

Method for the preparation of a serving of a reconstituted beverage

Introduction

This invention relates to a method for the preparation of a serving of a reconstituted beverage for a specific human subject comprising the steps of: a) obtaining a formula product (10); b) obtaining an infant feeding container (20); c) measuring a desired amount of the formula product (10) and dispensing it into the infant feeding container (20); d) measuring a desired amount of liquid (30) and dispensing it into the infant feeding container (20); and e) mixing the contents of the container (preferably after closing the container in order to prevent spoiling of formula product, liquid or reconstituted beverage); wherein step d) may be performed prior to or after step c). The invention also relates to a computer program executable on a computer (100) for assisting the preparation of reconstituted beverage in a feeding container wherein the ratio (40) between the desired amount of the formula product (10) and the desired amount of liquid (30) is determined using the method of the invention. The invention further relates to an electronic scale (200) for assisting in the preparation of a reconstituted beverage in a feeding container (20) wherein the scale is comprising a weighing unit (208) with a user interface (203), a control unit (215) and a communication module (216) arranged to communicate with a computer (100) hosting the computer program according to the invention. The invention also relates to a system comprising the computer program and the scale of the invention.

Background

Breastfeeding is the best way to ensure healthy growth and development of infants during the first months of life. When mothers cannot or choose not to breastfeed, an alternative for breast milk is needed. High-quality foods for infants and young children are available that are safe and scientifically developed according to their nutritional needs. Still there is an ongoing need to further improve alternative solutions to breast milk. Such improvements may come for example from new compositions, composition preparation methods or administration procedures.

Formula products, such as infant formula, are prepared by admixing a fixed amount of liquid such as (warm) water, with a corresponding amount of formula product. The ratio between the amount of liquid and formula product is fixed and is well-explained

on the package of the formula product, for example one scoop of infant formula product per 30 mL of water.

The hydration needs of children are not that different to those of adults. However,
5 infants and children are more susceptible to dehydration than adults. The values for total water intake for infants and children under conditions of moderate environmental temperature and moderate physical activity levels may vary. For example infants aged 0-6 months require 100-190 mL/kg/day -the liquid is coming from human milk/infant formula. Infants aged 6-12 months: 0.8-1.0 L/day - the liquid is coming
10 from human milk/infant formula and complementary foods and beverages. The water intake for infants aged 1-2 years is 1.1-1.2 L/day, for children aged 2-3 years: 1.3 L/day and for children 4-8 years: 1.6 L/day.

Compared to children and adults, infants have a higher total body water content. In newborns the total body water content can be as much as 75% and this decreases to
15 50-60% by the time they reach adulthood. Infants and children need water not only to replace the losses via respiration, sweating and urine, but also for growth. Instances of diarrhea and vomiting are frequent in infants and young children and both can lead to dehydration if water losses are not replaced. Infants cannot easily communicate their needs and active children can be so involved in what they are doing that they
20 forget to drink, so it is important for those caring for them to be alert to the possibility of dehydration especially during hot weather or during periods of illness. Risks of dehydration are also present when the air humidity is high, such as above 60%, in particular above 70%.

25 Iris Iglesia *et al* have shown that a high proportion of children and adolescents are at risk of an inadequate fluid intake. This risk is especially high in males and adolescents when compared with females or children categories, highlighting water intake among young populations as an issue of global concern (I. Iglesia et al 2015 Eur. J. Nutr. 54 Suppl (2):S57–S67 DOI:10.1007/s00394-015-0946-6).

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There are four environmental factors influencing human thermal comfort: airflow (i.e. .wind), air temperature, air humidity, and radiation from the sun or nearby hot surfaces. Next to these, there are personal factors such as clothing, the level of physical activity, and acclimatization/adaptation.

Sweat (or perspiration) is the human body's physiological response to high temperatures, and is an attempt to lower body temperature through evaporation of sweat. Maximum sweat rates of an adult can be up to 2–4 liters per hour or 10–14 liters per day (10–15 g/min·m²), but is less in children prior to puberty. Maximum sweat rates depend among other on the genetic make-up an individual. For example, a variation in the EDAR370A gene has been reported to change teeth, improve sweating capabilities by changing sweat glands, and change hair density and thickness. Under high air temperature and humidity conditions, the effect of perspiration is hindered due to reduced evaporation as a result of high humidity. When evaporation is hindered, overheating and dehydration can occur, with varying severity. The amount of clothing will also affect this cooling efficiency due to its restriction of the air flow over the skin.

In colder conditions, the body must either reduce heat loss or increase heat production. In these conditions evaporation and air humidity are relatively unimportant factors. The cooling of the exposed parts of the body by the wind now becomes the most important external factor affecting thermal balance.

The effect of radiation is important under all temperature conditions. Excess radiation always acts to increase the heat load on a person. This can be of assistance under cold conditions, but under hot conditions it's an extra heat load that must be shed. Airconditioning or climate control in houses and buildings may generate an airflow which is normally less humid as compared to the outside temperature. Consequently, if the expected water loss and/or human thermal comfort is based on the actual outside weather conditions or forecast, the expected water loss may need to be adjusted for the presence of climate control.

Most people use the temperature alone to provide some guide to the level of comfort. The risks of high temperatures on the human body may be listed as follows:

27-32°C	Caution: fatigue is possible with prolonged exposure and activity. Continuing activity could result in heat cramps.
32-41°C	Extreme caution: heat cramps and heat exhaustion are possible. Continuing activity could result in heat stroke.
41-54°C	Danger: heat cramps and heat exhaustion are likely; heat stroke is probable with continued activity.
Over 54°C	Extreme danger: heat stroke is imminent.

Generally, this risk definition is quite reasonable. However, humidity may vary a lot, particularly between different geographical locations or due to climate control such as air-conditioning. High humidity worsens the risk of high temperatures as sweating is less effective in lowering the body temperature. In the context of this invention, the relative air humidity is considered high if it is above 60%, in particular if it is above 70%.

The Apparent Temperature (AT) is a method of combining temperature and humidity and wind into a single number. At temperatures above 25 °C, the AT is equal to the heat index (HI). At temperatures below 10 °C, AT is equal to wind chill.

The AT can also be extended to take solar radiation into account as well. Although the effect of full sun may produce a maximum increase in the AT of about 8°C when the sun is at its highest elevation in the sky, inclusion of the effect of solar radiation into an AT formula makes it much more complex which is the reason why it is often omitted. The amount of deviation between the actual temperature and AT is controlled by the assumptions of the Steadman human model (Robert G. Steadman 1994 Norms of apparent temperature in Australia. Aust. Met. Mag., Vol 43, 1-16.).

Heat index values are particularly important for children. Young children are generally in more danger due to factors including larger skin surface relative to their small bodies, higher heat production as a result of exercise, and typically sweating less than adults. Also, children are often less aware than adults of the need to rest and re-hydrate.

In addition to children, people with certain conditions including obesity, diabetes, heart disease, cystic fibrosis, and mental retardation are at greater risk of overheating and dehydration.

Exposure to hypoxic environments causes comprehensive physiological alterations. Examples of hypoxic environments include environments at increased altitude (moderate altitude (1500–3500 m above sea level), high altitude (3500–5300 m above sea level), and extreme altitude (>5300 m above sea level)). Hypoxia can lead to a lower partial pressure of oxygen in blood and tissues. As an acute compensatory response, ventilation increases and sympathetic activation causes an altitude dependent increase in cardiac output in lowlanders exposed to high altitude.

Hyperventilation is one of the most important factors for ensuring oxygen supply to the tissue. Especially in dry and cold environments, the increased ventilation may be accompanied by increased loss of water. As such, a person's hydration status may also depend on the altitude the person is exposed to.

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When a person e.g. an infant, child or adult drinks more water than needed, this will fill up the stomach and hence reduce the desire to take other food. This may lead to under nutrition / weight loss which is generally undesirable for infants, children and some adults.

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US 2006/0278093 relates to a feeding formula appliance for preparing a fluid food at a desired consumption temperature on demand including a dispenser of water and powder, comprising a data processor, memories and a user interface for inputting information necessary for preparing the infant formula. The appliance comprises a processor and a quantity detector to control dosing of the product, control the filling level and the consumption temperature and the food consumption.

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Accordingly, there is a need for ways to control the intake of the right amount of liquid or water, and the right amount of nutrients.

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The inventors surprisingly found that by varying the ratio between the recommended amount of formula product and the corresponding amount of liquid dependent on the hydration status and/or the expected hydration status of a subject, one or more of the above-mentioned problems may be solved.

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Summary of the invention

Accordingly in one aspect the invention relates to a method for the preparation of a serving of a reconstituted beverage and its adaptation for a specific subject comprising the steps of:

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- a) obtaining a formula product (10);
- b) obtaining a feeding container (20);
- c) measuring a desired amount of the formula product (10) and dispensing it into the feeding container (20);
- d) measuring a desired amount of liquid (30) and dispensing it into the feeding container (20);

- e) mixing the contents of the container (preferably after closing the container in order to prevent spoiling of formula product, liquid or reconstituted beverage); wherein step d) may be performed prior to or after step c); wherein the ratio (40) between the desired amount of the formula product (10) and the desired amount of liquid (30) is dependent on the hydration status of the subject; preferably, wherein the subject is a human subject.

In another aspect the invention relates to a computer program executable on a computer (100) for assisting in the preparation of reconstituted beverage in a feeding container (20), wherein the computer program is configured to:

- a) store at least one personal subject profile comprising information related to an identified subject;
- b) store at least one set of preparation instructions for at least one formula product (10);
- 15 c) pair at least one formula product selected from a group consisting of one or more formula products (10.1, 10.2, 10.3, 10.4, ..., 10.x) with the stored subject profile;
- d) compute from the pairing of the formula product and stored subject profile, a coaching instruction set by determining preparation information, the coaching instruction set comprising a desired amount of the formula product (10) and a desired amount of liquid (30);

20 wherein the ratio (40) between the desired amount of the formula product (10) and the desired amount of liquid (30) is determined using the method of the invention.

25 In yet another aspect the invention relates to an electronic device (200), preferably a scale, for assisting in the preparation of a reconstituted beverage in a feeding container (20) wherein the device is comprising a weighing unit (208) with a user interface (203), a control unit (215) and a communication module (216) arranged to communicate with a computer (100) hosting the computer program according to the invention wherein the device comprises a coaching program (CP) configured for selecting a subject profile and controlling operations of the formula preparation according to

- 30 i) the coaching instruction set received from the computer device resulting from the pairing of the selected subject profile and an formula product selected from a

plurality of infant formula products (10.1, 10.2, 10.3, 10.4, ..., 10.x); and

ii) the hydration status of the subject or the expected hydration status of the subject.

- 5 In still another aspect the invention relates to a system for assisting in the preparation of a reconstituted beverage in a feeding container (20) comprising a computer program according to the invention and hosted on a computer and an electronic device (200) according to the invention, the device being arranged to communicate with the computer and being arranged for controlling operations of the formula preparation according to the received coaching instruction set communicated by the computer device.

Definitions

As used herein the term "reconstituted beverage" relates to a drinkable product that is prepared by dissolving a powder in a liquid such as dissolving an infant formula in water. The drinkable product has a viscosity of less than 200 cP (at 25 °C and a pressure of 1 atmosphere) such as between 1 and 100 cP. Methods to determine viscosity are well-known in the art just like references for calibration. For example water has a viscosity at 25 °C and a pressure of 1 atmosphere of 0.891 cP and soya bean oil of 60 Cp.

A formula product (10) as used herein refers to a product which upon reconstitution with a liquid, preferably with water, more preferably boiled water, provides a reconstituted drinkable product. The formula product usually is a powder, although in some instances it may be readily dissolvable tablet or cube. Examples of formula products include products that after reconstitution into a reconstituted beverage provide a complete nutrition for a subject such as IFT products, Follow-on-Formula (FOF), and JrGUM products. Alternatively, the formula product provides minerals and optionally lactose and is substantially free of protein and fat. Each formula product (10) has a recommended dosage (i.e. amount) of formula product per subject per day; a recommended number of feeding moments per subject per day and a recommended ratio (40) between the desired amount of the formula product (10) and the desired amount of liquid (30).

A reconstituted beverage from a formula product is prepared by admixing a fixed amount of liquid, preferably (warm) water, with a corresponding fixed amount of formula product i.e. recommended ratio or advised ratio or default preparation ratio, or normal value. Once the reconstituted beverage is consumed, its temperature
5 should not be too high in order to avoid burning of the subjects tongue or mouth. Hence normally the temperature of the liquid should be 37 °C or below. An adaptation of a serving of a reconstituted beverage is a change in the powder to liquid ratio as compared to the recommended ratio.

10 A “specific human” as used herein, is the human subject the reconstituted beverage is prepared for. In the preparation of the reconstituted beverage, the ratio (40) between the desired amount of the formula product (10) and the desired amount of liquid (30) is dependent on the hydration status of the human subject.

15 As used herein, the term “hydration status” refers to the balance between water outputs and water inputs in a human body. Excess loss of water or insufficient intake of water induces a state of dehydration. This dehydration is hypertonic when water loss exceeds electrolyte loss, leading to a higher blood electrolyte concentration and thus to an increased plasma osmolality. Euhydration is the state or situation of being
20 in water balance. Euhydration, however, is not a steady state, but rather is a dynamic state in that we continually lose water from the body and there may be a time delay before replacing it or we may take in a slight excess and then lose this. Hyperhydration is a state of being in positive water balance (a water excess) and hypohydration the state of being in negative water balance (a water deficit). High
25 temperatures optionally combined with high air humidity are well-known to increase the risk to become in an hypohydration state. Dehydration is the process of losing water from the body and rehydration the process of gaining body water.

The different forms of hydration status may be identified based on urine osmolality
30 (Uosm). Osmolality is expressed in units of milliOsmoles (mOsm) per kg of water or mOsm/kg where one mOsm is equivalent to one millimole of dissolved solute particles. A solution containing 1 osmole (1000 mOsm) of dissolved solute per kg of water lowers the freezing point of water by 1.858°C. Thus, the freezing point

depression of the urine specimen can be converted to units of osmolality or osmotic concentration by dividing it by 1.858.

Urine osmolality is used to measure the number of dissolved particles per unit of water in the urine. Urine osmolality may be measured using standard techniques. For example based upon the principle that increased concentration of a solute in a solution causes lowering of its freezing point. This method is referred to as freezing point depression osmometry and is using an osmometer. Osmometers read directly in mOsm/kg (milli osmoles per kilogram of water) water by converting the precise temperature sensor readings and directly comparing it with readings obtained using standard aqueous salt solutions of known osmolality (Standards).

Due to remarkable ontogenetic, individual and cultural differences in Uosm, a subjects Uosm is best compared to average values of Uosm of individuals with the same gender, similar age, country / region, cultural background. Manz *et al* European Journal of Clinical Nutrition (2003) 57, Suppl 2, S10–S18. doi:10.1038/sj.ejcn.1601896.

Alternatively, it may be compared to normal reference values. The average Uosm value for a random specimen is between 50 to 1200 mOsm/kg (50 to 1200 mmol/kg); after 12 to 14 hour fluid restriction it is greater than 850 mOsm/kg (850 mmol/kg) (<https://www.ucsfbenioffchildrens.org/> subpage medical-tests/osmolality-urine-test). W. Feldman *et al* disclose urine osmolality in normal newborns ranging from 113 to 183 mOsm (mean value for newborns aged 2 to 6 days old (W. Feldman *et al* 1969, Canad. Med. Ass. J., Nov. 15, vol. 101.595.)). This is in agreement with other disclosures showing that the renal function needs to develop during the first year of life. The maximum urine osmolality increases from 700-800 (mOsm/kg H₂O) at an age of 2 weeks; to 1000-1200 (mOsm/kg H₂O) at 8 weeks of age; to 1200-1400 (mOsm/kg H₂O) at an age of 1 year old (<https://www.nutrition.org.uk/> sub page attachments/442_Shaw.pdf).

The degree of dehydration (hydration status when in hypohydration state) may be defined by physical features which may be different for infants and older children:

Degree of dehydration		Infant	Older child
Mild	<5% infant /		

	<3% child	Thirsty, alert, restless, ↓urine	
Moderate	5-10% infant /	Lethargic, drowsy,	Alert, postural dizziness,
	3-6% child	sunken eyed, ↓urine	sunken eyed, ↓urine
Severe	>10% infant /	Limp, cold, no urine	Apprehensive, cold,
	>6% child	↓ consciousness	no urine, cramps

↓ = reduced amount of / reduced level of

Alternatively dehydration may be determined using the body mass: Acute changes in body mass over a short time period are assumed to be due to body water loss or gain; 1 ml of water has a mass of 1 g and therefore acute changes in body mass can be used to quantify water gain or loss. Over a short time period, no other body component will be lost at such a rate, making this assumption possible. For example an acute loss of body weight of 2% (e.g. a body of 100 kg losing 2 kg during an 3 hour exercise) is considered a mild dehydration.

- 10 Urine specific gravity may also be used as a tool for determining the hydration status in human subjects, although it is less accurate than clinical judgment in determining dehydration status (Purwanto *et al* Paediatr Indones, Vol. 50, No. 5, September 2010 pp 269 – 273).

- Alternatively, the color of the initial morning urine may be used as a hydration status indicator or other methods as shown by Armstrong *et al* (Interpreting hydration biomarkers, Armstrong *et al* European Journal of Clinical Nutrition (2013) 249 – 253). A subject that is euhydrated has a normal initial morning urine color. A hyperhydrated subject has a light-colored initial morning urine color, and a hypohydrated subject has dark-colored initial morning urine color. Such color analysis may be improved by comparing the color with a color chart so as to obtain a objective scoring for the urine color. Suitable color charts are for example the Pantone color series, RAL color chart, or RHS colour chart.

- As used herein, “water intake” is the sum of water in food and beverages plus metabolic water; “water output” is the sum of water losses by the lung, skin, intestine and kidney.

As used herein, the “apparent temperature” (AT) is the temperature equivalent perceived by humans, caused by the combined effects of air temperature, relative

humidity and wind speed. Apparent temperature was invented by Robert Steadman (Robert G. Steadman 1994 Norms of apparent temperature in Australia. Aust. Met. Mag., Vol 43, 1-16). AT is most commonly applied to the perceived outdoor temperature. However, it also applies to indoor temperatures, especially in saunas and when houses and workplaces are not sufficiently heated or cooled for high temperatures (i.e. temperatures above 25 °C). In humid conditions, the air feels much hotter, because less perspiration evaporates from the skin. AT for temperatures above 25 °C is defined by the Heat Index (HI) which is an estimate of the temperature (in °C) that would similarly affect the body at normal humidity (about 20 percent; https://en.wikipedia.org/wiki/Heat_index).

$$HI = c_1 + c_2T + c_3R + c_4TR + c_5T^2 + c_6R^2 + c_7T^2R + c_8TR^2 + c_9T^2R^2$$

where HI = Heat Index, T = Temperature (°C), R = Relative Humidity (%),

c1 = -8.78469475556	c2 = 1.61139411	c3 = 2.33854883889
c4 = -0.14611605	c5 = -0.012308094	c6 = -0.0164248277778
c7 = 0.002211732	c8 = 0.00072546	c9 = -0.000003582

When the AT is determined for a specific subject, the temperature in the formula above should be the temperature at the location where the subject is staying. As mentioned above, this formula does not take into account the effect of (solar) radiation. If needed, the AT value may be adjusted accordingly, or alternatively, appropriate protection against solar radiation may be created.

Wind Chill is defined as the portion of the cooling of a human body caused by air motion. Wind chill has limited effect on the hydration status of a human, and may be ignored in the context of this invention.

Details of the invention

In one aspect the invention relates to a method for the preparation of a serving of a reconstituted beverage and its adaptation for a specific subject comprising the steps of:

- obtaining a formula product (10);
- obtaining an feeding container (20);

c) measuring a desired amount of the formula product (10) and dispensing it into the feeding container (20);

d) measuring a desired amount of liquid (30) and dispensing it into the feeding container (20);

5 e) mixing the contents of the container (preferably after closing the container in order to prevent spoiling of formula product, liquid or reconstituted beverage);

wherein step d) may be performed prior to or after step c);

wherein the ratio (40) between the desired amount of the formula product (10) and the desired amount of liquid (30) is dependent on the hydration status of the subject;

10 preferably, wherein the subject is a human subject.

The formula product (10) having a recommended dosage of formula product per subject per day, the formula product (10) having a recommended number of feeding moments per subject per day and a recommended ratio (40) between the desired amount of the formula product (10) and the desired amount of liquid (30). Such

15 recommended values, which are herein also referred to as "desired amount" are provided by the supplier of the formula product and may depend on the type of product and the age of the subject. For example, the recommended values for a subject of 14 months may be 4 times 27 gram of formula product dissolved in 180 mL of water. In one embodiment of the method of the invention, the ratio (40) between
20 the desired amount of the formula product (10) and the desired amount of liquid (30) is amended based on the hydration status of the subject and the number of recommended feeding moments is increased, preferably while maintaining the recommended dosage of formula product per subject per day.

25 In one embodiment of the method of the invention, the hydration status of the specific subject is determined by subtracting the amount of reconstituted beverage not being consumed from the amount of reconstituted beverage prepared preferably by weighing the feeding container (20) prior to feeding and after feeding of the subject.

The amount of reconstituted beverage consumed in one serving may be used to
30 adjust the desired amount of formula product (10) per serving to compensate for the amount of reconstituted beverage consumed in the previous serving (50). For example, if a subject did not consume the full quantity of the last serving, the amount of formula product may be increased for the next serving to compensate for the lower intake of formula product. This is particularly relevant if the subject failed to consume

the normal amount of formula product (10) for two or more servings in a row and if the amount of reconstituted beverage consumed in one serving (50) is less than 80 % of the recommended serving size. So, in one embodiment, if the subject failed to consume the normal amount of formula product (10) for two or more servings in a row and if the amount of reconstituted beverage consumed in each one serving (50) is less than 80 % of the recommended serving size wherein the desired amount of formula product 10 in step c) is increased with at least 5%, more preferably at least 10% even more preferably at least 15%.

As this invention is not linked to a specific formula product, the skilled person will understand that the recommended amount of formula product per serving and the ratio (40) between the desired amount of the formula product (10) and the desired amount of liquid (30), depends on the formula product. These amounts may be obtained from the package of the formula product or from the supplier of the formula product. The gist of the invention is that this recommended ratio (40) is made dependent on the hydration status of the subject receiving the reconstituted beverage. In particular the relative amount of liquid to formula product is increased when the subject is in a state of hypohydration.

Since infants and children are less able to indicate if they are thirsty, the formula product preferably the formula product is a food product for children. Alternatively, the formula product is an infant formula product. Preferably, the formula product is a food product for children aged 0 to 36 months more preferably 1-36 months, such as an infant formula product (0-6 months), a follow on formula (6-12) or junior GUM product (12-36 months).

Likewise, elderly or diseased people may be less able to self-assess their hydration status and indicate if they are thirsty or not, in other words if they are in euhydration hyperhydration or hypohydration state. So, in one embodiment the formula product is an adult nutrition product.

Preferably, the subject in the method of the invention is a human subject, preferably a human subject between 0 and 5 years old, more preferably between 0 and 3 years old, even more preferably between 0 and 12 months old.

Accordingly, in one embodiment the formula product (10) is selected from a group consisting of one or more formula products (10.1, 10.2, 10.3, 10.4, ..., 10.x). This allows for a selection of an appropriate formula product 10 matching the nutrient

needs of the subject. For example, formula product 10.1 may be a first IFT formula, formula product 10.2 a second IFT product (e.g. an anti-reflux IFT product), formula product 10.3 a first Follow-on-Formula (FOF) and formula 10.4 a JrGUM.

- 5 In one embodiment, the ratio (40) between the desired amount of the formula product (10) and the desired amount of liquid (30) is below the recommended value (i.e. value as provided by standard /normal preparation instructions) when the subject is in a hypohydration status or at risk of becoming in an hypohydration status. In another embodiment of the invention, the ratio (40) is above the recommended value
10 when the subject is in a hyperhydration status or at risk of becoming in an hyperhydration status.

Formula products normally contain all nutrients needed by a subject. The only thing the customer has to do is to reconstitute a beverage from the formula product with a
15 liquid. Preferably this liquid is water, more preferably drinking water. The water may be boiled prior to use in order to destroy pathogenic bacteria, yeast and fungi which may be present in the water.

In one embodiment of the method of the invention, when the ratio (40) is below the
20 recommended value, the liquid is a mixture of water and isotonic water, i.e. water containing a similar concentrations of salt and sugar as in the human body. Preferably wherein the isotonic water comprises milk minerals and/or lactose. In another embodiment of the method of the invention, when the ratio (40) is below the recommended value, the liquid is a mixture of water and isotonic water with
25 additional lactose, preferably wherein the isotonic water comprises milk minerals, more preferably wherein the amount of lactose per 100 mL of the isotonic water is identical to the amount of lactose per 100 mL of reconstituted beverage when prepared according to the recommended preparation instructions, +/- 5%. Such a combination with lactose in the isotonic water is particularly preferred as it mimics the
30 lactose level in the composition of fore-, mid-, and hind- milk of mother's milk. Although the composition of mothers milk may vary going from fore milk to hind milk, the amount of lactose remains similar. As used herein, "milk minerals" is referring to salts present in milk, which predominantly consists of natural milk calcium in the form of calcium phosphate. Milk

minerals may for example be obtained as described in WO2014199014A1, in particular as described in claim 5 of WO2014199014A1.

The increase or decrease of the ratio (40) between the desired amount of the infant formula product (10) and the desired amount of liquid (30) as compared to the normal or recommended ratio, is at least 3%, such as 4%, 5%, 6%, 7%, 8%, 9%, 10%, 11%, 12%, 13%, 14%, 15% or even at least 20% such as at least 25%, 30%, 40% or even 50%; preferably wherein the increase or decrease of the ratio (40) is at least 5%, more preferably at least 10 %, even more preferably at least 15%. The increase or decrease of the ratio (40) is preferably less than 75%, more preferably less than 50%. In one embodiment the increase or decrease of the ratio (40) is selected from the group consisting of 5%, 10%, 15%, 20% and 25%.

In one embodiment, the increase or decrease of the ratio (40) between the desired amount of the infant formula product (10) and the desired amount of liquid (30) is a decrease, in other words, a specific amount of formula product is dissolved in a larger amount of liquid than the recommended amount. The decrease being at least 3%, such as 4%, 5%, 6%, 7%, 8%, 9%, 10%, 11%, 12%, 13%, 14%, 15% or even at least 20% such as at least 25%, 30%, 40% or even 50%; preferably wherein the decrease of the ratio (40) is at least 5%, more preferably at least 10 %, even more preferably at least 15%. The decrease of the ratio (40) is preferably less than 75%, more preferably less than 50%. In another embodiment the decrease of the ratio (40) as compared to the normal value is selected from the group consisting of 5%, 10%, 15%, 20% and 25%.

The hydration status of the subject may be determined using methods known in the art such as urine osmolality, physical features of the subject and / or acute changes in the body mass. The method of the invention is particularly useful in cases where the subject is in a hypohydration state, or at risk of becoming in an hypohydration state. In such cases, the subject is dehydrated or at risk of becoming dehydrated.

Three levels of dehydration are identified: mild, moderate, and severe.

A mild degree of dehydration is defined as an increase in the urine osmolality of up to 5% for infants (up to 3% for a child) as compared to a reference value (average values of Uosm of individuals with the same gender, similar age, country / region, cultural background). A moderate degree of dehydration is defined as an increase in

the urine osmolality of 5 - 10% for infants (3-6% for a child) as compared to a reference value (average values of Uosm of individuals with the same gender, similar age, country / region, cultural background). A severe degree of dehydration is defined as an increase in the urine osmolality of >10% for infants (>6% for a child) as compared to a reference value (average values of Uosm of individuals with the same gender, similar age, country / region, cultural background).

Alternatively, when the degree of dehydration is determined using acute changes in the body mass, a mild degree of dehydration is defined as a decrease in body mass of less than 5% for an infant (less than 3% for a child. A moderate degree of dehydration is defined as a decrease in body mass of from 5 to and including 10% for an infant (from 3 to and including 6% for a child). A severe degree of dehydration is defined as a decrease in body mass of more than 10% for an infant (more than 6% for a child).

The skilled person will understand that the ranges between different degrees of dehydration are not black and white and may vary slightly depending on the determination method used. This will not limit the person skilled in the art to apply the invention. In fact, different determination methods may be combined, for example when no urine is available to determine Uosm.

In one embodiment, the decrease in ratio (40) is at least 5% when the subject is suffering from a mild degree of dehydration, at least 15% when the subject is suffering from a moderate degree of dehydration, and at least 25% when the subject is suffering from severe dehydration.

In another embodiment, the decrease in ratio (40) is at least 10% when the subject is suffering from a mild degree of dehydration, at least 20% when the subject is suffering from a moderate degree of dehydration, and at least 35% when the subject is suffering from severe dehydration.

As used herein, changes in the ration between the desired amount of the formula product (10) and the desired amount of liquid (30), are expressed relative to the normal or recommended ratio between formula product and liquid.

In still another embodiment, the hydration status is determined using a hydration urine test. Such tests are commercially available, e.g. from <https://wetestonline.com/> under subpage "products/dehydration-test". These tests provide strips that can be

pushed into a wet diaper or nappy. A simple color code indicates the hydration status. When monitoring the hydration status of a subject over time, it is recommended to test the hydration status each day at the same time, preferably during the afternoon, since the osmolality of the first urine in the morning is usually higher than during the rest of the day. Accordingly, in another embodiment, the hydration status in the method of the invention is determined prior to the preparation of the reconstituted beverage and this hydration status is compared to an earlier hydration status determination. If it is the same, then the ratio (40) may be kept constant (i.e. the same as for the one used after the previous hydration status determination). Optionally, when the apparent temperature varies more than 5 degrees or when the altitude differs more than 500 meters the ratio (40) may be adjusted to accommodate for these differences as explained elsewhere herein. Likewise, recent consummation details may be considered when determining the new ratio (40). In yet another embodiment, the urine test involves testing of the urine color.

In one embodiment, the hydration status as referred to in the method of the invention also includes the expected hydration status. The expected hydration status refers to the hydration status of the subject in the future, in particular during the first 8 hours following the administration of the reconstituted beverage; more in particular during the first 5 hours following the administration of the reconstituted beverage; preferably during first 4 hours following the administration of the reconstituted beverage; more preferably during the first 3 hours following the administration of the reconstituted beverage. In yet another embodiment, the expected hydration status may be determined using the apparent temperature: if the subject is staying in an area with a temperature above 25 °C, such as above 26, 27, 28, 29,30 or even above 35°C, it is expected that the subject will produce more sweat, and hence lose more water. Consequently, the subject is at risk of becoming in an hypohydration state. Accordingly, in one embodiment, the hydration status is determined by the apparent temperature; preferably wherein the ratio (40) is lowered / decreased when the apparent temperature is above 25 °C, preferably above 26°C, more preferably above 27 °C. Alternatively, the hydration status is dependent on the apparent temperature and the ration (40) is lowered / decreased when the when the apparent temperature is above 30 °C, preferably above 33°C, more preferably above 35 °C, even more

preferably above 38 °C, most preferably when the apparent temperature is above 40 °C. It is understood that when the hydration status depending on the AT. Hydration status referring to expected hydration status.

In a preferred embodiment the Apparent Temperature (AT) is defined as the Heat Index HI wherein

$$HI = c_1 + c_2T + c_3R + c_4TR + c_5T^2 + c_6R^2 + c_7T^2R + c_8TR^2 + c_9T^2R^2$$

wherein HI = Heat Index, T = Temperature (°C), R = Relative Humidity (%),

$c_1 = -8.78469475556$ $c_2 = 1.61139411$ $c_3 = 2.33854883889$

10 $c_4 = -0.14611605$ $c_5 = -0.012308094$ $c_6 = -0.0164248277778$

$c_7 = 0.002211732$ $c_8 = 0.00072546$, and $c_9 = -0.000003582$.

It is noted that the HI may also be expressed in degrees Fahrenheit with appropriate values for c_1 - c_9 .

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The hydration state is depending on the total combination of food and drinks a subject is consuming. For formula-fed young children and in particular for formula-fed infants, the only food and liquid consumed is the infant formula optionally supplemented with small amounts of fruit or other food. Accordingly, in another embodiment of the invention, the ratio (40) between the desired amount of the infant formula product (10) and the desired amount of liquid (30) as defined in the method of the invention, is additionally depending on other food the subject is consuming. In case the other food is providing a lot liquid, that will have an influence on the hydration state of the subject, the same if the other food is predominantly of a dry nature. Hence, preferably the ratio (40) in the method of the invention is increased when the dry matter content in the other food is 30 wt% or lower, such as 25wt% or lower. Alternatively preferably, ratio (40) is increased when the dry matter content in the other food is 20wt% or lower, such as 15wt% or lower; more preferably wherein the ratio (40) is increased when the wt% of dry matter in the other food is 10% or lower; most preferably wherein the ratio (40) is increased when the wt% of dry matter in the other food is 5% or lower. The total food as used herein is defined as all other food and drinks the subject has consumed in the 12 hours preceding the administration of the reconstituted beverage and is expected to consume in the 12 hours after the administration of the reconstituted beverage.

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In still another embodiment, the ratio (40) as defined in the method of the invention, additionally depends on the actual amount of reconstituted beverage consumed during the 12 or 24 hours, preferably in the 24 hours, preceding the scheduled time of feeding the reconstituted beverage i.e. administering the reconstituted beverage.

- 5 The actual amount consumed is calculated from the amount of reconstituted beverage offered for consumption and the amount of reconstituted beverage not being consumed. The amount offered and / or consumed may easily be determined by weighing the container using a scale. Alternatively, the container may be provided with a scale indicating the volume present in the container.

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In particular when the apparent temperature (AT) needs to be calculated for use in the method of the invention, the AT and / or the ratio (40) as defined in the method of the invention is / are calculated using a computer.

- 15 As a computer may be used to calculate the AT and / or the ratio (40) as defined in the method of the invention, in another aspect the invention relates to a computer program executable on a computer (100) for assisting in the preparation of reconstituted beverage in a feeding container (20), wherein the computer program is configured to:

- 20 a) store at least one personal subject profile comprising information related to an identified subject;
- b) store at least one set of preparation instructions for at least one formula product (10);
- 25 c) pair at least one formula product selected from a group consisting of one or more formula products (10.1, 10.2, 10.3, 10.4, ..., 10.x) with the stored subject profile;
- d) compute from the pairing of the formula product and stored subject profile, a coaching instruction set by determining preparation information, the coaching instruction set comprising a desired amount of the formula product (10) and a
- 30 desired amount of liquid (30);

wherein the ratio (40) between the desired amount of the formula product (10) and the desired amount of liquid (30) is determined using the method of the invention.

In one embodiment, the computer (100) executing the computer program of the invention is using an electronic device (200) arranged in communication with the computer, wherein the preparation information is enabling the control of operations of the electronic device (200) for the preparation of an individual subject beverage and intended to be communicated to or be generated by the scale for enabling the scale to control such operations.

Optionally, the computer program is configured to determine the desired amount of liquid (30) and the desired amount of formula (10) for enabling the device to control the weighing of such amounts. Preferable the electronic device is an electronic scale.

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Alternatively, in another embodiment, the computer (100) executing the computer program of the invention is further configured to provide data entry means (120) accessible to the user for acquiring information on the subject profile. The subject profile may contain data relating to the subject such as one or more selected from the group consisting of the subject name, subject date of birth and/or age, gender, subject image, subject weight at one or more dates, allergy information, record of feeding times, record of feeding amounts offered, record of feeding consumed, formula product used by subject, and formula product (10) in current use by subject. The subject information may be used by the program to pair a subject to a specific formula product (10.1, 10.2, 10.3, 10.4, ..., 10.x). Likewise standard preparation instructions may be stored for each formula product (10.x) such as designated age group, number of administrations per day, quantity of formula product per administration and standard amount of liquid (water) per 100g of formula product.

In still another embodiment, the computer (100) executing the computer program of the invention is further configured to provide at least one control interface (142, 143) adapted for retrieving, e.g. by scanning a code such as a bar code or QR code, product identification data associated to the formula product (10) for identification or authentication of formula product to enable the pairing with the subject profile. In this way a person preparing the reconstituted beverage is guided in selecting the right formula product i.e. the formula product currently associated with the subject. The person preparing the reconstituted beverage may for instance select a subject and use the control interface (142, 143) to scan a product code of the formula product that is going to be used. The computer program will then check if the product code of

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the formula product that is going to be used is matching the formula product recorded as the formula product currently in use by the subject. In case the two products are not the same, the computer program will generate a warning which is shown the person preparing the reconstituted beverage. Alternatively, the electronic scale (200) 5 which may be used can be blocked by the computer program, optionally a warning signal may be shown in the scale (200).

In yet another embodiment, the computer program of the invention is configured to compute and display on the computer's user interface, preparation information such 10 as the individual and/or cumulated weighed quantities of infant formula administered per time period (e.g. per day) optionally in the form of a feeding history. A feeding history being an overview of the amounts of reconstituted beverage or formula product being prepared (and optionally being consumed) over a period of time. Different types of information may be displayed in graphs, tables, bars or other 15 graphics.

In one embodiment the computer program according to the invention is configured to communicate wireless to the electronic scale, preferably using Bluetooth or Wi-Fi.

20 The computer program according to the invention may be hosted on any type of computer. As most formula products are prepared at home, the computer program of the invention is preferably configured to be hosted by an in-home computer, a tablet or a smart phone. Hosting on a smart phone being preferred as such a device is generally available and helps to keep the solution non-expensive.

25 It may be that a reconstituted beverage for a subject is prepared from two or more formula product. Hence, in another embodiment, in step c) of the computer program of the invention at least two formula products are selected from a group consisting of two or more formula products (10.1, 10.2, 10.3, 10.4, ..., 10.x) with the stored subject 30 profile.

In particular, when a subject temporarily needs a lower amount of nutrients, e.g. due to illness, but still needs to the normal amount of liquid and minerals (e.g. to prevent dehydration), then in one embodiment of the computer program of the invention i) the total amount of lactose and minerals in the first formula product (10.1) is more than

70 wt%, preferably more than 80 wt% even more preferably more than 90 wt% of the dry weight of the first formula product (10.1), and ii) the total amount of protein, carbohydrate and fat in the second formula product (10.2) is more than 70 wt%, preferably more than 80 wt% even more preferably more than 90 wt% of the dry weight of the second formula product (10.2).

When calculating the apparent temperature (AT) the temperature and air humidity may be needed as input. Hence in one embodiment the computer (100) in the computer program of the invention is provided with air temperature determination means (130) for acquiring air temperature information on the location of the subject and which air temperature information is used to determine the apparent temperature(AT) and the AT is used to determine the expected hydration status. The air temperature determination means (130) may be a thermometer arranged in communication with the computer, or alternatively a control interface adapted for receiving the expected air temperature (such as a keyboard), or alternative a control interface adapted for receiving the expected air temperature at the location of the subject from an from an external source (such as an online weather service).

In another embodiment, the computer (100) in the computer program of the invention is provided with air humidity determination means (140) for acquiring air humidity information on the location of the subject and which air humidity information is used to determine the AT and the AT is used to determine the expected hydration status of the subject.

The air temperature determination means (140) may be an air humidity measuring device arranged in communication with the computer, or alternatively a control interface adapted for receiving the expected air humidity (such as a keyboard), or alternative a control interface adapted for receiving the expected air temperature at the location of the subject from an from an external source (such as an online weather service).

Preferably, the computer (100) in the computer program of the invention is provided with air temperature determination means (130) and with air humidity determination means (140) wherein the air temperature determination means (130) are for acquiring air temperature information on the location of the subject, and the air

humidity determination means (140) are for acquiring air humidity information on the location of the subject and the air temperature together with the air humidity on the location of the subject are used to determine the AT and the AT is used to determine the expected hydration status of the subject.

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In yet another aspect the invention relates to an electronic device (200), preferably a scale, for assisting in the preparation of a reconstituted beverage in a feeding container (20) wherein the device is comprising a weighing unit (208) with a user interface (203), a control unit (215) and a communication module (216) arranged to

10 communicate with a computer (100) hosting the computer program according to the invention wherein the device comprises a coaching program (CP) configured for selecting a subject profile and controlling operations of the formula preparation according to

- i) the coaching instruction set received from the computer device resulting from
- 15 the pairing of the selected subject profile and an formula product selected from a plurality of infant formula products (10.1, 10.2, 10.3, 10.4, ..., 10.x); and
- ii) the hydration status of the subject or the expected hydration status of the subject.

20 In one embodiment, the electronic device (200) according to the invention is arranged for weighing and controlling the liquid (30) quantity and formula product (10) quantity to match respectively a liquid (30) set point and a formula (10) set point during preparation. Preferably, the electronic device (200) according to the invention is further arranged for recording the weighed reconstituted beverage quantity.

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In another embodiment, the electronic device according to the invention is arranged for weighing the quantity of remaining (non-consumed) reconstituted beverage and for communicating it to the computer. Preferably comparing such quantity to a recommended reconstituted beverage and/or to the weighed reconstituted beverage

30 quantity recorded from the preparation is done by the computer program running on the computer (100).

In still another embodiment, the electronic device according to the invention is arranged for displaying on its user interface (203) information related to the ongoing

preparation and/ or next preparation(s). Information relating to the ongoing preparation may for example include the amount of liquid and formula product that has been measured; or needs to be measured, the name of the subject and a time for administration. Information relating to next preparation(s) may additionally include
5 information about adjustments to the amount of formula product (10), liquid (30) and to ratio (40) based on the hydration status or expected hydration status of the subject.

Optionally the electronic device according to the invention is arranged for displaying
10 on the user interface (203) the liquid (30) weighing and the formula product (10) weighing in real time such as under the form of progression bars and preferably for providing a visual and/or sound signal when the weighed liquid (30) quantity and formula product (10) quantity have matched the respective set points.

15 The electronic device according to the invention may further comprise a temperature sensing unit (209) for sensing the liquid temperature in the container; such temperature sensing unit being connected to the weighing unit (208) for communicating the temperature of the liquid and/or reconstituted beverage and optionally, the weighing unit (208) is configured for interrupting the coaching program
20 (CP) if the sensed temperature deviates from a temperature set point. Normally, the temperature set point will be such that it prevents preparation of reconstituted beverages which are too hot for consumption e.g. warmer than 37°C. A second temperature set point may be used to prevent preparation of reconstituted beverages which are too cold for consumption or for dissolving the formula product. Such
25 second temperature set point may be set 20°C or below, preferably at 25°C or below, more preferably at 30°C or below.

Further, the electronic device according to another embodiment of the device of the invention comprises an air temperature sensing unit (219) for sensing the air
30 temperature in the direct vicinity of the electronic device; such temperature sensing unit being connected to the communication module (216) for communicating the air temperature to the computer (100) such that the computer program of the invention may use this air temperature for calculating the expected hydration status of the

subject; changes in the expected hydration status may be communicated back to the electronic device and result in an adjustment of the coaching program (CP).

Alternatively, the electronic device according to an embodiment of the device of the invention comprises an air temperature sensing unit (219) for sensing the air

5 temperature in the direct vicinity of the electronic device, such temperature sensing unit being connected to the communication module (216) for communicating the air temperature to the computer (100), the computer (100) being configured for offering an adjustment of the coaching program (CP) if the sensed air temperature deviates from a temperature set point; e.g. in one embodiment an increase in the relative
10 amount of liquid as compared to the amount of formula product if the temperature is above 25°C.

In still another embodiment, the electronic device according to another embodiment of the device of the invention comprises an air humidity sensing unit (249) for sensing the relative air humidity in the direct vicinity of the electronic device; such humidity

15 sensing unit being connected to the communication module (216) for communicating the relative air humidity to the computer (100) such that the computer program of the invention may use this relative air humidity for calculating the expected hydration status of the subject; changes in the expected hydration status may be communicated back to the electronic device and result in an adjustment of the
20 coaching program (CP).

Alternatively, the electronic device according to an embodiment of the device of the invention comprises an air humidity sensing unit (249) for sensing the relative air humidity in the direct vicinity of the electronic device; such humidity sensing unit being connected to the communication module (216) for communicating the relative

25 air humidity to the computer (100) such that the computer (100) is configured for offering an adjustment of the coaching program (CP) if the sensed relative air humidity deviates from a relative air humidity set point; e.g. in one embodiment an increase in the relative amount of liquid if the relative air humidity is above 60%, such as above 70%, 80% or preferably above 85%.

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In still another aspect the invention relates to a system for assisting in the preparation of a reconstituted beverage in a feeding container (20) comprising a computer program according to the invention and hosted on a computer and an electronic device (200) according to the invention, the device being arranged to communicate

with the computer and being arranged for controlling operations of the formula preparation according to the received coaching instruction set communicated by the computer device.

- 5 In a preferred embodiment of the aspects of the invention the formula product (10) is an infant formula product, and the subject is an infant aged 0-36 months, and the liquid (30) is water, more preferably boiled water.

- 10 In another preferred embodiment of the aspects of the invention the formula product (10) is an infant formula product, and the subject is an infant aged 0-36 months, and the electronic device (200) is an electronic scale and the liquid (30) is water, more preferably boiled water.

- 15 In yet another preferred embodiment of the aspects of the invention the formula product (10) is an infant formula product, and the subject is an infant aged 0-36 months, and the electronic device (200) is an electronic scale, and the computer program is configured to be hosted on a smart-phone, and the liquid (30) is water, more preferably boiled water.

20 **Brief description of the drawings**

Figure 1 shows a computer -assisted system for assisting the preparation of formula product according to the invention;

- 25 Figure 2 relates to a flow chart for a coaching program for controlling the preparation of the reconstituted beverage on the electronic 200 taking into account the hydration status of the subject.

Detailed description of the drawings

- 30 The computer-assisted system 1 of the invention is illustrated in Figure 1. It commonly comprises a dedicated electronic device such as a scale 200, preferably an electronic scale, comprising a user interface 213 and an executable program hosted in a computer 100. The computer is connected to a communication network 105, generally linked to a remote resource such as a server 106. The computer comprises, as known per se, a user interface, a processor and memories, means for inputting data and a communication module. In particular, the computer may be a

smart phone, a tablet or an in-home computer accessible to the user in charge of preparing the formula.

The system further comprises a plurality of formula products 10.1, 10.2, 10.3, 10.4, ..., 10,x with ID1, ID2, ID3, ID4,..., IDx, respectively. The products may be for example a range of packaged infant formula compositions corresponding to different stages of the growth of the infant or be related to particular nutritional or therapeutic diets. The formula products may be stored in product packages such as cans, pouches, cartridges and the like. Each kind of formula product may be associated to product identification data (ID1, ID2, ID3, ID4, ..., IDx).

10 The product identification data may comprise: a product type (10.1, 10.2, 10.3, 10.4, ..., 10,x), a unique identification numeric or alphanumeric number (e.g. serial number), an expiry date, a brand or name, product plant, general preparation data, and combinations thereof. The product identification data can usually be used for determining the type of product the formula product belongs to and for safety, logistic and traceability purposes.

15 The product identification data is preferably coded in an optical code such as an 1-D or 2-D barcode such a QR code and the like. This information of the code can be retrieved by the computer such as by scanning with a camera and image processing means that can be part of the computer itself or be connected thereto. The product identification data can be stored in the memory of the computer and be used for preparing the reconstituted beverage by carrying out initial functions such as the identification and pairing of the infant formula product to a subject profile.

20 A particular program of the invention (which may also be referred to as application or "App") is configured to execute instructions in the computer to carry out these functions.

25 The electronic device 200, preferably an electronic scale, is preferably connected to the computer wirelessly such as by Bluetooth, Wi-Fi or equivalent. The communication between the application ("App") of the computer and the device can be carried out automatically such as by light pairing. The communication is configured to be bi-directional thereby enabling data to be communicated from the computer to the scale such as preparation instructions and data to be communicated from the scale to the computer such as feedback information like weight-related,

time-related, air humidity related, air temperature related and/or liquid temperature information.

The electronic device may determine the weight of the feeding container (20). Liquid
5 from an external source, such as tap water, may be poured into the container (20).
The amount of liquid may be determined by weighing the container (20) filled with
liquid. Likewise, the amount of formula product (10) may be determined using the
device (200). The ratio (40) between the amount of formula product (10) and liquid
(30) may be calculated by the device (200) or the computer (100) (the ratio is not
10 shown in Figure 1).
A program hosted in the computer (100) may be configured for sending a coaching
instruction set to the device (200). In a first operation step (S1), the program is
configured for acquiring information from the formula product such as by scanning a
code. An optional check on the authorization of the formula product may be carried
15 out by the program to ensure the safety compliance of the product. The program may
be ended if the formula product is identified as undesirable. Data may also be
transmitted (downloaded) from the server to the computer after product identification
is completed. For instance, data may relate to product information updates such as
nutritional facts, recommendations or messages for the user.
20 In a another operation, the program is configured for selecting the formula product as
function of relevant information in the subject profile such as his/her age and pair
them (Pairing formula product to subject; Step 2[S2]). Other kinds of information may
be taken into account that can be personalized to the subject to be fed such as a
particular allergy or therapeutic reason or diet. If pairing is unsuccessful in this
25 operation S2, for example because the scanned formula product is not adapted to
the infant profile, the program may be ended and/or a corresponding message
displayed. If pairing is successful, the program may record the identified infant
formula product in the infant profile.
As a result of such pairing, the program is allowed to determine the selected or
30 recorded infant formula product, the coaching instruction set in particular the
weighing set points based on the hydration status of the subject to control the
preparation of the formula product with the device 200 (Coaching instruction set Step
3 [S3]). The set points form a coaching instruction set which is addressed by the
computer to the device 200. These set points are specific to each formula product

and the hydration status of the subject. The setpoints can be: the weight of liquid (preferably water) and the weight of formula product. They are usually determined as function of information in the subject profile which is relevant to the preparation of the formula product, e.g. weight and/or size of the infant. This information is combined
5 with the hydration status or expected hydration status of the subject. The expected hydration status may be determined using the apparent temperature of the place where the subject resides. Therefore, the computer generally stores such information enabling such determination by the program. In the simplest possible form, for each subject such information can be the desired / linked formula product, a set of
10 standard preparation instructions for the product, the subject age, the (expected) hydration status or air temperature, and the relevant weight set points for the device 200.

Finally, the set of coaching instructions containing such set points are transferred from the computer to the device 200 for execution of a corresponding program by the
15 device (Step 4 [S4]).

In a possible variant, the determination of the set points could be executed by a program of the device 200 from information related to the formula product and to subject profile transferred by the computer 100 to the device 200. However, this
20 variant is less preferred as it requires a more complex control unit with more processing power and a larger memory in the scale.

The communication between the computer 100 and the remote server 106 via the communication network 105 is also preferably established bi-directionally to allow
25 exchange of information. In particular, the communication from the server to the computer can be carried out for updating the program of the invention in the computer, for sending product identification data or notifications such as nutritional recommendations, safety messages or promotional offers. The communication from the computer to the server can also be carried out for tracking information, sending
30 program status, creating and updating customer or nutritional data bases, for accessing to websites, shopping, etc.

The electronic device 200 of the invention, preferably is an electronic scale. The device comprises a weighing unit and an optional temperature sensing unit for

sensing the temperature of the liquid or reconstituted beverage. The device further optionally comprises an air temperature sensing unit and an air humidity sensing unit. The weighing unit is configured to provide preparation instructions, subject profile information or other types of information to the user via the user interface 213

5 comprising a screen (e.g. LED display, E-ink paper) and a user selection buttons such as to select and validate choices and/or navigate through different menus displayed on the screen. The scale is able to measure the liquid quantity filled in the feeding container 20 as well as the formula product quantity filled in the container when added to the liquid. The scale comprises at least one weight sensor that

10 provides weight-related input to a control unit (e.g. a main PCB). A communication module such as a bi-directional wireless module (e.g. Wi-Fi or Bluetooth) may also be connected to the control unit for the exchange of data (coaching instructions, consumption data, program updates, etc.) with the computer 100. A connectivity button, e.g. an on/off button with light e.g. LED, connectivity feedback may be further

15 provided. An electrical supply location for a rechargeable energy accumulator or an exchangeable battery, is provided to supply the different electronic components with low voltage current.

The temperature sensing unit can be connected to the device 200 to be able to communicate information as to the sensed temperature of the liquid in the feeding

20 container 20 (e.g. baby bottle). The temperature sensing unit may comprise a contactless sensor such as an infrared temperature sensor for sensing the temperature of the liquid in the feeding container without contact so reducing the risk of contamination. The unit preferably forms a lid that may cover and protect the weighing support of the weighing unit. The temperature sensing unit comprises a

25 control unit (e.g. PCB) to receive temperature input. The connection may be obtained by a wireless communication module connected to the control unit for communicating temperature information to the device and/or to the computer. An electrical supply location for a rechargeable energy accumulator or an exchangeable battery is provided to autonomously supply the temperature sensor and control unit with low

30 voltage current. The sensor could also be a contact sensor such a thermocouple probe.

The air temperature sensing unit can be connected to the device 200 to be able to communicate information as to the sensed air temperature in the surrounding of the device 200, which often is similar to the temperature at the location where the subject

is residing. The temperature sensing unit may comprise a contactless sensor such as an infrared temperature sensor for sensing the air temperature. The temperature sensing unit comprises a control unit (e.g. PCB) to receive temperature input. The connection may be obtained by a wireless communication module connected to the control unit for communicating temperature information to the device and/or to the computer. An electrical supply location for a rechargeable energy accumulator or an exchangeable battery is provided to autonomously supply the temperature sensor and control unit with low voltage current. The sensor could also be a contact sensor such a thermocouple probe.

The air humidity sensing unit can be connected to the device 200 to be able to communicate information as to the sensed air humidity in the surrounding of the device 200, which often is similar to the air humidity at the location where the subject is residing. The air humidity sensing unit may comprise a contactless sensor such as a capacitive, resistive, or thermal sensor that monitors minute changes in the atmosphere in order to calculate the humidity in the air. The air humidity sensing unit comprises a control unit (e.g. PCB) to receive humidity input. The connection may be obtained by a wireless communication module connected to the control unit for communicating humidity information to the device and/or to the computer. An electrical supply location for a rechargeable energy accumulator or an exchangeable battery is provided to autonomously supply the air humidity sensor and control unit with low voltage current.

Figure 2 illustrates the coaching program comprising the steps carried out by the device 200 under control of its control unit and user interface 213 during preparation of the reconstituted beverage. After the device 200 has started in step 1000, the device proposes the selection of a subject profile amongst a list of subject profiles in step 2000. The request for selection of a subject may appear on the screen of the user interface. The displayed subject profiles are preferably stored in a memory of the control unit of the device so that preparation is enabled even when the communication between the computer and scale is interrupted. The list of profiles can be regularly updated from the computer to the device. It is also possible to retrieve a new profile by requesting information from the computer in this operation. The validation of an existing subject profile, triggers the next operation of the procedure of the program.

In step 3000, the subject profile is usually stored in the computer to enable each profile to be paired with a particular formula product. The pairing is preferably carried out in the program executable by the computer but could also be carried out as instructions carried out by a program embedded in the control unit of the device 200.

- 5 This next operation of the procedure involves the determination of the hydration status of the subject selected. The hydration status may be determined based on an information request sent to the user concerning physical characteristics relating to the hydration status such as acute weight loss, Uosm, etc. Alternatively the expected hydration status may be determined by the computer 100 or the device 200 based on
- 10 the air temperature and optionally the relative air humidity. The air temperature and relative humidity may also be provide by the use via the user interface. The hydration status or expected hydration status is then determined by the computer program (app) running on the computer 100 or by the device 200. As a result of the pairing and hydration status determination, coaching instructions (also called "a coaching
- 15 instruction set" or "preparation instructions") are generated. The coaching instructions are preferably generated by the application stored in the computer 100 but, less preferably, could also be generated by a program in the device 200. If the general coaching instructions sets are determined by the computer, each set is attributed to a particular subject profile. Once the choice for the subject profile is performed by the
- 20 user on the user interface of the device and the general coaching instruction set is associated by the device to such profile, changes to the general coaching instruction set (i.e. standard preparation instructions) based on the hydration status are calculated and applied to the general coaching instructions, resulting in a "hydration stage-dependent coaching instruction set". This hydration-stage-dependent coaching
- 25 instruction set is enabling the device to operate the preparation according to the set matching the subject profile and subject hydration status.

The hydration stage-dependent coaching instruction set would typically comprise a liquid (preferably water) quantity set point and an formula product (preferably an infant formula) quantity set point for enabling the device to control the weighing of

30 such quantities.

The coaching instruction set may further comprise instruction data amongst: a time related to the frequency or period of preparation of the formula product, a number of preparations per day, formula product information, hydration status-based corrections being applied, and combinations thereof. For example, the control unit of the device

may receive information as the acceptable time range for the preparation and the control unit may operate a check to verify if the preparation operation is too early or too late or on time and can inform the user by a message, or disable the preparation procedure.

- 5 In the next operation 4000 of the scale's coaching program, the empty feeding container 20 (e.g. baby bottle) weight is measured (i.e. tared). This operation can be optional but it ensures weighing accuracy when different infant containers are utilized. The instruction to place the empty feeding container on the device 200 and the indication that the taring operation is running may be displayed on the screen. A
- 10 signal, e.g. a sound alert can be generated when the operation is completed. In the next step 5000, liquid, preferably water, is poured into the feeding container 20 by the user (or by a dosing device) and the amount of liquid is weighed by the device 200. A request for filling the feeding container with the desired amount of liquid can be displayed on the interface and a visual indication on the progress of the water
- 15 weighing operation is preferably displayed on the screen such as under the form of a progression bar liquid weight set point is reached.
- A next temperature sensing operation 6000 that may be optional or compulsory, may start at the condition of the preceding step being successfully completed. In this operation, the temperature sensing unit measures the liquid temperature by placing
- 20 the infrared sensor above the liquid surface. The infrared sensor may be electronically activated by means of a switch. A preferred arrangement of the switch can be a deformable annular ring-shaped switch which presents the advantage to be pressed or squeezed by hand on the side of the unit. The unit with the infrared sensor is configured to measure the temperature of liquid surface at a distance of a
- 25 few centimeters. The temperature result may be displayed on the user interface of the device 200 and/or on a user interface of the sensing unit. The temperature display may be a temperature point in scale or the like. The display may be followed by a validation step in which the user is requested to continue the preparation or it may automatically trigger the next operation. A check 7000 of the correct
- 30 temperature can be performed and a warning signal 8000 be generated if the sensed temperature does not match the temperature set point. If the sensed temperature is acceptable (e.g. corresponds to a temperature set point memorized in the scale), the next operation 9000 of the standard preparation procedure can take place.

In the next operation 9000, a request is displayed by the device to fill formula product 10 in the container. The weighing of the formula product (i.e. the cumulative weight of liquid and powder) is carried out by the scale in a same manner as for liquid. The weighing in step 9000 is preferably carried out in a continuous manner and preferably displayed on the screen such as under the form of a progression bar. When the measured weight reaches the formula set point, the operation is ended automatically or upon a user's prompt and a visual and/or sound signal is generated. The conditions and/or time at which the preparation has been completed can be confirmed by the device to the computer and recorded in the computer and/or device to be used for historical feed tracking of the preparation.

The coaching procedure in the device may also be configured to be modified manually by the user at the different steps of the preparation (e.g. increase or decrease of the water and/or infant formula set points). In such case, these modifications may also be transferred to the computer and recorded to ensure information tracking.

A consumption monitoring program carried out under the control of the electronic device 200 is described below. The procedure enables to determine the remaining (i.e. non-consumed) reconstituted beverage amount, to record it and to transfer this information to the computer 100. After the device 200 is in start mode, the consumption control procedure can be selected. A request for placing the feeding container may be displayed by the user interface of the device (e.g. "Remaining milk"). In the next operation, the device is configured to measure the remaining reconstituted beverage weight when the feeding container is positioned on the scale of the device 200. An indication of the remaining quantity (e.g. such as a volume on a graduated scale) of reconstituted beverage may be displayed on the user interface. A sound signal may be generated to indicate the end of the weighing step. The following operation may be to select the subject profile via a displayed message on the screen and to record the remaining reconstituted beverage quantity in relation to the selected subject profile. Alternatively, the order of subject selection and remaining reconstituted beverage determination may be changed.

The synchronization of the consumption information with the computer may be carried out immediately after it has been determined for a certain subject or be

postponed if the communication is not established. In the last step, a visual and/or sound signal can be generated by the scale to indicate the end of the procedure.

The computer program may be configured to automatically connect to the available
5 electronic device 200 and/or may invite the user to select a scale which is placed
within the connecting distance of the computer. The available devices can be
detected automatically and listed on a list of identified devices (e.g. by their name)
allowing selection of an individually selected device for connection by the user, e.g.
by simple click or touch. The connectivity to the device may also be bypassed by
10 selecting a bypass command (e.g. "Ignore") to enable access for the user to
application's functions which do not necessarily require the connection to the device
200 (e.g. inputting or consulting information, etc.).

A control interface may depict a menu for access to subject profiles (e.g. named
15 "subject profiles"). The menu may present a list of subject profile summaries. The
summaries may contain limited information such as main identification data (e.g.
photo, name, etc.) as well as essential coaching information for coaching the
preparation of the next infant formula via the electronic device. For instance, the
coaching information may include the infant formula powder name and next feeding
20 time. The coaching information may be completed by intuitive pictograms that can
easily inform the user on the type of instruction. An additional function may be
provided for each subject profile to add an subject feeding manually to the feeding
history. Data entry means are provided related to personal infant profile information.
The data entry means enable the information to be consulted, edited and modified by
25 the user. The information may comprise, for example, the age, gender, size, weight
of the subject. At least part of this information, for example, the age and/or weight,
will enable the program to properly pair a formula product 10 to the selected subject
profile. The additional information may comprise the identification of formula product
10.x which is recommended for the preparation for the subject as function of the
30 personal subject profile.

Coaching information may be provided such as the number of feedings per day.

A control interface can serve as guidance for retrieving the formula product 10 data
information. The interface may provide specific instructions for retrieving information

such as by scanning the code of the infant formula product. The application is preferably configured for automatically capturing the information data from the code (e.g. QR code). The program may be further configured for assessing the proper adaptation of the retrieved product information with the subject profile information, e.g. age and/or weight of the subject such as in control interface. The program may run a safety check operation to ensure that the formula product is a product authorized or adapted for subject consumption (e.g., recall product, expiry date passed, etc.). A message may be provided as to the proper adaptation and/or pairing of the formula product to the selected subject profile. The message may also mention that the product is not an authorized or adapted product. It should be noted that other ways may exist to retrieve information product in particular from the server via the communication network. However, the retrieval of the product information from the product itself such as by scanning is preferred because it can give reassurance to the user that the available formula product is one adapted to the subject to be fed.

Other control interfaces can display information as to the feeding history for a particular subject profile and/or for a particular time period. For instance, a daily consumption graph showing the formula consumption on a feeding volume and time basis. The total volume can be summed and compared to the daily planned consumption. As another example, a display of the consumption history over time which may include feeding statistical data showing for a given period (e.g. over 7 days) the difference between the planned formula quantities and the consumed quantities per each day (i.e. which are directly related to the remaining quantities of liquid measured by the device 200 after feeding as previously described in relation to the consumption control procedure). The planned formula quantities are preferably the theoretical recommended quantities calculated or extrapolated by the computer program as a function of the paired subject profile and product information. Alternatively, the planned quantities can be the formula weighed during preparation by the device 200.

The user interface of the device of the invention is very intuitive and enables the user to prepare the formula in the most accurate and safe manner.

Generally, certain requests require preparation-related steps such as placing the feeding container on the scale or filling the container with liquid or ingredient. Certain requests must be followed by a validation on a selection button to initiate the next

- step, e.g. to initiate a weighing operation by click or to validate the selection of a subject profile by click. A weighing operation is generally displayed in real time by showing the weight increase such as by means of a progression bar (or a percentage or function). Certain operations are ended by a visual and/or sound signal.
- 5 The nutritional coaching application may include additional functions such as online shopping or tracking of food input other than infant formula (such as fruit, meat, etc.).

It is to be understood that this invention is not limited to the specific embodiments and methods described herein, as specific components and/or conditions may, of course, vary. Furthermore, the terminology used herein is used only for the purpose
10 of describing particular embodiments of the present invention and is not intended to be limiting in any way.

It must also be noted that, as used in the specification and the appended claims, the singular form "a", "an," and "the" comprise plural referents unless the context clearly
15 indicates otherwise. For example, reference to a component in the singular is intended to comprise a plurality of components.

Unless defined otherwise, all technical and scientific terms used herein generally have the same meaning as commonly understood by one of ordinary skill in the art to which this invention belongs.

20 Except in the examples, or where otherwise expressly indicated, all numerical quantities in this description indicating amounts of material or conditions of reaction and/or use are to be understood as modified by the word "about" in describing the broadest scope of the invention. Practice within the numerical limits stated is generally preferred. Also, unless expressly stated to the contrary: percent, "parts of,"
25 and ratio values are by weight; the description of a group or class of materials as suitable or preferred for a given purpose in connection with the invention implies that mixtures of any two or more of the members of the group or class are equally suitable or preferred; description of constituents in chemical terms refers to the constituents at the time of addition to any combination specified in the description, and does not
30 necessarily preclude chemical interactions among the constituents of a mixture once mixed; the first definition of an acronym or other abbreviation applies to all subsequent uses herein of the same abbreviation and applies, mutatis mutandis, to normal grammatical variations of the initially defined abbreviation; and, unless

expressly stated to the contrary, measurement of a property is determined by the same technique as previously or later referenced for the same property.

5 List of Numbered embodiments

1. Method for the preparation of a serving of a reconstituted beverage and its adaptation for a specific subject comprising the steps of:
 - a) obtaining a formula product (10);
 - 10 b) obtaining a feeding container (20);
 - c) measuring a desired amount of the formula product (10) and dispensing it into the feeding container (20);
 - d) measuring a desired amount of liquid (30) and dispensing it into the feeding container (20);
 - 15 e) mixing the contents of the container (preferably after closing the container in order to prevent spoiling of formula product, liquid or reconstituted beverage);wherein step d) may be performed prior to or after step c);
wherein the ratio (40) between the desired amount of the formula product (10) and the desired amount of liquid (30) is dependent on the hydration status of the subject,
20 preferably wherein the subject is a human subject; more preferably wherein the subject is a human subject and the decrease in ratio (40) is at least 5% when the subject is suffering from a mild degree of dehydration, at least 15% when the subject is suffering from a moderate degree of dehydration, and at least 25% when the subject is suffering from severe dehydration.
25
2. Method according to numbered embodiment 1 wherein the hydration status of the human subject is determined by subtracting the amount of reconstituted beverage not being consumed from the amount of reconstituted beverage prepared; preferably if the subject failed to consume the normal amount of formula product (10)
30 for two or more servings in a row and if the amount of reconstituted beverage consumed in each one serving (50) is less than 80 % of the recommended serving size wherein the desired amount of formula product 10 in step c) is increased with at least 5%, more preferably at least 10% even more preferably at least 15%.

3. Method according to any one of the preceding numbered embodiments, wherein the ratio (40) between the desired amount of the formula product (10) and the desired amount of liquid (30) is below the recommended value (i.e. value as provided by standard / normal preparation instructions) when the subject is in a hypohydration status or at risk of becoming in an hypohydration status; or above the recommended value when the subject is in a hyperhydration status or at risk of becoming in an hyperhydration status.
4. Method according to numbered embodiment 3 wherein ratio (40) is at least 3%; preferably at least 5%, more preferably at least 10 %, even more preferably at least 15% below or above the normal value.
5. Method according to any one of the preceding numbered embodiments, wherein the subject is a human subject, preferably a human subject between 0 and 5 years old, more preferably between 0 and 3 years old, even more preferably between 0 and 12 months old.
6. Method according to any one of the preceding numbered embodiments wherein the liquid is water, preferably drinking water; or when the ratio (40) is below the recommended value, a mixture of water and isotonic water; preferably wherein the isotonic water comprises milk minerals and/or lactose.
7. Method according to any one of the preceding numbered embodiments wherein the hydration status is determined by the apparent temperature (AT), and/or wherein the ratio (40) is decreased when the apparent temperature is above 25 °C, preferably above 26 °C more preferably above 27 °C; and / or wherein the AT is defined as the Heat Index HI wherein
- $$HI = c_1 + c_2T + c_3R + c_4TR + c_5T^2 + c_6R^2 + c_7T^2R + c_8TR^2 + c_9T^2R^2$$
- wherein HI = Heat Index, T = Temperature (°C), R = Relative Humidity (%),
- | | | |
|---------------------|----------------------|-----------------------|
| c1 = -8.78469475556 | c2 = 1.61139411 | c3 = 2.33854883889 |
| c4 = -0.14611605 | c5 = -0.012308094 | c6 = -0.0164248277778 |
| c7 = 0.002211732 | c8 = 0.00072546, and | c9 = -0.000003582. |

8. Method according to any one of the preceding numbered embodiments wherein the ratio (40) between the desired amount of the infant formula product (10) and the desired amount of liquid (30) additionally depends on other food the subject is consuming, preferably wherein the ratio (40) is increased when the dry matter
5 content in the other food is 30 wt% or lower; or alternatively preferably wherein ratio (40) is increased when the dry matter content in the other food is 20wt% or lower.

9. Method according to any of the preceding numbered embodiments wherein the ratio (40) additionally depends on the actual amount of reconstituted beverage
10 consumed during the 24 hours preceding the scheduled time of feeding the reconstituted beverage.

10. The method according to any of the preceding numbered embodiments wherein the ratio (40) and / or the apparent temperature is/are calculated using a
15 computer.

11. A computer program executable on a computer (100) for assisting in the preparation of reconstituted beverage in a feeding container (20), wherein the computer program is configured to:

20 a) store at least one personal subject profile comprising information related to an identified subject;

b) store at least one set of preparation instructions for at least one formula product (10);

c) pair at least one formula product selected from a group consisting of one or
25 more formula products (10.1, 10.2, 10.3, 10.4, ..., 10.x) with the stored subject profile;

d) compute from the pairing of the formula product and stored subject profile, a coaching instruction set by determining preparation information, the coaching instruction set comprising a desired amount of the formula product (10) and a
30 desired amount of liquid (30);

wherein the ratio (40) between the desired amount of the formula product (10) and the desired amount of liquid (30) is determined using the method of anyone of numbered embodiments 1 to 10.

12. The computer program of numbered embodiment 11 wherein the computer (100) is using an electronic device (200) arranged in communication with the computer, wherein the preparation information is enabling the control of operations of the electronic device (200) for the preparation of an individual subject beverage and intended to be communicated to or be generated by the scale for enabling the scale to control such operations; preferably wherein the electronic device is an electronic scale.

13. The computer program according to numbered embodiment 12, wherein it is configured to determine the desired amount of liquid (30) and the desired amount of formula (10) for enabling the scale to control the weighing of such amounts.

14. The computer program according to anyone of numbered embodiments 11-13, wherein it is further configured to provide data entry means accessible to the user for acquiring information on the subject profile.

15. Computer program according to any one of numbered embodiments 11 to 14, wherein it is further configured to provide at least one control interface adapted for retrieving product identification data associated to the formula product (10) for identification or authentication of formula product to enable the pairing with the subject profile.

16. Computer program according to any one of numbered embodiments 11 to 15, wherein it is configured to compute and display on the computer's user interface, preparation information such as the individual and/or cumulated weighed quantities of infant formula administered per time period (e.g. per day) optionally in the form of a feeding history.

17. Computer program according to any one of numbered embodiments 12 to 16, wherein it is configured to communicate wireless to the electronic scale.

18. Computer program according to any one of numbered embodiments 11 to 17, wherein it is configured to be hosted by an in-home computer, a tablet or a smart phone.

19. The computer program according to anyone of numbered embodiments 11 to 17 wherein in step c) at least two formula products are selected from a group consisting of two or more formula products (10.1, 10.2, 10.3, 10.4, ..., 10.x) with the stored subject profile;

optionally wherein

i) the total amount of lactose and minerals in the first formula product (10.1) is more than 70 wt% of the dry weight of the first formula product (10.1), and

ii) the total amount of protein, carbohydrate and fat in the second formula product (10.2) is more than 70 wt% of the dry weight of the second formula product (10.2).

20. The computer program of anyone of numbered embodiments 11 to 19 wherein the computer (100) is provided with air temperature determination means (130) for acquiring air temperature information on the location of the subject which air temperature information is used to determine the apparent temperature (AT) and the AT is used to determine the expected hydration status of the subject.

21. The computer program of anyone of numbered embodiments 11 to 20 wherein the computer (100) is provided with air humidity determination means (140) for acquiring air humidity information on the location of the subject and which air humidity information is used to determine the AT and the AT is used to determine the expected hydration status of the subject.

22. Electronic device (200) for assisting in the preparation of a reconstituted beverage in a feeding container (20) wherein the device is comprising a weighing unit with a user interface (213), a control unit and a communication module arranged to communicate with a computer (100) hosting the computer program according to any one of numbered embodiments 11 to 21 wherein the device comprises a coaching program (CP) configured for selecting a subject profile and controlling operations of the formula preparation according to

i) the coaching instruction set received from the computer device resulting from the pairing of the selected subject profile and an formula product selected from a plurality of infant formula products (10.1, 10.2, 10.3, 10.4, ..., 10.x); and

- ii) the hydration status of the subject or the expected hydration status of the subject;
preferably wherein the electronic device (200) is an electronic scale.
- 5 23. Electronic device according to numbered embodiment 22, wherein it is arranged for weighing and controlling the liquid (30) quantity and formula product (10) quantity to match respectively a liquid (30) set point and a formula (10) set point during preparation and preferably for recording the weighed reconstituted beverage quantity.
- 10 24. Electronic device according to numbered embodiment 23, wherein the scale is arranged for weighing the quantity of remaining (non-consumed) reconstituted beverage and for communicating it to the computer and preferably for comparing such quantity to a recommended reconstituted beverage and/or to the weighed
- 15 reconstituted beverage quantity recorded from the preparation.
25. Electronic device according to numbered embodiments 23 or 24, wherein it is arranged for displaying on its user interface (213) information related to the ongoing preparation and/ or next preparation(s).
- 20 26. Electronic device according to any one of numbered embodiments 22 to 24, wherein the scale is arranged for displaying on the user interface (213) the liquid (30) weighing and the formula product (10) weighing in real time such as under the form of progression bars and preferably for providing a visual and/or sound signal when
- 25 the weighed liquid (30) quantity and formula product (10) quantity have matched the respective set points.
27. Electronic device according to any one of numbered embodiments 22 to 25, wherein it comprises a temperature sensing unit for sensing the liquid temperature in
- 30 the container; such temperature sensing unit being connected to the weighing unit for communicating the temperature of the liquid and/or reconstituted beverage and optionally, the weighing unit is configured for interrupting the coaching program (CP) if the sensed temperature deviates from a temperature set point.

28. Electronic device according to any one of numbered embodiments 22 to 26, wherein it comprises an air temperature sensing unit for sensing the air temperature in the direct vicinity of the electronic scale; such temperature sensing unit being connected to the communication module for communicating the air temperature to the computer (100) such that the computer program of the invention may use this air temperature for calculating the expected hydration status of the subject; changes in the expected hydration status may be communicated back to the electronic device and result in an adjustment of the coaching program (CP).

10 29. Electronic device according to any one of numbered embodiments 22 to 27 wherein it comprises an air humidity sensing unit for sensing the relative air humidity in the direct vicinity of the electronic device; such humidity sensing unit being connected to the communication module for communicating the relative air humidity to the computer (100) such that the computer program of the invention may use this relative air humidity for calculating the expected hydration status of the subject; changes in the expected hydration status may be communicated back to the electronic device and result in an adjustment of the coaching program (CP).

30. System for assisting in the preparation of a reconstituted beverage in a feeding container (20) comprising a computer program according to any of the preceding numbered embodiments 11 to 21 and hosted on a computer and an electronic device (200) according to any of numbered embodiments 22 to 29, the device being arranged to communicate with the computer and being arranged for controlling operations of the formula preparation according to the received coaching instruction set communicated by the computer device.

Claims

1. Method for the preparation of a serving of a reconstituted beverage and its adaptation for a specific subject comprising the steps of:
- 5 a) obtaining a formula product (10);
b) obtaining a feeding container (20);
c) measuring a desired amount of the formula product (10) and dispensing it into the feeding container (20);
d) measuring a desired amount of liquid (30) and dispensing it into the feeding
10 container (20);
e) mixing the contents of the container (preferably after closing the container in order to prevent spoiling of formula product, liquid or reconstituted beverage);
wherein step d) may be performed prior to or after step c);
wherein the ratio (40) between the desired amount of the formula product (10) and
15 the desired amount of liquid (30) is dependent on the hydration status of the subject, preferably wherein the subject is a human subject; more preferably wherein the subject is a human subject and the decrease in ratio (40) is at least 5% when the subject is suffering from a mild degree of dehydration, at least 15% when the subject is suffering from a moderate degree of dehydration, and at least 25% when the
20 subject is suffering from severe dehydration.
2. Method according to claim 1 wherein the hydration status of the human subject is determined by subtracting the amount of reconstituted beverage not being consumed from the amount of reconstituted beverage prepared; preferably if the
25 subject failed to consume the normal amount of formula product (10) for two or more servings in a row and if the amount of reconstituted beverage consumed in each one serving (50) is less than 80 % of the recommended serving size wherein the desired amount of formula product 10 in step c) is increased with at least 5%, more preferably at least 10% even more preferably at least 15%.
- 30 3. Method according to any one of the preceding claims, wherein the ratio (40) between the desired amount of the formula product (10) and the desired amount of liquid (30) is below the recommended value (i.e. value as provided by standard / normal preparation instructions) when the subject is in a hypohydration status or at

risk of becoming in an hypohydration status;
or above the recommended value when the subject is in a hyperhydration status or
at risk of becoming in an hyperhydration status.

5 4. Method according to claim 3 wherein ratio (40) is at least 3%; preferably at
least 5%, more preferably at least 10 %, even more preferably at least 15% below or
above the normal value.

5. Method according to any one of the preceding claims, wherein the subject is a
10 human subject, preferably a human subject between 0 and 5 years old, more
preferably between 0 and 3 years old, even more preferably between 0 and 12
months old.

6. Method according to any one of the preceding claims wherein the liquid is
15 water, preferably drinking water; or
when the ratio (40) is below the recommended value, a mixture of water and isotonic
water; preferably wherein the isotonic water comprises milk minerals and/or lactose.

7. Method according to any one of the preceding claims wherein the hydration
20 status is determined by the apparent temperature (AT), and/or wherein the ratio (40)
is decreased when the apparent temperature is above 25 °C, preferably above 26 °C
more preferably above 27 °C; and / or
wherein the AT is defined as the Heat Index HI wherein

$$HI = c_1 + c_2T + c_3R + c_4TR + c_5T^2 + c_6R^2 + c_7T^2R + c_8TR^2 + c_9T^2R^2$$

25

wherein HI = Heat Index, T = Temperature (°C), R = Relative Humidity (%),

c1 = -8.78469475556 c2 = 1.61139411 c3 = 2.33854883889

c4 = -0.14611605 c5 = -0.012308094 c6 = -0.0164248277778

c7 = 0.002211732 c8 = 0.00072546, and c9 = -0.000003582.

30

8. Method according to any one of the preceding claims wherein the ratio (40)
between the desired amount of the infant formula product (10) and the desired
amount of liquid (30) additionally depends on other food the subject is consuming,
preferably wherein the ratio (40) is increased when the dry matter content in the other

food is 30 wt% or lower; or alternatively preferably wherein ratio (40) is increased when the dry matter content in the other food is 20wt% or lower.

9. Method according to any of the preceding claims wherein the ratio (40)
5 additionally depends on the actual amount of reconstituted beverage consumed during the 24 hours preceding the scheduled time of feeding the reconstituted beverage.

10. The method according to any of the preceding claims wherein the ratio (40)
10 and / or the apparent temperature is/are calculated using a computer.

11. A computer program executable on a computer (100) for assisting in the preparation of reconstituted beverage in a feeding container (20), wherein the computer program is configured to:
15 a) store at least one personal subject profile comprising information related to an identified subject;
b) store at least one set of preparation instructions for at least one formula product (10);
c) pair at least one formula product selected from a group consisting of one or
20 more formula products (10.1, 10.2, 10.3, 10.4, ..., 10.x) with the stored subject profile;
d) compute from the pairing of the formula product and stored subject profile, a coaching instruction set by determining preparation information, the coaching instruction set comprising a desired amount of the formula product (10) and a
25 desired amount of liquid (30);

wherein the ratio (40) between the desired amount of the formula product (10) and the desired amount of liquid (30) is determined using the method of anyone of claims 1 to 10.

30 12. The computer program of claim 11 wherein the computer (100) is using an electronic device (200) arranged in communication with the computer, wherein the preparation information is enabling the control of operations of the electronic device (200) for the preparation of an individual subject beverage and intended to be

communicated to or be generated by the scale for enabling the scale to control such operations; preferably wherein the electronic device is an electronic scale.

13. The computer program of anyone of claims 11 to 19 wherein the computer
5 (100) is provided with air temperature determination means for acquiring air temperature information on the location of the subject which air temperature information is used to determine the apparent temperature (AT) and the AT is used to determine the expected hydration status of the subject; and / or wherein the computer (100) is provided with air humidity determination means for acquiring air
10 humidity information on the location of the subject and which air humidity information is used to determine the AT and the AT is used to determine the expected hydration status of the subject.

14. Electronic device (200) for assisting in the preparation of a reconstituted
15 beverage in a feeding container (20) wherein the device is comprising a weighing unit with a user interface (213), a control unit and a communication module arranged to communicate with a computer (100) hosting the computer program according to any one of claims 11 to 13 wherein the device comprises a coaching program (CP) configured for selecting a subject profile and controlling operations of the formula
20 preparation according to
i) the coaching instruction set received from the computer device resulting from the pairing of the selected subject profile and an formula product selected from a plurality of infant formula products (10.1, 10.2, 10.3, 10.4, ..., 10.x); and
ii) the hydration status of the subject or the expected hydration status of the
25 subject;
preferably wherein the electronic device (200) is an electronic scale.

15. System for assisting in the preparation of a reconstituted beverage in a feeding container (20) comprising a computer program according to any of the
30 preceding claims 11 to 13 and hosted on a computer and an electronic device (200) according to claim 14, the device being arranged to communicate with the computer and being arranged for controlling operations of the formula preparation according to the received coaching instruction set communicated by the computer device.