

STEPS TO PREPARE MILK REPLACER FORMULA FOR WILD MAMMALS

Recent research on the milk powders, formula recipes and preparation methods identified ways to improve nutritional benefits of formula fed to young wild mammals. **READ ALL INSTRUCTIONS FIRST.** Shortcuts/omissions compromise results.

Step 1: INITIAL PREPARATIONS

- 1) Wash hands. Generally declutter and clean the mixing area.
- 2) Remove dry ingredients from refrigerator or freezer and allow to reach room temperature. Inspect for color, contaminants, etc. Sniff powders to check freshness or an off odor (i.e., rancidity, unexpected scents). Do not use if concerned with quality.
- 3) Assemble and organize mixing supplies on the counter (e.g., gram scale, measuring cups, powders, whisk, instant read thermometer, recipe ingredients). Include printed copy of the recipe with ingredient weights (don't rely on memory).
- 4) Organize the recipe ingredients in mixing area: water (e.g., tap, filtered, distilled), milk powders, fats (i.e., liquid or powder), etc.

Step 2: WEIGHING

- 1) Use the scale TARE feature for each container to 'zero' it out before weighing each separate ingredient.
- 2) When the milk powder is at room temperature, place the weighing container on the gram scale and then fill/weigh the needed amount as by the recipe.
- 3) Weigh each dry and liquid ingredient separately in individual containers.
- 4) Heat a little more water than recipe requires to appropriate temperature ($\approx 110-130^{\circ}\text{F}$ or $43-54^{\circ}\text{C}$; not boiling).

Step 3: MIXING

- 1) For a single milk replacer powder in the recipe, prepare the powder as described in steps 2-6. If the recipe calls for multiple powders, prepare each powder separately (steps 2-6), and then combine all liquids later (step 7).
- 2) Pour the weighed warm water into formula mixing container. Sprinkle the weighed milk powder on the warm/hot water. Do not stir at this point. Set timer for 5 minutes.
- 3) After 5 minutes, the milk powder on the water in the container will start to wet and begin to sink. Whisk powder into water until the powder is completely dispersed ($\approx 1-2$ minutes). Don't worry about small clumps. Follow the same steps when making a large batch. If considering using a handheld immersion blender during last dispersal step of large batch, limit use to a few short bursts (≈ 5 seconds) to reduce problems. Avoid any use of countertop blender.
- 4) Cover container with lid to prevent evaporation and/or contamination. Label the container (formula, date/time mixed). If making several formulas or dilutions, label each container (formula, date/time mixed).
- 5) When formula is slightly cooled, place in refrigerator ($\approx 40^{\circ}\text{F}$ or 4.5°C) to allow a rest time for the powder(s) to hydrate and fully reconstitute (8 hours minimum).
- 6) After the reconstitution time, remove the formula(s) from the refrigerator. Stir lightly; small clumps will have dissipated. Rehabilitators planning to gavage (e.g., opossums) may strain formula to prevent tube obstruction.
- 7) If blending combining two or more milk replacers (now liquid form), pour those into a single container. If adding other liquids, such as extra fats (e.g., heavy whipping cream), weigh those cooled liquids and add those into cooled formula. Stir. It is then ready to use or return to the refrigerator. Dairy scientists advise mixed formula can be stored in refrigerator up to 3 days.
- 8) For longer storage: divide into small portions (e.g., ice cube tray), label with product/recipe and date and freeze. Remove frozen cubes to airtight container to minimize air exposure. Frozen cubes may be kept similar to time for ice cream (preferably used in less than a month, but up to 2 months). Thaw in refrigerator, warm water bath or at room temperature (not microwave).

Step 4: FEEDING

- 1) When ready to feed, lightly and briefly stir the formula liquid again to ensure formula is well mixed (but no bubbles).
- 2) Pour the estimated amount required for this feeding into a container(s) – and warm, such as in warm water bath or bottle warmer. Do not warm formula in microwave.
- 3) Keep the formula containers separate depending on recipe, dilution (e.g., full or half strength formula).
- 4) Follow standard practices to keep the formula containers separate for animals in quarantine.
- 5) Do NOT reuse heated formula; discard leftovers.