol; and quaternary alkylamine derivatives and salts thereof obtained by reaction with a substrate having a quaternary amine in the molecule, such as glycidyltrialkylammonium halogenide.

Examples of the glycoside of luteolin include cynaroside (luteolin 7-O-glucoside), scolymoside (luteolin 7-O-rutinoside), orientin (luteolin 8-C-glucoside), and isoorientin (luteolin 6-C-glucoside).

Examples of the glycoside of apigenin include apigenin-7-glucoside, apigenin-8-C-glucoside, apigenin-6-C-glucoside, and apigenin-7-O-neohesperidosid.

The flavone is more preferably luteolin, luteolin 7-O-glucoside, or apigenin.

[0034] Preferably, the flavanol is at least one selected from the group consisting of catechin, epicatechin, gallic acid, epigallocatechin, catechin gallate, epicatechin gallate, gallic acid gallate, and epigallocatechin gallate. The flavanol is more preferably at least one selected from the group consisting of catechin, epicatechin, epigallocatechin, epicatechin gallate, and epigallocatechin gallate, and still more preferably epigallocatechin gallate.

[0035] In the present invention, one or more types of the polyphenol may be used. In the present invention, when two or more types of polyphenols are used, they may be: a combination of a chlorogenic acid-class compound, and flavonol, flavone, and/or flavanol; two or more types of chlorogenic acid-class compounds; two or more types of flavonols; two or more types of flavones; or two or more types of flavanols. In the present invention, use of two or more of polyphenols in combination is preferred because it can more comprehensively reduce or prevent the odor caused by heating the chicken extract.

The polyphenol for use in the present invention is preferably at least one selected from the group consisting of 5-caffeoylquinic acid, 1,5-dicaffeoylquinic acid, quercetin, luteolin, apigenin, and epigallocatechin gallate. Use of two or more thereof is more preferred.

In one embodiment, the polyphenol for use in the present invention is preferably at least one selected from the group consisting of 5-caffeoylquinic acid, 1,5-dicaffeoylquinic acid, and luteolin. Use of two or more thereof is more preferred.

[0036] In the present invention, preferably, the total amount of the chlorogenic acid-class compound, flavonol, flavone, and flavanol in the oral composition is 0.01 mg/g or more. The total amount is more preferably 0.1 mg/g or more.

Preferably, the total amount of the chlorogenic acid-class compound, flavonol,

flavone, and flavanol in the oral composition is 5 mg/g or less. Due to the presence of the polyphenol in the chicken extract-containing oral composition, the odor generated from the chicken extract can be reduced or prevented. When the total amount of the chlorogenic acid-class compound, flavonol, flavone, and flavanol in the oral composition is in the above range, the odor generated from the chicken extract can be more effectively reduced or prevented.

The total amount of the chlorogenic acid-class compound, flavonol, flavone, and flavanol in the oral composition is more preferably 4 mg/g or less, still more preferably 3 mg/g or less. In the present invention, preferably, the polyphenol is added in the production of the oral composition such that the total amount of the chlorogenic acid-class compound, flavonol, flavone, and flavanol in the oral composition is in the above range.

[0037] In the method of producing a packaged food or beverage of the present invention, preferably, the total amount of the chlorogenic acid-class compound, flavonol, flavone, and flavanol in the raw material composition is 0.01 mg/g or more, more preferably 0.1 mg/g or more.

The total amount of the chlorogenic acid-class compound, flavonol, flavone, and flavanol is preferably 5 mg/g or less. Due to the presence of the polyphenol in the raw material composition containing the chicken extract, the odor caused by heating the chicken extract can be reduced or prevented. When the total amount of the chlorogenic acid-class compound, flavonol, flavone, and flavanol in the raw material composition containing the chicken extract is in the above range, the odor generated from the chicken extract in the raw material composition upon heating of the raw material composition can be more effectively reduced or prevented.

The raw material composition suffices as long as it contains the chicken extract described above and the polyphenol described above. Mixing conditions, adding order, and the like are not limited.

[0038] Preferably, the method of the present invention includes adding the polyphenol to the raw material composition such that the total amount of the chlorogenic acid-class compound, flavonol, flavone, and flavanol in the raw material composition satisfies the above range.

The total amount of the chlorogenic acid-class compound, flavonol, flavone, and flavanol in the raw material composition is more preferably 4 mg/g or less, still more preferably 3 mg/g or less.

The method of the present invention may include adjusting the polyphenol content in the raw material composition such that the total amount of the chlorogenic acid-class compound, flavonol, flavone, and flavanol in the raw material composition is in the above range.

- [0039] When the polyphenol for use in the present invention includes a chlorogenic acid-class compound, the total amount of the chlorogenic acid-class compound in the oral composition or the raw material composition is preferably 0.01 mg/g or more, more preferably 0.1 mg/g or more, still more preferably 1 mg/g or more. When the polyphenol for use in the present invention includes a chlorogenic acid-class compound, the total amount of the chlorogenic acid-class compound in the oral composition or the raw material composition is preferably 5 mg/g or less, more preferably 3 mg/g or less.
- [0040] When the polyphenol for use in the present invention includes flavanol, the total amount of flavanol in the oral composition or the raw material composition is preferably 0.01 mg/g or more, more preferably 0.1 mg/g or more, still more preferably 0.5 mg/g or more. When the polyphenol for use in the present invention includes flavanol, the total amount of flavanol in the oral composition or the raw material composition is preferably 5 mg/g or less, more preferably 3 mg/g or less.
- [0041] When the polyphenol for use in the present invention includes flavone, the total amount of flavone in the oral composition or the raw material composition is preferably 0.01 mg/g or more, more preferably 0.2 mg/g or more, still more preferably 0.5 mg/g or more. When the polyphenol for use in the present invention includes flavone, the total amount of flavone in the oral composition or the raw material composition is preferably 5 mg/g or less, more preferably 3 mg/g or less.
- [0042] When the polyphenol for use in the present invention includes flavanol, the total amount of flavanol in the oral composition or the raw material composition is preferably 0.01 mg/g or more, more preferably 0.1 mg/g or more, still more preferably 0.2 mg/g or more. When the polyphenol for use in the present invention includes flavanol, the total amount of flavanol in the oral composition or the raw material composition is preferably 2 mg/g or less, more preferably 1 mg/g or less.
- [0043] The amount of the chlorogenic acid-class compound, flavonol, flavone, and flavanol for use in the present invention in the oral composition or the raw material composition can be quantitated by HPLC or LC-MS for example.
- [0044] When the polyphenol for use in the present invention includes a chlorogenic acid-class compound, the ratio of the chlorogenic acid-class compound to anserine (chlorogenic acid-class compound/anserine) in the oral composition or the raw material composition is preferably 0.05 to 10.0, more preferably 0.3 to 1.0.
- [0045] When the polyphenol for use in the present invention includes flavonol, the ratio of the flavonol to anserine (flavonol/anserine) in the oral composition or the raw material composition is preferably 0.05 to 10.0, more preferably 0.2 to 1.0.
- [0046] When the polyphenol for use in the present invention includes flavone, the ratio of the flavone to anserine (flavone/anserine) in the oral composition or the raw material

composition is preferably 0.1 to 10.0, more preferably 0.2 to 0.5.

[0047] When the polyphenol for use in the present invention includes flavanol, the ratio of the flavanol to anserine (flavanol/anserine) in the oral composition or the raw material composition is preferably 0.01 to 5.0, more preferably 0.1 to 0.5.

[0048] <Odor component>

The packaged food or beverage of the present invention contains an oral composition sealed in a container, and there is a head space in the container. In the packaged food or beverage of the present invention, a concentration of odor components in a head space of the container is 100 ppm or less. The concentration of the odor components is a total concentration of trimethylamine, butanedione, and 3-methylbutanoic acid.

[0049] Odor components of the unpleasant odor such as fishy smell include other components in addition to the trimethylamine, butanedione, and 3-methylbutanoic acid described above. As a result of extensive studies by the present inventors, it was confirmed that odor from the above three components (trimethylamine, butanedione, and 3-methylbutanoic acid) is the main problem in chicken extract produced by a conventional production method in which no polyphenols are added. In a packaged chicken extract produced by a conventional production method in which no polyphenols are added, the above three odor components were regularly detected in the head space of the container. In one example of production lot of chicken extract, when chicken extract not containing polyphenols was heated under retort conditions (pressure heating conditions), i.e. sealed in a hermetic container and heated at 121°C for eight minutes, the total concentration of trimethylamine, butanedione, and 3-methylbutanoic acid in the head space of the container was 115 ppm. The present inventors added at least one polyphenol selected from the group consisting of a chlorogenic acid-class compound, flavonol, flavone, and flavanol to chicken extract of the above production lot, and heated the chicken extract under the above retort conditions. In this case, the total concentration of trimethylamine, butanedione, and 3-methylbutanoic acid in the head space was lower than 100 ppm, i.e. the odor caused by heating chicken extract under retort conditions was reduced.

In the packaged food or beverage and the method of producing the packaged food or beverage of the present invention, due to the presence of at least one polyphenol selected from the group consisting of a chlorogenic acid-class compound, flavonol, flavone, and flavanol in the oral composition and the raw material composition, generation of odor components from chicken extract, particularly, trimethylamine, butanedione, and 3-methylbutanoic acid, can be reduced or prevented, and the total concentration of these odor components in the head space of the container can be reduced to 100 ppm or less. In the packaged food or beverage of the present invention, the concentration of an odor components in a head space of the container of the packaged food

or beverage is preferably 50 ppm or less, more preferably 10 ppm or less, still more preferably 5 ppm or less. In the method of producing the packaged food or beverage of the present invention, the concentration of an odor components in a head space of the container of the packaged food or beverage is preferably 100 ppm or less, more preferably 50 ppm or less, still more preferably 10 ppm or less, even more preferably 5 ppm or less. No odor components may be present in the head space.

[0050] The concentration of the odor components can be measured by any method known in the relevant art. For example, gas chromatography (GC) can be used for measurement. Conditions that can be used for analysis of the odor components by gas chromatography may be, for example, the conditions for analysis by gas chromatography described in Examples.

[0051] The packaged food or beverage of the present invention contains a chicken extract and at least one polyphenol selected from the group consisting of a chlorogenic acid-class compound, flavonol, flavone, and flavanol, wherein an odor generated from the chicken extract is reduced or prevented. Preferably, the packaged food or beverage is one in which particularly an odor caused by heating the chicken extract is reduced or prevented. The heating of the chicken extract in the present invention may be heating in the production process of the packaged food or beverage, for example, heating under sterilization conditions. The odor generated from the chicken extract may be an odor caused by storing the chicken extract in an environment at 20°C or higher.

[0052] In the method of producing a packaged food or beverage of the present invention, a container sealing an oral composition is heated. Any method may be used to seal the oral composition in the container, and can be appropriately selected according to the form of the oral composition or the container. The heating conditions are preferably sterilization conditions, particularly, retort conditions.

Preferably, the packaged food or beverage of the present invention is one in which an odor caused by heating is reduced or prevented under chicken extract sterilization conditions, particularly under retort conditions. Preferably, the method of producing the packaged food or beverage of the present invention reduces or prevents an odor caused by heating under chicken extract sterilization conditions, particularly under retort conditions. In the packaged food or beverage of the present invention, and the method of producing the packaged food or beverage of the present invention, preferably, the odor components in the head space of the container are odor components generated by heating under chicken extract sterilization conditions, particularly under retort conditions.

[0053] <Heating conditions>

In the method of the present invention, preferably, heating in the heating a container is performed for sterilization. As described above, the method of the present invention

is preferably a method of producing a packaged food or beverage in which a chicken extract-containing oral composition is sealed in a container, which reduces or prevents an odor caused by heating under chicken extract sterilization conditions, particularly under retort conditions. The use of the present invention is preferably use of a polyphenol for reducing or preventing an odor caused by heating under chicken extract sterilization conditions, particularly under retort conditions, wherein the polyphenol is at least one selected from the group consisting of a chlorogenic acid-class compound, flavonol, flavone, and flavanol. The oral composition or packaged food or beverage of the present invention may be an oral composition or a packaged food or beverage wherein an odor caused by heating is reduced or prevented under chicken extract sterilization conditions, particularly under retort conditions.

The pressure and temperature under sterilization conditions (autoclaving conditions) are not limited. Any conditions known in the relevant field of the art can be applied. Specifically, for example, the heating may be performed at 50°C or higher, preferably at 100°C to 130°C for not longer than 400 minutes (preferably 6 to 37 minutes) under normal pressure or higher pressure. Heating under retort conditions can be performed under any conditions known in the relevant field of the art. Specifically, for example, the heating is performed at a temperature of 113°C to 120°C for 6 to 37 minutes, usually under normal pressure or higher pressure. The pressure under retort conditions may be, for example, 0.1 to 0.3 MPa (gauge pressure).

[0054] In the packaged food or beverage and the method of producing the packaged food or beverage of the present invention, the form of the container is not limited. The container for use in the present invention is not limited as long as it is a container designed to maintain commercial sterility of the content (i.e., the oral composition). Examples of the container that can be used include hermetic containers such as: glass or plastic jars; glass or plastic bottles; aluminum foil or plastic retort pouches; boil-in bags; carton boxes or juice boxes containing paper, plastic, or aluminum; buckets with lids; and cans. In the method of producing a packaged food or beverage of the present invention, when heating in the heating a container is performed under sterilization conditions, the container for use preferably has heat resistance under sterilization conditions.

The packaged food or beverage of the present invention is preferably a packaged beverage.

[0055] <Oral composition>

In one embodiment, the present invention provides an oral composition containing chicken extract and at least one polyphenol selected from the group consisting of a chlorogenic acid-class compound, flavonol, flavone, and flavanol, wherein the chicken extract contains histidine, carnosine, and anserine, and the oral composition contains

0.00001 to 10 wt% histidine, 0.00001 to 3 wt% carnosine, 0.00005 to 5 wt% anserine, and a total amount of the chlorogenic acid-class compound, flavonol, flavone, and flavanol in the oral composition is 0.01 mg/g or more.

In one embodiment, the present invention provides an oral composition containing chicken extract and at least one polyphenol selected from the group consisting of a chlorogenic acid-class compound, flavonol, flavone, and flavanol, wherein the chicken extract contains Cyclo(Phe-Phe), and a total amount of the chlorogenic acid-class compound, flavonol, flavone, and flavanol in the oral composition is 0.01 mg/g or more.

Preferred examples/embodiments of the chicken extract and the polyphenol in the oral composition of the present invention are as described above. The oral composition of the present invention is preferably one in which an odor generated from the chicken extract is reduced or prevented, more preferably one in which an odor caused by heating the chicken extract is reduced or prevented, still more preferably one in which an odor caused by heating under chicken extract sterilization conditions, particularly under retort conditions is reduced or prevented or an odor caused by storing the chicken extract in an environment at 20°C or higher is reduced or prevented. In the present invention, it suffices as long as the odor generated from chicken extract is reduced or prevented, compared to an odor generated when the oral composition contains no polyphenols.

[0056] In the present invention, preferably, the oral composition and the raw material composition are liquid. In the method of the present invention, chicken extract which is a commercial product or which is produced from chicken meat by hot water extraction or the like can be directly mixed with the polyphenol. When the chicken extract is in the form of a concentrate, dry powder, or a purified product of the concentrate or the dry powder, such a product may be diluted, dissolved, or the like in a liquid such as water, ethanol, or a mixture of water and ethanol before mixing with the polyphenol. When the polyphenol is in the form of a concentrate, dry powder, or a purified product of the concentrate or the dry powder, such a product can be similarly diluted, dissolved, or the like in the liquid or the like before adding. Alternatively, such a product may be added without being diluted, dissolved, or the like in advance, and then blended with a liquid so as to be diluted, dissolved, or the like in the liquid.

[0057] Preferably, the oral composition of the present invention is used as a food or beverage or medicine, more preferably a food or beverage. Examples of the food or beverage include functional foods, health-promoting foods, foods for special dietary uses, foods with function claims, dietary supplements, health supplements, and general supplements. The form of the food or beverage is not limited. For example, it may be a solid food or a liquid beverage. A beverage is preferred.

Preferably, the packaged food or beverage of the present invention is a packaged food or beverage in which a liquid oral composition (preferably, a beverage) containing chicken extract and a polyphenol is sealed in a container. The form of the medicine is not limited. Non-limiting examples include preparations for internal administration such as capsules, tablets, powder, granules, and dry syrups.

[0058] The oral composition of the present invention contains various pharmaceutically or dietary acceptable additives such as diluents, acidulants, antioxidants, stabilizers, preservatives, flavoring or masking agents, emulsifiers, pigments, seasonings, pH adjusters, and nutritional enhancers.

As the emulsifier, for example, xanthan gum, gum arabic, gellan gum and the like can be used alone or in combination of two or more. Commercially available emulsifiers such as Habo P90 sucrose monopalmitate, L90 Sucrose Monolaurate, sorbitol solution, propylene glycol, medium-chain triglycerides, lecithin (Compass Foods Pte. Ltd., Singapore), orange oil, SprayGum AA Arabic gum (Nexira, France), sucrose acetate isobutyrate, lactic acid, citric acid (San-Ei Gen F.F.I., Inc., Japan), Kelcogel (registered trademark) gellan gum (CP Kelco U.S., Inc.), and Kelcotrol (registered trademark) xanthan gum (CP Kelco U.S., Inc.) can be used.

[0059] The oral composition of the present invention can be produced by mixing the components. The oral composition can also be produced by heating the raw material composition.

[0060] The oral composition of the present invention is applicable for both therapeutic use (medical use) and non-therapeutic use (non-medical use). The "non-therapeutic" is a concept that does not include medical activities, i.e., a concept that does not include methods of surgery, therapy or diagnosis of humans.

[0061] The oral composition of the present invention is orally ingested (orally administered). The dose (intake) of the oral composition of the present invention is not limited.

[0062] A subject (administration subject) subjected to ingestion or administration of the composition of the present invention is not limited. The subject is preferably a human or non-human mammal, more preferably a human. In one embodiment, the administration subject in the present invention may be a middle-aged or older person.

[0063] Preferably, the oral composition of the present invention is used in the form of a food, beverage, health food, or health beverage.

[0064] <Use of polyphenol for reducing or preventing odor generated from chicken extract>

The present invention encompasses use of at least one polyphenol selected from the group consisting of a chlorogenic acid-class compound, flavonol, flavone, and flavanol for reducing or preventing an odor generated from chicken extract.

The use of the present invention is use of a polyphenol for reducing or preventing an odor caused by heating chicken extract in production of a packaged food or beverage

in which a chicken extract-containing oral composition is sealed in a container, wherein the polyphenol is at least one selected from the group consisting of a chlorogenic acid-class compound, flavonol, flavone, and flavanol. The use of the present invention is suitable for reducing or preventing an odor caused by heating chicken extract under sterilization conditions.

In one embodiment, the present invention provides use of at least one polyphenol selected from the group consisting of a chlorogenic acid-class compound, flavonol, flavone, and flavanol for reducing or preventing an odor caused by heating chicken extract or an odor caused by storing a packaged food or beverage in which a chicken extract-containing oral composition is sealed in a container in an environment at 20°C or higher.

Preferably, the odor caused by heating chicken extract, the odor caused by heating chicken extract under sterilization conditions, or the odor caused by storing the packaged food or beverage containing a chicken extract-containing oral composition at 20°C or higher is an odor derived from at least one odor component selected from the group consisting of trimethylamine, butanedione, and 3-methylbutanoic acid.

The oral composition, chicken extract, and polyphenol in the use of the present invention and preferred examples/embodiments thereof are the same as the oral composition, the chicken extract, and the polyphenol in the packaged food or beverage of the present invention described above and preferred examples/embodiments thereof. The oral composition in the use of the present invention suffices as long as it contains the chicken extract described above and the polyphenol described above. Mixing conditions, adding order, and the like are not limited.

[0065] <Method of maintaining the flavor, agent for maintaining the flavor>

Adding the polyphenol to chicken extract can reduce or prevent an odor caused by heating the chicken extract. Thus, the original flavor of the chicken extract can be maintained even after the chicken extract is heated. Thus, in one embodiment, the present invention may provide a method of maintaining the flavor of a chicken extract-containing oral composition, the method including adding at least one polyphenol selected from the group consisting of a chlorogenic acid-class compound, flavonol, flavone, and flavanol to the chicken extract so as to reduce or prevent an odor caused by heating the chicken extract and maintain the flavor of the chicken extract. In one embodiment, the present invention may provide an agent for maintaining the flavor of a chicken extract-containing oral composition, the agent containing at least one polyphenol selected from the group consisting of a chlorogenic acid-class compound, flavonol, flavone, and flavanol as an active ingredient, wherein the agent reduces or prevents an odor caused by heating the chicken extract. Examples of the flavor of the chicken extract include umami and thickness. Preferred examples/embodiments,

amounts, and the like of the chicken extract and the polyphenol are the same as those described for the oral composition described above. In the method of maintaining the flavor and the agent for maintaining the flavor of the present invention, heating of chicken extract may be heating under sterilization conditions or heating by storing at an environment at 20°C or higher.

Herein, any numerical range defined by a lower limit and an upper limit, i.e., a lower limit to an upper limit, includes the lower limit and the upper limit. For example, the range expressed by "1 to 2" means 1 or more and 2 or less and includes 1 and 2.

Herein, any of the above upper limits can be combined with any of the above lower limits to define the range.

Examples

- [0066] The present invention is more specifically described below with reference to examples. The present invention is not limited to these examples.
- [0067] Materials used in Examples and Comparative Examples are as follows.
- [0068] A. Chicken extract
- Commercially available chicken extract (CE), Brand's Essence of Chicken (BEC; manufacturer: Brand's Suntory (Thailand), Co. Ltd., under licensed from Suntory Beverage & Food Asia Pte. Ltd.) was used. The chicken extract is an extract obtainable by heating chicken meat and chicken bone in hot water, and contains Cyclo(Phe-Phe) in an amount of 0.000079 wt%. In the CE (1 ml), the amount of histidine was 0.45 wt%, the amount of carnosine was 0.094 wt%, and the amount of anserine was 0.19 wt%.
- [0069] Detection and quantification of Cyclo(Phe-Phe) in the chicken extract was performed on an LC-MS. LC-MS analysis was performed on an Agilent HPLC 1290 series-coupled TripleTOF 5600 (AB Sciex) with a Duo Spray Turbo V ion source and a gas generator (Peak Scientific Ltd.). The mass spectrometer uses electrospray ionization and multiple reaction monitoring (MRM) in positive ion mode at unit mass resolution, with the following parameters: Collision Energy Spread (CES): 10; Ion Release Delay (IRD): 67; Ion Release Width (IRW): 25; Ion Source Gas: 40; Curtain Gas (CUR): 30; Temperature: 500.0; IonSpray Voltage Floating (ISVF): 5500). MS compound-dependent parameter settings such as declustering potential (DP) and collision energy were optimized as 100.0 and 30.0 respectively. Analyst 1.8 (AB Sciex) was used for equipment control, data acquisition, and data processing.
- [0070] Cyclo(Phe-Phe) was dissolved in dimethyl sulfoxide (DMSO) in the concentration of 1 mg/mL and diluted to the working concentrations with ultrapure water prior to injected on to an Zorbax Eclipse Plus C18 RRHD 1.8 μ m 2.1 $\times$ 50 mm column (Agilent), with a UHPLC Guard Zorbax Eclipse Plus C18 2.1 $\times$ 5 mm, 1.8 μ m

(Agilent), and eluted with eluent A (ultrapure water: formic acid = 100: 0.1 (v/v)) and eluent B (acetonitrile: formic acid = 100: 0.1 (v/v)), with the following linear gradient: 0-0.5 min: 100% eluent A; 0.5-7.5 min: 100-65% eluent A; 7.5-10 min: 65-0% eluent A; 10-13 min: 0% eluent A; 13-13.1 min: 0-100% eluent A. The injection volume was 10 μ L at the flow rate of 300 μ L/min with the retention time of 7.6 min as quantifier and qualifier. A calibration curve was constructed by infusing 15.625, 31.25, 62.5, 125 ng/mL of standard Cyclo(Phe-Phe) into the mass spectrometer. Chicken extract was re-constituted as a 250 μ g/mL solution as the working solution by using chicken extract powder. The quantification of the Cyclo(Phe-Phe) in chicken extract was done by SCIEX OS 1.6.1.29803 Analytics (AB Sciex).

[0071] Histidine, carnosine, and anserine in the chicken extract were quantified by HPLC under the following conditions.

Device: high performance liquid chromatography system with a UV detector (Agilent 1100 Series available from Agilent)

Column: Zorbax 300-SCX 4.6 mm ID $\times$ 250 mm available from Agilent.

Mobile phase: 50 mM potassium dihydrogen phosphate

Flow rate: 1.0 mL/min

Flow channel: channel A (50 mM potassium dihydrogen phosphate), channel B (acetonitrile), channel D (deionized water)

UV detector wavelength: 210 nm

Sample injection volume: 10 μ L

[0072] B. Polyphenols

Cynarin (1,5-dicaffeoylquinic acid): SIAL Cynarin 91801 (Merck KGaA, Germany)

Chlorogenic acid (5-caffeoylquinic acid): Chlorogenic acid C3878 (Merck KGaA, Germany)

Apigenin: Apigenin 95.0% (HPLC) 10798 (Merck KGaA, Germany)

Epigallocatechin gallate: Sunphenon EGCg-OP (Taiyo Kagaku, Japan)

Luteolin: Luteolin L9283 (Merck KGaA, Germany)

Quercetin: Quercetin hydrate 337951 (Merck KGaA, Germany)

[0073] C. Emulsifier

Kelcotrol (registered trademark) xanthan gum (CP Kelco U.S., Inc.)

SprayGum AA Arabic gum (Nexira, France)

[0074] <Odor improvement using chlorogenic acid or cynarin>

<Examples 1 to 8>

Oral compositions (solutions) of Examples 1 to 8 were prepared according to the amounts shown in Table 1 below. Specifically, cynarin or chlorogenic acid in an amount shown in Table 1 was added to chicken extract (CE) (68 mL), and the mixture was sufficiently stirred to create a homogenous mixture, whereby a liquid oral com-

position was prepared in each of Examples 1 to 8.

[0075] <Comparative Example 1>

A liquid oral composition according to Comparative Example 1 was prepared by the same method as in Examples 1 to 8, except that cynarin and chlorogenic acid were not added.

[0076] Each of the resulting liquid oral compositions of Examples 1 to 8 and Comparative Example 1 was dispensed into a sealed glass container, followed by sterilization at 121°C for 8 minutes. Table 1 shows cynarin or chlorogenic acid concentration of each of the liquid oral compositions of Examples 1 to 8.

[0077] [Table 1]

		Chlorogenic acid (mg)	Cynarin (mg)	Chlorogenic acid concentration in the composition (mg/g)	Cynarin concentration in the composition (mg/g)
Comparative Example 1	Chicken extract (CE)	-	-	0	0
Example 1	CE with chlorogenic acid	12.5	-	0.18	0
Example 2		25.0	-	0.37	0
Example 3		50.0	-	0.74	0
Example 4		100.0	-	1.47	0
Example 5	CE with cynarin	-	12.5	0	0.18
Example 6		-	25.0	0	0.37
Example 7		-	50.0	0	0.74
Example 8		-	100.0	0	1.47

[0078] <Gas chromatography-mass spectrometry (GC-MS) headspace analysis>

The concentration of the unpleasant odor components (trimethylamine, butanedione, and 3-methylbutanoic acid) in the headspace of the container containing chicken extract was analyzed by Agilent 7890A-5975C GC-MS coupled with a headspace-solid phase microextraction unit. 10 mL of the liquid oral compositions was transferred out into a 20 mL extraction flask in which 40 µL of the internal standard was spiked. After being acidified by 1 mL of 2M sulphuric acid, the flask was sealed in water bath at 80°C to 100°C for 20 minutes. The headspace-solid phase microextraction was done 30 minutes before the injection to GC-MS. The data acquisition, qualitative data analysis, quantitative data analysis, and results reporting were done on Agilent MassHunter software suite for GC/MS.

The results are shown in Table 2 below. In Table 2, data are represented as mean ± standard deviation.

[0079] <Analysis of GC-MS analysis results>

The results in Table 2 below show that the liquid oral compositions according to

Examples 1 to 8 in which cynarin or chlorogenic acid was added to CE reduced the concentration percentage of odor components (trimethylamine, butanedione, and 3-methylbutanoic acid) as compared to Comparative Example 1, with dose-dependent effects. The total concentration of the three odor components in the headspace of the container was 100 ppm or less in each Example.

[0080] [Table 2]

		Trimethylamine	Butanedione	3-methylbutanoic acid
Comparative Example 1	Chicken extract (CE)	100.0% ± 31.8%	100.0% ± 17.6%	100.0% ± 35.7%
Example 1	CE with chlorogenic acid	88.9% ± 3.7%	86.4% ± 14.2%	84.7% ± 13.8%
Example 2		74.2% ± 2.2%	71.6% ± 5.6%	74.8% ± 19.0%
Example 3		60.3% ± 5.5%	63.8% ± 10.7%	66.0% ± 21.1%
Example 4		22.3% ± 1.6%	24.9% ± 1.5%	21.2% ± 3.8%
Example 5	CE with cynarin	73.4% ± 7.2%	75.3% ± 2.4%	80.6% ± 3.4%
Example 6		64.9% ± 0.4%	75.1% ± 13.7%	73.2% ± 38.1%
Example 7		35.7% ± 22.3%	53.4% ± 23.6%	56.3% ± 44.5%
Example 8		9.6% ± 8.6%	14.3% ± 18.3%	19.2% ± 3.8%

[0081] FIG. 1A is a graph showing the ratio of the amount of trimethylamine generated from the oral compositions each containing CE, and a chlorogenic acid or cynarin according to Examples 1 to 8 to the amount of trimethylamine generated from the chicken extract according to Comparative Example 1 which is taken as 100%.

FIG. 1B is a graph showing the ratio of the amount of butanedione generated from the oral compositions each containing CE, and a chlorogenic acid or cynarin according to Examples 1 to 8 to the amount of butanedione generated from the chicken extract according to Comparative Example 1 which is taken as 100%.

FIG. 1C is a graph showing the ratio of the amount of 3-methylbutanoic acid generated from the oral compositions each containing CE, and a chlorogenic acid or cynarin according to Examples 1 to 8 to the amount of 3-methylbutanoic acid generated from the chicken extract according to Comparative Example 1 which is taken as 100%.

[0082] <Odor improvement using apigenin, epigallocatechin gallate, luteolin, or quercetin>
<Examples 9 to 16>

Oral compositions (solutions) of Examples 9 to 16 were prepared according to the amounts shown in Table 3 below. Specifically, apigenin, epigallocatechin gallate, luteolin, or quercetin in an amount shown in Table 3 and emulsifiers were added to chicken extract (CE) (68 mL), and the mixture was sufficiently stirred to create a homogeneous mixture, whereby a liquid oral composition was prepared in each of Examples 9 to 16.

[0083] <Comparative Example 2>

A liquid oral composition according to Comparative Example 2 was prepared by the same method as in Examples 9 to 16, except that apigenin, epigallocatechin gallate, luteolin, and quercetin were not added.

[0084] Each of the resulting liquid oral compositions of Examples 9 to 16 and Comparative Example 2 was dispensed into a sealed glass container, followed by sterilization at 121°C for 8 minutes. Table 3 shows apigenin, epigallocatechin gallate, luteolin, or quercetin concentration of each of the liquid oral compositions of Examples 9 to 16.

[0085]

[Table 3]

		Apigenin (mg)	Epigallocatechin gallate (mg)	Luteolin (mg)	Quercetin (mg)	Apigenin concentration in the composition (mg/g)	Epigallocatechin gallate concentration in the composition (mg/g)	Luteolin concentration in the composition (mg/g)	Quercetin concentration in the composition (mg/g)
Comparative Example 2	Chicken extract (CE)	-	-	-	-	0	0	0	0
Example 9	CE with apigenin	20.0	-	-	-	0.29	0	0	0
Example 10		40.0	-	-	-	0.59	0	0	0
Example 11		-	10.0	-	-	0	0.15	0	0
Example 12		-	20.0	-	-	0	0.29	0	0
Example 13	CE with luteolin	-	-	20.0	-	0	0	0.29	0
Example 14		-	-	40.0	-	0	0	0.59	0
Example 15	CE with quercetin	-	-	-	10.0	0	0	0	0.15
Example 16		-	-	-	40.0	0	0	0	0.59

[0086] <GC-MS headspace analysis>

As in Examples 1 to 8, each odor component in the headspace of the container was analyzed by GC-MS. Table 4 shows the results.

<Analysis of GC-MS analysis results>

The results in Table 4 below show that the liquid oral compositions according to Examples 9 to 16 in which apigenin, epigallocatechin gallate, luteolin, or quercetin was added to CE reduced the concentration percentage of odor components (trimethylamine, butanedione, and 3-methylbutanoic acid) as compared to Comparative Example 2, with dose-dependent effects. The total concentration of the three odor components in the headspace of the container was 100 ppm or less in each Example.

[0087] [Table 4]

		Trimethylamine	Butanedione	3-methylbutanoic acid
Comparative Example 2	Chicken extract (CE)	100.0%	100.0%	100.0%
Example 9	CE with apigenin	97.7%	93.0%	113.6%
Example 10		53.0%	59.1%	79.7%
Example 11	CE with epigallocatechin gallate	26.5%	89.0%	22.3%
Example 12		22.9%	24.3%	21.0%
Example 13	CE with luteolin	94.5%	84.6%	81.6%
Example 14		46.7%	83.9%	43.2%
Example 15	CE with quercetin	90.3%	54.2%	81.1%
Example 16		71.4%	40.5%	57.4%

[0088] FIG. 2A is a graph showing the ratio of the amount of trimethylamine generated from the oral compositions each containing CE, and apigenin, epigallocatechin gallate, luteolin, or quercetin according to Examples 9 to 16 to the amount of trimethylamine generated from the chicken extract according to Comparative Example 2 which is taken as 100%.

FIG. 2B is a graph showing the ratio of the amount of butanedione generated from the oral compositions each containing CE, and apigenin, epigallocatechin gallate, luteolin, or quercetin according to Examples 9 to 16 to the amount of butanedione generated from the chicken extract according to Comparative Example 2 which is taken as 100%.

FIG. 2C is a graph showing the ratio of the amount of 3-methylbutanoic acid generated from the oral compositions each containing CE, and apigenin, epigallocatechin gallate, luteolin, or quercetin according to Examples 9 to 16 to the amount of 3-methylbutanoic acid generated from the chicken extract according to Comparative Example 2 which is taken as 100%.

[0089] It was confirmed from the comparison between the results of Examples 1 to 16 and

Comparative Examples 1 and 2 that an effect of reducing or preventing generation of odor components from chicken extract was obtained when at least one selected from the group consisting of a chlorogenic acid-class compound, flavonol, flavone, and flavanol was added to the chicken extract.

The above results show that adding at least one selected from the group consisting of a chlorogenic acid-class compound, flavonol, flavone, and flavanol to chicken extract provides an effect of reducing or preventing an odor from chicken extract.

Claims

- [Claim 1] A packaged food or beverage that is sealed in a container, comprising:
an oral composition containing chicken extract and a polyphenol,
wherein the polyphenol is at least one selected from the group
consisting of a chlorogenic acid-class compound, flavonol, flavone, and
flavanol,
a concentration of odor components in a head space of the container is
100 ppm or less, and
the concentration of the odor components is a total concentration of
trimethylamine, butanedione, and 3-methylbutanoic acid.
- [Claim 2] The packaged food or beverage according to claim 1,
wherein a total amount of the chlorogenic acid-class compound,
flavonol, flavone, and flavanol in the oral composition is 0.01 mg/g or
more.
- [Claim 3] The packaged food or beverage according to claim 1 or 2,
wherein the chlorogenic acid-class compound is at least one selected
from the group consisting of 3-caffeoylquinic acid, 4-caffeoylquinic
acid, 5-caffeoylquinic acid, 1,5-dicaffeoylquinic acid,
3,4-dicaffeoylquinic acid, 3,5-dicaffeoylquinic acid, and
4,5-dicaffeoylquinic acid.
- [Claim 4] The packaged food or beverage according to claim 1 or 2,
wherein the flavonol is quercetin and/or rutin.
- [Claim 5] The packaged food or beverage according to claim 1 or 2,
wherein the flavone is at least one selected from the group consisting of
luteolin, apigenin, a glycoside of luteolin, a glycoside of apigenin, a
derivative of luteolin, and a derivative of apigenin.
- [Claim 6] The packaged food or beverage according to claim 1 or 2,
wherein the flavanol is at least one selected from the group consisting
of catechin, epicatechin, epigallocatechin, epicatechin gallate, epigallo-
catechin gallate, gallocatechin, catechin gallate, and gallocatechin
gallate.
- [Claim 7] A method of producing a packaged food or beverage, comprising:
heating a container sealing a raw material composition containing
chicken extract and at least one polyphenol selected from the group
consisting of a chlorogenic acid-class compound, flavonol, flavone, and
flavanol,
wherein an odor caused by heating the chicken extract in the heating is

- reduced or prevented due to the presence of the polyphenol in the raw material composition.
- [Claim 8] The method according to claim 7, wherein the odor caused by heating the chicken extract is derived from at least one odor component selected from the group consisting of trimethylamine, butanedione, and 3-methylbutanoic acid.
- [Claim 9] The method according to claim 7 or 8, wherein a total amount of the chlorogenic acid-class compound, flavonol, flavone, and flavanol in the raw material composition is 0.01 mg/g or more.
- [Claim 10] The method according to claim 7 or 8, wherein the chlorogenic acid-class compound is at least one selected from the group consisting of 3-caffeoylquinic acid, 4-caffeoylquinic acid, 5-caffeoylquinic acid, 1,5-dicaffeoylquinic acid, 3,4-dicaffeoylquinic acid, 3,5-dicaffeoylquinic acid, and 4,5-dicaffeoylquinic acid.
- [Claim 11] The method according to claim 7 or 8, wherein the flavonol is quercetin and/or rutin.
- [Claim 12] The method according to claim 7 or 8, wherein the flavone is at least one selected from the group consisting of luteolin, apigenin, a glycoside of luteolin, a glycoside of apigenin, a derivative of luteolin, and a derivative of apigenin.
- [Claim 13] The method according to claim 7 or 8, wherein the flavanol is at least one selected from the group consisting of catechin, epicatechin, epigallocatechin, epicatechin gallate, epigallocatechin gallate, gallocatechin, catechin gallate, and gallocatechin gallate.
- [Claim 14] Use of a polyphenol for reducing or preventing an odor caused by heating chicken extract in production of a packaged food or beverage in which a chicken extract-containing oral composition is sealed in a container, wherein the polyphenol is at least one selected from the group consisting of a chlorogenic acid-class compound, flavonol, flavone, and flavanol.
- [Claim 15] The use according to claim 14, wherein the odor caused by heating the chicken extract is derived from at least one odor component selected from the group consisting of trimethylamine, butanedione, and 3-methylbutanoic acid.

- [Claim 16] The use according to claim 14 or 15,
wherein the polyphenol is added such that a total amount of the
chlorogenic acid-class compound, flavonol, flavone, and flavanol in the
oral composition is 0.01 mg/g or more.
- [Claim 17] The use according to claim 14 or 15,
wherein the chlorogenic acid-class compound is at least one selected
from the group consisting of 3-caffeoylquinic acid, 4-caffeoylquinic
acid, 5-caffeoylquinic acid, 1,5-dicaffeoylquinic acid,
3,4-dicaffeoylquinic acid, 3,5-dicaffeoylquinic acid, and
4,5-dicaffeoylquinic acid.
- [Claim 18] The use according to claim 14 or 15,
wherein the flavonol is quercetin and/or rutin.
- [Claim 19] The use according to claim 14 or 15,
wherein the flavone is at least one selected from the group consisting of
luteolin, apigenin, a glycoside of luteolin, a glycoside of apigenin, a
derivative of luteolin, and a derivative of apigenin.
- [Claim 20] The use according to claim 14 or 15,
wherein the flavanol is at least one selected from the group consisting
of catechin, epicatechin, epigallocatechin, epicatechin gallate, epigallo-
catechin gallate, gallocatechin, catechin gallate, and gallocatechin
gallate.
- [Claim 21] An oral composition comprising:
chicken extract; and
at least one polyphenol selected from the group consisting of a
chlorogenic acid-class compound, flavonol, flavone, and flavanol,
wherein the chicken extract contains histidine, carnosine, and anserine,
and
the oral composition contains 0.00001 to 10 wt% histidine, 0.00001 to
3 wt% carnosine, 0.00005 to 5 wt% anserine, and a total amount of the
chlorogenic acid-class compound, flavonol, flavone, and flavanol in the
oral composition is 0.01 mg/g or more.
- [Claim 22] An oral composition comprising:
chicken extract; and
at least one polyphenol selected from the group consisting of a
chlorogenic acid-class compound, flavonol, flavone, and flavanol,
wherein the chicken extract contains cyclophenylalanylphenylalanine
(Cyclo(Phe-Phe)), and
a total amount of the chlorogenic acid-class compound, flavonol,

- flavone, and flavanol in the oral composition is 0.01 mg/g or more.
- [Claim 23] The oral composition according to claim 21 or 22, wherein the chlorogenic acid-class compound is at least one selected from the group consisting of 3-caffeoylquinic acid, 4-caffeoylquinic acid, 5-caffeoylquinic acid, 1,5-dicaffeoylquinic acid, 3,4-dicaffeoylquinic acid, 3,5-dicaffeoylquinic acid, and 4,5-dicaffeoylquinic acid.
- [Claim 24] The oral composition according to claim 21 or 22, wherein the flavonol is quercetin and/or rutin.
- [Claim 25] The oral composition according to claim 21 or 22, wherein the flavone is at least one selected from the group consisting of luteolin, apigenin, a glycoside of luteolin, a glycoside of apigenin, a derivative of luteolin, and a derivative of apigenin.
- [Claim 26] The oral composition according to claim 21 or 22, wherein the flavanol is at least one selected from the group consisting of catechin, epicatechin, epigallocatechin, epicatechin gallate, epigallocatechin gallate, gallocatechin, catechin gallate, and gallocatechin gallate.