Title: FROZEN FRUIT SNACK AND METHOD

Abstract: A frozen fruit snack that includes a peeled half of a banana having a hollowed central channel that contains a filling composed of probiotic-enhanced frozen yogurt mixed with a puree of fresh bananas and strawberries. The treat further includes a thin coating of chocolate on the outer surface of the banana half, and a stick inserted into the banana half for providing a handle by which a consumer can conveniently hold the snack during consumption. The process for preparing the snack includes the steps of slicing the banana in half, removing a core of banana flesh from one of the halves to form a hollow channel therein, filling the hollow channel with the edible filling, inserting a stick into the banana half, peeling the banana half, freezing the banana half and its filling, and coating the surface of the banana half with a thin layer of dark chocolate.


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— as to the applicant’s entitlement to claim the priority of the earlier application (Rule 4.17(ii))
— of inventorship (Rule 4.17(iv))
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BACKGROUND OF THE INVENTION

1. Field Of The Invention

This invention relates generally to frozen fruit snacks and more particularly to a frozen fruit snack that is filled with an edible filling and coated with an edible outer coating and a method for preparing the same.

2. Description Of The Related Art

Over the past several decades, and especially in recent years, consumers have become increasingly health conscious with regard to their dietary habits. The popularity of many traditional snack food items that contain large quantities of sugar, sodium, fat, and calories, and that otherwise lack significant nutritional value, has waned as people have sought healthier snacking alternatives. Among the most prevalent of such alternatives are fresh fruits and vegetables, including frozen fresh fruits, which are generally very low in fat, calories, and sodium, and contain large quantities of vitamins, minerals, fiber, and antioxidants. It is well known that consuming fresh fruits can help reduce the risk of cancer, heart disease and high blood pressure, type 2 diabetes, and can slow the effects of aging. It has also been found that those who have a diet that is rich in fresh fruit have more energy and are less likely to gain weight. Due to the benefits associated with consuming fresh fruits, dietary guidelines in the United States, the United Kingdom, and in other countries around the world include a recommended consumption of at least 5 servings of fruits and vegetables a day.

Despite the known benefits of eating fresh fruits, there are a number of factors that continue to discourage consumers from opting for fruits over traditional, less healthful snack foods such as candy bars, potato chips, ice cream, pretzels, and fast foods. One such factor is convenience. Many consumers chose traditional snack foods because they are widely available, they are prepackaged in individual serving sizes, they are ready to eat, and they can be easily stored for lengthy periods of time. Conversely, fresh fruits are typically not widely available, they are generally not prepackaged in individual serving sizes, they have a relatively short shelf life, and they usually require some amount of preparation (e.g., washing, peeling, slicing, etc.)
before consumption. As a result, consumers who would choose to snack on fresh fruit if it were more convenient will often choose traditional snack foods instead.

[0006] Another factor that discourages many consumers, and children in particular, from eating fresh fruits is a general lack of excitement associated with fruits and, more generally, foods that are classified as healthful or "good for you". In selecting snack foods, consumers are often looking to satisfy a craving for something sweet, salty, rich, creamy, or that can otherwise be described as "decadent" or "indulgent". More often than not, such adjectives are descriptive of traditional snack foods, such as chocolate and ice cream, and not of fresh fruits. A need therefore exists for a convenient, decadent fruit snack that is both healthy and satisfying for the average consumer.

BRIEF SUMMARY OF THE INVENTION

[0007] In accordance with the present invention, there is provided a frozen fruit snack (herein also referred to as "the treat" or "the product") having an edible filling and an edible outer coating and a method for preparing the same. The treat preferably includes a peeled half of a banana having a hollowed central channel that contains a filling composed of probiotic-enhanced frozen yogurt (i.e., low-fat yogurt combined with low-fat ice cream and probiotic cultures) mixed with a puree of fresh bananas and strawberries. The treat preferably further includes a thin coating of chocolate on the outer surface of the banana half, and a stick inserted into the banana half for providing a hand-grippable handle by which a consumer can conveniently hold the treat during consumption.

[0008] A first preferred step in the process for preparing the inventive fresh fruit snack includes slicing a banana transversely into a first half and a second half of roughly equal size. After being sliced, each of the halves will preferably be further processed separately in a substantially identical manner. Therefore, the process will hereafter be described with respect to only one of the banana halves.

[0009] Next, a cylindrical core of banana flesh is axially removed from the banana half using a specialized suction coring device to form a hollow, cylindrical bore, hereafter referred to as a channel, in the banana half. The channel preferably extends to a depth that is short of the tip of the uncut end of the banana and does not extend through the outer surface of the banana. The removed banana core is collected and is mixed into the frozen yogurt filling (described above).

[0010] Next, the frozen yogurt filling is injected into the hollow core of the banana half. The filling is preferably injected using a conventional horizontal extruder with a tapered nozzle.
Preferably, the frozen yogurt filling contains live probiotic cultures for enhanced health benefits. The frozen yogurt preferably also contains a combination of conventional stabilizers and gums for providing the filling with a desired viscosity to facilitate injection of the filling into the banana half while mitigating leakage after the filling has been injected into the banana half.

Next, a stick is preferably inserted into the banana for providing the treat with a handle to facilitate convenient consumption. The stick is preferably formed of wood and is axially inserted through the cut end of the banana half into the filling in the central channel of the banana half.

Next, the peel of the banana half is removed using a conventional suction peeling process. Preferably, the product is then immediately microwave heated in order to inactivate enzymes in the banana that would otherwise cause the banana to brown when exposed to air. The product is then blast frozen to preserve the freshness of the banana and to harden the filling mixture.

Next, the product is preferably hand dipped into a thermostatically controlled tank of melted chocolate to cover the exterior surface of the banana half with a thin chocolate coating. The temperature of the tank is preferably maintained by an electrically heated water jacket in a conventional manner. The chocolate is preferably dark chocolate containing at least 35% cocoa liquor. After the banana half is extracted from the tank, excess chocolate is allowed to drip off of the product and the remaining chocolate coating is partially hardened through contact with the surface of the cold banana.

Next, the product is once again blast frozen in order to fully harden the chocolate coating. The product is then packaged and is subjected to a conventional metal detection process to ensure that it is safe for consumption.

It is therefore a first purpose of the present invention to provide a nutritious, indulgent fresh fruit snack and a method for preparing the same. It is a further purpose of the present invention to provide such a snack that is convenient. It is a further purpose of the present invention to provide such a snack that contains live probiotic cultures for enhanced health benefits.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

Fig. 1 is a perspective view illustrating the preferred embodiment of the inventive frozen fruit snack.
[0017] Fig. 2 is a view in section along the lines 2-2 of Fig. 1 illustrating the preferred embodiment of the inventive frozen fruit snack shown in Fig. 1.

[0018] Fig. 3 is a perspective view illustrating the preferred embodiment of the first step of the inventive process.

[0019] Fig. 4 is a perspective view illustrating the preferred embodiment of the second step of the inventive process.

[0020] Fig. 5 is a perspective view illustrating the preferred embodiment of the third step of the inventive process.

[0021] Fig. 6 is a perspective view illustrating the preferred embodiment of the fourth step of the inventive process.

[0022] Fig. 7 is a perspective view illustrating the preferred embodiment of the fifth step of the inventive process.

[0023] Fig. 8 is a perspective view illustrating the preferred embodiment of the sixth step of the inventive process.

[0024] Fig. 9 is a perspective view illustrating the preferred embodiment of the seventh step of the inventive process.

[0025] Fig. 10 is a perspective view illustrating the preferred embodiment of the eighth step of the inventive process.

[0026] Fig. 11 is a perspective view illustrating the preferred embodiment of the ninth step of the inventive process.

[0027] Fig. 12 is a perspective view illustrating a first alternative embodiment of the inventive frozen fruit snack.

[0028] Fig. 13 is a perspective view illustrating a second alternative embodiment of the inventive frozen fruit snack.

[0029] In describing the preferred embodiment of the invention which is illustrated in the drawings, specific terminology will be resorted to for the sake of clarity. However, it is not intended that the invention be limited to the specific term so selected and it is to be understood that each specific term includes all technical equivalents which operate in a similar manner to accomplish a similar purpose.

**DETAILED DESCRIPTION OF THE INVENTION**

[0030] Referring to Figs. 3-11, a method for preparing frozen banana treats is shown. Referring to Figs. 1 and 2, each completed banana treat 10 includes a peeled half of a banana 12,
a filling 14 composed of probiotic-enhanced frozen yogurt mixed with fresh bananas and strawberries, a thin chocolate outer coating 16, and a stick 18 for allowing a consumer to conveniently hold the treat 10 during consumption. Each component of the treat 10 will be described in greater detail below.

Prior to commencement of the various steps of the inventive method, the raw materials of the frozen banana treats, including bananas, frozen yogurt, strawberries, and chocolate, are received at a processing facility and are evaluated in a conventional manner to ensure that the ingredients meet specifications of quality and safety as suggested by the Compendium of Methods for the Microbiological Examination of Foods (Downes, F. P., & K. Ito. 2001. Compendium of methods for the microbiological examination of foods. 4th ed. Washington, D.C. American Public Health Association). Accordingly, fruits must be tested for standard plate count (<2500 colony forming units/g (CFU/g)), yeast and mold (<100 CFU/g), and coliforms (<10 CFU/g). Incoming chocolate will be tested for standard plate count (<5000 CFU/g), yeast (<50 CFU/g) and mold (<200 CFU/g), and coliforms (<10 CFU/g). The frozen yogurt will be tested for yeast and mold (<200 CFU/g) and coliforms (<10 CFU/g). Additionally, the final product will be tested for total plate count (<8000 CFU/g), yeast and mold (<400 CFU/g), and coliforms (<10 CFU/g) once the production process described below is completed. For quality purposes, microbial testing should also be performed to ensure that the active cultures in the final product are viable. Live and active culture testing will be performed as outlined by the National Yogurt Association.

Unless otherwise noted, the product is physically advanced between each of the process steps described below by a conventional belt conveyor within the processing facility. Prior to and during preparation of the treats, the product is processed and held in temperature controlled environments with temperatures therein ranging from about -60 degrees Celsius to about 10 degrees Celsius. The cold temperatures preserve the freshness of the various ingredients of the treats and minimize browning of the bananas which occurs due to the natural enzyme polyphenol oxidase (PPO) found in bananas.

Although most the inventive process steps are described herein as being performed automatically, it is contemplated that any of the steps can be performed by equivalent manual means as will be understood by those skilled in the art. Similarly, it is contemplated that the process steps that are described herein as being performed manually can alternatively be performed using equivalent automated means.
Referring to the first step of the method shown in Fig. 3, the outer skin of a banana 100 is sprayed with a pressurized stream of cold, chlorinated water 102 to clean the banana 100 and mitigate the possibility of cross contamination between the skin and the flesh of the banana 100 when the banana 100 is peeled (described below). The cold water also chills the banana 100 which reduces the likelihood of browning and makes the banana 100 firmer and thereby easier to handle without damaging the banana 100. Preferably, the chlorinated water has a chlorine concentration of about 100-150 parts per million (in accordance with U.S. federal regulations regarding food safety) and is at a temperature of about 12-15 degrees Celsius. Although it is preferred that chlorinated water be used to clean the banana 100, it is contemplated that the banana 100 can be cleaned using any other accepted method. It is further contemplated that the step of cleaning the banana 100 can be entirely omitted.

Referring to the second step of the inventive method shown in Fig. 4, the banana 100 is sliced transversely into two halves 110 and 112 of substantially equal length. The banana 100 is preferably sliced automatically in a conventional manner by an automated, continuously cleaned knife 114, although it is contemplated that the banana 100 can be sliced using any conventional manual or automated cutting means. For example, it is contemplated that the banana 100 can be conveyed or otherwise forcibly driven through the blade of a conventional band saw, reciprocating saw, table saw, or circular saw. Alternatively, it is contemplated that the banana 100 can be conveyed or otherwise forcibly driven against or along the sharpened edge of a fixed, stationary blade. Still further, it is contemplated that the banana 100 can be manually sliced using a knife, scissors, or shears.

Although it is preferred that the banana 100 be sliced into two halves of equal length for producing two substantially identical treats from a single banana (as further described below), it is contemplated that the banana 100 can be sliced transversely into two segments of unequal length to produce two treats of different size (i.e., one shorter and one longer). Alternatively, it is contemplated that the banana 100 can be sliced transversely into two segments of unequal length with one of the segments being used to produce one large treat or one small treat as desired, and with the other segment being discarded. Still further, instead of cutting the banana 100 transversely as described above, it is contemplated that the banana 100 can be cut on a bias or along a curved or irregularly shaped plane.

After the banana 100 is sliced in half, each half 110 and 112 of the banana 100 is further processed individually in a generally identical manner. The subsequent method steps for
preparing the inventive frozen banana treat will therefore be described with reference to one half 110 of the banana 100 only.

[0038] Referring now to the third step of the inventive process shown in Fig. 5, the banana half 110 is partially cored using a suction coring device that includes a cylindrical tube 120 having a first end with a sharpened circular edge 122 and a second end that is connected to a vacuum hose (not shown, but represented in Fig. 5 by the character "V"). A segment of thin wire (not within view) is mounted radially to, and transversely extends across, the sharpened edge 122 of the tube 120. The tube 120 is about 6 inches in length and has a diameter of about 0.5 inches, although it is contemplated that the tube 120 can have any length greater than about 2 inches and any diameter in a range of about 0.25 inches to about 1 inch depending on the size of the banana being processed and the amount of filling that is to be injected into the banana (as will be described in greater detail below).

[0039] In order to core the banana half 110, the tube 120 of the coring device is axially inserted into the banana half 110 (in the direction of arrow "A" in Fig. 5) with the sharpened edge of the tube 120 and the thin wire cutting into the flesh of the banana half 110. A banana "core" 124, composed of two semi-cylindrical segments of banana flesh (and seeds), is thus formed within the tube 120 (i.e., one segment on either side of the thin wire). The tube 120 is inserted to a depth that is about 1 inch short of the tip of the banana half's flesh, or about 1.5 inches short of the tip of the banana half's peel. Once fully inserted, the tube 120 is rotated about its axis (in the direction of arrow "B" in Fig. 5) approximately 180 degrees, thereby rotating the thin wire relative to the banana, which cuts the previously uncut end of banana core 124 (i.e., the end nearest the uncut end of the banana half 110) along a transverse plane and separates the end of the core 124 from the rest of the banana half 110. The tube is then axially extracted from the banana half 110 (in the direction of arrow "C" in Fig. 5), with the suction force in the tube 120 aiding to pull the core 124 out with the tube, thereby leaving an elongated, cylindrical central channel 126 in the banana half 110. The removed banana core 124 is then collected to be mixed into the filling of the treat (described below).

[0040] In the preferred embodiment of the invention, it is important that the central channel 126 not extend through the outer surface of the banana half's flesh at the uncut end of the banana half 110. Alternative embodiments of the inventive treat are contemplated in which a channel extends partially or entirely through the outer surface of a banana half's flesh. It is also important that the inner diameter of the vacuum hose of the coring device is smaller than the
inner diameter of the tube 120 for preventing the removed core 124 of the banana half 110 from being pulled into the vacuum hose and clogging or damaging the coring device.

[0041] Although the coring device described above is preferred for removing a core from the banana half 110, it is contemplated that any other manual or automatic coring means can be alternatively employed. For example, it is contemplated that a conventional, commercially available, manual fruit corer can be used to remove a core from the banana half 110. It is further contemplated that a knife can be used to remove the core. Still further, it is contemplated that a conventional, automatic, industrial fruit coring machine can be used to automatically remove a core from the banana half 110. Still further, it is contemplated that any sufficiently rigid, thin-walled, food safe cylindrical member, such as a straw, test tube, or segment of pipe can be adapted to remove a core from the banana half 110.

[0042] Referring now to the next step of the inventive method shown in Fig. 6, the central channel 126 of the cored banana half 110 is injected with an edible filling 130 composed of frozen yogurt (i.e., non-fat yogurt combined with low-fat ice cream) mixed with a puree of removed banana cores (described above) and fresh strawberries. The frozen yogurt preferably has a pH in a range of between 5.5 and 6.0, with titratable acidity (TA) of 0.30%. The banana-strawberry puree preferably constitutes about 20% of the total filling mixture and is added to the mixture before the mixture is frozen.

[0043] The filling 130 is injected into the central channel 126 by a conventional horizontal extruder 132 that has a tapered nozzle 134 and that is connected to a continuous freezer (not shown) that contains the filling mixture. It is preferred that the temperature of the filling mixture be at or near -5.5 degrees Celsius as it is pushed out of the extruder nozzle 134. Although using a horizontal extruder to fill the central channel 126 is preferred, it is contemplated that the filling 130 can be inserted into the central channel 126 using any other suitable means, such as by piping, spooning, or by axially inserting a solid, cylindrical core of the frozen filling mixture into the central channel 126.

[0044] Preferably, the frozen yogurt filling 130 contains live probiotic cultures, such as Lactobacillus and Bifidobacterium, which are known to have health-promoting effects, including improvement of lactose utilization and promotion of healthy digestive and immune systems. It is contemplated, however, that such probiotic cultures can be omitted from the filling 130. The frozen yogurt filling 130 preferably also contains a combination of conventional stabilizers and gums, and preferably a combination of locust bean gum and carboxymethylcellulose (CMC), for improving mouth feel, minimizing ice crystal formation, and achieving a desired viscosity as will
be appreciated by those skilled in the art. The viscosity of the yogurt is preferably low enough to allow the filling 130 to be easily injected into the central channel 136 of the banana half 110, but is preferably also high enough to prevent the filling 130 from leaking out of the banana half 110 after it has been injected.

Although it is preferred that unflavored frozen yogurt be used as a base in the filling mixture, it is contemplated that any flavor of frozen yogurt can alternatively be used, including, but not limited to vanilla, chocolate, strawberry, coffee, banana, cherry, blackberry, blueberry, or any combination thereof. It is further contemplated that the frozen yogurt used in the mixture can be unflavored. Still further, it is contemplated that edible substances other than frozen yogurt, including, but not limited to chocolate, caramel, peanut butter, fruit flavored fillings and jellies, ice cream, whipped cream, custard, cottage cheese, cream cheese, marzipan, or any combination thereof can additionally or alternatively be incorporated into the filling.

Similarly, while it is preferred that removed banana cores and fresh strawberries be mixed into the filling 130, it is contemplated that fruits other than bananas and strawberries, including, but not limited to peaches, plums, grapes, cherries, raspberries, blueberries, blackberries, kiwis, apricots, or cranberries, or any combination thereof can additionally or alternatively be pureed and mixed into the filling 130. It is further contemplated that any such fruit or fruits can be incorporated into the filling 130 whole or in cut pieces instead of being pureed. Additionally, it is further contemplated that food items other than fresh fruit pieces, including, but not limited to chocolate chips, peanut butter chips, granola, dried fruits, candy pieces, chopped or whole nuts, or any combination thereof can be additionally or alternatively mixed into the filling 130. It is further contemplated that fruit pieces and alternatives thereto can be entirely omitted from the filling 130.

Referring now to the next step of the inventive method shown in Fig. 7, a stick 140 is longitudinally inserted into the filling 130 in the central channel of the banana half 110. The stick 140 is preferably about 6 inches long, although it is contemplated that a stick having any length in a range of about 3 inches to about 12 inches can be used, depending on the size of the banana half 110. A first end of the stick is inserted into the filling 130 to a depth no greater than the depth of central channel 126, with the opposite end of the stick 140 protruding about 4 inches from the cut end of the banana half 110. The protruding length of the stick 140 provides a handle for allowing a consumer to comfortably hold the frozen banana treat without dirtying his or her hands. The stick 140 in the preferred embodiment of the invention is a conventional flat wooden popsicle stick, although it is contemplated that the stick 140 can have any cross-
sectional shape, such as cylindrical, conical, or oblong, and can be formed of any sufficiently rigid, food safe material, such as various plastics. It is further contemplated that the stick 140 can be inserted into the banana treat in various other positions and orientations (preferably after the banana has been peeled, as will be described below), such as transversely, intermediate the longitudinal ends of the banana half 110, or longitudinally, into the pointed (i.e., uncut) end of the banana half 110. It is further contemplated that the stick 140 can be entirely omitted from the treat.

[0048] Next, referring to Fig. 8, the peel 150 of the banana half 110 is removed using a conventional suction peeling process (not shown) that will be familiar to those skilled in the art. The peeling process is well known and will therefore not be described in any greater detail herein. It is contemplated, however, that the peel 150 of the banana half 110 can be removed by any other suitable means, such as by alternative automated means, or manually by hand.

[0049] A next optional step in the inventive process (not pictured) is exposing the filled banana half 110 to microwave heating at about 350 watts for about 30 seconds. The heating inactivates the enzyme polyphenol oxidase, and thereby mitigates browning of the banana without completely cooking the banana. This technique helps to maintain the desired texture of the banana. It is contemplated, however, that this step can be omitted.

[0050] Referring to the next step of the inventive process shown in Fig. 9, the banana half 110 and its filling 130 are blast frozen to prevent the filling 130 from melting and to preserve the freshness of the banana half 110. Freezing is accomplished by conveying the product through a conventional freezing tunnel 160 that is set to a temperature of about -45 degrees Celsius, although it is contemplated that the product can be frozen using any other method, such as by storing the product in a conventional freezer for a predetermined amount of time, or by dipping the product into a bath of liquid nitrogen. Blast freezing the product (i.e., reducing the temperature of the product rapidly), however, is preferred for preventing the formation of large ice crystals in the product as may result from a slower freezing method. Alternatively, it is contemplated that the product can be cooled but not frozen (i.e., at temperatures greater than 0\(^\circ\)C) for a predetermined amount of time.

[0051] Referring to the next step of the inventive process shown in Fig. 10, the product is manually held in an inverted orientation (i.e., with the uncut end of the banana half 110 pointing downward) and is dipped into a tank 170 of melted dark chocolate 172. The tank 170 is thermostatically controlled and is kept at a preferred temperature of about 30-40\(^\circ\) degrees Celsius for keeping the chocolate 172 in a generally liquid state without burning the chocolate 172. The
temperature of the tank 170 is preferably maintained by an electrically heated water jacket (not shown) in a conventional manner. Alternatively, it is contemplated that the chocolate 172 can be melted in any other suitable manner, such as by using a double boiler or other means of indirect or gentle heating.

After the product has been dipped into and removed from the tank 170, excess chocolate 172 is allowed to drip off the product until only a thin chocolate coating 174, partially hardened through contact with the cold surface of the frozen banana half 110, is left on the product. The chocolate coating preferably covers all exposed surfaces of the banana half 110 and part of the stick 140 immediately adjacent the cut end of the banana half 110 (as best shown in Fig. 1), although it is contemplated that only a portion of the banana half's surface can alternatively be coated. In addition to enhancing the flavor and the texture of the product, the chocolate coating 174 is a good source of natural antioxidants and acts as a barrier against oxidation, enzymatic browning, and dehydration of the product. The chocolate 172 preferably contains emulsifiers such as soy lecithin and polyglycerol polyricinoleate that establish proper viscosity of the chocolate 172 for effectively coating the banana half 110 and preventing the formation of ice crystals when the warm chocolate 172 enrobes the cold banana half 110. Although it is preferred that the banana half 110 be dipped into the melted chocolate 172, it is contemplated that the chocolate coating 174 can be applied to the banana half 110 in any suitable manner. For example, it is contemplated that the chocolate coating can be poured or sprayed onto the banana half 110.

The chocolate 172 used to coat the product is preferably dark chocolate containing at least 35% cocoa liquor, although it is contemplated that any other type of chocolate, such as milk chocolate or bittersweet chocolate, can alternatively be used to coat the product. It is further contemplated that other types of edible coatings, including, but not limited to caramel, peanut butter, artificially flavored syrups, fruit based syrup toppings, chopped or whole nuts, granola, honey, various granular or powdered coatings such as sugar or cinnamon, or any combination thereof can additionally or alternatively be applied to the product either simultaneously as a mixture or sequentially in separate layers. It is further contemplated that the chocolate coating 174 and the alternatives thereof can be entirely omitted from the inventive product.

After being coated with chocolate, the product is once again conveyed through a freezer tunnel and is blast frozen at a temperature of about -45 degrees Celsius in a similar manner to that described above. This second freezing is performed in order to fully harden the
chocolate coating 174 and the filling 130. Alternatively, it is contemplated that the product can be cooled but not frozen (i.e., at temperatures greater than 0°C) for a predetermined amount of time. Referring to Fig. 11, the product is then packaged and is subjected to a conventional metal detection process (not shown) to ensure that it is safe for consumption.

It is contemplated that the product can be shipped and stored at freezing temperatures (<0°C) or at refrigeration temperatures (>0°C). However, prolonged exposure to temperatures above freezing conditions, drastic fluctuations of temperature, light, air, and moisture have a detrimental effect on the quality, acceptance, and shelf life of the finished product. A preliminary study involving sensory evaluation and physical-chemical analysis was performed to estimate the shelf life of the product. Samples of the product were stored at different freezing temperatures (-40°C, -20°C, -12°C) and at refrigeration temperature (4°C) for six weeks. Based on the results of this study, the shelf life of the product is estimated to be at least six months if kept at a storage temperature of -20°C (typical freezer temperature).

Although the product and process of the preferred embodiment of the invention have been described in the context of using a banana as a primary fresh fruit ingredient, it is contemplated that various other fresh fruits, including, but not limited to strawberries, peaches, plums, grapes, plantains, cherries, raspberries, blueberries, blackberries, kiwis, apricots, cranberries, or olives could alternatively be incorporated in a similar manner. For example, if a peach or other pitted fruit were used, it is contemplated that instead of being cored as with a banana, the peach could be split in half and pitted with the remaining pit cavity being filled with a desired filling, as shown in Fig. 12. Alternatively, if a fruit is used that has a naturally formed cavity, such as a raspberry, it is contemplated that the naturally formed cavity can be filled with a desired filling, as shown in Fig. 13. In any such alternative embodiment, it is contemplated that the fresh fruit used can be subjected to any or all of the process steps described above, including cleaning, filling, sticking, freezing, and coating.

This detailed description in connection with the drawings is intended principally as a description of the presently preferred embodiments of the invention, and is not intended to represent the only form in which the present invention may be constructed or utilized. The description sets forth the designs, functions, means, and methods of implementing the invention in connection with the illustrated embodiments. It is to be understood, however, that the same or equivalent functions and features may be accomplished by different embodiments that are also intended to be encompassed within the spirit and scope of the invention and that various
modifications may be adopted without departing from the invention or scope of the following claims.
A method for preparing a frozen banana treat comprising:

1. a) slicing a banana into a first half and a second half;
2. b) removing a core from the first half to form a hollow channel in the first half;
3. c) filling the hollow channel with an edible filling; and
4. d) freezing the first half and said edible filling.

2. The method for preparing a frozen banana treat in accordance with claim 1, further comprising adding probiotic cultures to the edible filling.

3. The method for preparing a frozen banana treat in accordance with claim 1, further comprising inserting a stick into said first half.

4. The method for preparing a frozen banana treat in accordance with claim 3, wherein the stick is inserted into the filling.

5. The method for preparing a frozen banana treat in accordance with claim 1, wherein the step of filling the hollow channel comprises injecting the edible filling into the hollow channel.

6. The method for preparing a frozen banana treat in accordance with claim 5, wherein the filling is injected into the hollow channel by a horizontal extruder.

7. The method for preparing a frozen banana treat in accordance with claim 1, further comprising removing a peel from the first half.

8. The method for preparing a frozen banana treat in accordance with claim 7, further comprising coating an outer surface of the peeled first half with an edible coating.

9. The method for preparing a frozen banana treat in accordance with claim 7, further comprising coating an outer surface of the peeled first half with chocolate.
10. The method for preparing a frozen banana treat in accordance with claim 1, wherein the step of filling the hollow channel with an edible filling comprises filling the hollow channel with a frozen yogurt mixture.

11. A method for preparing a frozen banana treat comprising:
   a) slicing a banana into a first half and a second half;
   b) removing a core from the first half to form a hollow channel in the first half;
   c) filling the hollow channel with an edible filling;
   d) removing a peel from said first half;
   e) freezing the first half and said edible filling; and
   f) coating an outer surface of the first half with an edible coating.

12. The method for preparing a frozen banana treat in accordance with claim 11, further comprising adding probiotic cultures to the edible filling.

13. The method for preparing a frozen banana treat in accordance with claim 11, further comprising inserting a stick into said first half.

14. The method for preparing a frozen banana treat in accordance with claim 13, wherein the stick is inserted into the filling.

15. The method for preparing a frozen banana treat in accordance with claim 11, wherein the step of filling the hollow channel comprises injecting the edible filling into the hollow channel.

16. The method for preparing a frozen banana treat in accordance with claim 15, wherein the filling is injected into the hollow channel by a horizontal extruder.

17. The method for preparing a frozen banana treat in accordance with claim 11, wherein the step of filling the hollow channel with an edible filling comprises filling the hollow channel with a frozen yogurt mixture.

18. A method for preparing a frozen banana treat comprising:
2 a) slicing a banana into a first half and a second half;
3 b) removing a core from the first half to form a hollow channel in the first half;
4 c) filling the hollow channel with an edible filling;
5 d) inserting a stick into the first half; and
6 e) freezing the first half and said edible filling.

19. The method for preparing a frozen banana treat in accordance with claim 18, further comprising adding probiotic cultures to the edible filling.

20. The method for preparing a frozen banana treat in accordance with claim 18, wherein the stick is inserted into the filling.

21. The method for preparing a frozen banana treat in accordance with claim 18, wherein the step of filling the hollow channel comprises injecting the edible filling into the hollow channel.

22. The method for preparing a frozen banana treat in accordance with claim 21, wherein the filling is injected into the hollow channel by a horizontal extruder.

23. The method for preparing a frozen banana treat in accordance with claim 18, further comprising removing a peel from the first half.

24. The method for preparing a frozen banana treat in accordance with claim 23, further comprising coating an outer surface of the peeled first half with an edible coating.

25. The method for preparing a frozen banana treat in accordance with claim 23, further comprising coating an outer surface of the peeled first half with chocolate.

26. The method for preparing a frozen banana treat in accordance with claim 18, wherein the step of filling the hollow channel with an edible filling comprises filling the hollow channel with a frozen yogurt mixture.

27. A method for preparing a frozen banana treat comprising:
2. a) slicing a banana into a first half and a second half;
   b) removing a core from the first half to form a hollow channel in the first half;
   c) filling the hollow channel with an edible filling;
   d) inserting a stick into the first half;
   e) removing a peel from the first half;
   f) freezing the first half and said edible filling; and
   g) coating an outer surface of the first half with an edible coating.

28. The method for preparing a frozen banana treat in accordance with claim 27, further comprising adding probiotec cultures to the edible filling.

29. The method for preparing a frozen banana treat in accordance with claim 27, wherein the stick is inserted into the filling.

30. The method for preparing a frozen banana treat in accordance with claim 27, wherein the step of filling the hollow channel comprises injecting the edible filling into the hollow channel.

31. The method for preparing a frozen banana treat in accordance with claim 30, wherein the filling is injected into the hollow channel by a horizontal extruder.

32. The method for preparing a frozen banana treat in accordance with claim 27, wherein the step of coating the outer surface of the first half with an edible coating comprises coating the outer surface of the peeled first half with chocolate.

33. The method for preparing a frozen banana treat in accordance with claim 27, wherein the step of filling the hollow channel with an edible filling comprises filling the hollow channel with a frozen yogurt mixture.

34. A method for preparing a fresh fruit snack comprising filling a cavity of a fruit with an edible filling.

35. The method for preparing a fresh fruit snack in accordance with claim 34, wherein the
method further comprises forming the cavity in the fruit by coring the fruit.

36. The method for preparing a fresh fruit snack in accordance with claim 34, wherein the method further comprises forming the cavity in the fruit by removing at least one seed from the fruit.

37. The method for preparing a fresh fruit snack in accordance with claim 34, further comprising coating the fruit with chocolate.

38. The method for preparing a fresh fruit snack in accordance with claim 34, further comprising inserting a stick into the fruit.

39. The method for preparing a fresh fruit snack in accordance with claim 34, further comprising freezing the fruit.

40. The method for preparing a fresh fruit snack in accordance with claim 34, further comprising adding probiotic cultures to the filling.

41. The method for preparing a frozen banana treat in accordance with claim 34, wherein the step of filling the cavity with an edible filling comprises filling the cavity with a frozen yogurt mixture.

42. A frozen banana treat comprising:
   a) a segment of a banana having a hollow channel formed therein; and
   b) an edible filling within the hollow channel.

43. The frozen banana treat in accordance with claim 43, wherein the edible filling comprises a frozen yogurt mixture.

44. The frozen banana treat in accordance with claim 44, wherein the frozen yogurt mixture comprises frozen yogurt and fresh fruit pieces.

45. The frozen banana treat in accordance with claim 44, wherein the frozen yogurt mixture
comprises frozen yogurt, banana, and strawberry.

46. The frozen banana treat in accordance with claim 43, wherein the edible filling contains probiotic cultures.

47. The frozen banana treat in accordance with claim 43, wherein the segment of banana is peeled and has an edible outer coating.

48. The frozen banana treat in accordance with claim 48 wherein the edible outer coating is formed of chocolate.

49. The frozen banana treat in accordance with claim 43, further comprising a stick for holding the treat.

50. A frozen banana treat comprising:
   a) a peeled segment of a banana having a hollow channel formed therein;
   b) an edible filling containing probiotic cultures within the hollow channel;
   c) an chocolate outer coating on the surface of the banana segment; and
   d) a stick for holding the treat.

51. A frozen banana treat prepared by a process comprising the steps of:
   a) slicing a banana into a first half and a second half;
   b) removing a core from the first half to form a hollow channel in the first half;
   c) filling the hollow channel with an edible filling;
   d) inserting a stick into the first half;
   e) removing a peel from the first half;
   f) freezing the first half and said edible filling; and
   g) coating an outer surface of the first half with an edible coating.

52. The frozen banana treat prepared by the process in accordance with claim 52, further comprising adding probiotec cultures to the edible filling.

53. The frozen banana treat prepared by the process in accordance with claim 52, wherein the
2 stick is inserted into the filling.

54. The frozen banana treat prepared by the process in accordance with claim 52, wherein the step of filling the hollow channel comprises injecting the edible filling into the hollow channel.

55. The frozen banana treat prepared by the process in accordance with claim 55, wherein the filling is injected into the hollow channel by a horizontal extruder.

56. The frozen banana treat prepared by the process in accordance with claim 52, wherein the step of coating the outer surface of the first half with an edible coating comprises coating the outer surface of the peeled first half with chocolate.

57. The frozen banana treat prepared by the process in accordance with claim 52, wherein the step of filling the hollow channel with an edible filling comprises filling the hollow channel with a frozen yogurt mixture.
INTERNATIONAL SEARCH REPORT

International application No
PCT/US 09/34036

A CLASSIFICATION OF SUBJECT MATTER
USPC - 426/91, 426/98, 426/100; 426/102; 426/514; 426/524
According to International Patent Classification (IPC) or to both national classification and IPC

B FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
USPC 426/91, 426/98, 426/100, 426/102, 426/514, 426/524

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched (text search - see terms below)

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
PubWEST (USPT, PGPB, USOC, EPAB, JPAB), Google Scholar
Search Terms: banana, channel, chocolate, coating, core, extruder, filling, freeze, half, hollow, peel, stick, yogurt

C DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
<thead>
<tr>
<th>Category*</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y</td>
<td>US 5,957,040 A (Feola) 28 September 1999 (28 09 1999), Fig 6a, 6b, abstract, col 3, in 14-17, 59-62, col 4, in 49-51, and claim 3</td>
<td>6, 10, 16, 17, 22, 26, 31, 33, 41, 43-45, 55, 57</td>
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<td>Y</td>
<td>US 6,399,124 B1 (Lesens et al.) 4 June 2002 (04 06 2002), col 2, in 14-18, 44-66</td>
<td>2, 12, 19, 28, 40, 46, 50, 52</td>
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