

Title: A feeding device for feeding an infant, a method for discharging fluid from an infant feeding device, and a kit of parts

The invention relates to a feeding device for feeding an infant, for example an infant nursing bottle.

Nutritional compositions for infants aim to resemble human milk as much as possible, as human milk is generally seen as the ideal source of nutrition for infants up to at least 6 months of age. Although infant formula have become better and better over time, there are still important differences between human milk and infant formula. As mother's milk is not always available and some parents choose not use mother's milk, there is still a need for further improvements of infant formula.

When a baby is breastfed, it will first get fore milk, then after a certain point in time, mid milk and at the end, hind milk. Fore milk is relatively watery (more watery than mid milk or hind milk), and has a relatively low caloric value. Mid milk is the bulk of the milk produced in a feed. Hind milk is richer in fats and hence has a higher caloric value as compared to fore milk or mid milk. It was found that babies that are thirsty, but not hungry, limit their drinking behavior to fore milk only. In that way nature prevents overfeeding of babies. Similar to an adult enjoying a sweet desert after a fat dinner, a baby may want to consume some additional fore and optionally mid milk from the second breast of the mother after having consumed the hind milk. Surprisingly, it was found that a babies' sucking (nutritive sucking) behavior varies during the feeding process. This variation appeared to correspond to drinking fore milk, mid milk and hind milk. Nutritive sucking (NS) occurs at about one suck per second, and as the feed continues a burst-pause pattern emerges. The first minutes of NS are steady with none or very few short pauses (fore milk consumption), as the feed continues, bursts appear with a pause between bursts (active feeding stage, long slow rhythmic sucking and swallowing with occasional pauses, swallowing 0.5 to 2 times per suck; consuming mid milk). At the end

of feeding, the number of swallows decreases just like the strength of sucking. At this stage, hind milk is consumed. (Shandley S, *et al* (2021) Abnormal Nutritive Sucking as an Indicator of Neonatal Brain Injury. Front. Pediatr. 8:599633. doi: 10.3389/fped.2020.599633).

5 This distinction between fore, mid and hind milk is lost when using infant formula or when using breast milk that was previously collected from a mother and/or donor.

 It is believed that the loss of distinction between fore, mid and hind milk, e.g. when using infant formula, contributes to weight gain later in life.
10 Infants who consumed higher-volumes of formula milk at the age of 3 months gained more body weight and length in later infancy than breastfed infants. Infants fed with higher-volumes of formula milk seemed to have an increased risk of greater body weight and overweight. Thus, the higher-volume formula feeding should be avoided in the early infancy to prevent
15 overweight or obesity in later infancy. See the publication of Huang, J., Zhang, Z., Wu, Y. et al., "Early feeding of larger volumes of formula milk is associated with greater body weight or overweight in later infancy", Nutr. J. 17, 12 (2018).

 Obesity is now prevalent even among our youngest children: during
20 2011-2012, 8.1% of infants and toddlers had weight-for-recumbent-length that was greater than the 95th percentile in the USA. This is particularly alarming because once obesity develops in these early years, it is likely to persist into adulthood, laying the foundation for the continued presence of obesity and related comorbid conditions, such as diabetes and
25 cardiovascular disease, across future generations. Rapid weight gain during the first months of life is an indicator of early childhood obesity.

 WO98/30455 discloses a method and bottle for infant feeding, and provides a method for infant feeding by non-human milk which mimics breast fore- and hind-milk feeding. The method comprises the steps of (a)
30 feeding the infant by fore-milk equivalent having a volume of, for example, 30 - 60 % of a total meal and a percentage of fat of, for example, 2.5 - 3.5 %, and

and (b) feeding the infant by hind-milk equivalent having a volume of, for example, 40 - 70% of the total meal and a percentage of fat of, for example 3.7 - 5.5 %. Also, WO'455 proposes a bottle for feeding infants comprising first and second compartments and being designed in such a manner
5 enabling the infant to consume at first a content being held in said first compartment and thereafter admixing same with a content being held in said second compartment.

Infant feeding bottles having two chambers as such are also known e.g. from US7225938, US7150369, US5611776, WO95/24177, US5060811
10 and US5593052. Such bottles are used for various purposes, e.g. for transferring contents of the first chamber to the second chamber, or for the sequential oral administration of different fluids, e.g. medicine, followed by milk, water or fruit juice.

It is an object of the present invention to further improve infant
15 formula compositions and/or the way babies are fed such compositions.

Also, an object of the invention is to provide an improved infant nursing bottle, in particular to provide a nursing bottle that can achieve improved infant feeding, for example to prevent overfeeding.

According to an aspect of the invention this is achieved by the
20 features of claim 1.

Accordingly, the feeding device preferably comprises a first fluid receptacle, at least a second fluid receptacle, a teat (which may be replaceable), as well as a valve structure for selectively providing a fluid communication between the fluid receptacles and the teat, wherein the
25 feeding device has a sensor configured to detect use of the feeding device, and a controller for controlling the valve structure based on the detected use of the feeding device by the sensor.

In this way improved infant feeding can be achieved. The inventors surprisingly found that the drinking behavior of the baby (i.e. an
30 instantaneous use of the feeding device) is indicative for the baby's needs, in particular a baby's need for mid milk and/or hind milk. Accordingly, the

present feeding device is configured to monitor the baby's (instantaneous) drinking behavior, the monitoring being carried out by the sensor (i.e. using the sensor detection results). Also, the present feeding device includes at least two receptacles (e.g. at least three receptacles), i.e. at least the first
5 and second receptacle, for separately containing respective fluids that are to be discharged (e.g. separately, or in a mixed state) via the teat.

The skilled person will appreciate that the valve structure is preferably controllable by the controller to set or adjust a fluid flow path between at least one of the receptacles and the teat. For example, the valve
10 structure can be controlled (by/via the controller) to allow or block fluid communication between at least one of the receptacles and the teat. The valve structure can be controlled to allow or block fluid communication between each of the receptacles and the teat. Also, the valve structure can be controlled to adjust a fluid communication between at least one of the
15 receptacles and the teat, for example for changing an amount or a flow rate of fluid flowing from that receptacle to the teat from a first non-zero amount or flow rate to a second non-zero amount or flow rate.

According to an embodiment, the feeding device (e.g. the controller) can be configured to automatically switch between feeding from the first
20 fluid receptacle to feeding from the second fluid receptacle (for example to switch from a fore milk equivalent composition to a mid milk equivalent composition and/or to a hind milk equivalent composition in case such compositions are present in the two or more receptacles) based on the detected use of the device.

25 Alternatively, the switching can be achieved manually, by a user/operator, in which case the feeding device can include a signaling device (e.g. sound signal emitter and/or light signal emitter) for signaling a detected use, such as a sensor detection result or a processed sensor detection result, to a user/operator. In that case it is preferred that the
30 feeding device includes a user interface (e.g. a user interface of or communicating with the controller, or a user interface provided by the

controller per se) that can be manually operated by the user to switch a state of the valve structure (in particular based on a detected use of the device, signaled to the user/operator via the signaling device).

Good results can be achieved in case the sensor is configured to
5 detect one or more of:

- a sucking behavior (concerning sucking on the teat);
- a fluid pressure upstream of the teat; and
- a fluid flow rate of fluid flowing to or through the teat.

In particular, a change in a detected (instantaneous) sucking
10 behavior can be indicative of a change in the needs of the baby drinking from the feeder. In addition or alternatively, a change of detected (instantaneous) fluid pressure (in a fluid line leading to the teat) can be indicative of the change of the baby's needs. In addition or alternatively, a change in a detected (instantaneous) fluid flow rate (of fluid flowing through
15 or to the teat) can be indicative of the change of the baby's needs. Once such a change has been detected, the controller can control the valve structure to select the other (i.e. second) fluid receptacle instead of the initial (first) fluid receptacle to feed the baby, or to select both the first receptacle and the second receptacle to feed the baby (with a mixture of the fluids), so that the
20 change of his/her needs is satisfied.

In addition or alternatively, the sensor can be configured to detect a change of the shape of the teat, for example to detect teat deformation. Such a sensor can e.g. include an optical sensor and/or a strain sensor (e.g. a pressure sensors based on hetero-core fiber optics, known per se) mounted
25 in or on the teat, or being integrated in the teat.

According to a preferred embodiment, the first receptacle contains a fore milk equivalent, wherein the second receptacle contains a hind milk equivalent.

In this way, infant overfeeding can be prevented by the device,
30 wherein during use a baby's change of feeding behavior can represent a baby's need for the hind milk (the equivalent being present in the second

receptacle), wherein the device can detect the change of feeding behavior and can control the valve structure to change from feeding fore milk equivalent from the first receptacle to feeding hind milk equivalent from the second receptacle.

5 Alternatively or additionally, at least one of the receptacles may contain a fore milk concentrate or a hind milk concentrate, and another receptacle can contain water, wherein the water can preferably be mixed by the device with the milk concentrate (e.g. by discharging the milk concentrate and the water simultaneously from the respective receptacles)
10 to provide milk that is to be fed to the infant.

 Optionally, and depending on the contents of the receptacles, the device can be configured for controlling the valve structure to change from feeding fore milk equivalent to a mid milk equivalent first (e.g. to feeding a mixture of milk from both the first and second receptacle) and to
15 subsequently change from the mid milk equivalent and to feeding hind milk equivalent from the second receptacle. Optionally, in case the device includes a separate third receptacle, that third receptacle can contain a mid-milk equivalent (in which case no mixing of fluids from the first and second receptacle is required during a mid-milk feeding period).

20 Further, according to an aspect of the invention, there is provided a method for discharging fluid from an infant feeding device, for example a feeding device according to the invention, the method including:

- feeding a first fluid to a teat of the feeding device during a first feeding period;
- 25 - a sensor monitoring a use of the feeding device during the first feeding period; and
- feeding a second fluid to the teat of the feeding device during a second feeding period, the second feeding period starting in case a predetermined change of the use of the feeding device has been detected by
30 the sensor.

 In this way, the above-mentioned advantages can be achieved.

It is preferred that the method includes changing a fluid communication concerning at least one of the fluids (e.g. adjusting the state of a valve that controls a respective fluid communication concerning that fluid) based on the detected change of the use of the feeding device.

5 Optionally, the first fluid and second fluid can be mixed during the first feeding period. Alternatively, mixing of the first fluid and second fluid is prevented during the first feeding period.

 Optionally, the first fluid and the second fluid can be mixed during the second feeding period. Alternatively, mixing of the first fluid and second
10 fluid is prevented during the second feeding period.

 The method optionally includes feeding a third fluid to the teat of the feeding device, for example during the first feeding period, and/or during the second feeding period and/or during a further (or intermediate) third feeding period. In that case, optionally, the third fluid (if any) and the first
15 fluid and/or the second fluid can be mixed during the first feeding period, or during the second feeding period, or during a subsequent or intermediate third feeding period. Alternatively, mixing of the third fluid with one or more of the other fluids can be prevented during discharge of the third fluid.

 According to a preferred aspect of the invention there is provided a
20 kit of parts comprising at least a first liquid (or first powder to be reconstituted with water to provide the first liquid) and a second liquid (or second powder to be reconstituted with water to provide the second liquid), each of the first and second liquid comprising a fat fraction, a carbohydrate fraction and a protein fraction, wherein the first and second liquid together
25 form an infant formula or young child formula, preferably an infant formula; and wherein the energy content from fat of the total energy content of the second liquid is at least 20% higher as compared to the energy content from fat of the total energy content of the first liquid. For the avoidance of doubt, it is understood that the first and second liquid is not a combination
30 of two infant formulas for different age groups. As used herein, an “infant formula” means a breast-milk substitute specially manufactured to satisfy,

by itself, the nutritional requirements of infants during the first months of life up to the introduction of appropriate complementary feeding. The composition of infant formula products and young child formula is managed by legal provisions, like for example the CODEX Alimentarius from the FAO
5 or similar provisions in the USA, Europe or China. Details of such compositions and production methods thereof are known.

In addition or alternatively, according to a preferred aspect of the invention there is provided a kit of parts comprising at least a fore milk
10 equivalent and a hind milk equivalent, the fore and hind milk equivalent each comprising a fat fraction, a protein fraction, a carbohydrate, and a mineral fraction, wherein the fore milk equivalent is not identical to the hind milk equivalent and wherein:

i. the mineral fraction in the fore milk equivalent is
15 substantially the same as the mineral fraction in the hind milk equivalent (i.e. a total amount of minerals per milliliter and relative ratio of different minerals); and/or

ii. the fat fraction in the fore milk equivalent provides at least 20% less calories than the fat fraction in the hind milk fraction,
20 preferably at least 30% less calories, more preferably at least 40% less ; and/or

iii. the protein fraction in the fore milk equivalent is substantially the same as the protein fraction in the hind milk equivalent (i.e. a total amount of protein per milliliter and the protein composition);
25 and /or

iv. the carbohydrate fraction in the fore milk equivalent is substantially the same as the carbohydrate fraction in the hind milk equivalent (i.e. a total amount of carbohydrate per milliliter and the carbohydrate composition); and/or in a preferred embodiment

30 wherein the fore milk equivalent is not identical to the hind milk equivalent and wherein the

- i. the mineral fraction in the fore milk equivalent is substantially the same as the mineral fraction in the hind milk equivalent;
- ii. the fat fraction in the fore milk equivalent provides at least 20% less calories than the fat fraction in the hind milk fraction,
- 5 preferably at least 30% less calories, more preferably at least 40% less calories.

In a more preferred embodiment the invention relates to the kit of parts wherein the fore milk equivalent is not identical to the hind milk equivalent and wherein the

- 10 i. the mineral fraction in the fore milk equivalent is substantially the same as the mineral fraction in the hind milk equivalent;
- ii. the fat fraction in the fore milk equivalent provides at least 20% less calories than the fat fraction in the hind milk fraction, preferably at least 30% less calories, more preferably at least 40% less
- 15 calories; and
- iii. the protein fraction in the fore milk equivalent is substantially the same as the protein fraction in the hind milk equivalent; and
- iv. the carbohydrate fraction in the fore milk equivalent is
- 20 substantially the same as the carbohydrate fraction in the hind milk equivalent.

As used herein, the energy value of one gram of fat corresponds to 9.0 kcal/g, the energy value of one gram of protein corresponds to 4.0 kcal/g, and the energy value of one gram of carbohydrate corresponds to 4.0 kcal/g
25 (source www.fao.org).

Optionally, the kit of parts can include a mid milk equivalent, the mid milk equivalent comprising a fat fraction, a protein fraction, a carbohydrate, and a mineral fraction, wherein the mid milk equivalent is not identical to the hind milk equivalent and wherein the mid milk
30 equivalent is not identical to the fore milk equivalent, wherein preferably:

- i. the mineral fraction in the mid milk equivalent is substantially the same as the mineral fraction in the hind milk equivalent (i.e. a total amount of minerals per milliliter and relative ratio of different minerals); and/or
- 5 ii. the fat fraction in the fore milk equivalent provides less calories than the fat fraction in the mid milk fraction, and the fat fraction in the mid milk equivalent provides less calories than the fat fraction in the hind milk fraction; and/or
- 10 iii. the protein fraction in the mid milk equivalent is substantially the same as the protein fraction in the fore milk equivalent; and /or
- iv. the carbohydrate fraction in the mid milk equivalent is substantially the same as the carbohydrate fraction in the fore milk equivalent
- 15 wherein preferably:.
- i. the mineral fraction in the mid milk equivalent is substantially the same as the mineral fraction in the hind milk equivalent (i.e. a total amount of minerals per milliliter and relative ratio of different minerals); and
- 20 ii. the fat fraction in the fore milk equivalent provides less calories than the fat fraction in the mid milk fraction, and the fat fraction in the mid milk equivalent provides less calories than the fat fraction in the hind milk fraction;
- wherein more preferably:.
- 25 i. the mineral fraction in the mid milk equivalent is substantially the same as the mineral fraction in the hind milk equivalent (i.e. a total amount of minerals per milliliter and relative ratio of different minerals); and
- ii. the fat fraction in the fore milk equivalent provides less
- 30 calories than the fat fraction in the mid milk fraction, and the fat fraction in

the mid milk equivalent provides less calories than the fat fraction in the hind milk fraction; and

iii. the protein fraction in the mid milk equivalent is substantially the same as the protein fraction in the fore milk equivalent;

5 and

iv. the carbohydrate fraction in the mid milk equivalent is substantially the same as the carbohydrate fraction in the fore milk equivalent.

For example, the kit of parts can be used in a method according to the invention. The kit of parts can for example include a first receptacle (e.g. a container or cup) containing the fore milk equivalent, and a second receptacle (e.g. a container or cup) containing the hind milk equivalent. Optionally, the kit of parts can also include other components of a feeding device according to the invention, for assembly of the feeding device.

15 Further advantageous embodiments of the invention are described in the dependent claims.

In the following, the invention will be explained using exemplary embodiments and drawings. The drawings are schematic. In the drawings, similar or corresponding elements have been provided with similar or corresponding reference signs.

Figure 1 schematically shows an opened side view of an exemplary embodiment of the invention;

Figure 2 is similar to Figure 1, showing an alternative example; and

25 Figure 3 shows a further example of a feeding system according to an aspect of the invention.

Figure 1 depicts a feeding device 1 for feeding an infant, in particular a feeding bottle. The feeding device 1 at least comprises a first fluid receptacle 4 (containing a first fluid/beverage M1), a second fluid receptacle 8 (containing a second fluid/beverage M2), a teat (i.e. a nipple) 10, as well as a valve structure (e.g. a valve system) 24, 28 for selectively

providing a fluid communication between the fluid receptacles 4, 8 and the teat 10.

The skilled person will appreciate that the feeding device can be configured in various ways, having e.g. only two fluid receptacles (reservoirs) or more than two, wherein the feeding device can include a fluid duct structure 23, 34, 38 for feeding fluid M1, M2 (e.g. liquid, a beverage) from the receptacles 4, 8 to the teat 10. The feeding device 1 can e.g. include a housing 2 (e.g. a bottle wall, a bottle shaped housing, a container) wherein the fluid receptacles 4, 8 are contained/located or integrated.

Optionally, the teat 10 can be removably coupled to the housing 2 via a respective teat connector 11 (e.g. via a screw-thread connection). In that case, a fluid communication is available between the teat 10 and a downstream section 23 of the device's fluid duct structure 23 when the teat 10 has been coupled to the housing 2 (wherein disassembly/separation of the teat 10 from the housing 2 leads to removal of the teat 10 from the fluid duct structure in case the duct structure remains in the housing 2).

According to an embodiment, the feeding device is refillable, i.e. configured for multi-use. For example, the fluid receptacles 4, 8 can be refillable receptacles, or exchangeable (replaceable) capsules. In case of refillable receptacles, it is preferred that the fluid receptacles 4, 8 are configured to be cleansed, e.g. in a washing process, for example by being removably arranged in the housing 2. Similarly, it is preferred that the respective fluid duct structure 23, 34, 38 is configured to be cleansed, e.g. in a washing process, for example by being removably arranged in the housing 2. Removing contents (e.g. a refillable fluid receptacle, an exchangeable capsule and/or a duct structure part) from the housing 2 can e.g. be achieved via a top of the housing 2 after the teat 10 has been disassembled, or e.g. via another side that can be provided with a removable wall section for allowing access to the interior of the housing 2 (e.g. via an optional removable/releasable bottom wall B of the housing 2).

In another embodiment, the device 1 can be a single-use device, e.g. configured to be discarded (preferably to be recycled) after it has been used.

The valve structure can include e.g. a first valve 24 that is associated with the first receptacle 4 (for controlling fluid flow from that
5 receptacle 4 to the teat 10), and a second valve 28 that is associated with the second receptacle 8 (for controlling fluid flow from the second receptacle 8 to the teat 10). The valves 24, 28 can e.g. be integrated in the respective receptacles 4, 8 and/or in the respective fluid duct structure 23, 34, 38, as will be clear to the skilled person. Besides, the valves 24, 28 can be separate
10 elements (as in the drawings) or they can be combined/integrated with each other. It is preferred that the valve structure 24, 28 is configured to select which of the two (or more) fluid receptacles 4, 8 is in fluid communication with the teat 10.

According to one embodiment, during operation, the valve
15 structure 24, 28 only allows one of the fluid receptacles 4, 8 to be in fluid communication with the teat 10 at a time (i.e. mixing of fluids from the receptacles can preferably be prevented by the valve structure). Alternatively, the valve structure 24, 28 can be configured, or adjustable to a valve state, to allow dispensing of a mixture of fluids M1, M2 from the two
20 receptacles (i.e. by simultaneous discharge of the fluids M1, M2, e.g. in a predetermined mixing ratio).

The valve structure 24, 28 can include e.g. one or more electric actuators, servo's, solenoid valves, motors or the-like, for setting valve states. Each of the valves 24, 28 can e.g. be adjustable (by a controller 22)
25 between an opened valve state (allowing fluid flow) and a closed valve state (blocking fluid flow), wherein each valve 24, 28 can optionally provide several mutually different opened valve states (e.g. for setting/adjusting an amount of fluid flow, e.g. by adjusting a size of a fluid flow passage through the valve). Also, the valve structure 24, 28 can include or be connectable to
30 an electric power source (not shown) for providing electric power thereto.

The device has a controller 22 configured to control the valve structure 24, 28. The controller 22 can e.g. be or include a microelectronics unit, a programmed controller carrying out software code, an electronic circuit, or the-like. The controller 22 can include or be provided with a power source (e.g. a battery or an external power source) for powering the controller.

For example, the feeding device 1 can include a single electric power source (not shown) for powering the controller 22 as well as an electrically controllable valve structure 24, 28.

The controller 22 can be part of or integrated with the valve structure, or communicate with the valve structure via a suitable communication link, e.g. including one or more communication lines, for example for sending valve control signals to the respective valve(s) 24, 28 to set respective valve states (i.e. for opening or closing the respective valve). For example, the controller 22 can be configured to provide valve control signals that are electric valve powering signals, controlling and powering the respective valve(s) 24, 28 for setting a desired valve structure state.

The controller 22 can be located in and/or connected to a housing 2 of the feeding device 1. In an alternative embodiment, the controller 22 is located externally (and remotely) of the feeding device 1, the controller 22 and valve structure 24, 28 being configured to communicate wirelessly with each other utilizing a suitable wireless transmission means (e.g. Bluetooth or the-like). In yet another embodiment, the controller 22 is configured to communicate wirelessly (e.g. via Bluetooth or the-like) with an external or remote user interface device (configured to wirelessly receive information or data from the controller 22 of the feeding device 1 and e.g. configured to process received information or data, and optionally having a memory to store such information or data and/or having a display to display such information or data), for example with an app on a cell phone or the like, to allow archiving and/or displaying information about the feeding process

such as total amounts of fluid M1, M2, duration, number of feedings per day etc.

Besides, the controller 22 can include or be associated with a user operable user interface. Such a user interface can for example include at least one user operable knob, switch or button K1, provided in or on the housing 2, for operating the controller 22, and in particular for initiating a change of the state of the valve structure 24, 25, 28 (via the controller 22).

Besides, instead of an electronic or digital controller, a mechanical valve controller can be used. Such a mechanical valve controller can for example include at least one user operable knob, switch or button, provided in or on the housing 2 and coupled to the valve structure for directly controlling the valve structure, in particular for changing a state of the valve structure 24, 25, 28.

In addition or alternatively, the device 1 can include a user operable user interface, for example at least one user operable knob, switch or button K2, for adjusting a state of a valve or each valve, for example for adjusting fluid communication between at least one of the receptacles and the teat, and in particular for changing an amount or a flow rate of fluid flowing from that receptacle to the teat from a first non-zero amount or flow rate to a second non-zero amount or flow rate (during operation).

Advantageously, the device has a sensor 20 configured to detect use of the feeding device 1. The sensor 20 can be configured in various ways. The sensor 20 can correspond to or be similar to a sensor that is known from US6109100, which is configured to provide data responsive to a human or animal subject sucking on a nipple or other outlet connected to a supply of feeding fluid stored in a reservoir. The sensor 20 can e.g. be an electronic sensor, which can be electrically powered by an integrated (or external) power source, wherein the sensor 20 can be configured to provide electronic monitoring signals. It is preferred that the sensor 20 is communicatively connected to the controller 22 to transmit the sensor signals (i.e. sensor detection results) to the controller 22. A respective sensor signal can e.g. be

an analogue or digital signal. Also, according to an embodiment, the sensor and controller can be integrated with each other (e.g. being provided on the same printed circuit board, or differently).

As is mentioned before, the sensor 20 can e.g. be configured to
5 detect one or more of:

- a sucking behavior (concerning the sucking of a user on the teat 10), e.g. a sucking pattern (such as a number of sucking instances per minute or a number of suck-swallow-breath instances per minute);
- a fluid pressure upstream of the teat 10, e.g. a pressure in a
10 section 23 of the fluid duct structure; and
- a fluid flow rate, for example an average or instantaneous flow rate, of fluid flowing to or through the teat 10 (e.g. of fluid flowing through a section 23 of the fluid duct structure).

The controller 22 is preferably configured to control the valve
15 structure 24, 28 based on the detected use of the feeding device 1 by the sensor 20. In this way, improved (in particular automatic) infant feeding can be achieved, wherein the user (infant) can directly influence which fluid is being dispensed via the teat by changing device use (e.g. by changing sucking behavior, which can or will change fluid pressure and/or fluid flow
20 rate upstream of the teat 10).

It follows that the sensor 20 is preferably configured to generate a sensor signal indicative of a detected use of the device 1, wherein it is further preferred that the controller 22 is configured to process the sensor signal for determining a predetermined change of the use of the feeding
25 device 1. Then, the controller 22 is preferably configured to change a state of the valve structure 24, 28 in case a predetermined change of the use of the feeding device 1 has been determined by the controller 22.

For example, the predetermined change of the use of the feeding device 1 can be one or more of:

- 30 - a change in sucking – swallowing ratio (e.g. a change from short rapid sucks, into a more rhythmic sucking and swallowing pattern with one

or two sucks followed a short pause allowing the baby to swallow the feeding product);

-a predetermined pause in sucking (for example a pause of at least 30 seconds; and

- 5 -a decrease of an average fluid flow rate, for example a threshold decrease of an average flow rate (for example a change, in particular a reduction, of at least 30% of a detected mass flow or volume flow per minute) compared to an initial flow rate at a start of a feeding cycle.

Also, the controller 22 can be configured to automatically detect a
10 start of a feeding cycle, based on a received sensor signal, e.g. signaling a first sucking on the teat, signaling a first pressure change and/or signaling a first fluid flow rate change or a first fluid flow rate higher than zero. The controller 22 can automatically start monitoring the sensor signal to detect a subsequent change of a use of the device 1 once the start of the feeding has
15 been detected.

For example, the controller 22 can be configured to automatically start detecting a sucking pattern at/from the start of the feeding cycle (using the sensor signal), to evaluate if a predetermined pause in sucking occurs (which can be the predetermined change of the use of the feeding device).

- 20 Also, for example, the controller 22 can be configured to automatically start detecting the average fluid flow rate at/from the start of the feeding cycle (using the sensor signal), to evaluate if the fluid flow rate decreases to a threshold value (which can be the predetermined change of the use of the feeding device).

- 25 The controller 22 can be configured to control the valve structure 24, 28 to allow fluid communication between the first receptacle 4 and the teat 10, and optionally to block fluid communication between the second receptacle 8 and the teat 10, during a first feeding period, for example from the start of a feeding cycle. In case a further (third) receptacle 5 is present
30 (see below and Figure 2), the controller can be configured to also block fluid

communication between the third receptacle 5 and the teat 10 during the first feeding period.

Also, the controller 22 can be configured to control the valve structure 24, 28 to block fluid communication between the first receptacle 4 and the teat 10 and to allow fluid communication between the second receptacle 8 and the teat 10 during a (subsequent) second feeding period. Alternatively, the controller 22 can be configured to control the valve structure 24, 28 to allow fluid communication between the first receptacle 4 and the teat 10 during the (subsequent) second feeding period (in particular in case mixing of the respective fluids is desired). In that case, it may also be advantageous in case the controller 22 can control the valve structure 24, 28 to adjust the fluid communication between the first receptacle 4 and the teat 10 during the (subsequent) second feeding period (for example by controlling the first valve 24 to adjust from a first opened valve state to a second opened valve state that differs from the first opened valve state), e.g. to set a certain mixing ratio between the fluids M1, M2. Optionally, in case a further (third) receptacle 5 is present, the controller can also be configured to block fluid communication between the third receptacle 5 and the teat 10 during the second feeding period.

It is preferred that the controller 22 is configured to control the valve structure such that the start of the second feeding period is based on the detected use of the feeding device 1 by the sensor 20 (and in particular on a change of the detected use).

Moreover, preferably, the device 1 has a signaling device 13, e.g. a sound signal emitter (e.g. a loudspeaker) and/or light signal emitter (e.g. one or more light emitting diodes) for signaling a detected use of the feeding device to an operator.

In addition, the device 1 can be configured to utilize a third feeding period, for feeding a third fluid which may be a mixture of the first fluid M1 and the second fluid M2. Then, it is preferred that the controller 22 is configured to control the valve structure such that the start of the third

feeding period is based on the detected use of the feeding device 1 by the sensor 20 (and in particular on a change of the detected use). The third feeding period can e.g. be an intermediate feeding period (i.e. between a mentioned first feeding period and a second feeding period), or it can be
5 subsequent to the second feeding period.

Operation of the feeding device 1 can include a method for discharging fluid (from the feeding device 1, via the teat 10), the method including:

- feeding a first fluid M1 (from the first receptacle 4) to the teat 10
10 of the feeding device 1 during a first feeding period;
- the sensor 20 monitoring a use of the feeding device 1 during the first feeding period; and
- feeding a second fluid M2 (from the second receptacle 8) to the teat 10 of the feeding device 1 during a second feeding period, the second feeding
15 period starting in case a predetermined change of the use of the feeding device has been detected by the sensor 20.

During use, each of the receptacles 4, 8 of the feeding device 1 can e.g. contain beverage, for example milk or a milk equivalent (e.g. formula based milk), wherein it is preferred that a composition of the contents M1 of
20 the first receptacle 4 differs from a composition of the contents M2 of the second receptacle 8. As an example, a fat content (such as a volume percentage) of fat of the liquid M1 in the first receptacle 4 can be lower than a fat content of the liquid in the second receptacle 8. In other words: the liquid M2 (beverage, milk) held in the second receptacle 8 is preferably
25 richer in fat than the liquid (beverage, milk) held in the first receptacle 4.

As is mentioned before, according to a preferred embodiment, the first receptacle 4 contains a fore milk equivalent, wherein the second receptacle 8 contains a hind milk equivalent. As will be explained below in further detail, and as will be clear to the skilled persons, these fluids can
30 have various compositions.

Alternatively, for example, one of the fluids can be a milk concentrate, in particular a fore milk concentrate or a hind milk concentrate, and the other of the fluids can be water (that is to be mixed with the milk concentrate).

5 In case the first fluid M1 is a fore milk equivalent, and the second fluid M2 is a hind-milk equivalent, the device 1 can operate to discharge mid milk via the teat by feeding a mixture of the contents from the two receptacles (e.g. during the second feeding period, or during an optional third feeding period between a first and second feeding period).

10 Thus, improved infant feeding can be achieved (e.g. to prevent baby overfeeding), wherein the feeding device can automatically adjust the feeding to a change of detected infant feeding needs i.e. the adjusting being based on a monitored use of the feeding device 1 by the respective sensor 20.

 Also, as follows from the above, it is preferred that fluid from each
15 of first receptacle and second receptacle can pass to and through the teat 10, wherein flow from (i.e. selection of) either one of the first 4 and second 8 receptacle is regulated by the valve structure 24, 28 and respective controller 22, such that it is determined which of the receptacles communicates 4, 8 with the teat 10 (and which does not).

20 According to an example, operation of the device 1 can be such that:

- a. the valve means 22, 24, 28 allow only fluid/beverage M1 from the first receptacle 4 to pass to the teat 10 at the beginning of the feeding cycle;
- 25 b. the valve means 22, 24, 28 monitor the sucking behavior and/or fluid flow rate and/or respective fluid pressure to the teat;
- c. if there is a pause in the sucking (e.g. a pause of at least 30 seconds) and/or if an average fluid flow rate decreases with e.g. at least 30% (e.g. a detected fluid flow rate per minute), and/or e.g. a change in a
30 suck-swallow-breath pattern, the valve means 22, 24, 28 switches to allow fluid/beverage M2 from the second receptacle 8 to pass to the teat 10.

It can be preferred that the first fluid M1 and second fluid M2 are not mixed during operation. In particular, the controller 22 controls the valve structure 24, 28 to only feed the first fluid M1 to the teat 10 during the first feeding period and to only feed the second fluid M2 to the teat 10 during the (subsequent) second feeding period.

Alternatively, the first fluid M1 and second fluid M2 are mixed during operation, for example once a change of device use has been detected (such as for feeding a mixture that represents or is similar to mid milk, or for mixing a milk concentrate with water).

In particular, during use, a start of a feeding session begins with an infant (the user) sucking on the teat 10. The controller 22 preferably detects the start of the feeding session, for example by detecting the start of the sucking. Also, at the start of the feeding session, the controller 22 can control the valve structure (e.g. by opening the first valve 24 and by closing the second valve 28) to provide fluid communication between the first receptacle 4 and the teat only, so that first fluid M1 can be discharged via the teat 10 to the infant. It will be appreciated that the feeding leads to fluid flow (and flow rate) in the device 1, as well as respective fluid pressure variations (due to the infant's sucking action).

During feeding, the sensor 20 detects the use of the device 1 and can provide a respective sensor detection result (e.g. sensor signal) to the controller 22, e.g. to be processed by the controller to determine if/when a predetermined change in feeding behavior (e.g. sucking behavior, fluid pressure and/or fluid flow rate) occurs.

After a certain feeding period, the infant can change his/her use of the feeding device 1, for example by changing sucking behavior (as is explained above), which can lead to a change in fluid pressure (e.g. a fluid pressure pattern) and/or fluid flow rate upstream of the teat 10. The controller 22 can detect this change of the use of the feeding device 1, based on the detection results received from the sensor 20, and after such detection the controller 22 controls the valve structure (e.g. by closing the

first valve 24 and by opening the second valve 28) to provide fluid communication between the second receptacle 8 and the teat only, so that second fluid M2 can be discharged via the teat 10 to the infant.

Alternatively, as is mentioned above, the controller 22 can detect
5 the change of the use of the feeding device 1, based on the detection results received from the sensor 20, and after such detection the controller 22 controls the valve structure (e.g. by optionally adjusting an opening state of the first valve 24, and by opening the second valve 28) to provide fluid
10 communication between both the receptacle 4 first and second receptacle 8 and the teat, so that a mixture of first fluid M1 and second fluid M2 can be discharged via the teat 10 to the infant. In this case, the controller 22 may also operate to detect another change of the use of the feeding device 1, based on the detection results received from the sensor 20, and after such
15 detection the controller 22 controls the valve structure (e.g. by closing the first valve 24, and by maintaining the second valve 28 in an opened state or adjusting the second valve 28 to a further opened valve state) to provide fluid communication between second receptacle 8 and the teat only, so that only second fluid M2 can be discharged via the teat 10 to the infant.

During operation, the optional signaling device 13 can be controlled
20 by the controller 22 to emit a signal (e.g. sound or light signal S), informing a device operator (e.g. a parent) of a detected change of the use of the feeding device. For example, the device operator may use an optional user interface K1 to instruct the controller to change valve states based on information (i.e. the signal S) received from the signaling device 13, for
25 example to confirm that the feeding device 1 can switch or mix fluids from the receptacles 4, 8.

Moreover, during use, a user operable interface K2 (if present) can be handled by the operator for adjusting a fluid discharge state of one or more of the valves 24, 28, for example for selecting a fluid mixing ratio in
30 case a mixture of the fluids M1, M2 is to be dispensed.

Optionally, such a mixing ratio can depend on predetermined information, for example according to powder mixing instructions in case the fluids in the receptacles have been supplied or prepared by mixing powder with liquid (e.g. with water), or a mixing ratio for mixing a milk
5 concentrate with water in case one of the fluids is (fore or hind) milk concentrate.

Figure 2 shows an alternative feeding device 1', which includes an additional third fluid receptacle 5 containing a third fluid M3, and a respective third valve 25 (of the valve structure) for controlling fluid flow
10 from the third fluid receptacle 5 to the teat 10. Operation of the second embodiment corresponds to the above operation of the first embodiment, wherein the third valve 25 can be controlled (e.g. by the controller 22) depending on a detected use of the device 1'. As an example, the first receptacle 4' of the second embodiment can contain a fore milk equivalent,
15 wherein the second receptacle 8' contains a mid milk equivalent, and wherein the third receptacle 5 contains a hind milk equivalent. In this way, the device can discharge mid milk equivalent (directly from the second receptacle) without having to mix contents of different receptacles.

Alternatively, the first receptacle 4' of the second embodiment can
20 contain a fore milk concentrate, wherein the second receptacle 8' may contain a hind milk concentrate, wherein the third receptacle 5 contains water. In this way, the device can discharge fore milk by mixing fore milk concentrate with water. Also, the device can discharge hind milk by mixing hind milk concentrate with water. Even more, the device may discharge mid
25 milk by mixing fore milk concentrate, hind milk concentrate and water at a certain (predetermined) mixing ratio, as will be appreciated by the skilled person.

Also, a combination of the above examples is feasible, wherein one of the receptacles contains a fore milk concentrate or hind concentrate and a
30 second of the receptacles contains a hind milk equivalent or fore milk

equivalent, respectively, and a third of the receptacles contains the water (to be mixed with the milk concentrate).

The second embodiment can also include one or more user interface devices, mentioned above, and/or a signaling device (not shown in Figure 2),
5 as will be clear to the skilled person.

Further, the second embodiment includes a sensor 120 that is configured to detect a change of the shape of the teat (which is usually made of a flexible or resilient material) , for example to detect teat deformation (e.g. teat contraction, teat bending), wherein the sensor 120 can provide a
10 detection result to the controller 22 for determining a use of the device 1'. The sensor 120 can e.g. include an optical sensor and/or a strain sensor (e.g. a pressure sensors based on hetero-core fiber optics, known per se) mounted in or on the teat, or being integrated in the teat. This sensor 120 can be used e.g. instead of a sensor 20 located upstream of the teat.

15 The invention can be provided or embodied in the form of a kit of parts (for example for refilling the device 1), the kit of parts e.g. including one receptacle of container containing the first fluid M1 or containing first formula for preparing the first fluid (by mixing the first formula with water), and one receptacle or container containing the second fluid M2 or
20 containing second formula for preparing the second fluid (by mixing the second formula with water).

As is mentioned before, the kit of part can e.g. comprise at least a fore milk equivalent (in a first container/receptacle) and (separately, in a second container/receptacle) a hind milk equivalent, the fore and hind milk
25 equivalent each comprising a fat fraction, a protein fraction, a carbohydrate, and a mineral fraction wherein

- i. the mineral fraction in the fore milk equivalent is substantially the same as the mineral fraction in the hind milk equivalent; and/or
- 30 ii. the fat fraction in the fore milk equivalent provides at least 20% less calories than the fat fraction in the hind milk fraction,

preferably at least 30% less calories, more preferably at least 40% less calories; and/or

iii. the protein fraction in the fore milk equivalent is substantially the same as the protein fraction in the hind milk equivalent;

5 and /or

iv. the carbohydrate fraction in the fore milk equivalent is substantially the same as the carbohydrate fraction in the hind milk equivalent; and/or

preferably wherein the

10 i. the mineral fraction in the fore milk equivalent is substantially the same as the mineral fraction in the hind milk equivalent; and

ii. the fat fraction in the fore milk equivalent provides at least 20% less calories than the fat fraction in the hind milk fraction, preferably at least 30% less calories, more preferably at least 40% less calories.

While the invention has been explained using exemplary embodiments and drawings, these do not limit the scope of the invention in any way, said scope being provided by the claims. It will be appreciated that 20 many variations, alternatives and extensions are possible within said scope, as will be clear to the skilled person from the description and the drawings.

As used herein, fore milk may also be referred to as fore-milk or pre-feed; mid milk may also be referred to as midmilk, mid-milk, bulk milk, composite milk, or pooled milk; hind milk may also be referred to as hind- 25 milk or post-feed.

In one embodiment, the macro nutrient composition (ready to drink or powdered composition after recombination with water according to manufacturing instructions is

Amounts	Fore milk equivalent	Hind milk equivalent	Fore milk equivalent Preferred	Hind milk equivalent preferred

Energy	60-85 kcal/100ml	60-85 kcal/100ml	60-70 kcal / 100ml	60-70 kcal / 100ml
Protein	1.8-5.5 g/100 kcal	1.8-5.5 g/100 kcal	1.8-3.0 g/ 100 kcal	1.8-3.0 g/ 100 kcal
Lipid	3.0-6.0 g/100kcal	3.0-6.0 g/100kcal	4.4-6.0 g/100kcal	4.4-6.0 g/100kcal
Carbo hydrate	*	*	9.0-12.0 g/100 kcal*	11-14.0 g/100 kcal*

* see iv. below.

With the proviso that:

- i. the energy content in the fore milk equivalent is about equal to the energy content in the hind milk equivalent (about equal is defined as less than 5% difference, preferably it is equal);
- ii. the protein content in the fore milk equivalent is about equal to the protein content in the hind milk equivalent (about equal is defined as less than 5% difference, preferably it is equal);
- iii. the fat content in the hind milk equivalent is higher than in the fore milk equivalent, preferably it is between 30% and 400% higher, more preferably between 40% and 300% higher, most preferably between 60% and 200% higher;
- iv. the fore and hind milk equivalent comprise nutritionally available carbohydrates suitable for the feeding of the infant or young child (e.g. lactose) in such quantities as to adjust the product to the energy density in accordance with the requirements.

Vitamins and minerals levels are preferably the same in the fore and hind milk equivalent. Optional ingredients include but are not limited to human milk oligosaccharides (e.g. 2'FL, 3FL, 3'GL, 3'SL, 6'SL, LNT, LNnT etc), prebiotics like galacto-oligosaccharides, fructo-oligosaccharides or combinations thereof (such prebiotics may also be referred to as non-digestible oligosaccharides / non digestible carbohydrates), probiotics. All of these are well-known in the art.

The whey : casein ratio in the product is preferably between 1:5 up to 5:1, more preferably between 1:1 up to 2: 1. Alternatively, (partially) hydrolyzed protein may be used.

Product for infants (0-12 months) preferably fall within the
5 preferred macronutrient ranges listed above and young child formula
(between 1 and 3 years old) preferably fall within the broader
macronutrient ranges listed above.

Further to the above, as will be clear to the skilled person, generic
description of an infant formula comprising a fat fraction, protein fraction,
10 carbohydrate fraction are known in the art just like their preparation (e.g.
preparing the nutrition powder).

As is commonly known, regarding infant formula, the fat fraction
may comprise vegetable oils, preferably a mixture of vegetable oil and
(bovine) milk fat (e.g. cream). It may further comprise Long Chain Poly
15 Unsaturated Fatty Acids (LC PUFA) such as DHA, EPA and ARA.

Infant formula carbohydrate fraction may e.g. comprise digestible
saccharides and non-digestible oligosaccharides.

Infant formula protein fraction may e.g. comprise whey protein and
casein, optionally partially hydrolysed protein.

20 General background information regarding infant formula
compositions can also be found in Applicant's WO2021008982.

Regarding the structure of the device 1, an electric power source
can be part of the device 1, being e.g. located in a housing 2 of the device
(such as a battery and/or a rechargeable power source), or it can e.g. be an
25 external power source (e.g. an external power adapter, transformer unit, an
external battery) that is electrically connected to integrated electric
components (e.g. valve structure, controller 20 and/or sensor 20) via a
suitable external power cord (not shown), a power connector, socket and/or
plug, known as such to the skilled person.

30 Besides, it is preferred that the device 1 includes or is associated
with a user interface, for example at least one user operable switch or

button (not shown) provided in or on the housing 2, for controlling the valve structure and/or controller 22, and in particular for initiating a change of the state of the valve structure 24, 25, 28. For example, the controller 22 can be operated via the user interface (e.g. by a parent) to start or initiate a feeding cycle, to set or reset the valve structure 24, 25, 28 to a certain valve structure state, to reset the controller to a controller start-up state, and/or to provide a further or different function, as will be appreciated by the skilled person.

Also, it will be clear that the two (or more) fluid receptacles 4, 8 can be arranged, shaped and dimensioned in various ways. They can be equal in size or differ in size, and/or they can be arranged next to each other or one receptacle can be located within another receptacle, and the-like. Preferably, each fluid receptacle 4, 8 is dimensioned to contain at least a single dose of a respective fluid (beverage) M1, M2 that is to be fed from that receptacle to an infant during a single meal, but that is not required.

Also, according to an embodiment of the invention, no valve structure is required. Referring to Figure 3, there is shown a first feeding device 1" (of a feeding system) having a single fluid receptacle 4" (containing first fluid M1) and a sensor 20. The feeding system has a separate receptacle 8", provided by a separate second feeding device 250 that does not include a sensor, but that does have a teat 210, for feeding second fluid M2 to an infant. The first feeding device 1" does include a signaling device 13, e.g. sound signal emitter and/or light signal emitter for signaling a detected use of that feeding device to an operator. Operation of the third embodiment follows operation of the above-described embodiments, however, changing valve states is not required. To the contrary, in this case, during operation, the operator/parent can switch feeding from the first feeding device 1" (i.e. halting feeding from the first device) to the second one 250 based on the information received from the signaling device. 13 (concerning a detected use of that feeding device 1").

Besides, the invention can include using milk, collected by a mother, i.e. milk produced by human mammary glands. A mother may optionally collect milk from her breast using methods known in the art and keep the fore, mid and/or hind milk separated. These milk fractions may be applied in the method according to the invention in a preferred embodiment wherein the first fluid is (human) fore milk, the second fluid is (human) mid milk and the optional third fluid is (human) hind milk. The collected fore, mid and/or hind milk (and preferably each of these three milk fractions) may therefore be used in a device of the invention and the method relating thereto.

Hence the method of the invention may optionally also be extended with a step of (separately) collecting at least one of fore, mid and hind milk from a mother (and preferably collecting each of these three fractions, separately) and using one or more (preferably each) of these separately collected fluids/milks in the method / device of the invention.

Alternatively or additionally, at least one of the fluids can be water.

Also, alternatively or additionally, one or more of the fluids may be a milk concentrate, for example a fore milk concentrate and a hind milk concentrate.

For example, in a method (and feeding device) of the invention, the first fluid may be a fore milk concentrate, the second fluid a hind milk concentrate, and the optionally third fluid water (in which case the water can be mixed by the method and/or device with the fore milk concentrate to provide fore milk that is to be fed to the infant, and wherein the water can be mixed by the method and/or device with the hind milk concentrate to provide hind milk that is to be fed to the infant). This embodiment has the advantage that there can be less waste of milk, and contamination of the fore milk concentrate and hind milk concentrate can be prevented. For example, at the end of the feed, any remainder of the fore milk concentrate

and any remainder of the remainder of hind milk concentrate can be stored
e.g. in an refrigerator, for a next feed.

Claims

1. A feeding device (1) for feeding an infant, comprising a first fluid receptacle (4), a second fluid receptacle (8), a teat (10), as well as a valve structure (24, 25, 28) for selectively providing a fluid communication
5 between the fluid receptacles (4, 8) and the teat (10), characterized by a sensor (20) configured to detect use of the feeding device (1), and a controller (22) for controlling the valve structure (24, 25, 28) based on the detected use of the feeding device (1) by the sensor (20).
2. The feeding device according to claim 1, wherein the first
10 receptacle (4) contains a fore milk equivalent, wherein the second receptacle (8) contains a hind milk equivalent or a mid milk equivalent, wherein the feeding device (1) preferably includes a third receptacle (5) containing a milk equivalent that differs from the milk equivalents contained in the other receptacles.
- 15 3. The feeding device according to any of the preceding claims, wherein the sensor (20) is configured to detect one or more of:
-a sucking behavior;
-a fluid pressure upstream of the teat (10); and
-a fluid flow rate of fluid flowing to or through the teat (10).
- 20 4. The feeding device according to any of the preceding claims, wherein the sensor (20) is configured to generate a sensor signal indicative of a detected use of the device (1), wherein the controller (22) is preferably configured to process the sensor signal for determining a predetermined change of the use of the feeding device (1), wherein the controller (22) is
25 preferably configured to change a state of the valve structure in case a predetermined change of the use of the feeding device (1) has been determined by the controller (22).
5. The feeding device according to any of the preceding claims, including a signaling device (13), e.g. sound signal emitter and/or light
30 signal emitter for signaling a detected use of the feeding device to an operator, wherein the feeding device preferably includes a user interface

(K1, K2) for example at least one user operable switch and/or button, for controlling the valve structure (24, 25, 28) and/or controller (22), in particular for initiating a change of a state of the valve structure 24, 25, 28).

6. The feeding device according to any of the preceding claims,
5 wherein the predetermined change of the use of the feeding device (1) is associated with one or more of:
- a detected predetermined pause in sucking; and
 - a detected decrease of an average fluid flow rate, for example a threshold decrease of the average flow rate compared to an initial flow rate at a start
10 of a feeding cycle.
7. The feeding device according to any of the preceding claims,
wherein the controller (22) is configured to control the valve structure (24,
25, 28) to allow fluid communication between the first receptacle (4) and the
teat (10) during a first feeding period, for example from the start of a
15 feeding cycle, the controller for example being configured to detect the start of the feeding cycle based on the detected use of the feeding device (1) by the sensor (20), the controller for example being configured to block fluid communication between the second receptacle (8) and the teat (10) during the first feeding period.
- 20 8. The feeding device according to any of the preceding claims,
wherein the controller (22) is configured to control the valve structure (24,
25, 28) to allow fluid communication between the second receptacle (8) and the teat (10) during a second feeding period, wherein the controller (22) is optionally configured to control the valve structure (24) to block or adjust
25 fluid communication between the first receptacle (4) and the teat (10) during the second feeding period.
9. The feeding device according to claim 7 and 8, wherein the
controller (22) is configured to control the valve structure (24, 25, 28) such
that the start of the second feeding period and/or the start of an optional
30 third feeding period is based on the detected use of the feeding device (1) by the sensor (20).

10. Method for discharging fluid from an infant feeding device (1), for example a feeding device according to any of the preceding claims, the method including:
- feeding a first fluid to a teat (10) of the feeding device (1) during a first feeding period;
 - a sensor (20) monitoring a use of the feeding device (1) during the first feeding period; and
 - feeding a second fluid to the teat (10) of the feeding device (1) during a second feeding period, the second feeding period starting in case a predetermined change of the use of the feeding device has been detected by the sensor (20),
- wherein the method optionally includes feeding a third fluid to the teat (10) of the feeding device (1) during the second feeding period and/or during a further third feeding period, the third fluid optionally being a mixture of the first fluid and the second fluid,
- wherein the method optionally includes emitting a signal (S) to an operator when a change of the use of the feeding device has been detected by the sensor (20);
- the method for discharging fluid from an infant feeding device (1) optionally including controlling a valve structure (24, 25, 28) to feed the first fluid to the teat (10) during the first feeding period and to feed the second fluid to the teat (10) during the second feeding period, the method optionally including controlling a valve structure (24, 25, 28) to feed a third fluid to the teat (10) during the a third feeding period.
11. Method according to claim 10, wherein the first fluid is a fore milk equivalent, wherein the second fluid is a mid-milk equivalent or a hind-milk equivalent;
- or
- wherein the first fluid is a fore milk concentrate or a hind milk concentrate,
- wherein the second fluid is water, wherein the water is preferably mixed with the first fluid during a respective feeding period.

12. A kit of parts comprising at least a first liquid (or first powder to be reconstituted with water to provide the first liquid) and a second liquid (or second powder to be reconstituted with water to provide the second liquid), each of the first and second liquid comprising a fat fraction, a carbohydrate fraction and a protein fraction, wherein the first and second liquid together form an infant formula or young child formula, preferably an infant formula; and wherein the energy content from fat of the total energy content of the second liquid is at least 20% higher as compared to the energy content from fat of the total energy content of the first liquid.
- 10 13. A kit of parts comprising at least a fore milk equivalent and a hind milk equivalent, the fore and hind milk equivalent each comprising a fat fraction, a protein fraction, a carbohydrate, and a mineral fraction, wherein the fore milk equivalent is not identical to the hind milk equivalent and wherein
- 15 i. the mineral fraction in the fore milk equivalent is substantially the same as the mineral fraction in the hind milk equivalent; and/or
- ii. the fat fraction in the fore milk equivalent provides at least 20% less calories than the fat fraction in the hind milk fraction, preferably at least 30% less calories, more preferably at least 40% less; and/or
- 20 iii. the protein fraction in the fore milk equivalent is substantially the same as the protein fraction in the hind milk equivalent; and /or
- iv. the carbohydrate fraction in the fore milk equivalent is substantially the same as the carbohydrate fraction in the hind milk equivalent; and/or
- 25 preferably wherein the fore milk equivalent is not identical to the hind milk equivalent and wherein
- i. the mineral fraction in the fore milk equivalent is substantially the same as the mineral fraction in the hind milk equivalent; and
- ii. the fat fraction in the fore milk equivalent provides at least 20% less calories than the fat fraction in the hind milk fraction, preferably at least 30% less calories, more preferably at least 40% less calories; and
- 30

14. Use of any of the feeding devices of any of claims 1 -9 in the method of anyone of claim 10- 11, preferably wherein the kit of parts of claim 12 or 13 is used in any of the method of any of claims 10-11.

15. A feeding device (1") for feeding an infant, the feeding device
5 comprising a fluid receptacle (4"), a teat (210), and a sensor (20) configured to detect use of the feeding device (1"), and a signaling device (13), e.g. sound signal emitter and/or light signal emitter for signaling a detected use of the feeding device to an operator.

16. Method for discharging fluid from an infant feeding device (1"), for
10 example a feeding device according to claim 15, the method including:
-feeding a first fluid to a teat (10) of the feeding device (1") during a first feeding period;
-a sensor (20) monitoring a use of the first feeding device (1") during the first feeding period; and
15 - emitting a signal (S) to an operator when a change of the use of the first feeding device (1") has been detected by the sensor (20),
the method optionally including:
halting the use of the first feeding device (1") for example to proceed
proceeding with the feeding of a second fluid using a second feeding device
20 (250).