

COMPOSITIONS AND METHODS FOR MASKING OFF-NOTES IN CONSUMABLES

TECHNICAL FIELD

5 The present disclosure relates methods of suppressing off-notes of non-animal derived proteins contained in consumables. More particular, the present disclosure relates to flavor compositions and consumables comprising certain off-note blocking compounds and masking agents that improve the organoleptic properties of non-animal derived protein containing consumables.

10 BACKGROUND

The use of non-animal proteins in foodstuffs to replace animal raw materials such as egg or milk, but also meat is becoming increasingly important due to the benefits of protein in the diet. While consumers expect their food and beverage products to have multi-functional benefits, consumers still have high expectations that those products deliver great taste along with efficacy in terms of health benefits. Because each type of protein has its own inherent taste, formulating protein into food and beverage products can produce distinctive tastes perceived as unappealing. For example, products made from plant proteins, e.g., leguminous plants, such as soy or pea, display a flavor profile described as grassy, beany, green, earthy, nutty and/or bitter. Particular off-notes often mentioned in relation to soy protein and pea proteins are beany, soy and bitter attributes. Off-notes often mentioned in relation to potato protein are fishy, green, earthy-musty and bitter attributes.

Further, food scientists have devoted much time developing methods for preparing acceptable meat-like food applications, such as beef, pork, poultry, fish, and other seafood analogs, from a wide variety of non-animal proteins. One such approach is texturization into fibrous meat analogs, for example, through extrusion processing. The resulting meat analog products exhibit improved meat-like visual appearance and improved texture.

30 Accordingly, there remains a need for non-animal proteins and products containing non-animal proteins that exhibit improved flavor with reduced off-notes.

SUMMARY

In one embodiment, a masking composition for masking non-animal derived protein off-notes includes one or more off-note blocking compounds; and one or more masking agents. The one or more off-note blocking compounds are selected from the group consisting of pea or rice peptides, 1,3-propanediol, ethyl cyclohexanoate, green coffee extract, molasses distillates, hyaluronic acid and combinations thereof. The one or more masking agents are selected from the group consisting of fatty acids, carbonyls, sulfur compounds, sweet browns, esters, sweeteners, lactones, juice derivatives and combinations thereof.

In another embodiment, a consumable includes a non-animal derived protein; a masking composition comprising one or more off-note blocking compounds selected from the group consisting of pea or rice peptides, 1,3-propanediol, ethyl cyclohexanoate, green coffee extract, molasses distillates, hyaluronic acid and combinations thereof; and one or more masking agents selected from the group consisting of fatty acids, carbonyls, sulfur compounds, sweet browns, esters, sweeteners, lactones, juice derivatives and combinations thereof; and a flavorant.

These and other features, aspects and advantages of specific embodiments will become evident to those skilled in the art from a reading of the present disclosure.

DETAILED DESCRIPTION

The following text sets forth a broad description of numerous different embodiments of the present disclosure. The description is to be construed as exemplary only and does not describe every possible embodiment since describing every possible embodiment would be impractical, if not impossible. It will be understood that any feature, characteristic, component, composition, ingredient, product, step or methodology described herein can be deleted, combined with or substituted for, in whole or part, any other feature, characteristic, component, composition, ingredient, product, step or methodology described herein. Numerous alternative embodiments could be implemented, using either current technology or technology developed after the filing date of this patent, which would still fall within the scope of the claims. All publications and patents cited herein are incorporated herein by reference.

The present disclosure relates to the surprising finding that the addition of a masking composition, i.e. a combination of off-note blocking compounds and masking agents, to consumable products comprising non-animal proteins makes it possible to provide consumable products with an improved flavor profile due to the suppression or at least reduction of off-notes.

“Non-animal derived protein” refers to protein preparations made from raw materials including, but not limited to, grain (rice, millet, maize, barley, wheat, oat, sorghum, rye, teff, triticale, amaranth, buckwheat, quinoa); legume or pulses, beans (such as soybean, mung beans, faba beans, lima beans, runner beans, kidney beans, navy beans, pinto beans, azuki beans, and
5 the like), peas (such as green peas, yellow peas, chickpeas, pigeon peas, cowpea, and black-eyed peas and the like), sesame, garbanzo, potatoes, lentils, and lupins; seed and oilseed (black mustard, India mustard, rapeseed, canola, safflower, sunflower seed, flax seed, hemp seed, poppy seed, pumpkin, chia, sesame); nuts (almond, walnut, Brazil, Macadamia, cashews, chestnuts, hazelnuts, pine, pecans, peanuts, pistachio and ginkgo); algal (kelp, wakame, spirulina,
10 chlorella); mycoprotein and/or fungal protein.

The term “off-note” refers to an unpleasant after taste that develops over time after consumption of consumables.

One of the most important criterion for consumer acceptance of foods is flavor. Proteins have little flavor of their own, but influence flavor perception. Protein ingredients both transmit
15 undesirable off-notes to foods and reduce perceived impact of desirable flavorants. In response, Applicants have developed a composition that makes it possible to provide non-animal protein ingredients and products containing non-animal proteins with an improved flavor profile with reduced off-notes.

According to the present disclosure, a masking composition may include, one or more
20 off-note blocking compounds; one or more masking agents; and optionally a flavorant. The masking composition may also include other optional ingredients for particular applications.

The masking composition of the present disclosure may be used in a wide variety of consumables or applications and is not restricted to any particular physical mode or product form. According to the present disclosure, the term “consumable” refers to products for
25 consumption by a subject, typically via the oral cavity (although consumption may occur via non-oral means such as inhalation), for at least one of the purposes of enjoyment, nourishment, or health and wellness benefits. Consumables may be present in any form including, but not limited to, liquids, solids, semi-solids, tablets, capsules, lozenges, strips, powders, gels, gums, pastes, slurries, syrups, aerosols and sprays. The term also refers to, for example, dietary and
30 nutritional supplements. Consumables include compositions that are placed within the oral cavity for a period of time before being discarded but not swallowed. It may be placed in the mouth before being consumed, or it may be held in the mouth for a period of time before being discarded.

Broadly, consumables include, but are not limited to, foodstuffs of all kinds, confectionery products, baked products, sweet products, savoury products, fermented products, dairy products, beverages, oral care products, nutraceuticals and pharmaceuticals.

Exemplary foodstuffs include, but are not limited to, chilled snacks, sweet and savoury
5 snacks, fruit snacks, chips/crisps, extruded snacks, tortilla/corn chips, popcorn, pretzels, nuts,
other sweet and savoury snacks, snack bars, granola bars, breakfast bars, energy bars, fruit bars,
other snack bars, meal replacement products, slimming products, convalescence drinks, ready
meals, canned ready meals, frozen ready meals, dried ready meals, chilled ready meals, dinner
mixes, meat analogs, frozen pizza, chilled pizza, soup, canned soup, dehydrated soup, instant
10 soup, chilled soup, UHT soup, frozen soup, pasta, canned pasta, dried pasta, chilled/fresh pasta,
noodles, plain noodles, instant noodles, cups/bowl instant noodles, pouch instant noodles, chilled
noodles, snack noodles, dried food, dessert mixes, sauces, dressings and condiments, herbs and
spices, spreads, jams and preserves, honey, chocolate spreads, nut-based spreads, and yeast-
based spreads.

15 Exemplary confectionery products include, but are not limited to, chewing gum (which
includes sugarized gum, sugar-free gum, functional gum and bubble gum), centerfill confections,
chocolate and other chocolate confectionery, medicated confectionery, lozenges, tablets,
pastilles, mints, standard mints, power mints, chewy candies, hard candies, boiled candies, breath
and other oral care films or strips, candy canes, lollipops, gummies, jellies, fudge, caramel, hard
20 and soft panned goods, toffee, taffy, liquorice, gelatin candies, gum drops, jelly beans, nougats,
fondants, combinations of one or more of the above, and edible flavour compositions
incorporating one or more of the above.

Exemplary baked products include, but are not limited to, alfajores, bread,
packaged/industrial bread, unpackaged/artisanal bread, pastries, cakes, packaged/industrial
25 cakes, unpackaged/artisanal cakes, cookies, chocolate coated biscuits, sandwich biscuits, filled
biscuits, savoury biscuits and crackers, bread substitutes.

Exemplary sweet products include, but are not limited to, breakfast cereals, ready-to-eat
("rte") cereals, family breakfast cereals, flakes, muesli, other ready to eat cereals, children's
breakfast cereals, hot cereals.

30 Exemplary savoury products include, but are not limited to, salty snacks (potato chips,
crisps, nuts, tortilla-tostada, pretzels, cheese snacks, corn snacks, potato-snacks, ready-to-eat
popcorn, microwaveable popcorn, pork rinds, nuts, crackers, cracker snacks, breakfast cereals,
meats, aspic, cured meats (ham, bacon), luncheon/breakfast meats (hotdogs, cold cuts, sausage),

tomato products, margarine, peanut butter, soup (clear, canned, cream, instant, ultrahigh temperature “UHT”), canned vegetables, pasta sauces.

Exemplary dairy products include, but are not limited to, cheese, cheese sauces, cheese-based products, ice cream, impulse ice cream, single portion dairy ice cream, single portion water
5 ice cream, multi-pack dairy ice cream, multi-pack water ice cream, take-home ice cream, take-home dairy ice cream, ice cream desserts, bulk ice cream, take-home water ice cream, frozen yoghurt, artisanal ice cream, dairy products, milk, fresh/pasteurized milk, full fat fresh/pasteurized milk, semi skimmed fresh/pasteurized milk, long-life/uht milk, full fat long life/uht milk, semi skimmed long life/uht milk, fat-free long life/uht milk, goat milk,
10 condensed/evaporated milk, plain condensed/evaporated milk, flavoured, functional and other condensed milk, flavoured milk drinks, dairy only flavoured milk drinks, flavoured milk drinks with fruit juice, soy milk, sour milk drinks, fermented dairy drinks, coffee whiteners, powder milk, flavoured powder milk drinks, cream, yoghurt, plain/natural yoghurt, flavoured yoghurt, fruited yoghurt, probiotic yoghurt, drinking yoghurt, regular drinking yoghurt, probiotic drinking
15 yoghurt, chilled and shelf-stable desserts, dairy-based desserts, soy-based desserts.

Exemplary beverages include, but are not limited to, flavoured water, soft drinks, fruit drinks, coffee-based drinks, tea-based drinks, juice-based drinks (includes fruit and vegetable), milk-based drinks, gel drinks, carbonated or non-carbonated drinks, powdered drinks, alcoholic or non-alcoholic drinks, and ready to drink liquid formulations of these beverages.

20 Exemplary fermented foods include, but are not limited to, cheese and cheese products, meat and meat products, soy and soy products, fish and fish products, grain and grain products, fruit and fruit products.

In certain embodiments, consumables, for example, meat analogs include a high concentration of non-animal derived protein. The total amount of protein may be between about
25 2% by weight and about 15% by weight, or between about 2% and about 12% by weight, or between about 3% and about 10% by weight, or between about 4% and about 8% by weight, or between about 5% and about 7% by weight, or between about 6.4% to 6.5%, or about 6.4% protein by weight, or greater than 3% by weight, greater than 4% by weight, greater than 5% by weight, or greater than 6% by weight of the consumable, or any percentage ranges or specific
30 percentages within these ranges.

Off-note Blocking Compounds

According to the present disclosure, off-note blocking compounds for use in a masking composition as described herein, may be selected from the group consisting of peptides, 1,3-propanediol, ethyl cyclohexanoate and natural complex ingredients such as, green coffee extract, molasses distillates and hyaluronic acid. Additional off-note blocking compounds according to the present disclosure may include compounds from various plants, for example, chamomile, hibiscus, pnanax ginseng root, chickory root extract and licorice extract.

In one embodiment, the term “peptide material” is understood to indicate a protein hydrolysate and may contain all types of peptides that may vary in length as well as a certain amount of free amino acids resulting from the hydrolysis. The protein raw material is hydrolyzed by one or more hydrolytic enzymes. In one example, enzyme preparations are used which have a low exo-peptidase activity to minimise the liberation of free amino acids and to improve taste profiles of the protein hydrolysates. In one embodiment, the peptide material has a molecular weight of from about 150 to about 10,000 daltons and in another embodiment from about 200 to about 5,000 daltons. Further, the peptide material may be present in an amount from about 0.0001% to about 0.5%, in another embodiment from about 0.0005% to about 0.2%, in another embodiment from about 0.05% to about 0.5%, in another embodiment from about 0.1% to about 0.2%, or any individual number within the range, by weight of the masking composition. In one example, the peptide material may be derived from pea protein. In another example, the peptide material may be derived from rice protein.

In certain embodiments, the peptide material is subjected to enzymatic hydrolysis, wherein the peptide is contacted with one or more enzyme(s) under conditions and for a period of time suitable for the enzyme(s) to at least partially break down the peptide. All enzymes should be food grade.

In one embodiment, the enzyme(s) used for enzymatic hydrolysis may, for example, be selected from proteolytic enzymes. Proteolytic enzymes catalyse the hydrolysis of proteins and peptides. Proteolytic enzymes include, for example, proteinases, which hydrolyze proteins to form small peptides, and peptidases, which further hydrolyze small peptides to form amino acids. The proteolytic enzyme(s) may, for example, have endopeptidase activity (attack internal peptide bonds) and/or exopeptidase activity (attack peptide bonds at the end of the protein or peptide such as amino- or carboxypeptidases).

Proteolytic enzymes include, for example, protease, peptidase, glutaminase (e.g. L-glutamine-amido-hydrolase (EC 3.5.1.2)), endoprotease, serine endopeptidase, subtilisin peptidase (EC 3.4.21.62), serine protease, threonine protease, cysteine protease, aspartic acid

protease, glutamic acid protease, trypsin, chymotrypsin (EC 3.4.21.1), pepsin, papain, and elastase.

Proteolytic enzymes (EC 3.4 and EC 3.5) are classified by an EC number (enzyme commission number), each class comprises various known enzymes of a certain reaction type.

- 5 EC 3.4 comprises enzymes acting on peptide bonds (peptidases/proteinases) and EC 3.5 comprises enzymes that act on carbon-nitrogen bonds other than peptide bonds.

Examples for EC 3.4 include, for example, the following: aminopeptidase (EC 3.4.11), dipeptidase (3.4.13), dipeptidyl-peptidase (3.4.14), peptidyl-dipeptidase (3.4.15), serine-carboxypeptidase (3.4.16), metallocarboxypeptidase (3.4.17), cysteine-carboxypeptidase
10 (3.4.18), omegapeptidase (3.4.19), serine-endopeptidase (3.4.21), cysteine-endopeptidase (3.4.22), aspartate-endopeptidase (3.4.23), metalloendopeptidase (3.4.24), threonine-endopeptidase (3.4.25).

Examples for EC 3.5 include, without limitation, proteolytic enzymes that cleave in linear amides (3.5.1), for example, without limitation, glutaminase (EC 3.5.1.2).

- 15 Various proteolytic enzymes, suitable for food-grade applications, are commercially available from suppliers such as Novozymes, Amano, Biocatalysts, Bio-Cat, Valey Research (now subsidiary of DSM), EDC (Enzyme Development Corporation), and others. Some examples include: Neutrase®, Alcalase®, Protamex®, and Flavorzyme®, (available from Novozymes); the Promod® series: e.g. 215P, 439L, 523MDP, 782MDP, 845MDP and 903MDP, Flavorpro®
20 937MDP, 852MDP, 795MDP, 766MDP, 750MDP, P523MDP (available from Biocatalysts); Protin PC10, Umamizyme®, Peptidase R (or 723), protease A, protease M, protease N, protease P, and Thermoase GL30 (available from Amano); Validase® AFP and Validase® FPII (available from Valey Research); Fungal protease, Exo-protease, Papain, Bromelain, and the Enzeco® series of proteases and peptidases (available from EDC).

- 25 The enzymatic hydrolysis will be performed under conditions suitable for all the enzymes involved. As will be apparent to the skilled person, the temperature and pH should be within a suitable range for hydrolysis to occur to the desired degree. The incubation length will vary accordingly, with shorter incubations when conditions are nearer to the optimum conditions. Necessary ions, if required or beneficial for the chosen enzymes may be present. Subjecting the
30 incubated mixture to agitation, for example by stirring (e.g. at 50 to 500 rpm or 100 to 200 rpm) may improve the hydrolysis.

The enzymatic hydrolysis may, for example, be performed at a temperature less than the temperature at which the enzymes denature. The temperature may, for example, be selected to give a desired reaction rate. The enzymatic hydrolysis may, for example, be performed at a

temperature ranging from about 35°C to about 80°C. For example, the enzymatic hydrolysis may be performed at a temperature ranging from about 40°C to about 75°C or from about 45°C to about 70°C.

The enzymatic hydrolysis may, for example, be performed at a pH at which the enzymes
5 do not denature. The pH may, for example, be selected to give a desired reaction rate. The enzymatic hydrolysis may, for example, be performed at a pH ranging from about 7 to about 8.5, for example from about 7.5 to about 8.5, for example from about 7.9 to about 8.3.

The enzymatic hydrolysis may, for example, take place for a period of time ranging from about 1 hour to about 48 hours. For example, the enzymatic hydrolysis may take place for a
10 period of time ranging from about 2 hours to about 48 hours or from about 4 hours to about 36 hours or from about 6 hours to about 24 hours or from about 8 hours to about 16 hours.

In one embodiment, the peptide that is subjected to the enzymatic hydrolysis may, for example, be an aqueous slurry. Thus, in certain embodiments, the method may comprise combining the aqueous slurry with water and a buffer solution prior to the enzymatic hydrolysis.
15 In one embodiment, the reaction mixture after incubation was cooled to room temperature and the mixture was submitted to a separation step, for example by centrifugation, so as to recover the supernatant. In accordance with the present disclosure, the supernatant can be either maintained as it is in liquid form or converted into a powder using mild conditions, for example, spray drying or freeze drying.

20 In another embodiment, it was surprisingly and unexpectedly found that 1,3-propanediol may be used alone or in combination with the other off-note blocking compounds in the masking composition to reduce or eliminate off-notes imparted by non-animal derived protein. 1,3-propanediol is a polar compound that can be prepared from corn sugar. Generally, 1,3-propanediol is included in consumables in an amount such that 1,3-propanediol does not itself
25 provide flavor to the food or beverage and is not perceived through taste as being included in the product. For example, 1,3-propanediol is included in an amount generally considered to be below the organoleptically perceptible flavor threshold for the average consumer. In other words, a comparative product containing no 1,3-propanediol is not perceptibly different in taste than a product containing 1,3-propanediol. 1,3-propanediol is commercially sold as ZEMEA® from
30 DuPont Tate & Lyle BioProducts (Wilmington, Del.) but other sources of 1,3-propanediol may also be used.

According to certain embodiments, the amount of 1,3-propanediol present in a meat analog product or other non-animal protein containing consumable may be in the concentration of from at least about 10 ppm to about 1000 ppm. According to certain embodiments, the amount of 1,3-

propandiol may be in the concentration of from at least about 50 ppm to about 500 ppm. According to certain embodiments, the amount of 1,3-propandiol may be in the concentration of from at least about 100 ppm to about 300 ppm. According to certain embodiments, the amount of 1,3-propandiol may be in the concentration of about 100 ppm.

5 In another embodiment, it was surprisingly and unexpectedly found that ethyl cyclohexanoate may be used alone or in combination with the other off-note blocking compounds in the masking composition to reduce or eliminate off-notes imparted by non-animal derived protein. Ethyl cyclohexanoate, sometimes referred to as ethyl cyclohexyl carboxylate (CAS 3289-28-9; FEMA No 3544), is known to occur in various natural oils, for example, in
10 virgin olive oil (see, for example, Reiners et al, J. Agric. Food Chem. 1998, 46, 2754-2763) and rum (see Franitza et al, J. Agric. Food Chem. 2016, 64, 637-645). The compound possess a remarkable low odor threshold of about 1 ppt (Gary R. Takeoka et al, Lebensm.-Wiss. u.-Technol., 24,569-570 (1991).

Surprisingly it was found that the use of ethyl cyclohexanoate around its odor detection
15 threshold, that is about 0.5 ppt (ng/L) to about 20 ppt (ng/L) (including 0.6, 0.7, 0.8, 0.9, 1, 1.5, 2, 2.5, 5, 7.5, 8, 9, 10, 12, 14, 15, 16, 18 ppt (ng/L)), provides the masking of certain off-notes, in particular, off-notes of non-animal derived proteins. The addition of higher concentrations (e.g., 50 ppt or more (such as 75 ppt, 100 ppt, 150 ppt, 175 ppt) provides a significant effect on several off-note attributes, but in addition confers some fruity notes. Depending on the consumable
20 these fruity notes are desired or less desired.

The required amount of ethyl cyclohexanoate to achieve a noticeable effect, mainly depends on the amounts of non-animal derived protein present in the consumable product. For example, good results were achieved by the addition of up to 20 ppt (e.g. 0.5 ppt to about 15 ppt) of ethyl cyclohexanoate to a consumable comprising about 3 wt % of non-animal derived protein.
25 As another example one may cite meat analog consumables (e.g., fillets, nuggets, burgers, sausages, "meatballs", and deli "meats") comprising about 15 – 50 wt% (such as 17, 20, 25, 30, 35, 40, 45 wt%) of non-animal derived protein. To such type of consumables comprising high amounts (about 15 wt% to about 50 wt%) of non-animal derived proteins, one may add up to 250 ppt of ethyl cyclohexanoate to achieve good results.

30 Thus there is provided in a further embodiment a consumable comprising non-animal derived protein and ethyl cyclohexanoate, characterized in that the consumable comprises up to about 1ng (including 0.005, 0.01, 0.05, 0.1, 0.25, 0.3, 0.5, 0.5, 0.75 ng) of ethyl cyclohexanoate per 1 gram non-animal derived protein.

In another embodiment, it was surprisingly and unexpectedly found that natural complex ingredients such as, green coffee extract, molasses distillates and hyaluronic acid may be used alone or in combination with the other off-note blocking compounds in the masking composition to reduce or eliminate off-notes imparted by non-animal derived protein.

5 According to the present disclosure, the one or more off-note blocking compounds may directly be added to a consumable product comprising non-animal derived proteins, or it may be in an earlier step, be admixed with further food additives, such as flavor agents, stabilizers, emulsifiers, preservatives, gums, starches, dextrines, vitamins and minerals, functional ingredients, salts, antioxidants, sweeteners, and colorants, or it may be in a first step entrapped in
10 a matrix material before admixing to a consumable product.

Masking Agents

In accordance with the present disclosure, masking agents are used in combination with the off-note blocking compounds disclosed above in order to create compositions suitable for
15 blocking, masking or modifying the undesirable off-note(s) in a particular non-animal derived protein. Masking or blocking undesirable flavor notes has been practiced in food and beverage development for many years. Historically, this involved using more sugar or fat to cover bitterness and adjust flavor perception. Flavorists simply “over flavored” their products to hide the offending taste. These traditional methods are wholly unsatisfactory, especially for health
20 conscious consumers where reduced fat and sugar content is a common goal.

Various non-animal proteins provide undesirable off-notes. Particularly, undesirable off-notes are the beany, bitter, grassy, astringent, earthy, chalky, and rancid off-notes from pea and soy proteins. The term off-note refers to an unpleasant flavour and after taste that develops over time after consumption of consumables. The addition of off-note blockers will block, mask or
25 modify the off-notes and make them less apparent or unnoticeable. Non-animal proteins will thereby lose their beany / bitter / grassy / astringent / earthy / chalky / rancid taste.

According to one embodiment, suitable masking agents for use in accordance with the present disclosure include fatty acids including, but not limited to, nonanoic acid, decanoic acid, dodecanoic acid, tetradecanoic acid, hexadecanoic acid, oleic acid, octanoic acid, 9-decenoic and
30 hexanoic.

In another embodiment, suitable masking agents include carbonyls including, but not limited to, acetone, acetyl propionyl, 2-heptanone, 2-nonanone, 2-undecanone and cis-4-heptenal. In another embodiment, suitable off-note blocking compounds include sulfur, including, but not limited to, isothiocyanates, methyl sulfide, diallyl disulfide, propenyl disulfide,

dimethyl sulfide, dimethyl trisulfide and extracts of alliaceous ingredients. In another embodiment, the sulfur components may be found in sulfur containing oils such as, for example, garlic oil, onion oil, mustard oil and horseradish oil.

In another embodiment, suitable masking agents include sweet browns including, but not limited to, maltol, vanillin, cyclopentenolone, furaneol, vanilla extracts, vanilla derivatives, caramel extracts and condensed milk derivatives.

In another embodiment, suitable masking agents include esters including, but not limited to, ethyl cyclohexanoate, ethyl succinate, ethyl lactate, ethyl caprate, ethyl dodecanoate, ethyl myristate, ethyl palmitate and ethyl oleate. In another embodiment, suitable masking agents include sweeteners including but not limited to, steviol glycosides such as rebaudiosides; rebusodide, swingle extract, mogroside V, erythritol, glucosylated steviol glycosides, honey distillates and sugar distillates.

In another embodiment, suitable masking agents include lactones including, but not limited to, gamma decalactone, delta decalactone, delta dodecalactone, gamma undecalactone and massoia lactone. In another embodiment, masking agents include juice derivatives including, but not limited to, strawberry, cucumber, apple, cherry, kiwi and apricot.

According to one embodiment, suitable masking agents for use in accordance with the present disclosure include terpenes including, but not limited to, fenchol, terpineol, caryophyllene, bisabolene, farnoscene and farnesol. In another embodiment, suitable terpenes include, but are not limited to, carotenes (such as, for example, alpha -carotene, beta -carotene, gamma -carotene, delta -carotene, lycopene, neurosporene, phytofluene, phytoene), and xanthophylls (such as, for example, canthaxanthin, cryptoxanthin, aeaxanthin, astaxanthin, lutein, rubixanthin); monoterpenes (such as, for example, limonene, perillyl alcohol); sesquiterpenes (such as, for example, caryophyllene, β -caryophyllene, zingiberene); saponins; lipids including: phytosterols, campesterol, beta sitosterol, gamma sitosterol, stigmasterol, tocopherols (vitamin E), and omega -3, -6, and -9 fatty acids (such as, for example, gamma-linolenic acid); triterpenoids (such as, for example, oleanolic acid, ursolic acid, betulinic acid, moronic acid); alpha-pinenes, cis-beta-ocimenes and bisabolenes (such as alpha-bisabolene and gamma-bisabolene).

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In one example, the masking composition may include a masking agent in an amount from about 0.00000001% to about 0.0025%, in another embodiment from about 0.0000001% to about 0.0015%, in another embodiment from about 0.000001% to about 0.001%, in yet another

embodiment from about 0.00001% to about 0.0005%, or any individual number within the range, by weight of consumable.

In accordance with another embodiment, the masking composition may include a plurality of masking agents, including, for example, 5, 6, 7, 8, 9, 10, or more masking agents. In some embodiments, the masking composition includes at least five masking agents; in another embodiment at least ten masking agents; in another embodiment at least ten masking agents.

The masking composition may include the off-note blocking compound and masking agent in weight ratio of about 500 to 1; in another embodiment about 100 to 1; in another embodiment about 75 to 1; in another embodiment about 50 to 1; in yet another embodiment about 25 to 1; in yet another embodiment about 10 to 1; in yet another embodiment about 5 to 1; and in yet another embodiment about 2.5 to 1.

In one embodiment, the masking composition may be included in a consumable in an amount from about 0.001% to about 1.0%, in another embodiment from about 0.05% to about 0.5%, in another embodiment from about 0.1% to about 0.25, or any individual number within the range, by weight of consumable.

Flavorants

In one embodiment, the masking composition may, optionally, include a flavorant. By “flavorant” it is meant a composition created by a flavorist using methods known to the skilled person that is a mixture of tastants, aroma compounds and sensates. Examples of suitable flavorants include natural flavors, artificial flavors, spices, seasonings, and the like. Exemplary flavorants include synthetic flavor oils and flavoring aromatics and/or oils, oleoresins, essences, and distillates, and a combination comprising at least one of the foregoing.

Flavor oils include spearmint oil, cinnamon oil, oil of wintergreen (methyl salicylate), peppermint oil, Japanese mint oil, clove oil, bay oil, anise oil, eucalyptus oil, thyme oil, cedar leaf oil, oil of nutmeg, allspice, oil of sage, mace, oil of bitter almonds, and cassia oil; useful flavoring agents include artificial, natural and synthetic fruit flavors such as vanilla, and citrus oils including lemon, orange, lime, grapefruit, yuzu, sudachi, and fruit essences including apple, pear, peach, grape, raspberry, blackberry, gooseberry, blueberry, strawberry, cherry, plum, prune, raisin, cola, guarana, neroli, pineapple, apricot, banana, melon, apricot, cherry, tropical fruit, mango, mangosteen, pomegranate, papaya, and so forth.

Additional exemplary flavors imparted by a flavorant include a milk flavor, a butter flavor, a cheese flavor, a cream flavor, and a yogurt flavor, a vanilla flavor, tea or coffee flavors, such as a green tea flavor, an oolong tea flavor, a tea flavor, a cocoa flavor, a chocolate flavor,

and a coffee flavor; mint flavors, such as a peppermint flavor, a spearmint flavor, and a Japanese mint flavor; spicy flavors, such as an asafetida flavor, an ajowan flavor, an anise flavor, an angelica flavor, a fennel flavor, an allspice flavor, a cinnamon flavor, a chamomile flavor, a mustard flavor, a cardamom flavor, a caraway flavor, a cumin flavor, a clove flavor, a pepper
5 flavor, a coriander flavor, a saffron flavor, a savory flavor, a Zanthoxyli Fructus flavor, a perilla flavor, a juniper berry flavor, a ginger flavor, a star anise flavor, a horseradish flavor, a thyme flavor, a tarragon flavor, a dill flavor, a capsicum flavor, a nutmeg flavor, a basil flavor, a marjoram flavor, a rosemary flavor, a bayleaf flavor, and a wasabi (Japanese horseradish) flavor; a nut flavor such as an almond flavor, a hazelnut flavor, a macadamia nut flavor, a peanut flavor,
10 a pecan flavor, a pistachio flavor, and a walnut flavor; floral flavors; and vegetable flavors, such as an onion flavor, a garlic flavor, a cabbage flavor, a carrot flavor, a celery flavor, mushroom flavor, and a tomato flavor.

According to some embodiments, flavorants may also include aldehydes and esters such as cinnamyl acetate, cinnamaldehyde, citral diethylacetal, dihydrocarvyl acetate, eugenyl
15 formate, p-methylamilol, and so forth can be used. Further examples of aldehyde flavourings include acetaldehyde (apple), benzaldehyde (cherry, almond), anisic aldehyde (licorice, anise), cinnamic aldehyde (cinnamon), citral, i.e., alpha-citral (lemon, lime), neral, i.e., beta-citral (lemon, lime), decanal (orange, lemon), ethyl vanillin (vanilla, cream), heliotrope, i.e., piperonal (vanilla, cream), vanillin (vanilla, cream), alpha-amyl cinnamaldehyde (spicy fruity flavours),
20 butyraldehyde (butter, cheese), valeraldehyde (butter, cheese), citronellal (modifies, many types), decanal (citrus fruits), aldehyde C-8 (citrus fruits), aldehyde C-9 (citrus fruits), aldehyde C-12 (citrus fruits), 2-ethyl butyraldehyde (berry fruits), hexenal, i.e., trans-2 (berry fruits), tolyl aldehyde (cherry, almond), veratraldehyde (vanilla), 2,6-dimethyl-5-heptenal, i.e., melonal (melon), 2,6-dimethyloctanal (green fruit), and 2-dodecenal (citrus, mandarin), and the like.

25 Generally any flavorant or food additive such as those described in "Chemicals Used in Food Processing", Publication No 1274, pages 63-258, by the National Academy of Sciences, can be used. This publication is incorporated herein by reference.

The masking composition may include from about .01% to about 6.0%, in another embodiment from about 0.1% to about 1.0%, in yet another embodiment from about 0.2% to
30 about 0.5%, or any individual number within the range, by weight of a flavorant.

Uses

The masking composition obtained by and/or obtainable by the methods described herein may, for example, be added to consumables / food products (e.g. as part of a flavour composition) to improve mouthfeel and/or reduce / mask off-notes of the consumable.

5 In general terms, “mouthfeel” refers to the complexity of perceptions experienced in the mouth as influenced by the aroma, taste, and texture qualities of food and beverage products. From a technical perspective, however, mouthfeel sensations are specifically associated with physical (e.g. tactile, temperature) and/or chemical (e.g. pain) characteristics perceived in the mouth via the trigeminal nerve. Accordingly, they are a consequence of oral-tactile stimulations
10 and involve mechanical, pain and temperature receptors located in the oral mucosa, lips, tongue, cheeks, palate and throat.

Mouthfeel perceptions include, for example, one or more of texture - astringent, burning, cold, tingling, thick, biting, fatty, oily, slimy, foamy, melting, sandy, chalky, watery, acidic, lingering, metallic, body, body sweet, carbonation, cooling, warming, hot, juicy, mouth drying,
15 numbing, pungent, salivating, spongy, sticky, fullness, cohesiveness, density, fracturability, graininess, grittiness, gumminess, hardness, heaviness, moisture absorption, moisture release, mouthwatering, mouthcoating, roughness, slipperiness, smoothness, uniformity, uniformity of bite, uniformity of chew, viscosity, fast-diffusion, full body, salivation and retention.

By “improvement of mouthfeel” it is meant that any one or more of desired mouthfeel
20 perceptions is/are enhanced and/or that any one or more undesirable mouthfeel perceptions is/are reduced.

By “masking of off-notes” it is meant that the intensity and/or length of perception of undesirable attributes in a food product is reduced, as analysed by trained panelists when comparing food comprising an ingredient with off-note masking to food without an added off-
25 note masking ingredient.

According to other embodiments, the disclosed method may be used to reduce or eliminate off-notes imparted by non-animal derived protein such as plant protein. Exemplary plant proteins include soy protein and pea protein. As used herein, soy includes all consumables containing soy in any form, including soybean oil used either alone, in combination, for example
30 as a nutraceutical, or as a medicament, soy bean curd, soy milk, soy butter or soy paste. The plant protein may comprise algae (such as spirulina), beans (such as black beans, canelli beans, kidney beans, lentil beans, lima beans, pinto beans, soy beans, white beans), broccoli, edamame, nuts (such as almonds, brazil nuts, cashews, peanuts, pecans, hazelnuts, pine nuts, walnuts), peas (such as black eyed peas, chickpeas, green peas), potatoes, oatmeal, seeds (such as chia, flax,

hemp, pumpkin, sesame, sunflower), grain (rice, millet, maize, barley, wheat, oat, sorghum, rye, teff, triticale, amaranth, buckwheat, quinoa), seitan (i.e., wheat gluten-based), tempeh, tofu, mycoprotein or fungal protein; insects and leaf protein and mixtures thereof.

According to other embodiments, the disclosed masking composition may be used to
5 reduce or eliminate off-notes imparted by meat analog products containing non-animal protein. “Meat analog” is a food product that approximates the aesthetic qualities and/or chemical characteristics of certain types of meat. The term Meat analogue includes those prepared with textured vegetable proteins (TVP), high moisture meat analogue (HMMA) and low moisture meat analogue (LMMA) products.

10

Meat Analog Composition and Extrusion Process

Food scientists have devoted much time developing methods for preparing acceptable meat-like food applications, such as beef, pork, poultry, fish, and shellfish analogs, from a wide variety of non-animal proteins. One such approach is texturization into fibrous meat analogs, for
15 example, through extrusion processing. The resulting meat analog products exhibit improved meat-like visual appearance and improved texture.

Meat analog products are produced with high moisture content and provide a product that simulates the fibrous structure of animal meat and has a desirable meat-like moisture, texture, mouthfeel, flavor and color.

20 Texturization of protein is the development of a texture or a structure via a process involving heat, and/or shear and the addition of water. The texture or structure will be formed by protein fibers that will provide a meat-like appearance and perception when consumed. The mechanism of texturization of proteins starts with the hydration and unfolding of a given protein by breaking intramolecular binding forces by heat and/or shear. The unfolded protein molecules
25 are aligned and bound by shear, forming the characteristic fibers of a meat-like product. In one embodiment, polar side chains from amino acids form bonds with linear protein molecules and the bonds will align protein molecules, forming the characteristic fibers of a meat-like product.

To make non-animal proteins palatable, texturization into fibrous meat analogs, for example, through extrusion processing has been an accepted approach. Due to its versatility,
30 high productivity, energy efficiency and low cost, extrusion processing is widely used in the modern food industry. Extrusion processing is a multi-step and multifunctional operation, which leads to mixing, hydration, shear, homogenization, compression, deaeration, pasteurization or sterilization, stream alignment, shaping, expansion and/or fiber formation. Ultimately, the non-

animal protein, typically introduced to the extruder in the form of a dry blend, is processed to form a fibrous material.

More recent developments in extrusion technology have focused on using twin screw extruders under high moisture (40-80%) conditions for texturizing non-animal proteins into fibrous meat alternatives. In the high moisture twin screw process, also known as “wet extrusion”, the raw materials, predominantly non-animal proteins such as soy and/or pea protein, are mixed and fed into a twin-screw extruder, where a proper amount of water is dosed in and all ingredients are further blended and then melted by the thermo-mechanical action of the screws. The realignment of large protein molecules, the laminar flow, and the strong tendency of stratification within the extruder's long slit cooling die contribute to the formation of a fibrous structure. The resulting wet-extruded products tend to exhibit improved whole muscle meat-like visual appearance and improved palatability. Therefore, this extrusion technology shows promise for texturizing non-animal proteins to meet increasing consumer demands for healthy and tasty foods.

Texturization processes may also include spinning, simple shear flow, and simple shear flow and heat in a Couette Cell (“Couette Cell” technology). The spinning process consists of unfolding protein molecules in a high alkaline pH solution, and coagulating the unfolded protein molecules by spraying the protein alkaline solution into an acid bath. The spraying is made by a plate with numerous fine orifices. The protein coagulates forming fibers as soon as it gets in contact with the acid medium. The fibers are then washed to remove remaining acid and/or salts formed in the process. A Couette Cell is a cylinder-based device where the inner cylinder rotates and the outer cylinder is stationary, being easy to scale up. The Couette Cell operates under the same principle of forming protein fibers by subjecting the protein to heat and shear in the space between the stationary cylinder and the rotational cylinder.

With respect to simple shear flow and heat in a Couette Cell, this process can induce fibrous structural patterns to a granular mixture of non-animal proteins at mild process conditions. This process is described in “On the use of the Couette Cell technology for large scale production of textured soy-based meat replacers”, Journal of Food Engineering 169 (2016) 205-213, which is incorporated herein by reference.

Meat analog products having qualities (for example, texture, moisture, mouthfeel, flavor, and color) similar to that of whole muscle animal meat may be produced using non-animal proteins formed using extrusion under conditions of relatively high moisture. In one embodiment, meat analog products may include non-animal protein, one or more of flour, starch, and edible fiber, an edible lipid material.

In certain compositions, the amount of non-animal protein included in the mixture to be extruded includes no more than about 90% by weight of the dry ingredients. For example, the amount of non-animal protein present in the ingredients utilized to make meat analog products according to the present disclosure may range from about 3% to about 90% by weight of the dry ingredients. In another embodiment, the amount of non-animal protein present in the ingredients utilized to make meat analog products according to the present disclosure may range from about 10% to about 80% by weight of the dry ingredients. In a further embodiment, the amount of non-animal protein present in the dry ingredients utilized to make meat analog products according to the present disclosure may range from about 25% to about 50% by weight. In another further embodiment, the amount of non-animal protein present in the dry ingredients utilized to make meat analog products according to the present disclosure may be about 40%.

The term “dry ingredients” includes all the ingredients in the mixture to be extruded except for added water and ingredients added with the added water (i.e., the “wet ingredients”).

In addition to the foregoing, the meat analog product includes water at a relatively high amount. In one embodiment, the total moisture level of the mixture extruded to make the meat analog product is controlled such that the meat analog product has a moisture content that is at least about 50% by weight. To achieve such a high moisture content, water is typically added to the ingredients. Although, a relatively high moisture content is desirable, it may not be desirable for the meat analog product to have a moisture content much greater than about 65%. As such, in one embodiment the amount of water added to the ingredients and the extrusion process parameters are controlled such that the meat analog product (following extrusion) has a moisture content that is from about 40% to about 65% by weight.

Among the suitable extrusion apparatuses useful in the practice of the described process is a commercially available double barrel, twin-screw extruder apparatus such as a Wenger TX 52 model manufactured by Wenger (Sabetha, Kansas) or Cleextral BC21 model manufactured by Cleextral (France).

The screws of a twin-screw extruder can rotate within the barrel in the same or opposite directions. Rotation of the screws in the same direction is referred to as single flow or co-rotating whereas rotation of the screws in opposite directions is referred to as double flow or counter-rotating. The speed of the screw or screws of the extruder may vary depending on the particular apparatus; however, it is typically from about 100 to about 750 revolutions per minute (rpm). Generally, as the screw speed increases, the density of the extrudate will decrease. The extrusion apparatus contains screws assembled from shafts and worm segments, as well as mixing lobe and

ring-type shearing elements as recommended by the extrusion apparatus manufacturer for extruding non-animal protein material.

The extrusion apparatus generally comprises a plurality of heating zones through which the protein mixture is conveyed under mechanical pressure prior to exiting the extrusion apparatus through an extrusion die. The temperature in each successive heating zone generally exceeds the temperature of the previous heating zone by between about 10° C. to about 70° C. In one embodiment, the dry premix is transferred through multiple heating zones within the extrusion apparatus, with the protein mixture heated to a temperature of from about 25° C. to about 160° C. such that the molten extrusion mass enters the extrusion die at a temperature of from about 160° C. In one embodiment, the protein mixture is heated in the respective heating zones to temperatures of about 65° C., about 95° C., about 150° C., and about 160° C.

The pressure within the extruder barrel is typically between about 30 psig and about 500 psig, or more specifically between about 50 psig and about 300 psig. Generally, the pressure within the last two heating zones is between about 50 psig and about 500 psig, even more specifically between about 50 psig to about 300 psig. The barrel pressure is dependent on numerous factors including, for example, the extruder screw speed, feed rate of the mixture to the barrel, feed rate of water to the barrel, and the viscosity of the molten mass within the barrel.

Water along with additional “wet ingredients” is injected into the extruder barrel to hydrate the non-animal protein mixture and promote texturization of the proteins. As an aid in forming the molten extrusion mass, the water may act as a plasticizing agent. Water may be introduced to the extruder barrel via one or more injection jets. The rate of introduction of water to the barrel is generally controlled to promote production of an extrudate having the aforementioned desired characteristics, such as an extrudate with a moisture content as described above.

25 Textured vegetable proteins (TVP)/Low moisture meat analogue (LMMA)

Textured vegetable proteins (TVPs) can be defined as food products made from edible protein sources and characterized by having structural integrity and identifiable texture such that each unit will withstand hydration in cooking and other procedures used in preparing the food for consumption. A majority of TVPs produced today are produced by extrusion technology. These TVPs are often rehydrated with 60-65% moisture and blended with other ingredients including, but not limited to, binders, meats, other TVPs, flavours, excipient, fats, oils, or seasonings.

The low-moisture meat analog (LMMA) product is most often cut with an extruder knife at the extruder die to form the finished product size and shape. Drying after extrusion, to remove moisture, improves storage, handling, and shelf-stability. These LMMAs are often rehydrated

with 60-70% moisture. Additionally, other food ingredient items can be added to improve finished product functionality and appearance, including, but not limited to, oil, other proteins, salt, seasonings, flavours, maskers, enhancers, or binders. Generally re-hydrated LMMA contains 40-80% moisture, 0-25% oil, 5-30% protein.

- 5 A typical formulation of LMMA contains water, protein concentrates, protein isolates, oil, a binder (e.g. cellulose, vital wheat gluten) and flavours, maskers, seasonings, etc. that provide a taste and texture closer to an animal meat product.

EXAMPLES

10

The following examples are given solely for the purpose of illustration and are not to be construed as limitations of the present invention, as many variations of the invention are possible without departing from the spirit and scope of the present disclosure.

- 15 Pea protein isolate (Nutralys® F85M, Roquette, Lestrem, France) or (Pisane® M9, Coscura, Belgium) and pea fiber (Pea Fiber I50M, Roquette, Lestrem, France) and salt were used as ingredients and were blended for 1 to 5 minutes to form the base, i.e. control, dry feed formulation. Oils such as sunflower, safflower, rapeseed, canola, olive oil and water may be used as ingredients and injected via pumps connected to side injection ports at the barrel of the extruder.

- 20 Extrusion was performed using a pilot-scale, co-rotating, intermeshing, twin-screw food extruder (Wenger TX 52 model manufactured by Wenger (Sabetha, Kansas)). A continuous dry feeding equipment was used to feed the raw materials into the extruder. While operating, water was injected, via an inlet port, into the extruder by a positive displacement pump. The pump was pre-calibrated and adjusted so that the extrudate moisture content was 52.5%. The screw speed
25 was set at 250 rpm. At the end of the extruder, a long cooling die was attached, with a dimension of 3 in × ½ in × 48 in (W×H×L).

- 30 As seen in Table 1 below, four different meat analog products were prepared via extrusion (Examples 1-5). Example 1 was the Control; Example 2 was the Control plus Masker A (combination of pea peptide and green coffee extract plus masking agents); Example 3 was the Control plus Masker B (combination of pea and rice peptides and green coffee extract plus masking agents); Example 4 was the Control plus Masker C (combination of peptides, green coffee extract and molasses distillates plus masking agents); Example 5 was the Control plus Masker D (1,3 propane diol plus masking agents). Using a bench-top tasting panel (consisting of 10-15 panelists), panelists were asked to record the sensory attribute differences between the

Control and example samples, particularly focusing on off-notes (reduction or differences) and savory notes.

Table 1
Meat Analog Compositions

	Example 1 (Control)	Example 2	Example 3	Example 4	Example 5
Dry Ingredients (45 wt%)					
Pea Protein Isolate	39.0	38.9	38.9	38.9	38.9
Pea Fiber	5.0	5.0	5.0	5.0	5.0
Salt	1.0	1.0	1.0	1.0	1.0
Masker A		0.1			
Masker B			0.1		
Masker C				0.1	
Masker D					0.1
Wet Ingredients (55 wt%)					
Water (Moisture Content)	53.5	53.5	53.5	53.5	53.5
Safflower Oil	1.5	1.5	1.5	1.5	1.5
Total	100	100	100	100	100

The meat analog compositions of Examples 1-5 were taste tested by 10-15 panelists of which 5 were flavorists and they were asked to describe the meat analogs as compared to the control.

Table 2

Sample	Taste Results
Example 1 (Control)	Pea like, bitter, earth, beany, astringent
Example 2	More bland, off-notes are reduced, less bitter, less green, less beany
Example 3	More bland and clean, reduced off-notes, less green, less pea like, less beany, less bitter
Example 4	More bland and clean, reduced off-notes, less green, less pea like, less beany, less bitter
Example 5	More bland and clean, reduced off-notes, less bitter, less astringent

From Table 2 above, it can be seen that the samples containing the off-note blocking compound and masking agents are found to have less off-notes and to be less beany, less bitter and less astringent compared to the Control.

As seen in Table 3 below, four different low moisture TVP products (meat analog burgers) were prepared (Examples 6-11). Example 6 was the Control; Example 7 was the Control plus Masker A (combination of peptides and green coffee extract plus masking agents); Example 8 was the Control plus Masker B (combination of pea peptide and green coffee extract plus masking agents); Example 9 was the Control plus Masker C (combination of pea and rice peptides, green coffee extract and molasses distillates plus masking agents); Example 10 was the Control plus Masker D (1,3 propane diol plus masking agents); and Example 11 was the Control plus Masker E (ethyl cyclohexanoate plus masking agents).

The protein concentrate was hydrated with a portion of the water. An emulsion was made using water, oil, and a portion of the dry ingredients including hydrocolloids. The hydrated protein concentrate, the emulsion, and the remaining ingredients were mixed until well incorporated and then formed into burger patties. The burgers were cooked from raw on the stove top using 3.5% oil to reach an internal temperature of 160F.

Using a bench-top tasting panel (consisting of 10-15 panelists), panelists were asked to record the sensory attribute differences between the Control and example samples, particularly focusing on off-notes (reduction or differences) and savory notes.

Table 3
Low Moisture TVP

	Example 6 (Control)	Example 7	Example 8	Example 9	Example 10	Example 11
Ingredients (g)						
Pea Protein ¹	14.20	14.20	14.20	14.20	14.20	14.20
Water	61.65	61.55	61.55	61.55	61.55	61.55
Coconut Oil	4.20	4.20	4.20	4.20	4.20	4.20
Citrus Fiber (powder)	0.90	0.90	0.90	0.90	0.90	0.90
Methyl Cellulose	0.85	0.85	0.85	0.85	0.85	0.85
Potato Starch	0.85	0.85	0.85	0.85	0.85	0.85
Rice Protein ²	0.85	0.85	0.85	0.85	0.85	0.85
Vegetable Oil	5.50	5.50	5.50	5.50	5.50	5.50
Pea Protein Isolate ³	10.00	10.00	10.00	10.000	10.00	10.00
Salt	1.00	1.00	1.00	1.00	1.00	1.00
Masker A		0.10				
Masker B			0.10			
Masker C				0.10		
Masker D					0.10	
Masker E						0.10
Total	100	100	100	100	100	100

¹Nutralys® T70 S

5 ²Remypro N80+

³ Nutralys® F85M

The TVP compositions of Examples 6-10 were taste tested by 10-15 panelists of which 5 were flavorists and they were asked to describe the samples as compared to the control.

10

Table 4

Sample	Taste Results
Example 6 (Control)	Pea like, bitter, earth, beany, astringent
Example 7	More bland, off-notes are reduced, less bitter, less earthy
Example 8	More bland and clean, reduced off-notes, less green, less pea like, less astringent
Example 9	More bland and clean, reduced off-notes, less pea like, less earthy, less bitter
Example 10	More bland and clean, reduced off-notes, less beany, less bitter, less earthy, less pea like
Example 11	More bland and clean, reduced off-notes, less pea like, less earthy, less bitter

From Table 4 above, it can be seen that the samples containing the off-note blocking compound and masking agents are found to have less off-notes and to be less beany, less bitter and less earthy compared to the Control. Additional comments indicate that the maskers provided a cleaner, more neutral profile and increased the umami and savory notes in the burgers. The same results were achieved replacing pea protein with soy protein in Table 3.

10 High Moisture Texturized Protein –Post Extrusion Masker Addition

The high moisture pea protein strips from Example 1 were used to test the performance of the maskers added after extrusion. The blank strips were tenderized and vacuum marinated using a 20% water/masker brine. Masker A, B, C, D, and E were evaluated at 0.1%. After marination, the strips were cooked on the stove top using oil at 6% until the internal temperature reached 15 160F.

The high moisture pea strips were tasted blind by 7 trained tasters and they were asked to describe the strips and also rate the strips on specific attributes. A blind blank was also included in each tasting to eliminate any bias. The strips with masker A, B, C, D, or E all had lower scores in off notes such as pea, astringent, bitter, beany, and earthy compared to the blank and 20 the blind blank.

The dimensions and values disclosed herein are not to be understood as being strictly limited to the exact numerical values recited. Instead, unless otherwise specified, each such dimension is intended to mean both the recited value and a functionally equivalent range surrounding that value. For example, a dimension disclosed as “40 mm” is intended to mean
5 “about 40 mm”.

While particular embodiments of the present invention have been illustrated and described, it would be obvious to those skilled in the art that various other changes and modifications can be made without departing from the spirit and scope of the invention. It is therefore intended to cover in the appended claims all such changes and modifications that are
10 within the scope of this invention.

15

What is claimed:

1. A masking composition for masking non-animal derived protein off-notes comprising:
one or more off-note blocking compounds; and
5 one or more masking agents;
wherein the one or more off-note blocking compounds are selected from the group
consisting of pea or rice peptides, 1,3-propandiol, ethyl cyclohexanoate, green coffee
extract, molasses distillates, hyaluronic acid and combinations thereof; and wherein the
one or more masking agents are selected from the group consisting of fatty acids,
10 terpenes, carbonyls, sulfur compounds, sweet browns, esters, sweeteners, lactones, juice
derivatives and combinations thereof.
2. The masking composition according to claim 1, wherein the fatty acids are selected from
the group consisting of nonanoic acid, decanoic acid, dodecanoic acid, tetradecanoic acid,
15 hexadecanoic acid, oleic acid, octanoic acid, 9-decenoic, hexanoic and combinations thereof.
3. The masking composition according to claim 1, wherein the carbonyls are selected from
the group consisting of acetone, acetyl propionyl, 2-heptanone, 2-nonanone, 2-undecanone, cis-
4-heptenal and combinations thereof.
- 20 4. The masking composition according to claim 1, wherein the sulfur compounds are
selected from the group consisting of isothiocyanates, methyl sulfide, diallyl disulfide, propenyl
disulfide, dimethyl sulfide, dimethyl trisulfide, extracts of alliaceous ingredients and
combinations thereof.
- 25 5. The masking composition according to claim 1, wherein the sweet browns are selected
from the group consisting of maltol, vanillin, cyclopentenolone, furaneol, vanilla extracts, vanilla
derivatives, caramel extracts, condensed milk derivatives and combinations thereof.
- 30 6. The masking composition according to claim 1, wherein the esters are selected from the
group consisting of ethyl cyclohexanoate, ethyl succinate, ethyl lactate, ethyl caprate, ethyl
dodecanoate, ethyl myristate, ethyl palmitate and combinations thereof.

7. The masking compositions according to claim 1, wherein the sweeteners are selected from the group consisting of steviol glycosides, erythritol, glucosylated steviol glycosides, honey distillates, sugar distillates and combinations thereof.
- 5 8. The masking composition according to claim 1, wherein the lactones are selected from the group consisting of gamma decalactone, delta decalactone, delta dodecalactone, gamma undecalactone, massoia lactone and combinations thereof.
9. The masking composition according to claim 1, wherein the terpenes are selected from
10 the group consisting of fenchol, terpineol, caryophyllene bisabolene, farnoscene, farnesol and combinations thereof.
10. The masking composition according to claim 1, wherein the weight ratio of off-note blocking compound to masking agent is between 2.5:1 and 500:1.
- 15 11. A consumable comprising:
a non-animal derived protein;
a masking composition comprising one or more off-note blocking compounds selected from the group consisting of pea or rice peptides, 1,3-propandiol, ethyl cyclohexanoate, green
20 coffee extract, molasses distillates, hyaluronic acid and combinations thereof; and one or more masking agents selected from the group consisting of fatty acids, terpenes, carbonyls, sulfur compounds, sweet browns, esters, sweeteners, lactones, juice derivatives and combinations thereof; and
a flavorant.
- 25 12. The consumable according to claim 10, wherein the consumable is a meat analog.
13. The consumable according to claim 10, wherein the consumable is a beverage.
- 30 14. The consumable according to claim 10, wherein the non-animal derived protein is a pea protein.
15. The consumable according to claim 10, wherein the non-animal derived protein is a soy protein.
- 35

16. The consumable according to claim 10, wherein the masking composition is present in an amount from 0.01% to 1.0%, by weight of the consumable.