Title: Modification of milk resulting in low potassium and minimal electrolyte changes with minimal changes in taste

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SUPPLEMENTARY FILE

Required materials for the Dialysis method

• Cellophane membrane

- HEIKO Wrap Cellophane™ 500 mm × 30 m (SHIMOJIMA Co., Ltd., Taito Ward, Tokyo Prefecture, Japan)

• Glass container with a top diameter of 75 mm, a base diameter of 65 mm, and depth of 70 mm.

• Submarine motor™ (Tamiya, INC., Shizuoka City, Shizuoka Prefecture, Japan)

• Two AA batteries for the submarine motor™.

• Small frame work:

- Clean tea strainer diameter™ 55 mm (Sun corporation Inc., Tsubame City, Niigata Prefecture, Japan): as a mold for a hollow of the cellophane membrane.

• Large frame work:

- Clean tea strainer diameter™ 77 mm (Sun corporation Inc., Tsubame City, Niigata Prefecture, Japan): to support the 55 mm diameter™ Clean tea strainer by bridging the glass container.

• Stirrer

    - CT-MINI 2-4990-01™ (AsOne corporation)

• 35 mm stirring bar

• Sodium polystyrene sulfonate which was previously washed with deionised water

    - AmberLite™ IR120B (DuPont de Nemours, Inc.)

• Propeller protection framework

    - Tea strainer of Masaki type B small™ (Masaki Inc., Fukuoka City, Fukuoka Prefecture, Japan)

• Propeller protection cover

    - Tea filter bag (Tokiwa kougyou Inc., Shikokuchuo City, Ehime Prefecture, Japan)

• Homogenized-whole-cow's milk

• Deionised water

• Food wrap: to prevent evaporation of the dialysate.

• A pair of nippers: to modify the submarine motor™ props.

Experimental procedure for the Dialysis method

Step 1. Cut the cellophane membrane into a 500 mm × 500 mm sheet. Then carefully stretch this cellophane membrane along the inside of the two-piled framework (the small framework and the large framework) so as not to tear the cellophane membrane (Figure S2).

Step 2. Place 7.5 g (dry weight) of sodium polystyrene sulfonate into the hollow of the cellophane membrane.

Step 3. Cut the tips of the four props and propeller of the submarine motor™ using a pair of nippers: to stir the dialysate at a lower position (Figure S3).

Step 4. Connect the AA battery to the submarine motor™ in reverse order to create an upward flow in the dialysate. In this condition, the Submarine motor is pressed downward due to Newton's third law and become stable during stirring.

Step 5. Remove the pin of the propeller protection framework (Figure S4), then cover the tip of the submarine motor™ with this propeller protection framework (Figure S5).

Step 6. Cut a tea filter bag 40 mm from the bottom. Cover the tip of the submarine motor™ with this tea filter bag primarily to prevent sodium polystyrene sulfonate from being impacted by the propeller (Figure S6).

Step 7. Stand the submarine motor™ up in the hollow of the cellophane membrane.

Step 8. Place the stirring bar and 150.0 g of milk into the container.

Step 9. Set the superstructure on the container. Place 15.0 g of deionised water into the hollow of the cellophane membrane (Figure S1).

Step 10. Cover both the submarine motor™ and the hollow of the cellophane membrane with food wrap to prevent evaporation (Figure S7).

Step 11. Stir both the milk and the deionised water for 300 min in a refrigerator. The battery of the Submarine motor needs to be exchanged once during the reaction time.

Supplementary Figures

Figure S1

To prevent the milk from dilution caused by osmotic pressure differences between the milk and the dialysate, the liquid-level height of the dialysate was set at 10–30 mm lower than that of the milk. This was adjusted by the size of the container.

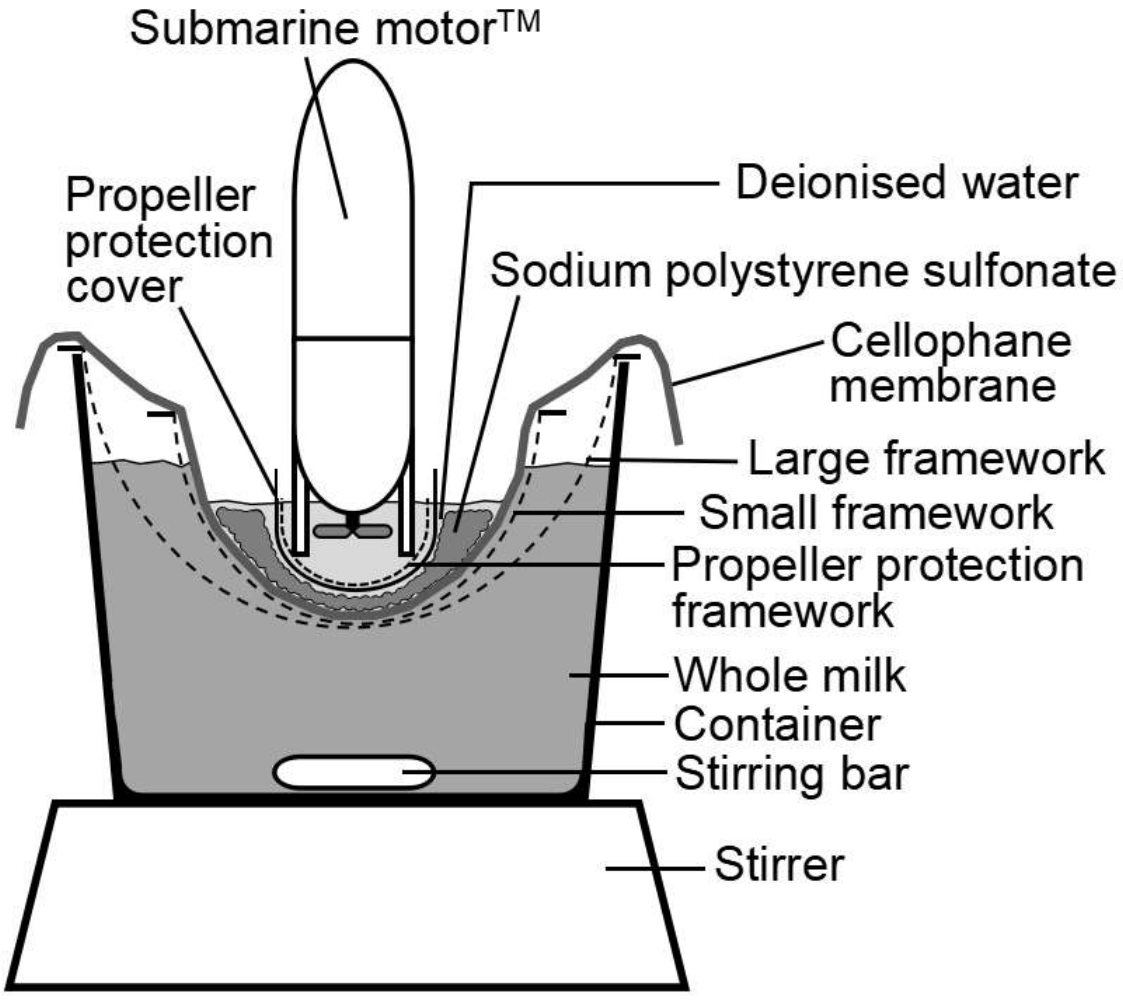

Figure S2

Cellophane membrane was stretched along the inside of the two-piled framework.

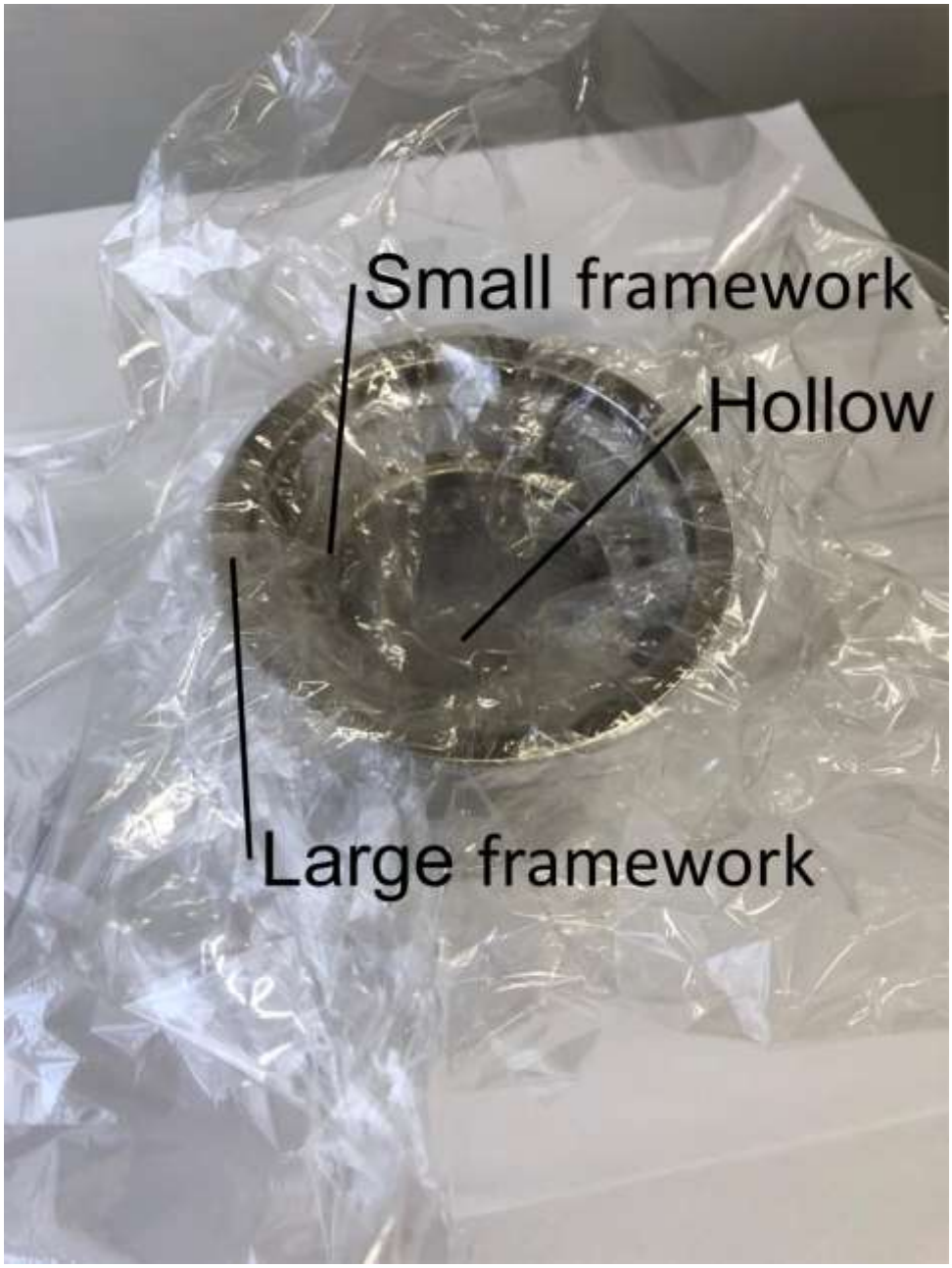

Figure S3

Tips of the four props and propeller of the submarine motor™ were cut using a pair of nippers.

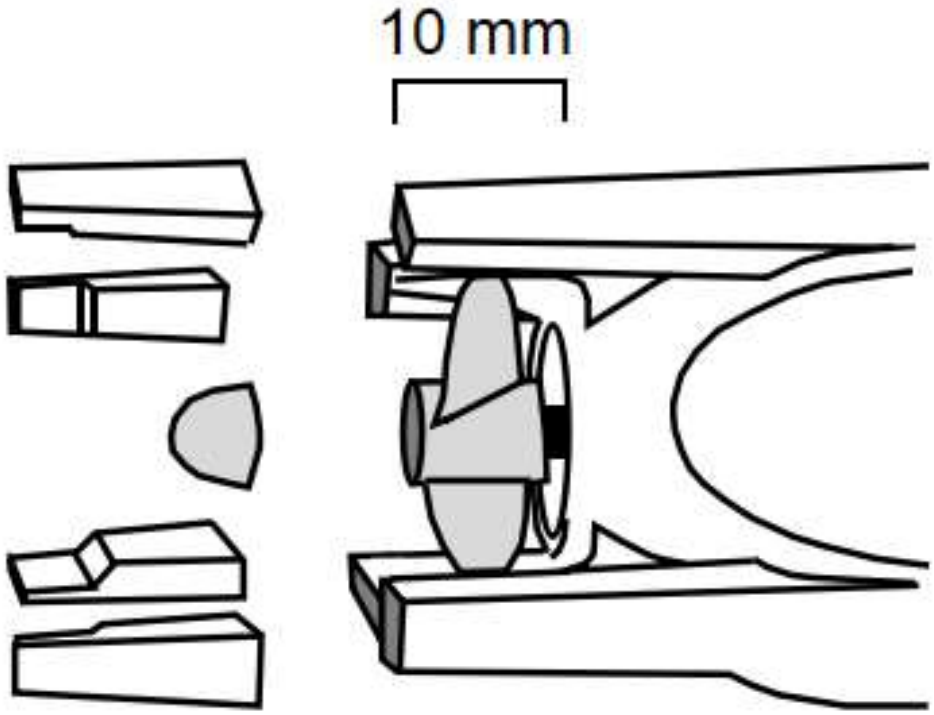

Figure S4

A pin of the propeller protection framework was removed.

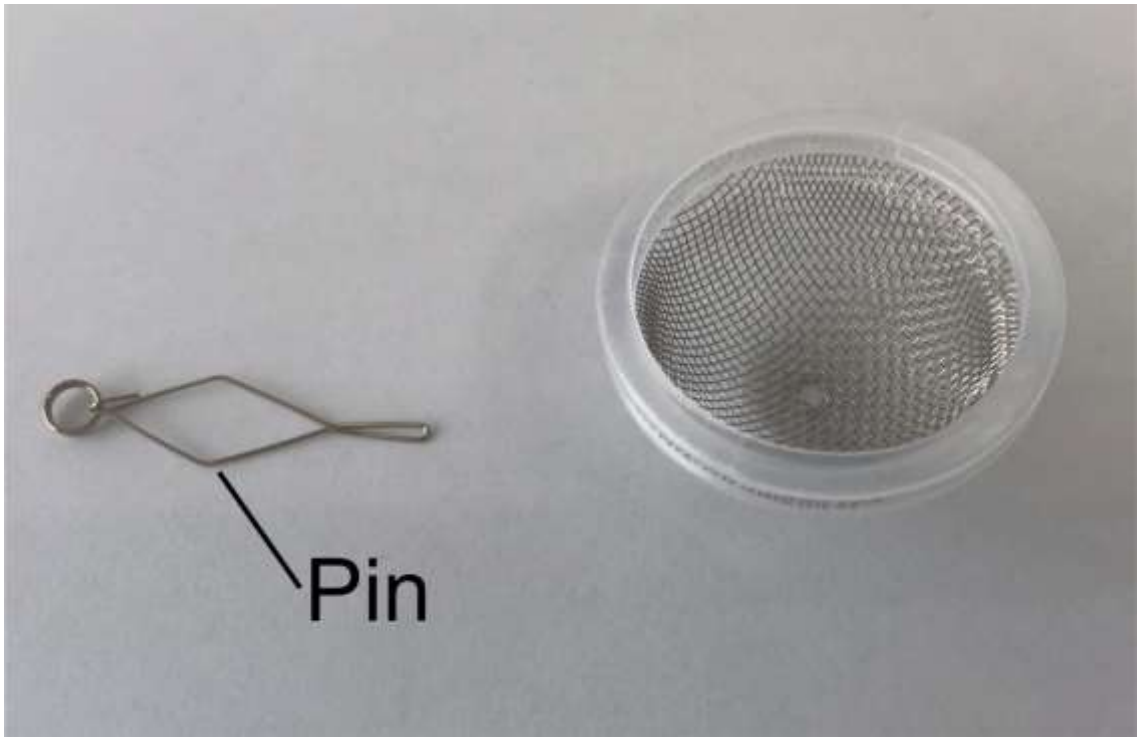

Figure S5

The tip of the submarine motor™ was covered with the propeller protection framework.

Figure S6

The tip of the submarine motor™ which was covered with the propeller protection framework was covered with a tea filter bag.

Figure S7

Both the submarine motor™ and the hollow of the cellophane membrane were covered with food wrap.

Figure S8

The dialysate after dialysis procedure. The figure shows that the dialysate remained clear enough to see double lines after dialysis procedure. The double lines were drawn in the background for assessing degrees of clearness.