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(54) Title: CORE AND SHELL KIBBLE-LIKE PRODUCT

(57) Abstract: A liquid core and shell product is provided. The product can have at least three layers: a solid food based material, a liquid-based substance, and an encapsulate material. The liquid core and shell product can deliver a liquid-based substance to the mouth of a consumer in a clean way, where it may also provide a unique mouth feel. The liquid core and shell product can also act as a delivery vehicle for functional ingredients and/or organoleptic enhancers.

CORE AND SHELL KIBBLE-LIKE PRODUCT

BACKGROUND

[0001] Coatings such as gravy, flavoring agents, and supplements can be applied to dry pet food products, such as dry kibbles, to improve flavor, desirability, and/or nutrient content of the kibbles. However, such coatings are typically messy, and may require application to the dry kibble at every meal.

[0002] Wet pet food products may be desirable to pets because of their texture and flavor, but are also messy and inconvenient for the customer. These drawbacks are sufficient to prevent customers from purchasing and feeding such wet pet food products.

[0003] Dry pet food products provide benefits to consumers, such as being nutritionally complete, convenient to feed (e.g., multiple feeding occasions from a single package, shelf stable after opening), and having a less strong odor than other pet food products, such as wet pet food.

[0004] However, a potential drawback to purchasing and using dry pet food is that pets are accustomed to getting their bodily water intake from their prey, and consequently, typically drink less than the optimal amount of water when fed a dry pet food diet. This can lead to potential health problems, such as, for example, reduced activity levels, kidney stones, and disease of the lower urinary tract.

SUMMARY

[0005] A food product in accordance with the present disclosure can comprise an encapsulate material surrounding a liquid-based substance, and a coating comprising a solid food material surrounding at least a portion of the encapsulate material. The solid food material can comprise a kibble. The solid food material can have a moisture content of less than about 10%. The liquid-based substance can further comprise at least one of a functional ingredient and an organoleptic enhancer. The liquid-based substance can be selected from the group consisting of oil and water. The liquid-based substance can have a viscosity of from about 0.8 cp to 2,000 cp. The encapsulate material can be selected from the group consisting of a hydrophilic matrix, a hydrophobic matrix, gelatin, a divalent cation set alginate, a protein based film, and a hydrocolloid based film.

[0006] A method for making a food product in accordance with the present disclosure can comprise obtaining an encapsulate material, filling said encapsulate material with a liquid-based substance, and coating or encrusting said encapsulate material with a solid food material. The coating or encrusting can be accomplished by panning. The solid food material can be a kibble. The solid food material can have a moisture content below 10%. The liquid-based substance can further contain at least one of a functional ingredient or an organoleptic enhancer. The liquid-based substance can comprise at least one of an oil and water. The encapsulate material can be selected from the group consisting of a hydrophilic matrix, a hydrophobic matrix, gelatin, divalent cation set alginate, protein based film, hydrocolloid based film, and combinations thereof. The liquid-based substance can have a viscosity of from about 0.8 cp to 2,000 cp.

[0007] Another food product in accordance with the present disclosure can comprise an oil-based substance encapsulated by a gelatin-based material or a divalent cation set alginate, and a coating comprising a solid food material surrounding at least a portion of the gelatin-based material or the divalent cation set alginate. The solid food material can be a kibble. The oil-based substance can further comprise at least one of a functional ingredient and an organoleptic enhancer. The viscosity of the oil-based substance can from about 0.8 cp to about 2,000 cp.

[0008] Yet another food product in accordance with the present disclosure can comprise a core of a hydrating material surrounded by an encapsulate material, and a coating of a solid food material surrounding at least a portion of the encapsulate material. The encapsulate material can be selected from the group consisting of a divalent cation set alginate, paraffin wax, bees wax, candelilla, carnauba, shellac, animal fats, tapioca, and combinations thereof. The solid food material can be kibble. The hydration material can comprise water.

[0009] A further food product in accordance with the present disclosure can comprise a core of an emulsion surrounded by an encapsulate material, and a coating of a solid food material surrounding at least a portion of the encapsulate material. The emulsion can comprise an oil and water emulsion. The encapsulate material can be selected from the group consisting of a hydrophilic matrix, a hydrophobic matrix, gelatin, divalent cation set alginate, protein based film, hydrocolloid based film, paraffin wax, bees wax, candelilla, carnauba, shellac, animal fats, tapioca, and combinations thereof.

DETAILED DESCRIPTION

[0010] The food products of the present disclosure comprise a plurality of individual pieces, also referred to as "kibbles." Kibbles in accordance with the present invention comprise, for

example, a liquid-based substance (also called a "liquid core") surrounded by an encapsulating material, the encapsulating material coated or encrusted by a solid food material coating (also called a "shell"). Herein, such a configuration is referred to as a "liquid core and shell" kibble, configuration, and/or product.

[0011] Pet food kibbles of the present disclosure can comprise, for example, a solid food coating material ("shell") formulated as a dry kibble. Such a dry kibble may be advantageous because it delivers the mouth feel of both a dry kibble and liquid-based substance simultaneously with each bite. The mouth feel and/or flavor of such a combination of textures may be attractive to pets. For purposes of the present disclosure, "mouth feel" is defined as the physio-chemical interaction occurring in the mouth as perceived by the pet through mastication of the kibble. For example, mouth-feel may include attributes such as hard, soft, chewy, cohesive, dry, grainy, gummy, smooth, uniform, viscous, moist, crunchy, and combinations thereof.

[0012] Further, dry kibbles in accordance with the present disclosure may be advantageous in that that the pet owner does not have to purchase or administer a separate product, such as a gravy or liquid or semi-liquid functional agent, to the animal in addition to the liquid core and shell kibble. Stated another way, such liquid core and shell kibbles may provide benefits typically derived from a combination of a dry kibble and an additional component, such as a gravy or wet food product.

[0013] For example, a liquid core and shell kibble in accordance with the present disclosure can comprise about 27% liquid-based substance, 12% encapsulate material, and 61% solid food material coating. Further, the liquid core and shell kibble can include, for example, about 40% liquid-based substance, 20% encapsulate material, and 40% solid food material coating.

[0014] In various embodiments, the solid food material coating ("shell") of the liquid core and shell kibble can comprise a semi-moist food material. The semi-moist shell can, for example, have a moisture content more than 10%, or from about 15% -50%, or further from about 12% to 40%, and yet further from about 20% to 30% moisture by weight of the semi-moist shell.

Liquid-Based Substance

[0015] The liquid-based substances of the present disclosure can comprise, for example, water-based materials, oil-based materials, and combinations thereof. Further, the liquid-based substance can comprise an emulsion, which can be any combination of two liquids which are not soluble or miscible. The emulsion can, for example, be a combination of an oil-

or lipid-based material with a water-based material. For example, the emulsion can comprise between about 10% to about 90% oil- or lipid-based material and about 90% to about 10% water-based material, and further, between about 40% to 60% oil- or lipid-based material and between about 60% to 40% water-based material.

[0016] Oil-based material within the scope of the present disclosure can include any oil suitable for consumption by the intended consumer of the pet food product. For example, the oil-based material can contain, among other oils, plant-based oils, seed oils, nut oils, butter, and animal fats. Suitable plant-based oils include, but are not limited to, coconut oil, olive oil, vegetable oil, soy oil, canola oil, palm oil, rice bran oil, avocado oil, and combinations thereof. Suitable seed oils include, but are not limited to, flax-seed oil, cottonseed oil, rapeseed oil, sunflower seed oil, and combinations thereof. Suitable nut oils include, but are not limited to, peanut oil, almond oil, pecan oil, walnut oil, cashew oil, and combinations thereof. Suitable animal fats include, but are not limited to, fish oil and other animal fats.

[0017] A suitable oil-based material can comprise a low viscosity, such as a viscosity between about 1 cp and about 2,000 cp, and further, in the ranges of between about 10-500, about 10-100, about 100-300, about 300-500, about 500-2,000, about 100-800, about 50, about 100, about 200, about 300, about 400, about 500, about 600, about 800, about 1000, about 1,200, about 1,500, and about 1,800 cp. As a non-limiting example, sunflower seed oil has a viscosity of about 10 cp and rapeseed oil has a viscosity of about 98 cp. The viscosity of the oil-based material can change depending on the functional or active ingredients, agents, and/or organoleptic enhancers that are present within the core.

[0018] Further, the oil-based material of the liquid core can be protected from oxidation, thus preserving the oil-based substance. The oil-based material can be preserved for at least 12 months, at least 15 months, at least 18 months, at least 21 months, at least 24 months, at least 27 months, at least 30 months, at least 33 months, or for at least 36 months. This also controls the amount of oil that leaches or becomes rancid within the product.

[0019] Suitable functional ingredients can include, for example, ingredients with a low flash point or smoke point. Ingredients with low flash or smoke points may smoke or create a flame at a low temperature such as, for example, below 120°C. Such ingredients can include, but are not limited to, hydrocarbons, carbonyls, aldehydes, ketones, acids, esters, lactones, bases, sulfur compounds, acetals, ethers, halogens, nitriles and amides, phenyls, furans, oxides, pyrans, coumarins, oxazoles, anhydrides, phthalides, and combinations thereof. These ingredients are frequently utilized in the manufacture of ingredients that provides scent, flavor,

or nutritional benefits. Such ingredients can, for example, be present in the product of the present application in an amount of less than 2% by weight.

[0020] In various embodiments, the liquid-based substance can comprise one or more functional ingredients and/or organoleptic enhancers. Suitable functional ingredient and/or organoleptic enhancer can comprise, for example, about 1% to 10% by weight of the liquid core and shell, where values such as, but not limited to, 1% to 5%, 1% to 3%, 2%, 4%, 6%, 7%, 8%, and 9% are envisioned. The amount of the functional ingredients and/or organoleptic enhancers can change depending on the intended recipient and the type of functional ingredients and/or organoleptic enhancers used. As a non-limiting example, some functional ingredients and/or organoleptic enhancers may have higher potency than others, therefore a high potency ingredient would be used in a smaller amount.

[0021] Further, suitable functional ingredients and/or organoleptic enhancers can include ingredients that are oxygen sensitive. Oxygen sensitivity can be measured using the redox potential of the ingredient. Alternatively, the oxygen sensitivity can be measured using the Oxygen Bomb test, PV (a measure of power applied per unit area), the number of aldehydes present, and combinations thereof. Oxygen sensitive ingredients include, but are not limited to, vitamin B6 (min 1 mg/kg), vitamin C, vitamin E (50- 1000 IU/kg), linoleic acid (min 1%), and folate. These oxygen sensitive ingredients could be utilized in the liquid core or in the encapsulate material, and can be present in, for example, an amount of less than about 1.5% by weight. For example, an oxygen sensitive ingredient can be an oil contained within the core of the liquid core and shell product. Such an oil can, for example, comprise up 85% to 100% by weight of the liquid core.

[0022] Functional ingredients and/or organoleptic enhancers can include ingredients that are light sensitive. Light sensitive ingredients include, but are not limited to, vitamin A (5000-250,000 IU/kg), vitamin B12 (min 0.022 mg/kg), vitamin D (50-5000 IU/kg), vitamin E (50-1000 IU/kg), pyridoxine (min 1 mg/kg), riboflavin (min 2.2 mg/kg), and linoleic acid (min 1%). Light sensitivity can be determined through shelf life testing using a light box, as is known in the art. Light sensitive ingredients can be present in the liquid core and shell product of the present disclosure in, for example, an amount of about less than 1% by weight of the product.

[0023] Suitable functional agents can also include agents that provide a dietary advantage when consumed. For example, functional agents and/or organoleptic enhancers can include vitamins, nutritional supplements, dental preparations, medications, and pharmaceutical

preparations. Nutritional supplements can include, for example, any supplement that benefits the intended consumer of the liquid core and shell product, including, but not limited to, macronutrient, phytonutrient, vitamin, herbal, and mineral supplements. Vitamins can, for example, include any vitamin that can be delivered by an oil-based carrier, including, but not limited to Vitamin A, B, C, D, E, and combinations thereof. In embodiments in which the liquid core and shell product is formulated for human consumption, functional ingredients and/or organoleptic enhancers can be selected from, but are not limited to, antioxidants, vitamin A, vitamin B, vitamin B6, caffeine, fish oil, vitamin B12, vitamin C, vitamin D, calcium, chondroitin, folic acid, cranberry, probiotics, and combinations thereof. In an embodiment in which liquid core and shell product is formulated for animal consumption, functional ingredients and/or organoleptic enhancers can be selected from, but are not limited to, glucosamine, chondroitin, MSM, green-lipped mussel extract, fish oil, probiotics, multivitamins, lysine, milk thistle, S-adenosyl methionine, (SAM-e), digestive enzymes, coenzyme Q10, azodyl, and combinations thereof.

[0024] Suitable functional ingredients and/or organoleptic enhancers can further include a prebiotic, a probiotic, or a combination of both. Probiotic ingredients can include, but are not limited to, *Lactobacilli*, *Bifidobacteria*, including *Bifidobacterium animalis*, *Enterococci* bacteria and combinations thereof. Probiotics are bacteria which ferment a substrate to create an environment which is less favorable to pathogenic bacteria, thus reducing the population of pathogenic bacteria. Prebiotics can include, but are not limited to, Fructooligosaccharide, Galactooligosaccharide, Mannan Oligosaccharides, Inulin, resistant starch, lactulose, and combinations thereof. Prebiotics are fermentable fibers which pass through the digestive system into the hindgut to provide substrate for probiotic bacteria. Prebiotics can, for example, be located in the solid-based material of the product. Probiotics can, for example, be included in the liquid core of the product.

[0025] Further, functional ingredients can be utilized to improve the bad taste or aroma of one or more other ingredients in a food composition. Such ingredients include, but are not limited to psyllium, magnesium and iron.

[0026] The liquid core may further comprise ingredients intended to improve oral care, such as, for example, essential oils, anti-microbial agents, breath freshening agents, and combinations thereof. Further, oral care ingredients can include, but are not limited to, agar oil, ajwain oil, angelica root oil, anise oil, asafetida, balsam of peru, basil oil, bay oil, bergamot oil, black pepper oil, buchu oil, birch, camphor, cannabis flower essential oil,

caraway oil, cardamom seed oil, carrot seed oil, cedarwood oil, chamomile oil, calamus root, cinnamon oil, cistus, citronella oil, lemongrass oil, clary sage, clove leaf oil, coffee, coriander, costmary oil, costus root, cranberry seed oil, cubeb, cumin oil/black seed oil, cypress, cypriol, curry leaf, davana oil, dill oil, elecampane, eucalyptus oil, fennel seed oil, fenugreek oil, fir, frankincense oil, galangal, galbanum, geranium oil, ginger oil, goldenrod, grapefruit oil, limonene, henna oil, helichrysum, hickory nut oil, horseradish oil, hyssop, Idaho tansy, jasmine oil, juniper berry oil, laurus nobilis, lavender oil, ledum, lemon oil, lemongrass, lime, litsea cubeba oil, linaloe, mandarin, marjoram, melaleuca, Melissa oil, menthe arvensis oil, mountain savory, mugwort oil, mustard oil, myrrh oil, myrtle, neem oil, neroli, nutmeg, orange oil, lemon oil, oregano oil, orris oil, palo santo, parsley oil, patchouli oil, perilla, pennyroyal oil, peppermint oil, petitgrain, pine oil, ravensara, red cedar, roman chamomile, rose oil, rosehip oil, rosemary oil, rosewood oil, sage oil, star anise oil, sandalwood oil, sassafras oil, savory oil, schisandra oil, spearmint oil, spikenard, spruce, tangerine, tarragon oil, tea tree oil, thyme oil, tsuga, turmeric, valerian, vetiver oil, western red cedar, wintergreen, yarrow oil, ylang-ylang, zedoary oil, and combinations thereof. Oral care ingredients can, for example, be present in an amount of from about 0.001% to 10% by weight, were values such as 0.1% to 2%, 0.005% to 2%, 1% to 5%, 1% to 10%. 0.001% to 0.1% (by weight of the liquid core and shell product) and values in-between are envisioned. Such oral care liquid core and shell products can be formulated for the intended consumer.

[0027] In various embodiments, the intended consumer is a feline or canine. In such embodiments, suitable oral care ingredients include, but are not limited to, sodium hexametaphosphate, sodium tripolyphosphate, sodium metaphosphate, sodium trimetaphosphate, L-ascopic acid 2-monophosphate, zinc sulfate, malic acid, chlorhexidine, green tea extract, tea tree oil, essential oils, and combinations thereof. In embodiments in which sodium hexametaphosphate is used, it is preferably included in an amount of from about 0.5% to 2.5% by weight. For example, sodium tripolyphosphate can be included in an amount of from about 0.2% to 2.0% by weight. Sodium metaphosphate can, for example, be included in an amount of from about 0.2% to 2.0% by weight. Sodium trimetaphosphate can, for example, be included in an amount of from about 0.4% to 2.0% by weight. C 50-L-ascorbic acid-2-monophosphate can, for example, be included in an amount of from about 0.1% to 1.0% by weight. Zinc sulfate can, for example, be included in an amount of from about 0.01% to 0.1% by weight. Malic acid can, for example, be included in an amount of from about 0.25% to 2.0% by weight. Chlorhexidine can, for example, be included in an amount of from

about 0.5% to 2.0% by weight. Green tea can, for example, be included in an amount of from about 0.5% to 0.15% by weight. Tea tree oil can, for example, be included in an amount of from about 0.008% to 0.08% by weight.

[0028] Further, the liquid core can include one or more palatants, flavorings, and/or scents. For example, the liquid core can comprise meat flavoring, smoky aroma or palatant, gravy, peanut butter, almond butter, fruit flavorings, vegetable flavorings, mint, and combinations thereof. The palatant, flavoring, and/or scent may provide an enhanced organoleptic experience for the recipient, as the palatant, flavoring, and/or scent is protected within the liquid core such that the pet experiences a more intense flavor and/or scent than the organoleptic enhancer would provide were it not protected and/or preserved within the liquid core.

[0029] The liquid-based substance can, for example, be heat stable, such that the center of the liquid core and shell product maintains its shape when exposed to heat. Further, the heat stable center can be stable at room temperature, which may increase the shelf life of the product and provide for easier storage by the customer.

[0030] In various embodiments, antioxidant compositions can be added to the liquid core, the shell, or both. In embodiments in which antioxidants are added to the shell, the amount of antioxidant compositions required to reduce oxidation of the liquid core would be less when compared to commercially available kibble products utilizing antioxidants only within the liquid core. Anti-oxidant compositions can be any compositions known in the art to possess anti-oxidant properties suitable for consumption by the intended recipient. Antioxidants can, for example, be provided in an amount of about 150 ppm to 5ppm, where values such as 6, 7, 8, 9, 10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 110, 120, 130, 140, 20-90, 10-50, 10-100, 30-120, and all values there between are envisioned. The amount of antioxidant can depend on the fat content of the product. Antioxidants can be selected, for example, from BHT, BHA, and combinations thereof. In embodiments in which the liquid is an oil, antioxidants may control the amount of oil that leaches or becomes rancid in the product.

[0031] In a further embodiment, the liquid core and shell product can include a humectant. The humectant can include, but is not limited to, salt, glycerol, sugar, and gum. For example, the humectant can be glycerol.

Encapsulate Material

[0032] Pet food products in accordance with the present disclosure comprise an encapsulate

material surrounding the liquid-based substance. The encapsulate material can, for example, encapsulate and protect the liquid-based substance. For example, the encapsulate material can protect the liquid-based substance (such as, for example, an oil-based material), from degradation, leaching, and/or becoming rancid, a problem seen in the industry with regard to carbohydrate products coated with oil-based materials.

[0033] The encapsulate material can comprise, for example, a hydrophilic matrix, a hydrophobic matrix, gelatin, tapioca, alginates, divalent cation set alginates, protein or hydrocolloid-based film, and combinations thereof. Suitable gelatin materials can comprise, for example, those having a gelatin bloom strength between about 100-500 bloom, between about 200-250 bloom, about 100 bloom, about 120 bloom, about 150 bloom, about 200 bloom, about 250 bloom, about 300 bloom, about 350 bloom, about 400 bloom, about 450 bloom, about 500 bloom, and any amount there between. Further, the physical characteristics of a gelatin encapsulate material may be driven by a level of Aw (water activity) equilibrium of the entire system, which may preferably be in a range of about 0.3- 0.75.

[0034] The encapsulate material surrounding the liquid core of the product can comprise a water impermeable material. For example, the encapsulate material can comprise a wax. Wax materials suitable for use include, but are not limited to, paraffin wax, bees wax, candelilla, carnauba, shellac, animal fats, and composites of wax and suitable materials such as cellulose ethers, e.g. a wax methylcellulose composite. However, any material capable of encapsulating a liquid-based substance and preserving the liquid-based substance suitable as safe for consumption is within the scope of the present disclosure.

[0035] In various embodiments, the liquid-based substance is encapsulated using a soft gel encapsulation process. In such embodiments, the encapsulate material can comprise protein, humectant, and water. A method for surrounding a liquid-based substance within a soft gel encapsulate material can comprise mixing an encapsulate material, forming a sheet of encapsulate material, forming a capsule from the sheet of encapsulate material, and depositing a liquid-based substance into the capsule. Further, the method can comprise mixing protein, humectants, and water, cooking the mixture, and conditioning the cooked mixture to develop a pumpable protein-based slurry. The slurry can be deposited on a set of chilled rollers and converted into two streams of continuous sheets of soft film. Both streams of film can be fed in between two forming rollers with machined symmetrical forming cavities. The liquid-based substance can then be deposited into each capsule as the two sheets of film are pressed together by forming rollers. Once the capsules are fully formed and sealed, the finished

product of liquid-based substance fully encapsulated in protein based soft film is released from the cavities of the forming rollers for post forming processing. The remaining web is then removed.

[0036] The encapsulate material can also comprise a preformed capsule. For example, a suitable preformed capsule can comprise a one piece capsule or a two piece capsule. In embodiments in which the encapsulate material is a gel capsule (either preformed or formed around the liquid core as described above), the capsule can be sized so that the final liquid core and shell product is bite-sized for the intended pet, taking into consideration gape, bite force, jaw size, and the like. For example, the capsule can have a diameter of between about 1-10mm, where values such as 4-8mm, 5-8mm, 5 mm, 6mm, 7mm, 8mm, and 9mm are envisioned. The thickness of the water impermeable encapsulate material can be between about 0.1-1.0mm, between about 0.2-0.7mm, and between about 0.3-0.5mm thick.

[0037] The encapsulate material can be in any state capable of surrounding a liquid-based substance such that little to no oxygen reaches the liquid-based substance. Such states include, but are not limited to, solid, gel, semi-solid, and thick liquid. Additionally, the encapsulate material can be mixed with chunks of other food products, such as, but not limited, to meat products.

[0038] Multiple different types of encapsulate materials can be used together in connection with the same liquid core and shell product of the present disclosure. In such embodiments, each different type of encapsulate material can have a different function such that when the functions are combined, a desired and/or predetermined effect is generated. For example, a first encapsulate material can include a highly aromatic compound that quickly dissipates to entice a pet, while a second encapsulate material can comprise an active ingredient which, for example, supports dental health (e.g., sodium tri-polyphosphate). In another example, the use of two different flavored encapsulate materials can generate variety or create a more refined/complex aroma/flavor experience (e.g., more meal-like). In a further example, a first encapsulate material can include an ingredient which begins a reaction (e.g., an enzyme that breaks down proteins for digestion) and a second encapsulate material can include an ingredient which stops a reaction (e.g., an ingredient which breaks down the digestion enzyme and is in a slow release form). Such a configuration may, for example, assist in delivering a desired level of digestibility. Other potential encapsulate material combinations can include, for example, a fast release encapsulate material and a slow release encapsulate material (where the fast release encapsulate material brings one smell and/or taste and the slow release

encapsulate material morphs the smell and/or taste).

[0039] For example, the encapsulate material can comprise between about 5% to 30% by weight of the liquid core and shell product by weight, where values such as 0.1% to 20%, 1% to 30%, 5% to 10%, and 8% by weight, as well as each discreet amount, 0.5, 0.8, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, and 30% by weight as well as each range there between is envisioned.

[0040] Functional ingredients within the liquid core can, for example, carry with them unwanted and undesirable aromas and/or flavors. These flavors can be masked by a portion of the encapsulate material that is designed to overpower, subdue, or capture the aroma or flavor. In one such example, the flavor is that of green-lip muscle and it is sequestered by an aroma enhancer/masking agent such as those known in the industry, such as, but not limited to those produced by Flavor House (Adelanto, Canada). In another example, the unsavory aroma is fish oil which is only unsavory to the pet owner serving the food product. In this instance, the encapsulate material includes a volatile aromatic. Examples of suitable volatile aromatics are phenolics, benzoic acid, and vanillin produced by Sensient (Milwaukee, WI) or MANE (France). The effect of such encapsulate materials is greatest at the initial breaking of the product so that consumers do not smell the functional ingredient, e.g., fish oil, but the dog or cat is able to smell it upon consumption. In another example, the unwanted aroma or flavor is simply bland and the use of encapsulate materials can provide a flavor/aroma spike that can enhance the consuming experience for both the consumer and pet. In another example, the negative aroma/flavor is produced by the addition of psyllium or oligosaccharides and is managed via methods included above. Preferably, the flavoring is included in the product of the present application in an amount of about 1% to 10% by weight, where values such as 2%, 3%, 4%, 5%, 6%, 7%, 8%, 9%, 2-5%, 4-8%, and 3-9% by weight are envisioned. Where scents are used to mask unwanted aromas, these are present in amounts from about 1-5% by weight of the product. Some examples of scent ingredients are smoke oil and meat scents, such as, but not limited to, chicken, beef, duck, seafood, pork, and combinations thereof.

Solid Material Coating

[0041] Pet food products in accordance with the present comprise a liquid-based substance coated by an encapsulated material, which is in turn coated or encrusted in a solid food material. The solid food material (also referred to as the "shell"), can comprise any solid food material suitable for a pet, where the solid food material may be completely solid, soft, or semi-solid. For purposes of the present disclosure, "solid food" material or product refers to

completely solid, granular, semi-solid, hard, and soft food products. The solid food material is preferably selected from, but not limited to, a carbohydrate-based product, a protein-based product, and combinations thereof. Carbohydrate sources include any carbohydrate suitable for consumption by the intended consumer of the liquid core and shell product, including but are not limited to, wheat, oats, grains, seeds, grass, barley, millet, corn, potato, and starchy-vegetables. The carbohydrate source can be combined, for example, with other ingredients typically used in animal food products in order to create a dry carbohydrate that can be used as a coating for purposes of the present application. In further embodiments, the solid food material comprises a dry pet food material. Any suitable dry pet food material can be used.

[0042] For example, the liquid core can comprise high levels of moisture, and the surrounding solid food material can contain less than 12% moisture by weight, less than 10% by weight moisture, or less than 9% by weight. Such a configuration can produce a pet food product which may be transported and stored under normal conditions, yet is capable of providing hydration to pets. For the purposes of this disclosure, the term "dry" corresponds with a material containing about 12% or less moisture by weight.

[0043] Further, the solid food material can comprise between about 10% and 50% by weight of the liquid core and shell product, and further between about 15% and about 30% by weight of the liquid core and shell product.

[0044] In various embodiments, the solid food material is mixed with other ingredients such as, for example, fats, oils, eggs, sugar, meat products, leavening agents, spices, flavorings, and combinations thereof. For example, the solid food material can comprise a combination of a carbohydrate mixed with other ingredients to form a carbohydrate-based food product. Examples of such carbohydrate-based food products suitable for human consumption include, but are not limited to, cereal, pretzel, puffed rice, puffed corn, chips, crackers, granola, oatmeal, cornmeal, and combinations thereof. Examples of such carbohydrate-based food products suitable for animal consumption, include, but are not limited to, kibble, treat, chews, dental treats, biscuits, and combinations thereof.

[0045] Further, the solid food material can have, for example, a water activity level of about 0.75 or less, where values such as, but not limited to, a range of 0.25 - 0.75, 0.3 - 0.6, 0.4 - 0.5, 0.3-0.75, 0.55, and ranges there between are contemplated. Such water activity levels may provide, for example, a crunchy sensation and/or sound in the mouth when consumed. The solid food material can be combined with other ingredient typically used in food products in order to create a dry carbohydrate that can be used as a coating. The moisture level for solid

food materials of the present disclosure can be less than about 15%, where values such as 5-15%, 6%, 7%, 8%, 9%, 10%, 11%, 12%, 13%, 14%, 5-10%, 6-12%, and values in between are envisioned.

[0046] The solid food material can comprise, for example, about 2-10% fiber by weight, 4-15% moisture by weight, 5%-30% fat by weight, and 18-60% protein by weight. The fiber component can be included in an amount of about 2%, 3%, 4%, 5%, 6%, 7%, 8%, 9%, 10%, 3-5%, 4-8%, 3-9% by weight, and all values there between. The fat component can be included in an amount of about 5%, 6%, 7%, 8%, 9%, 10%, 12%, 15%, 18%, 20%, 22%, 25%, 30%, 5-10%, 10-20%, 10-30%, 20-30% by weight, and all values there between. The protein component can be included in an amount of about 18%, 20%, 22%, 25%, 30%, 32%, 35%, 38%, 40%, 42%, 45%, 48%, 50%, 52%, 55%, 60%, 18-30%, 20-30% by weight, and all values there between.

[0047] Any method for providing a solid food material for coating or encrusting of the encapsulate material is within the scope of the present disclosure. For example, the solid food material can be produced by obtaining a solid food product (such as a dry dog food), reducing the size of the solid food product into small pieces of solid food material, and spraying the pieces of solid food material onto the encapsulate material coated liquid-based substance. Another example of a method of producing a solid food material includes reducing the size of the solid food material into small pieces, placing a binder composition onto the encapsulate material coated liquid-based substance, and rolling or shaking the encapsulated liquid-based substance in the small pieces of the solid food material such that the pieces adhere to the binder, creating a coating and/or encrusting the encapsulate material coated liquid-based substance with the solid food product. In yet a further non-limiting example, a solid food material is shaped into a hollow form, such that an encapsulate layer and liquid-based substance can be injected into the center of the solid food material. The solid food material, for purposes of the present disclosure, can be solid or semi-solid, where the solid food material ranges from very soft to hard. In another embodiment, the carbohydrate-based material can be place onto the encapsulate material using panning.

[0048] In some forms, the solid food material surrounds from about 1% to 100% by weight of the encapsulate material and the liquid core, where ranges such as 2% -50%, 5%-75%, 10% to 80%, 15% to 90%, 20% to 100%, 40% - 80%, 50% to 100% by weight and envisioned, and particular values such as, but not limited to, 50%, 55%, 60%, 65%, 70%, 75%, 80%, 85%, 90%, 95%, 96%, 97%, 98%, 99%, or 100% by weight are envisioned.

[0049] In other embodiments, the solid food product, or mixture including a solid food product, is cooked, baked, fried, extruded, or processed prior to being used in the liquid core and shell product of the present application. The solid food product can be oven baked, fried in oil, or extruded; however, the disclosure is not limited to these embodiments.

[0050] In accordance with the present disclosure, an intensely flavored element or topper can be utilized in the liquid core, shell, or as a coating over the shell. Such flavors can include, for example, meat flavorings, seafood flavorings, fruits and fruit extracts, natural flavorings, and synthetic flavorings. Flavors can be present in products of the present disclosure from about 0.02% to 1.0%.

[0051] Liquid core and shell products in accordance with the present disclosure can be coated or encrusted in a wet-based product comprising a solid food material. In such embodiments, the solid food material comprises carbohydrate, protein, or combinations thereof. The wet-based product used for encrusting or coating can also be a semi-moist solid food material. In an embodiment where the solid food material is either wet or semi-moist, the moisture content of the solid food material is more than 10%, preferably from about 15% -50%, from about 12% to 40%, and further, from about 10% to 15%.

Methods of Making Food Products

[0052] The present disclosure provides a number of methods of making liquid core and shell products comprising a liquid core, an encapsulate material, and a solid food material coating. For example, one method comprises obtaining a liquid-based substance that is contained within an encapsulate material and coating the encapsulate material with a solid food material. The method can further comprise breaking a solid food material into smaller pieces and coating the encapsulated liquid-based substance with pieces of the solid food product. The solid food product can be baked, cooked, or fried breaking into smaller pieces, although this is not required. For example, the solid food material can be cooked under temperature and pressure conditions, such as in an extruder, prior to coating the encapsulated liquid-based substance.

[0053] A method for forming a liquid core and shell product wherein the liquid core is an oil-based material and the shell is a carbohydrate-based material can include obtaining a hydrophilic matrix (e.g., a gelatin-coated oil-based product) and coating it in a carbohydrate and protein-based product. The method can further include breaking a carbohydrate-based product into smaller pieces and coating the gelatin coated oil-based product with the pieces of

the carbohydrate-based product. The carbohydrate-based product can be baked, cooked, or fried prior to being broken into smaller pieces, although this is not required. For example, the carbohydrate-based product can be cooked under temperature and pressure conditions, such as in an extruder, prior to being used to coat the gelatin coated oil-based product.

[0054] Coating the encapsulated liquid-based substance can, for example, include pulverizing a solid food material and spraying it onto the surface of the encapsulated liquid-based substance. The spray can, for example, comprise pulverized kibble or cereal in combination with a tacky material, such as, but not limited to, gelatin, molasses, honey, and similar materials, or, alternatively, may simply be a water solution. The solid food material (e.g., pulverized kibble or cereal) can have a wide solids content range of about 10%-80% by weight, depending on the application methodology. The solid material can be sprayed, applied via automatic brush dispensing, printed, enrobed, or any combination thereof.

[0055] The resulting liquid-based substance inside the encapsulate material (e.g., gelatin or otherwise) with the outer solid food material coating can be dried to a final external moisture. Methods of drying would be commensurate with maintaining the encapsulate material and would thus normally require lower temperatures. This can be achieved using super-heated steam, vacuum driers, or a gentle heating profile.

[0056] Another method of making a liquid core and shell food product in accordance with the present disclosure comprises obtaining a liquid-based substance coated in an encapsulate material and coating or encrusting it with a solid food material. The method can additionally include the step of reducing the size of the solid food material by, for example, smashing, grinding, milling, chopping, breaking, and combinations thereof. Further, the method can includes adhering the pieces of solid food material to the encapsulate layer of the liquid core and shell product by, for example, spray drying, rolling, panning, shaking, baking, and combinations thereof. In some embodiments, the method includes applying a binder material to the encapsulate material prior to adhering the pieces of the solid food material to the encapsulate material. Moisture can be added to the layer of encapsulate material prior to adhering the pieces of solid food material to the layer of encapsulate material.

[0057] A further method of making a liquid core and shell food product can comprise obtaining an encapsulate material, preferably a protein- or gelatin-based material, forming it into a capsule, filling it with a liquid-based substance, and coating the capsule containing the liquid-based substance with a solid food material. The method can further include cooking or baking the solid food material prior to using it as a coating. Further, the solid food material

can be broken into smaller pieces prior to using it as a coating. The capsule formed by the encapsulate material can be, for example, a rigid two piece capsule or a soft one piece capsule. A rigid two piece capsule can, for example, be filled with the liquid-based substance, followed by placing the second piece of the capsule securely onto the first piece of the capsule. A soft one piece capsule can, for example, be injected with the liquid-based substance and sealed.

[0058] Yet another method of making a liquid core and shell food product comprises forming a hollow product of solid food material or providing a pre-formed hollow product of solid food material and filling it with an encapsulate material and a liquid-based substance, such that the liquid-based substance is surrounded by the encapsulate material. The method can also include closing the hollow solid food material after it is filled and/or baking the solid food material after it is filled with an encapsulate material and a liquid-based substance.

[0059] In a further embodiment, a pocket made of a solid-based material is created and then filled with a capsule (acting as the encapsulate material) containing a liquid core comprising a hydrating material. Once the capsule containing the hydrating material is placed in the pocket, the pocket can be sealed or closed such that the capsule is minimally exposed or not exposed. In a further embodiment, the capsules filled with the hydrating material are mixed with conventional food products, such as cereal or kibble. In such an embodiment, a further coating may be present on the outside of the capsule.

[0060] A liquid core and shell food product that is capable of being heated such that the liquid-core becomes warm without compromising the carbohydrate product that is coating or encrusting the liquid-core can be formed in accordance with the present disclosure. For example, a liquid core and shell food product having a warm liquid core can be formed by obtaining the liquid core and shell product of the present application and warming it. Further, the warmed liquid core and shell product can be provided to an animal in need thereof. In such an embodiment, the liquid-core can include animal products and/or a gravy substance.

[0061] The liquid core and shell product of the present disclosure can be any size and shape capable of having a liquid core. Suitable shapes can include, but are not limited to, sphere, prism, cube, rectangular box, triangular, star, round, irregular, ellipse, and the like. The shape may also have an irregular texture and/or multiple textures on the surface of the product. Further, the liquid core and shell product can be bite-sized for the intended consumer (e.g., dog or cat). The bite size of the intended consumer can be determined based on a variety of factors including, but not limited to, size, jaw size, bite, gape, and combinations thereof.

[0062] Liquid core and shell products of the present disclosure can, for example, comprise a radius of about 5 mm to about 25mm, and further, a radius of about 10mm to 20mm.

[0063] A pet food kibble in accordance with the present disclosure can be used as a delivery system configured to deliver one or more functional ingredients within the liquid-based substance and/or the solid food material coating of the kibble. As previously described, suitable functional ingredients can include, for example, prebiotics, probiotics, weight and energy management supplements, oral care ingredients, immunity boosting ingredients, ingredients benefiting brain development, ocular care ingredients, ingredients benefiting skin and coat or hair, or combinations thereof.

[0064] In a preferred embodiment where the liquid core is oil, the fat content of the product is at least 20%, at least 30%, at least 40%, at least 50%, at least 60%, at least 70%, or at least 80%, by weight of the product. Amounts of 25%, 30%, 35%, 40%, 45%, 50%, 55%, 60%, 65%, 70%, 75%, 85% and 95% by weight of the product are envisioned. The fat content of the liquid core and shell product can be adjusted depending on the recipient, the functional agent and/or organoleptic enhancer included. Further, the fat content can be adjusted depending on the nutritional needs of the recipient.

[0065] In various embodiments, the liquid core and shell product has an extremely volatile content. The volatile content represents a vapor pressure of below 10mmHg. Such volatile materials include, but are not limited to, oils, flavoring agents, and heat sensitive materials. These materials are highly volatile, where volatility of a material is determined by its vapor pressure at process temperature. Another important parameter is ignition temperature. Many products have an extremely high vapor pressure at conditions of extrusion. They will flash off aggressively leaving only a small amount of their initial concentration. By including these volatile materials in the product of the present application instead of processing through an extruder, the material does not flash off and is stronger in usage.

[0066] In another embodiment of the present application, the liquid core and shell product maintains equilibrium between the oil and gelatin portions and the moisture in the kibble. Preferably, the equilibrium between the oil, gelatin, and carbohydrate-based material is preferably about 0.30 to 0.75.

[0067] The present disclosure also provides for an internal palatant delivery. For example, a method for internal palatant delivery comprises administering the liquid core and shell product of the present application to a recipient in need thereof. The recipient can be a human or an

animal. The internal palatant is can be selected from, but is not limited to, scents, flavoring agents, and other agents having an appealing taste. The palatant can be delivered via the liquid core of the product, such that when the recipient bites into the product, the palatant is released. Preferably, the recipient enjoys the palatant and wants to consume more of the product. In various embodiments, the liquid core and shell product has an increased palatability when compared with commercially available kibble.

[0068] In various embodiments, the liquid core and shell product can be configured to treat or prevent dehydration in a pet. For example, dehydration can be lessened in severity in at least 10%, at least 20%, at least 30%, at least 40%, at least 50%, at least 60%, and at least 70%, 80%, 90% and 100% of the animals consuming the product (measured by the intake of water for the animal in a day and in comparison to animals having food and water fed ad libitum). Alternatively, an animal consuming a product of the disclosure can have hydration levels that are at least 10%, at least 20%, 30%, 40%, 50%, or higher, or at least 10%, at least 20%, 30%, 40%, 50% or closer to desired hydration levels than animals not fed the product, but having food and water fed ad libitum. Dehydration and hydration are preferably diagnosed through blood, urine, and fecal samples. Once dehydration is diagnosed, lab testing is completed to determine the level of dehydration. Certain skin elasticity measurements can also be used to determine if an animal is dehydrated.

EXAMPLES

Example 1

[0069] This example describes one method of coating or encrusting a gelatin coated oil-based material.

Materials and Methods

[0070] A gelatin capsule will be filled with an oil-based substance was obtained, where the oil-based substance will contain an oral care supplement for cats. A dry cat kibble will also be obtained. The dry cat kibble will have a moisture content of less than 10%. The dry cat kibble will be ground into small pieces. The dry kibble will have the following general composition:

	Full Range Cat	More Typical Range Cat	Dog	More Typical Range Dog
Protein	60-28%	45-28%	45-18%	35-18%
Fat	30-9%	22-9%	22-5%	15-8%

Moisture	15-4%	15-7%	15-6.5%	15-6.5%
Fiber	10-2%	7.5-2%	6.5-2%	6.5-3%

[0071] The gelatin capsule will then be moistened and placed into a plastic container full of the dry cat kibble pieces. The container will then be shaken such that the pieces of dry kibble will adhere to the gelatin capsule. The coated gelatin capsule will then be dried creating an oil-core carbohydrate product. The oil-core carbohydrate product will then be fed to cats.

Results and Conclusions

[0072] The cats will consume the oil-core carbohydrate product. The oil-based product will be delivered to the cat's mouth with each bite, creating very little, if any mess. Cats will be attracted to the food and visit the food bowl multiple times to consume the oil-core carbohydrate product.

Example 2

[0073] This example describes one method of coating or encrusting a gelatin coated oil-based material.

Materials and Methods

[0074] In a perforated coating drum maintained at a temperature no greater than 28° C., shellac was atomized (50 psi pump, 50 psi spray pattern (Spray Dynamics)) onto gelatin capsules containing an oil-based substance to pre-treat the surface; the rotational speed was high (14 rpm), and no air flow was maintained. After allowing the shellac to roll-in for five minutes, the shellac- coated capsules were dried for ten minutes under a moderate air flow (27° C.; dryness=2.0 g moisture/kg air), while a low rotational speed was maintained (7 rpm). Then, the coated capsules were coated with the adhesive binder, while maintaining a high rotational speed (14 rpm) and no air flow for five minutes; the gelatin capsules were tumbled to facilitate coating. Next, pieces of a carbohydrate product were added to the tumbling mass of binder-coated gelatin capsules. As the carbohydrate product pieces will be added, the rotational speed will be systematically reduced to begin the adhering process (from 14 rpm to 10 rpm to 4 rpm to 2 rpm over the course of 5 minutes). Next, the binder will be dried under a high speed air flow (400 CFM; 27° C.) for 15 minutes. During drying, a low rotational speed will be maintained (2 rpm), and horizontal mixing bars and slow tumbling will be used to prevent clustering. Then, a dextrin film will be formed over the coated product under an air flow (200 CFM; 27° C.) and with a medium rotational speed (4 rpm) for three minutes. Finally, the coated capsules having pieces of a carbohydrate product adhered thereto will be

dried under a medium speed air flow (200 CFM; 27° C.) and with a low rotational speed (2 rpm) for 5 minutes.

Results and Conclusions

[0075] The resulting product will be an oil-core carbohydrate product where the oil is protected from oxidation and the overall product having a crunchy outer shell with a unique mouth feel.

CLAIMS

1. A food product comprising:

a. an encapsulate material surrounding a liquid-based substance; and

b. a coating comprising a dry solid food material surrounding at least a portion of the encapsulate material.

2. The food product of claim 1, wherein the solid food material is a kibble.

3. The food product of claim 1, wherein the solid food material has a moisture content of less than about 10%.

4. The food product of claim 1, wherein the liquid-based substance further comprises at least one of a functional ingredient and an organoleptic enhancer.

5. The food product of claim 1, wherein the liquid-based substance is selected from the group consisting of oil and water.

6. The food product of claim 1, wherein the liquid-based substance has a viscosity of from about 0.8 cp to about 2,000 cp.

7. The food product of claim 1, wherein the encapsulate material is selected from the group consisting of a hydrophilic matrix, a hydrophobic matrix, gelatin, a divalent cation set alginate, a protein based film, and a hydrocolloid based film.

8. A method for making a food product comprising the steps of:

a. obtaining an encapsulate material;

b. filling said encapsulate material with a liquid-based substance; and

c. coating or encrusting said encapsulate material with a dry solid food material.

9. The method of claim 8, wherein the coating or encrusting is accomplished by panning.

10. The method of claim 8, wherein the solid food material is kibble.

11. The method of claim 8, wherein the solid food material has a moisture content below about 10%.

12. The method of claim 8, wherein the liquid-based substance further contains at least one of a functional ingredient and an organoleptic enhancer.

13. The method of claim 8, wherein the liquid-based substance can comprise at least one of an oil and water.

14. The method of claim 8, wherein the encapsulate material is selected from the group consisting of a hydrophilic matrix, a hydrophobic matrix, gelatin, divalent cation set alginate, protein based film, hydrocolloid based film, and combinations thereof.

15. The method of claim 8, wherein the liquid-based substance has a viscosity of from

about 0.8 cp to about 2,000 cp.

16. A food product comprising:

a. a core comprising a hydrating material surrounded by an encapsulate material; and

b. a coating comprising a dry solid food material surrounding at least a portion of the encapsulate material.

17. The food product of claim 16, wherein the encapsulate material is selected from the group consisting of a divalent cation set alginate, paraffin wax, bees wax, candelilla, carnauba, shellac, animal fats, tapioca, and combinations thereof.

18. The food product of claim 16, wherein the solid food material is kibble.

19. The food product of claim 16, wherein the hydration material is water.

INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER
INV. A23K20/158 A23K40/30 A23K50/42 A23K50/45
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B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
A23K

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

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Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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X	US 2011/081451 A1 (SIEGEL SVEN [DE] ET AL) 7 April 2011 (2011-04-07) sentence 1; claim 1; examples E7, F11	1-8, 10-18
X	US 2003/031768 A1 (DALZIEL SEAN M [US] ET AL) 13 February 2003 (2003-02-13) paragraph [0044]; claims; example 4	1-19
X	US 2011/306501 A1 (DREHER JING [DE] ET AL) 15 December 2011 (2011-12-15) claims 16,23,30-32; examples	1-18

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[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

* Special categories of cited documents :

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"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)

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"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

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"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

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INTERNATIONAL SEARCH REPORT

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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

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Information on patent family members

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(54)发明名称

芯与壳的粗磨状产品

(57)摘要

本申请提供了一种液芯与壳的产品。该产品可以具有至少三层:固体食物基材料、液基物质和包封材料。液芯与壳的产品能以干净的方式将液基物质递送到消费者的口中,其中它还可以提供独特的口感。液芯与壳的产品还可以用作功能成分和/或感官增强剂的递送载体。

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1.一种食品,所述食品包括:

a.包封材料,所述材料围绕液基物质;和

b.包衣,所述包衣包括围绕所述包封材料的至少一部分的干固体食物材料。

2.根据权利要求1所述的食品,其中所述固体食物材料是粗磨物。

3.根据权利要求1所述的食品,其中所述固体食物材料具有小于约10%的水分含量。

4.根据权利要求1所述的食品,其中所述液基物质还包含功能成分和感官增强剂中的至少一种。

5.根据权利要求1所述的食品,其中所述液基物质选自由油和水组成的组。

6.根据权利要求1所述的食品,其中所述液基物质具有约0.8厘泊至约2000厘泊的粘度。

7.根据权利要求1所述的食品,其中所述包封材料选自由亲水基质、疏水基质、明胶、二价阳离子集合藻酸盐、蛋白质基膜和水胶体基膜组成的组。

8.一种制备食品的方法,所述方法包括以下步骤:

a.获得包封材料;

b.用液基物质填充所述包封材料;和

c.用干固体食物材料涂覆或包裹所述包封材料。

9.根据权利要求8所述的方法,其中通过滚抛实现所述涂覆或包裹。

10.根据权利要求8所述的方法,其中所述固体食物材料是粗磨物。

11.根据权利要求8所述的方法,其中所述固体食物材料具有约10%以下的水分含量。

12.根据权利要求8所述的方法,其中所述液基物质还包含功能成分和感官增强剂中的至少一种。

13.根据权利要求8所述的方法,其中所述液基物质可以包括油和水中的至少一种。

14.根据权利要求8所述的方法,其中所述包封材料选自由亲水基质、疏水基质、明胶、二价阳离子集合藻酸盐、蛋白质基膜、水胶体基膜及它们的组合组成的组。

15.根据权利要求8所述的方法,其中所述液基物质具有约0.8厘泊至约2000厘泊的粘度。

16.一种食品,所述食品包括:

a.芯,所述芯包含被包封材料包围的水合材料;和

b.包衣,所述包衣包括围绕包封材料的至少一部分的干固体食物材料。

17.根据权利要求16所述的食品,其中所述包封材料选自由二价阳离子集合藻酸盐、石蜡、蜂蜡、小烛树蜡、巴西棕榈蜡、虫胶、动物脂肪、木薯及它们的组合组成的组。

18.根据权利要求16所述的食品,其中所述固体食物材料是粗磨物。

19.根据权利要求16所述的食品,其中所述水合材料是水。

芯与壳的粗磨状产品

背景技术

[0001] 诸如肉汁、调味剂和补充剂的包衣可以应用于干宠物食品，诸如干粗磨物，以改善粗磨物的风味、吸引力和/或营养成分。然而，这样的包衣通常是脏乱的，并且会需要在每餐应用于干粗磨物。

[0002] 湿宠物食品由于它们的质地和风味而会被宠物所需要，但是对于消费者而言也是脏乱且不便的。这些缺点足以阻止客户购买和喂食这样的湿宠物食品。

[0003] 干宠物食品对消费者提供益处，例如营养全面、方便喂食(例如单个包装的多次喂食机会、开封后储存稳定)、并且具有比其它宠物食品如湿宠物食品不那么强烈的气味。

[0004] 然而，购买和使用干宠物食品的潜在缺点是宠物习惯于从它们的猎物中获取它们的身体的水分，因此在喂食干宠物食物饮食时宠物通常会饮用少于最佳量的水。这可导致潜在的健康问题，诸如例如活动水平降低、肾结石和下尿路疾病。

发明内容

[0005] 根据本公开的食品可以包括围绕液基物质的包封材料和包括围绕包封材料的至少一部分的固体食物材料的包衣。固体食物材料可以包含粗磨物。固体食物材料可以具有小于约10％的水分含量。液基物质可以进一步包含功能成分和感官增强剂中的至少一种。液基物质可以选自由油和水组成的组。液基物质可以具有约0.8厘泊至2000厘泊的粘度。包封材料可以选自由亲水基质、疏水基质、明胶、二价阳离子集合藻酸盐(a divalent cation set alginate)、蛋白质基膜和水胶体基膜组成的组。

[0006] 根据本公开的制造食品的方法可以包括：获得包封材料，用液基物质填充所述包封材料，以及用固体食物材料涂覆或包裹所述包封材料。涂覆或包裹可以通过滚抛(panning)来实现。固体食物材料可以是粗磨物。固体食物材料可以具有低于10％的水分含量。液基物质可以进一步包含功能成分或感官增强剂中的至少一种。液基物质可以包括油和水中的至少一种。包封材料可以选自由亲水基质、疏水基质、明胶、二价阳离子集合藻酸盐、蛋白质基膜、水胶体基膜及它们的组合组成的组。液基物质可以具有约0.8厘泊至2000厘泊的粘度。

[0007] 根据本公开的另一种食品可以包括由明胶基材料或二价阳离子集合藻酸盐包封的油基物质，以及包含围绕明胶基材料或二价阳离子集合藻酸盐的至少一部分的固体食物材料的包衣。固体食物材料可以是粗磨物。油基物质还可以包含功能成分和感官增强剂中的至少一种。油基物质的粘度可以为约0.8厘泊至约2000厘泊。

[0008] 根据本公开的另一种食品可以包括由包封材料包围的水合材料的芯和围绕包封材料的至少一部分的固体食物材料的包衣。包封材料可以选自由二价阳离子集合藻酸盐、石蜡、蜂蜡、小烛树蜡、巴西棕榈蜡、虫胶、动物脂肪、木薯及它们的组合组成的组。固体食物材料可以是粗磨物。水合材料可以包含水。

[0009] 根据本公开的另外的食品可以包括由包封材料包围的乳液的芯和围绕包封材料的至少一部分的固体食物材料的包衣。乳液可以包含油和水乳液。包封材料可以选自由亲

水基质、疏水基质、明胶、二价阳离子集合藻酸盐、蛋白质基膜、水胶体基膜、石蜡、蜂蜡、小烛树蜡、巴西棕榈蜡、虫胶、动物脂肪、木薯及它们的组合组成的组。

具体实施方式

[0010] 本公开的食品包括多个单独的块，也称为“粗磨物”。根据本发明的粗磨物包括例如被包封材料包围的液基物质(也称为“液芯”)，所述包封材料被固体食物材料包衣(也称为“壳”)涂覆或包裹。本文中，这种结构被称为“液芯与壳”的粗磨物、构造和/或产品。

[0011] 本公开的宠物食品粗磨物可以包括例如配制为干粗磨物的固体食品涂覆材料(“壳”)。这样的干粗磨物可以是有利的，因为它在每咬下一块时同时提供干粗磨物和液基物质的口感。这种质地组合的口感和/或风味可对宠物有吸引力。为了本公开，“口感”被定义为宠物通过咀嚼粗磨物所感知的口中发生的生理-化学相互作用。例如，口感可以包括诸如硬、软、耐嚼、粘性、干、颗粒状、胶粘、光滑、均匀、粘稠、微湿、酥脆及它们的组合的属性。

[0012] 此外，根据本公开的干粗磨物可以是有利的，因为宠物主人除了液芯与壳的粗磨物不需要为动物购买或施用单独的产品，诸如肉汁或液体或半液体功能剂。换句话说，这种液芯与壳的粗磨物可以提供通常来源于干粗磨物和附加组分如肉汁或湿食品的组合的益处。

[0013] 例如，根据本公开的液芯与壳的粗磨物可以包含约27％液基物质、12％包封材料和61％固体食物材料包衣。此外，液芯与壳的粗磨物可以包括例如约40％液基物质、20％包封材料和40％固体食物材料包衣。

[0014] 在各种实施方案中，液芯与壳的粗磨物的固体食物材料包衣(“壳”)可以包括半微湿食品材料。例如，半微湿的壳可以具有半微湿的壳的重量的大于10％、或约15％-50％、或进一步约12％至40％的水分含量，以及还进一步具有约20％至30％的水分。

液基物质

[0015] 本公开的液基物质可以包括例如水基材料、油基材料及它们的组合。此外，液基物质可以包括乳液，其可以是两种不是可溶的或易混合的液体的任意组合。乳液可以例如是油基或脂基材料与水基材料的组合。例如，乳液可以包含约10％至约90％的油基或脂基材料和约90％至约10％的水基材料，进一步地，包含约40％至60％的油基或脂基材料和约60％至40％的水基材料。

[0016] 在本公开的范围内的油基材料可以包括适合宠物食品的预期消费者消费的任何油。例如，油基材料可以含有植物基油、种子油、坚果油、黄油和动物脂肪等油类。合适的植物基油包括但不限于椰子油、橄榄油、植物油、大豆油、菜籽油、棕榈油、米糠油、鳄梨油及它们的组合。合适的种子油包括但不限于亚麻籽油、棉籽油、油菜籽油、向日葵籽油及它们的组合。适用的坚果油包括但不限于花生油、杏仁油、山核桃油、胡桃油、腰果油及它们的组合。合适的动物脂肪包括但不限于鱼油和其它动物脂肪。

[0017] 合适的油基材料可以包括低粘度，例如约1厘泊至约2000厘泊的粘度，并且还可以在约10-500厘泊、约10-100厘泊、约100-300厘泊、约300-500厘泊、约500-2000厘泊、约100-800厘泊、约50厘泊、约100厘泊、约200厘泊、约300厘泊、约400厘泊、约500厘泊、约600厘泊、约800厘泊、约1000厘泊、约1200厘泊、约1500厘泊和约1800厘泊的范围内。作为非限制性实例，向日葵籽油具有约10厘泊的粘度，油菜籽油具有约98厘泊的粘度。油基物质的粘度可以

根据芯内存在的功能性或活性成分、试剂和/或感官增强剂而变化。

[0018] 此外，可以保护液芯的油基材料使其免于氧化，从而保存油基物质。油基材料可以保存至少12个月、至少15个月、至少18个月、至少21个月、至少24个月、至少27个月、至少30个月、至少33个月、或至少36个月。这也控制了在产品内浸出或变腐臭的油的量。

[0019] 合适的功能成分可以包括例如具有低闪点或烟点的成分。具有低闪点或烟点的成分会在低温诸如例如低于120℃下冒烟或产生火焰。这些成分可包括但不限于烃、碳酰、醛、酮、酸、酯、内酯、碱、硫化合物、缩醛、醚、卤素、腈和酰胺、苯基(phenyls)、呋喃、氧化物、吡喃、香豆素、噁唑、酸酐、苯酞及它们的组合。这些成分经常用于制造提供香味、风味或营养益处的成分中。这些成分例如可以以小于2重量%的量存在于本申请的产品中。

[0020] 在各种实施方案中，液基物质可以包含一种或多种功能成分和/或感官增强剂。合适的功能成分和/或感官增强剂可以包含例如液芯与壳的重量的约1%至10%，其中预期到以下值，诸如但不限于1%至5%、1%至3%、2%、4%、6%、7%、8%和9%。功能成分和/或感官增强剂的量可以根据预期的接受者和使用的功能成分和/或感官增强剂的类型而变化。作为非限制性实例，一些功能成分和/或感官增强剂可能具有比其它功能成分和/或感官增强剂更高的效能，因此高效能成分将以较小的量使用。

[0021] 此外，合适的功能成分和/或感官增强剂可以包括氧敏感的成分。可以使用成分的氧化还原电位来测量氧敏感性。或者，可以使用氧弹试验(Oxygen Bomb test)、PV(每单位面积施加的功率的测量)、存在的醛的数量及它们的组合来测量氧敏感性。氧敏感成分包括但不限于维生素B6(最少1mg/kg)、维生素C、维生素E(50-1000IU/kg)、亚油酸(最少1%)和叶酸。这些氧敏感成分可以用于液芯或包封材料中，并且可以以例如小于约1.5重量%的量存在。例如，氧敏感成分可以是包含在液芯与壳产品的芯内的油。这样的油例如可以占液芯的85重量%至100重量%。

[0022] 功能成分和/或感官增强剂可以包括对光敏感的成分。光敏成分包括但不限于维生素A(5000-250000IU/kg)、维生素B12(最小0.022mg/kg)、维生素D(50-5000IU/kg)、维生素E(50-1000IU/kg)、吡哆醇(最小1mg/kg)、核黄素(最小2.2mg/kg)和亚油酸(最少1%)。如本领域已知的，可以通过使用灯箱的保质期测试来确定光敏度。光敏成分可以例如以产品的约小于1重量%的量存在于本公开的液芯与壳的产品中。

[0023] 合适的功能剂还可以包括在消费时提供饮食优势的制剂。例如，功能剂和/或感官增强剂可以包括维生素、营养补充剂、牙科制剂、药物和药物制剂。营养补充剂可以包括例如有益于液芯与壳的产品的预期消费者的任何补充剂，包括但不限于大量营养素、植物营养素、维生素、草药和矿物质补充剂。维生素可以例如包括可由油基载体递送的任何维生素，包括但不限于维生素A、B、C、D、E及它们的组合。在液芯与壳的产品被配制用于人类消费的实施方案中，功能成分和/或感官增强剂可以选自但不限于抗氧化剂、维生素A、维生素B、维生素B6、咖啡因、鱼油、维生素B12、维生素C、维生素D、钙、软骨素、叶酸、蔓越莓、益生菌及它们的组合。在液芯与壳的产品被配制用于动物消费的实施方案中，功能成分和/或感官增强剂可以选自但不限于葡糖胺、软骨素、MSM、绿唇贻贝提取物、鱼油、益生菌、多种维生素、赖氨酸、乳蓟、S-腺苷甲硫氨酸(SAM-e)、消化酶、辅酶Q10、肾康安(azodyl)及它们的组合。

[0024] 合适的功能成分和/或感官增强剂还可包括益生元、益生菌或两者的组合。益生菌成分可包括但不限于乳酸杆菌(Lactobacilli)、双歧杆菌(Bifidobacteria)(包括动物双

歧杆菌(Bifidobacterium animalis))、肠球菌(Enterococci bacteria)及它们的组合。益生菌是使底物发酵以产生不太利于病原菌的环境从而减少病原菌的种群的细菌。益生元可包括但不限于低聚果糖、低聚半乳糖、甘露寡糖、菊粉、抗性淀粉、乳果糖及它们的组合。益生元是通过消化系统进入后肠以为益生菌提供底物的可发酵纤维。益生元可以例如位于产品的固体基材料中。益生菌可以例如包含在产品的液芯中。

[0025] 此外,可以利用功能成分来改善食品组合物中一种或多种其它成分的不良味道或香味。这些成分包括但不限于欧车前、镁和铁。

[0026] 液芯还可以包含旨在改善口腔护理的成分,诸如例如精油、抗微生物剂、呼吸清新剂及它们的组合。此外,口腔护理成分可以包括但不限于琼脂油、印度藏茴香(ajwain)油、当归根油、茴香油、阿魏、秘鲁香胶、罗勒油、月桂油、香柠檬油、黑胡椒油、合香叶油、桦树、樟脑、大麻花精油、葛缕子油、豆蔻籽油、胡萝卜籽油、雪松油、洋甘菊油、菖蒲根、肉桂油、岩蔷薇、香茅油、柠檬草油、鼠尾草、丁香叶油、咖啡、香菜、艾菊油、木香、蔓越莓籽油、荜澄茄、孜然油/黑籽油、柏树、莎草(cypriol)、咖喱叶、印蒿油、莳萝油、土木香、桉树油、茴香籽油、葫芦巴油、冷杉、乳香油、高良姜、白松香、天竺葵油、姜油、麒麟草、葡萄柚油、柠檬烯、指甲花油、蜡菊、山核桃油、辣根油、海索草、爱达荷艾菊(Idaho tansy)、茉莉花油、杜松子油、月桂、薰衣草油、杜香、柠檬油、柠檬草、酸橙、山苍子油、沉香(linaloe)、柑橘、马郁兰、千层树、蜜蜂花油、辣薄荷(menthe arvensis)油、山香薄荷(mountain savory)、艾蒿油、芥子油、没药油、桃金娘、苦楝树油、橙花、肉豆蔻、橙油、柠檬油、牛至油、鸢尾草油、玉檀香、欧芹油、广藿香油、紫苏、薄荷油、胡椒薄荷油、苦橙叶、松油、罗文莎叶、红柏、罗马甘菊、玫瑰油、玫瑰果油、迷迭香油、红木油、鼠尾草油、八角茴香油、檀香油、黄樟油、香薄荷油、五味子油、留兰香油、甘松香油、云杉、橘子、龙蒿油、茶树油、百里香油、铁杉、姜黄、缬草、香根草油、西红杉、冬青、蓍草油、依兰树油、蓬莪术油及它们的组合。口腔护理成分可以以例如0.001重量%至10重量%的量存在,预期诸如0.1%至2%、0.005%至2%、1%至5%、1%至10%、0.001%至0.1%(按液芯与壳产品的重量计)及其间的值。这种口腔护理液芯与壳的产品可以配制用于预期的消费者。

[0027] 在各种实施方案中,预期的消费者是猫科动物或犬科动物。在这样的实施方案中,合适的口腔护理成分包括但不限于六偏磷酸钠、三聚磷酸钠、偏磷酸钠、三偏磷酸钠、L-抗坏血酸2-单磷酸盐、硫酸锌、苹果酸、氯己定、绿茶提取物、茶树油、精油及它们的组合。在使用六偏磷酸钠的实施方案中,其优选包括在约0.5重量%至2.5重量%的量内。例如,三聚磷酸钠可以包括在约0.2重量%至2.0重量%的量内。偏磷酸钠可以包括在例如约0.2重量%至2.0重量%的量内。三偏磷酸钠可以包括在例如约0.4重量%至2.0重量%的量内。C 50-L-抗坏血酸-2-单磷酸盐(C 50-L-ascorbic acid-2-monophosphate)可以包括在例如约0.1重量%至1.0重量%的量内。硫酸锌可以包括在例如约0.01重量%至0.1重量%的量内。苹果酸可以包括在例如约0.25重量%至2.0重量%的量内。氯己定可以包括在例如约0.5重量%至2.0重量%的量内。绿茶可以包括在例如约0.5重量%至0.15重量%的量内。茶树油可以包括在例如约0.008重量%至0.08重量%的量内。

[0028] 此外,液芯可以包括一种或多种增味剂(palatant)、调味剂和/或香味。例如,液芯可以包含肉调味剂、烟熏香料或增味剂、肉汁、花生酱、杏仁油、水果调味剂、蔬菜调味剂、薄荷及它们的组合。增味剂、调味剂和/或香味可以为接受者提供增强的感官体验,因为增味

剂、调味剂和/或香味在液芯中得到保护，使得宠物体验到与不在液芯内保护和/或保存的感官增强剂所提供的相比更强烈的风味和/或香味。

[0029] 液基物质可以例如是热稳定的，使得当暴露于热时液芯与壳的产品的中心保持其形状。此外，热稳定中心在室温下可以是稳定的，这会增加产品的保质期，并为客户提供更容易的储存。

[0030] 在各种实施方案中，可以将抗氧化剂组合物加入到液芯、壳或两者中。在将抗氧化剂加入到壳中的实施方案中，与仅在液芯内使用抗氧化剂的市售粗磨物产品相比，减少液芯氧化所需的抗氧化剂组合物的量将更小。抗氧化剂组合物可以是本领域已知的具有适于预期接受者消费的抗氧化性质的任何组合物。抗氧化剂例如可以以约150ppm至5ppm的量提供，其中预期诸如6、7、8、9、10、20、30、40、50、60、70、80、90、100、110、120、130、140、20-90、10-50、10-100、30-120的值，以及其间的所有值。抗氧化剂的量可以取决于产品的脂肪含量。抗氧化剂可以选自例如BHT、BHA及它们的组合。在液体是油的实施方案中，抗氧化剂可以控制在产品中浸出或变腐臭的油的量。

[0031] 在另一个实施方案中，液芯与壳的产品可以包括湿润剂。湿润剂可以包括但不限于盐、甘油、糖和树胶。例如，湿润剂可以是甘油。

包封材料

[0032] 根据本公开的宠物食品包括围绕液基物质的包封材料。包封材料可以例如包封并保护液基物质。例如，包封材料可以保护液基物质(诸如例如油基物质)免受降解、浸出和/或变腐臭，这是工业上关于涂覆有油基材料的碳水化合物产品遇到的问题。

[0033] 包封材料可以包括例如亲水基质、疏水基质、明胶、木薯淀粉、藻酸盐，二价阳离子集合藻酸盐、蛋白质或水胶体基膜及它们的组合。合适的明胶材料可以包括例如明胶勃鲁姆强度为约100-500勃鲁姆、约200-250勃鲁姆、约100勃鲁姆、约120勃鲁姆、约150勃鲁姆、约200勃鲁姆、约250勃鲁姆、约300勃鲁姆、约350勃鲁姆、约400勃鲁姆、约450勃鲁姆、约500勃鲁姆及期间任何量的明胶材料。此外，明胶包封材料的物理特性可取决于整个体系的Aw(水活度)平衡的水平，其可以优选在约0.3-0.75的范围内。

[0034] 围绕产品的液芯的包封材料可以包含水不渗透性材料。例如，包封材料可以包含蜡。适合使用的蜡材料包括但不限于石蜡、蜂蜡、小烛树蜡、巴西棕榈蜡、虫胶、动物脂肪和蜡的复合物以及合适的材料如纤维素醚，例如蜡甲基纤维素复合物。然而，能够包封液基物质并保存适合于安全消费的液基物质的任何材料都在本公开的范围内。

[0035] 在各种实施方案中，使用软凝胶包封方法包封液基物质。在这样的实施方案中，包封材料可以包括蛋白质、湿润剂和水。围绕软凝胶包封材料中的液基材料的方法可以包括混合包封材料，形成包封材料片，从包封材料片形成胶囊，以及将液基材料沉积到胶囊中。此外，该方法可以包括混合蛋白质、保湿剂和水，蒸煮混合物，以及调节煮熟的混合物以产生可泵送的蛋白质基浆液。浆料可以沉积在一组冷却辊上并转化成两股连续的软膜片。两股膜可以在具有机械加工的对称成形腔的两个成形辊之间进料。然后当两片膜通过成型辊压在一起时，液基物质可以沉积到每个胶囊中。一旦胶囊完全形成并密封，完全包封在蛋白质基软膜中的液基材料的成品从成形辊的腔中释放出来用于后成形处理。然后去除剩余的网状物(web)。

[0036] 包封材料还可以包括预成形胶囊。例如，合适的预成形胶囊可以包括一片胶囊或

两片胶囊。在包封材料是凝胶胶囊(如上所述预先成形或围绕液芯形成)的实施方案中,胶囊的尺寸可以制作为使得最终的液芯与壳的产品在考虑到张嘴、咬合力、颌大小等时对于预期的宠物是一口大小的(bite-sized)。例如,胶囊可以具有约1-10mm的直径,其中可以预期诸如4-8mm、5-8mm、5mm、6mm、7mm、8mm和9mm的值。不透水包封材料的厚度可以为约0.1-1.0mm、约0.2-0.7mm和约0.3-0.5mm厚。

[0037] 包封材料可以处于能够围绕液基物质的任何状态,使得很少到没有氧气到达液基物质。这些状态包括但不限于固体、凝胶、半固体和粘稠液体。此外,包封材料可以与其它食品块混合,例如但不限于肉制品。

[0038] 多种不同类型的包封材料可以与本公开的相同的液芯与壳的产品一起使用。在这样的实施方案中,每种不同类型的包封材料可以具有不同的功能,使得当组合该功能时,产生所需的和/或预定的效果。例如,第一包封材料可以包括快速消散以吸引宠物的高水平芳族化合物(highly aromatic compound),而第二包封材料可以包含例如支持牙齿健康的活性成分(例如三聚磷酸钠)。在另一个实例中,使用两种不同风味的包封材料可以产生多样性或产生更精炼/复杂的香味/风味体验(例如更像餐食)。在另一个实例中,第一包封材料可以包括开始反应的成分(例如,用于消化的分解蛋白质的酶),并且第二包封材料可以包括停止反应的成分(例如,分解消化酶并处于缓释形式的成分)。这样的配置可以例如有助于提供所需水平的消化率。其它可能的包封材料组合可以包括例如快速释放包封材料和缓释包封材料(其中快速释放包封材料带来一种气味和/或味道,而缓释包封材料改变该气味和/或味道)。

[0039] 例如,包封材料可以包括占液芯与壳的产品重量的约5重量%至30重量%,其中可以预期诸如0.1重量%至20重量%、1重量%至30重量%、5重量%至10重量%和8重量%的值,以及每个离散的量,0.5重量%、0.8重量%、1重量%、2重量%、3重量%、4重量%、5重量%、6重量%、7重量%、8重量%、9重量%、10重量%、11重量%、12重量%、13重量%、14重量%、15重量%、16重量%、17重量%、18重量%、19重量%、20重量%、21重量%、22重量%、23重量%、24重量%、25重量%、26重量%、27重量%、28重量%、29重量%和30重量%以及它们之间的每个范围。

[0040] 例如,液芯内的功能成分可带有不想要的和不期望的香味和/或风味。这些风味可以被包封材料的一部分所掩盖,该部分被设计为压制、抑制或捕获香味或风味。在一个这样的实例中,风味是绿唇贻贝的风味,而其被香味增强剂/掩蔽剂隔绝,诸如在行业中已知的那些,诸如但不限于由风味屋公司(Flavor House)(阿德兰托,加拿大)生产的那些。在另一个实例中,令人不愉快的香味是鱼油,其仅对于使用食品的宠物主人而言是难闻的。在这种情况下,包封材料包括挥发性芳族化合物。合适的挥发性芳族化合物的实例是森馨公司(Sensient)(密尔沃基,威斯康辛州)或曼氏公司(MANE)(法国)生产的酚类、苯甲酸和香草醛。这类包封材料的效果在产品最初破裂时是最好的,使得消费者不会嗅到功能成分,例如鱼油,但是狗或猫在食用时能够闻到它。在另一个实例中,不需要的香味或风味仅仅是清淡的,而使用包封材料可以提供能够增强消费者和宠物的食用体验的风味/香味的尖峰(spike)。在另一个实例中,通过添加欧车前或寡糖产生不良的香味/风味,并通过包括上述的方法进行控制。优选地,调味剂以约1重量%至10重量%的量包括在本申请的产品中,其中预期诸如2重量%、3重量%、4重量%、5重量%、6重量%、7重量%、8重量%、9重量%、2-5

重量%、4-8重量%和3-9重量%的值。当气味用于掩蔽不需要的香味时，它们以产品的约1-5重量%的量存在。气味成分的一些例子是烟油和肉味，例如但不限于鸡肉、牛肉、鸭肉、海鲜、猪肉及它们的组合。

固体材料包衣

[0041] 根据本发明的宠物食品包括由包封材料涂覆的液基物质，其又被涂覆或包裹在固体食物材料中。固体食物材料(也称为“壳”)可以包括适合宠物的任何固体食物材料，其中固体食物材料可以是完全固体的、软的或半固体的。为了本公开的目的，“固体食品”材料或产品是指完全固体的、颗粒状的、半固体的、硬的和软的食品。固体食物材料优选选自但不限于碳水化合物基产品、蛋白质基产品及它们的组合。碳水化合物来源包括适用于液芯与壳的产品的预期消费者消费的任何碳水化合物，包括但不限于小麦、燕麦、谷物、种子、草、大麦、粟、玉米、马铃薯和含淀粉的蔬菜。碳水化合物来源可以与例如动物食品中通常使用的其它成分组合，以产生可用作本申请目的的包衣的干碳水化合物。在另外的实施方案中，固体食物材料包括干宠物食物材料。可以使用任何合适的干宠物食物材料。

[0042] 例如，液芯可以包含高水平的水分，并且周围的固体食物材料可以含有小于12重量%、小于10重量%或小于9重量%的水分。这种配置可以生产可以在正常条件下运输和储存，还能够向宠物提供水合作用的宠物食品。为了本公开的目的，术语“干的”对应于含有约12重量%或更少的水分的材料。

[0043] 此外，固体食物材料可以包含液芯与壳的产品的约10重量%至50重量%，以及进一步包含液芯与壳的产品的约15重量%至约30重量%。

[0044] 在各种实施方案中，将固体食物材料与其它成分诸如例如脂肪、油、蛋、糖、肉制品、发酵剂、香料、调味剂及它们的组合混合。例如，固体食物材料可以包含碳水化合物与其它成分混合的组合，以形成基于碳水化合物的食品。适用于人类消费的这类基于碳水化合物的食品的实例包括但不限于谷物、椒盐脆饼、膨化米、膨化玉米、炸土豆条(chips)、饼干、燕麦卷、燕麦片、玉米粉及它们的组合。适用于动物消费的这类基于碳水化合物的食品的实例包括但不限于粗磨物、零食(treat)、咀嚼物、牙科用零食、饼干及它们的组合。

[0045] 此外，固体食物材料可以具有例如约0.75或更低的水活度水平，其中预期以下值，诸如但不限于0.25-0.75、0.3-0.6、0.4-0.5、0.3-0.75、0.55的范围，和其间的范围。这样的水活度水平可以例如在食用时在口中提供松脆感和/或声音。固体食物材料可以与通常用于食品中的其它成分组合以产生可用作包衣的干碳水化合物。本公开的固体食物材料的水分含量可以小于约15%，其中预期诸如5-15%、6%、7%、8%、9%、10%、11%、12%、13%、14%、5-10%、6-12%的值及其间的值。

[0046] 固体食物材料可以包含例如约2-10重量%的纤维、4-15重量%的水分、5重量%-30重量%的脂肪和18-60重量%的蛋白质。纤维成分可以包括在按重量计约2%、3%、4%、5%、6%、7%、8%、9%、10%、3-5%、4-8%、3-9%的量中，及其间所有值。脂肪成分可以包括在按重量计约5%、6%、7%、8%、9%、10%、12%、15%、18%、20%、22%、25%、30%、5-10%、10-20%、10-30%、20-30%的量中，及其间的所有值。蛋白质组分可以包括在按重量计约18%、20%、22%、25%、30%、32%、35%、38%、40%、42%、45%、48%、50%、52%、55%、60%、18-30%、20-30%的量中，及其间的所有值。

[0047] 用于提供涂覆或包裹包封材料的固体食物材料的任何方法都在本公开的范围内。

例如，可以通过获得固体食品(例如干狗粮)，将固体食品的尺寸减小为小块的固体食物材料，并将固体食物材料块喷洒到涂覆包封材料的液基物质上，来生产固体食物材料。生产固体食物材料的方法的另一个实例包括将固体食物材料的尺寸减小为小块，将粘合剂组合物放置在涂覆包封材料的液基物质上，以及将包封的液基物质在固体食物材料的小块中滚动或摇动，使得块粘附到粘合剂上，导致涂覆包封材料的液基物质涂覆或包裹上固体食品。在另一个非限制性实例中，固体食物材料成形为中空形状，使得可以将包封层和液基物质注入到固体食物材料的中心。为了本公开的目的，固体食物材料可以是固体或半固体，其中固体食物材料的范围为从非常软到硬。在另一个实施方案中，可以使用滚抛(panning)将碳水化合物基材料放置在包封材料上。

[0048] 在某些形式中，固体食物材料围绕约1重量％至100重量％的包封材料和液芯，其中预期诸如按重量计2％至50％、5％至75％、10％至80％、15％至90％、20％至100％、40％至80％、50％至100％的范围，以及特定值，诸如但不限于按重量计50％、55％、60％、65％、70％、75％、80％、85％、90％、95％、96％、97％、98％、99％或100％。

[0049] 在其它实施方案中，将固体食品或包含固体食品的混合物在用于本申请的液芯与壳的产品之前进行蒸煮、烘烤、油炸、挤压或加工。固体食品可以烘烤、油炸或挤压；然而，本公开不限于这些实施方案。

[0050] 根据本公开，可以将风味强烈的成分或装饰配料(topper)用于液芯、壳中或作为壳上的包衣。这些风味剂可以包括例如肉调味剂、海鲜调味剂、水果和水果提取物、天然调味剂和合成调味剂。风味剂可以在本发明的产品中以约0.02％至1.0％存在。

[0051] 根据本公开的液芯与壳的产品可以被涂覆或包裹在包含固体食物材料的湿基产品中。在这样的实施方案中，固体食物材料包括碳水化合物、蛋白质或它们的组合。用于包裹或涂覆的湿基产品也可以是半微湿固体食物材料。在固体食物材料是湿或半微湿的实施方案中，固体食物材料的水分含量大于10％，优选约15％-50％，约12％至40％，进一步约10％至15％。

制备食品的方法

[0052] 本公开提供了制备包含液芯、包封材料和固体食物材料包衣的液芯与壳的产品的多种方法。例如，一种方法包括获得包含在包封材料内的液基物质，并用固体食物材料涂覆包封材料。该方法还可以包括将固体食物材料破碎成更小的块并用固体食品的块涂覆包封的液基物质。固体食品可以烘烤、煮熟或炸成小块，尽管这不是必需的。例如，在涂覆包封的液基物质之前，可以在温度和压力条件下，例如在挤出机中，对固体食物材料进行蒸煮。

[0053] 用于形成液芯与壳的产品的方法，其中液芯为油基材料，壳为碳水化合物基材料，该方法可包括获得亲水基质(例如，明胶涂覆的油基产品)并将其涂覆在基于碳水化合物和蛋白质的产品中。该方法还可以包括将基于碳水化合物的产品破碎成更小的块并用基于碳水化合物的产品的块涂覆明胶涂覆的油基产品。基于碳水化合物的产品可以在破碎成更小块之前进行烘烤、煮熟或油炸，尽管这不是必需的。例如，基于碳水化合物的产品可以在温度和压力条件下，例如在挤出机中，在用于涂覆明胶涂覆的油基产品之前进行蒸煮。

[0054] 包封的液基物质的涂覆可以包括例如粉碎固体食物材料并将其喷洒到包封的液基物质的表面上。喷雾可以例如包括粉状粗磨物或谷物并组合粘性材料，诸如但不限于明胶、糖蜜、蜂蜜和类似材料，或者可替换地，可以简单地是水溶液。根据施用方法，固体食物

材料(例如粉状粗磨物或谷物)可以具有约10重量%至80重量%的宽泛的固体含量范围。可以通过自动刷分配、印模(printed)、挂浆(enrobed)或它们的任意组合来喷洒固体材料。

[0055] 所得的在具有外部固体食物材料包衣的包封材料(例如明胶或其它)内的液基物质可以被干燥成最终的外部水分。干燥方法将与维持包封材料相称,因此通常需要较低的温度。这可以使用超热蒸汽、真空干燥器或温和的加热分布来实现。

[0056] 制备根据本公开的液芯与壳的食品的另一种方法包括获得涂覆在包封材料中的液基物质,并用固体食物材料涂覆或包裹它。该方法另外可以包括通过例如粉碎、研磨、碾磨、切碎、破碎及它们的组合来减小固体食物材料的尺寸的步骤。此外,该方法可以包括通过例如喷雾干燥、轧制、滚抛、摇动、烘烤及它们的组合将固体食物材料块粘附到液芯与壳产品的包封层。在一些实施方案中,该方法包括在将固体食物材料块粘合到包封材料之前将粘合剂材料施加到包封材料。在将固体食物材料块粘附到包封材料层之前,可以将水分加入到包封材料层中。

[0057] 制备液芯与壳的食品的另一种方法可以包括获得包封材料,优选蛋白质基或明胶基材料,将其形成为胶囊,用液基物质填充胶囊,并用固体食物材料涂覆含有液基物质的胶囊。该方法还可以包括在将固体食物材料用作包衣之前对其进行烹调或烘烤。此外,在将固体食物材料用作包衣之前,可将其破碎成较小的块。由包封材料形成的胶囊可以是例如刚性的两片胶囊或软的单片胶囊。例如,可以用液基物质填充刚性两片胶囊,然后将第二片胶囊牢固地放置在第一片胶囊上。例如,可以将液基物质注入软的单片胶囊并密封。

[0058] 制备液芯与壳的食品的另一种方法包括形成固体食物材料的中空产品或提供固体食物材料的预先形成的中空产品,并用包封材料和液基物质将其填充,使得液基物质被包封材料包围。该方法还可以包括在在中空固体食物材料被填充之后将其关闭和/或用包封材料和液基物质填充固体食物材料后对其进行烘烤。

[0059] 在另一个实施方案中,产生由固体基材料制成的袋,然后用含有包含水合材料的液芯的胶囊(作为包封材料)将其填充。一旦将含有水合材料的胶囊放置在袋中,则可以将袋密封或封闭,使得胶囊被最低限度地暴露或不暴露。在另一个实施方案中,填充有水合材料的胶囊与常规食品如谷物或粗磨物混合。在这样的实施方案中,另外的包衣可存在于胶囊的外部。

[0060] 根据本公开可以形成能够进行加热的液芯与壳的食品,使得液芯变暖而不损害涂覆或包裹液芯的碳水化合物产品。例如,可以通过获得本申请的液芯与壳的产品并温热它来形成具有暖液芯的液芯与壳的食品。此外,可以将温热的液芯和壳的产品提供给有需要的动物。在这种实施方案中,液芯可以包括动物产品和/或肉汁物质。

[0061] 本公开的液芯与壳的产品可以是能够具有液芯的任何尺寸和形状。合适的形状可以包括但不限于球形、棱柱形、立方体、矩形盒状、三角形、星形、圆形、不规则形、椭圆形等。该形状在产品的表面上也可具有不规则的纹理和/或多个纹理。此外,液芯与壳的产品可以针对预期的消费者(例如狗或猫)是一口大小的。预期消费者的一口大小可以基于多种因素来确定,包括但不限于大小、颚大小、咬合、张嘴及它们的组合。

[0062] 本公开的液体芯和壳的产品可以例如包括约5mm至约25mm的半径,进一步地包括约10mm至20mm的半径。

[0063] 根据本公开的宠物食物粗磨物可以用作构造成在粗磨物的液基物质和/或固体食

物材料包衣内递送一种或多种功能成分的递送系统。如前所述，合适的功能成分可以包括例如益生元、益生菌、重量和能量管理补充剂、口腔护理成分、免疫增强成分、有益于脑发育的成分、眼睛护理成分、有益于皮肤和皮毛或毛发的成分或它们的组合。

[0064] 在液芯为油的优选实施方案中，产品的脂肪含量为产品重量的至少20％、至少30％、至少40％、至少50％、至少60％、至少70％、或至少80％。预期的产品重量的25％、30％、35％、40％、45％、50％、55％、60％、65％、70％、75％、85％和95％的量。可以根据接受者、所包含的功能剂和/或感官增强剂来调节液芯与壳的产品的脂肪含量。此外，可以根据接受者的营养需求来调节脂肪含量。

[0065] 在各种实施方案中，液芯与壳的产品具有极为易挥发的成分。挥发性成分具有低于10mmHg的蒸气压。这种挥发性材料包括但不限于油、调味剂和热敏材料。这些材料是高挥发性的，其中材料的挥发性由其在加工温度下的蒸气压确定。另一个重要参数是点火温度。许多产品在挤出条件下具有极高的蒸气压。它们将迅速地闪蒸掉，只剩下少量的其初始浓度。通过将这些挥发性材料包含在本申请的产品中来代替通过挤出机加工，使材料不会闪蒸掉并且在使用中更强。

[0066] 在本申请的另一个实施方案中，液芯与壳的产品保持油和明胶部分之间的平衡以及粗磨物中的水分。优选地，油、明胶和碳水化合物基材料之间的平衡优选为约0.30至0.75。

[0067] 本公开还提供了内部增味剂递送。例如，用于内部增味剂递送的方法包括将本申请的液芯与壳的产品施用于有需要的接受者。接受者可以是人类或动物。内部增味剂可以选自但不限于气味、调味剂和具有吸引力的味道的其它制剂。可以通过产品的液芯递送增味剂，使得当接收者咬入产品时，释放出增味剂。优选地，接收者喜欢该增味剂，并希望食用更多的产品。在各种实施方案中，与市售的粗磨物相比，液芯与壳的产品具有增加的适口性。

[0068] 在各种实施方案中，液芯与壳的产品可被构造为治疗或预防宠物的脱水。例如，脱水的严重性可以缓解食用该产品的动物的至少10％、至少20％、至少30％、至少40％、至少50％、至少60％和至少70％、80％、90％和100％(通过一天中动物的水摄入量测量，并且与自由进食食物和水的动物相比)。或者，食用本公开产品的动物可以具有以下水合水平，其为至少10％、至少20％、30％、40％、50％或更高，或至少10％、至少20％、30％、40％、50％或相比不饲喂产品但自由进食食物和水的动物具有更接近所需的水合水平的水合水平。脱水和水合优选通过血液、尿液和粪便样品诊断。一旦诊断出脱水，完成实验室测试以确定脱水水平。也可以使用某些皮肤弹性测定来确定动物是否脱水。

实施例

实施例1

[0069] 本实施例描述了一种涂覆或包覆有明胶涂覆的油基材料的方法。

材料和方法

[0070] 获得填充有油基物质的明胶胶囊，其中油基物质将含有用于猫的口腔护理补充剂。还获得干的猫粗磨物。干的猫粗磨物的水分含量小于10％。将干的猫粗磨物磨成小块。干粗磨物将具有以下的总组成：

	猫的完整范围	猫的更典型的范围	狗	狗的更典型的范围

蛋白质	60-28%	45-28%	45-18%	35-18%
脂肪	30-9%	22-9%	22-5%	15-8%
水分	15-4%	15-7%	15-6.5%	15-6.5%
纤维	10-2%	7.5-2%	6.5-2%	6.5-3%

[0071] 然后将明胶胶囊弄湿并放入装满干的猫粗磨物块的塑料容器中。然后将容器摇动，使得干粗磨物块粘附到明胶胶囊上。然后将涂覆的明胶胶囊干燥，产生油芯碳水化合物产品。然后将油芯碳水化合物产品喂给猫。

结果与结论

[0072] 猫食用油芯碳水化合物产品。每咬一口油基产品将会递送到猫的口中，造成极少的脏乱，如果有任何脏乱的话。猫会被食物吸引，并多次在食物碗处逗留以食用油芯碳水化合物产品。

实施例2

[0073] 本实施例描述了一种涂覆或包裹有明胶涂覆的油基物质的方法。

材料和方法

[0074] 在保持在不超过28℃温度下的穿孔包衣圆筒中，将虫胶雾化(50psi泵，50psi喷雾模式(喷雾动力学(Spray Dynamics)))到含有油基物质的明胶胶囊上以预处理表面；转速高(14rpm)，且气流未保持。在使虫胶进入五分钟后，将涂覆虫胶的胶囊在适度的气流(27℃；干燥度＝2.0g水分/kg空气)下干燥10分钟，同时保持低转速(7rpm)。然后，用粘合剂涂覆已涂覆的胶囊，同时保持高转速(14rpm)，并且无空气流动，维持五分钟；明胶胶囊被翻滚以促进涂覆。接着，将碳水化合物产品的块加入到涂覆粘合剂的明胶胶囊的翻滚的团中。随着碳水化合物产品块的添加，将系统地降低转速，以开始粘合过程(在5分钟的过程中从14rpm到10rpm再到4rpm再到2rpm)。接着，粘合剂在高速气流(400CFM；27℃)下干燥15分钟。在干燥期间，保持低转速(2rpm)，并且使用水平搅拌棒和缓慢的翻滚来防止聚集。然后，在气流(200CFM；27℃)和中等转速(4rpm)下在涂覆产品上形成糊精膜，持续3分钟。最后，将上面具有附着碳水化合物产品的块的涂覆胶囊在中速气流(200CFM；27℃)下以低转速(2rpm)干燥5分钟。

结果与结论

[0075] 所得产物是油芯碳水化合物产品，其中油得到保护免受氧化，并且该产品是带有具有独特口感的松脆外壳的整个产品。