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(54) Title: IMPROVEMENT IN OR RELATING TO ORGANIC COMPOUNDS

(57) Abstract: Use of 2'-aminoacetophenone in a flavour formulation, particularly a beef flavour formulation.



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Improvement in or Relating to Organic Compounds

Field of the Invention

This disclosure relates to the use of 2'-aminoacetophenone as a flavour ingredient in beef flavour formulations.

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Background of the Invention

It has been said that people eat with their eyes. However, if a food-stuff does not taste good, consumers will not respond favourably to it.

As consumers become ever more educated, curious and adventurous about their food, the
10 desire for the familiar nevertheless remains high. And although the drive for novel and creative flavours remains, the flavours must remain authentic.

There is a constant need for new flavour ingredients. In the search for new flavour ingredients, it is conventional to prepare extracts of natural food products and subject them to aroma analysis. In this way, it is possible to identify key aroma compounds that
15 can form the basis for new flavour creations.

Summary of the Invention

The applicant carried out extraction and aroma analysis on beef, and in particular beef fat. Key aroma compounds were identified, but flavour formulations containing these key
20 aroma compounds, whilst identifiable as being beef flavours, were nevertheless deemed to be somewhat artificial and non-authentic.

Addressing this problem, applicant surprisingly found that authenticity can be brought to beef flavour formulations using 2'-aminoacetophenone as a flavour ingredient

Accordingly, the invention provides in a first aspect the use of 2'-aminoacetophenone as a
25 flavour ingredient.

2'-aminoacetophenone is typically abbreviated as "2'-AAP". It corresponds to CAS Number 551-93-9.

In another aspect, the invention provides a beef flavour formulation comprising 2'-aminoacetophenone.

- 5 In yet another aspect, the invention provides a comestible product comprising a beef flavour formulation containing 2'-aminoacetophenone.

Detailed Description of the Invention

2'-aminoacetophenone is a known compound. It is known to occur naturally in wine,
10 grapes, rice, corn-flower tortilla and dairy powders. As regards its presence in meat products, it has been reported in Food Research International 62, (2014) 35-42 that it is present in the back fat of pigs, and may contribute to the undesirable off-note in pork products known as "boar taint". The use of 2'-aminoacetophenone in flavour formulations has been described in, e.g., JP 5,174,231 B1 and JP 2005/013138 A.

- 15 Tonbeek et al. (J. Agr. Food Chem. vol. 19, No. 5, 1971) describes the continuous extraction of a beef broth and the analysis of this extract by gas-liquid chromatography. The odour of a fraction of this extract was determined to have an odour reminiscent of 2'-aminoacetophenone; however, that molecule was not identified in the extract.

Likewise, applicant could not identify 2'-aminoacetophenone in beef fat. And it was indeed
20 surprising that this molecule was found to add authenticity to beef flavours.

2'-aminoacetophenone can be used in all manner of beef flavour formulations to deliver authenticity thereto, and particularly an authentic beef fatty profile. In particular, 2'-aminoacetophenone provides a flavour generally associated with aged beef.

In an embodiment of the invention, beef flavour formulations may contain 2'-
25 aminoacetophenone in combination with one or more fat-derived ingredients, such as

unsaturated aldehydes, e.g. 2,4-decadienal, 2,4-nonadienal, and sulphury components, such as 2-methyl-3-furanthiol and 2-acetylthiazole.

In an embodiment of the invention, beef flavour formulations may contain 2'-aminoacetophenone in combination with one or more Maillard-derived ingredients, such as furaneol, pyrazines, and 2-methyl-3-furanthiol.

A particularly desirable authentic beef flavour can be achieved when a beef flavour formulation contains 2'-aminoacetophenone at very low concentrations. Thus, according to a preferred embodiment, the concentration of 2'-aminoacetophenone is from about 1 to about 100 parts per trillion (ppt), preferably from about 1 to about 50 ppt, and more preferably from about 1 to about 20 ppt. According to a particularly preferred embodiment, the concentration of 2'-aminoacetophenone is from about 1 to about 12 ppt.

Beef flavour formulations referred to herein may be employed in all manner of comestible products. Particular comestibles include foods and beverages, such as meat products, e.g. ham, fresh or raw sausage preparations, and seasoned or marinated fresh or salt meat products; baked products; snack foods preferably selected from the group consisting of baked or fried potato chips or potato dough products, bread dough products and corn or peanut-based extrudates; spice blends; condiments; fermented products; ready-to-heat foods; ready-to-eat meals; seasoning preparations; sauces; soups; bouillon; and noodles.

Beef flavour formulations of the present invention can make a general improvement to the flavour of comestibles. They may be added to a comestible by simple mixing with other ingredients in the final blending of a comestible, such as a convenience food. Alternatively, they may be added to the outside of a comestible, for example, by the process of dusting or spray coating a snack food. Still further, the beef flavour formulation may be added to a comestible during its formation, in a process which is sometimes referred to as internal flavouring.

Beef flavour formulations of the present invention are typically spray-dried, encapsulated and/or applied in another delivery system.

The formulations may optionally comprise additional ingredients, in particular those outlined in the IOFI (International Organization of the Flavor Industry) LISTS OF FLAVOURINGS AND NON-FLAVOURING FLAVOUR INGREDIENTS. For instance, such additional ingredients include, but are not limited to, fillers, flowing agents, carriers, delivery systems, weighting agents, emulsifiers and stabilizers. Suitable fillers include, but are not limited to, flour, rice, maltodextrins, modified starches, gums, cellulose, medium chain triglyceride, alginates, silicon dioxide, whey powder and pectines. When a filler is employed in the flavour composition, it may be used in amounts from 0 to about 99%, by weight of the flavour composition. Suitable free flowing agents or anticaking agents include, but are not limited to, aluminum silicate, calcium aluminum silicate, calcium carbonate, calcium silicate, magnesium carbonate, magnesium silicate, mono-, di- and tri-calcium orthophosphate, potassium aluminum silicate, silicon dioxide (amorphous), sodium aluminum silicate and stearic acid salts. When a free flowing agent or anticaking agent is employed in the flavour composition, it may be used in amounts from 0 to about 10%, by weight of the flavour composition. Suitable carriers include, but are not limited to, maltodextrins, starches, gelatine, and gums.

The beef flavour formulations of the present invention may be mixed or blended with other components or the full base (e.g. the dough) of a consumer product or they may also be coated on the consumer product. In particular, they may be added as powder blended flavours to culinary products or snacks. For instance, the beef flavour formulations of the present invention may be added to the dough of an extruded product.

There now follows a series of examples that serve to further illustrate the invention.

Example 1: Target Aroma Profile

Outer fat from an aged T-bone steak was extracted after poaching at 52 °C for 45 minutes. The fat was removed, frozen in liquid nitrogen and extracted with Pentane/Dichloromethane (2/1). The extract contained key beef fat flavour components comprising a mixture of aldehydes, acids, phenols and ketones including 2,4-decadienal, 2,4-nonadienal, hexanoic acid, p-cresol and octadien-2-one.

Based on the analysis of said extract, an aroma recombinant (i.e. a flavour formulation) was created, containing 2,4-decadienal, 2,4-nonadienal, hexanoic acid, p-cresol, octadien-2-one, 6-methyl-heptanal, 4-cis-heptenal, 2 pentyl pyridine, 2-propionyl thiazole, 2-acetyl-2-thiazoline, 5,6,7,8-tetrahydroquinoxaline, benzothiazole, and 4-methyl octanoic acid as the major components.

Both the extract and the aroma recombinant were tasted by a trained panel. Panellists indicated that the extract captured the essential fatty beefy, animalic, buttery, roasted, sweet pop-corn-like aspects. However, they perceived the aroma recombinant as artificial and lacking in authenticity.

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Example 2: Evaluation against Methyl Anthranilate

Methyl anthranilate was chosen for comparison, as this ingredient is typically used in grape flavours to provide a similar note.

Methyl anthranilate was added at 125 ppt to a standard beef entrecote base to determine if this could add the missing authenticity.

The standard beef entrecote base comprises taste and aroma active flavour compounds such as yeast powders, sodium chloride and other minerals, lactic acids, furaneol, 2,4-decadienal and 2,4-nonadienal.

However, panellists indicated that methyl anthranilate was too harsh and artificial; it led flavours to the sweet fruit direction instead of sweet meaty fatty direction.

Example 3: Flavour Creation with 2'-Aminoacetophenone

2'-aminoacetophenone was added to the standard beef entrecote base (see example 2) at 2.5 ppt level.

Panellists indicated that this demonstrated a significant positive effect: The usage of 2'-aminoacetophenone in combination with above mentioned known beefy fatty ingredients was deemed to reach the objective, creating an authentic aged beef fat flavour.

5 Example 4: Technical Tasting by Expert Panel

The technical tasting was done at a lab, by bench evaluation.

Four different flavours – beef, pork, chicken and corn – were applied on a basic evaluation base for savoury, which contains NaCl (0.3%), MSG (0.02%) and 5'-IMP/5'-GMP (50/50) (0.007%).

- 10 2'-aminoacetophenone was added to these flavoured savoury bases at different concentrations for comparison.

2'-AAP on Beef Flavour:

General profile of this flavour: beef meaty, sulphury, metallic, red meat, slightly roasted

Depending on the amount of 2'-AAP added, panelists described the flavours as:

- 15 - @ 1-2 ppt: made a difference, added fattier character, less meaty, it gave more beef collagen character than lean meat.
- @ 5, 10, 20, 50 ppt: profile changed a lot, the flavour got more rare meat character.

In general, the pannelists felt that 2'-AAP added an aged beef character and authenticity.

2'-AAP on Pork Flavour:

- 20 General profile of this flavour: porky, fatty, after taste: meaty & cooked pork character

@ 5 ppt 2'-AAP: no difference can be noticed.

2'-AAP on Chicken Flavour:

General profile of this flavour: fatty, roasted, chicken meaty, crispy skin, grilled

@ 5 ppt 2'-AAP: grilled dripping fat character enhanced. It gave an effect, but the panellists did not feel that this added authenticity to the chicken flavour.

2'-AAP on Corn Flavour:

General profile of this flavour: Corn, pyrazine, roasted, toasted

5 @ 5 ppt 2'-AAP: no difference can be noticed.

Comparison of 2'-Aminoacetophenone and Methyl Anthranilate on Beef Flavour

Methyl anthranilate was evaluated vs 2'-AAP on beef flavour

- @ 5 ppt (i.e. at the same concentration)
- @ 65 ppt, 100 ppt, 200 ppt, and 500 ppt
- 10 - @ 1 ppb, 2 ppb, and even 5 ppb (i.e. at 1000x higher concentration)

No effect from methyl anthranilate could be observed at any of these concentrations.

Example 5: Comparison of Odour Activity Values (OAV)

The aroma impact for 2'-aminoacetophenone and methyl anthranilate was evaluated at
15 two different levels: iso-concentration (5 ppt) and iso-OAV (0.023 and 0.0044/0.0046).

Compound	Concentration used [ppt]	Concentration used [ppm]	Threshold in water [ppm]	OAV [conc/threshold]
2'-aminoacetophenone	2.5	0.0000025	0.00108	0.0023
	5	0.000005		0.0046
methyl anthranilate	5	0.000005	0.0281	0.0002
	65	0.000065		0.0023
	125	0.000125		0.0044
	5000	0.005		0.1779

Claims:

1. The use of 2'-aminoacetophenone in a beef flavour formulation.
2. Use according to claim 1, wherein the beef flavour comprises 2'-aminoacetophenone and one or more ingredients selected from the group consisting of unsaturated aldehydes, e.g. 2,4-decadienal, 2,4-nonadienal; sulphur components such as 2-methyl-3-furanthiol and 2-acetylthiazole; and Maillard-derived ingredients, such as furaneol, pyrazines, and 2-methyl-3-furanthiol.
3. Use according to claim 1 or claim 2, wherein 2'-aminoacetophenone is present in the beef flavour formulation in amounts of 1 to 100 parts per trillion.
4. A beef flavour formulation comprising 2'-aminoacetophenone.
5. A beef flavour formulation according to claim 4 that comprises 2'-aminoacetophenone and one or more ingredients selected from the group consisting of unsaturated aldehydes, e.g. 2,4-decadienal, 2,4-nonadienal; sulphur components such as 2-methyl-3-furanthiol and 2-acetylthiazole; and Maillard-derived ingredients, such as furaneol, pyrazines, and 2-methyl-3-furanthiol.
6. A beef flavour formulation according to claim 4 or 5, wherein 2'-aminoacetophenone is present in an amount of 1 to 100 parts per trillion.
7. A comestible comprising the beef flavour composition as defined in any of the claims 4 through 6.
8. A cosmeestible according to claim 7 that is selected from the group consisting of foods and beverages, such as meat products, e.g. ham, fresh or raw sausage preparations, and seasoned or marinated fresh or salt meat products; baked products; snack foods preferably selected from the group consisting of baked or fried potato chips or potato dough products, bread dough products and corn or peanut-based extrudates; spice blends; condiments; fermented products; ready-to-heat foods; ready-to-eat meals; seasoning preparations; sauces; soups; bouillon; and noodles.

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2017/062508

A. CLASSIFICATION OF SUBJECT MATTER INV. A23L27/26 A23L13/40 A23L13/60 ADD.		
According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) A23L		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) EPO-Internal, WPI Data, BIOSIS, FSTA		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
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☒ Further documents are listed in the continuation of Box C. ☒ See patent family annex.		
* Special categories of cited documents : "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family		
Date of the actual completion of the international search	Date of mailing of the international search report	
8 August 2017	17/08/2017	
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Authorized officer Tallgren, Antti	

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