



WildAgain Wildlife Rehabilitation, Inc. Evergreen, Colorado.

## **Wombaroo Rabbit Milk Replacer – Part 2. Reflections on the product.**

Some who read the lab and performance tests presented in Part 1 for Wombaroo Rabbit Milk Replacer may ask “...OK, lots of interesting data, but what does it all mean for wildlife formula?” Or they may ponder “...Is it a close match to cottontail milk?”

To restate some of the introductory information from Part 1, Wombaroo Rabbit Milk Replacer is one of many specialized substitute milk formulas produced by Wombaroo Food Products located in South Australia, Australia, and available online in North America. They make products for wildlife rehabilitators, aviculturists and animal breeders. They also supply specialty formulated milk products to universities, hospitals and research institutions worldwide for use in animal studies. Many of their products use human-grade food ingredients, including their Rabbit Milk Replacer.

Wombaroo's Rabbit Milk Replacer is formulated for various domestic species of rabbits (European, California, NZ-White, etc.) that are generally kept in a captive setting. This includes pets, breeding programs, or institutional settings. Since wildlife rehabilitators using WildAgain's website are generally focused on wildlife species found in North America, the test results from Part 1 apply to wild rabbits, such as cottontails. Thus, the analysis here in Part 2 will discuss the applicability of the product specifically to cottontail milk. However, the analytical process below can apply to other lagomorph species as well, by adjusting the recipes to match the milk composition analysis for the species.

### **Overall impressions of the product**

1. Since the manufacturer indicates that human food grade ingredients are included, the product is likely higher in quality than other milk replacers that incorporate “animal feed grade” ingredients. Cow's milk based. No added pre- or pro-biotics.

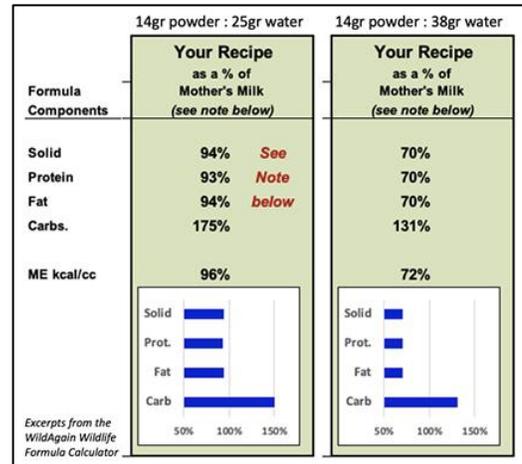
2. The protein and fat concentrations adhere to the Typical Analysis on the package label. Moisture is slightly high.
3. Overall ash content (dietary minerals) is acceptable at 5.12% but shy of the Typical 6%.
4. Consistency is loose, fluffy and sticky, which suggests spray-dry processing. This results in a +6 to -12% average error rate when measuring by volume (scooping). Weighing the powder eliminates this needless error.
5. Outstanding reconstitution performance when allowed to rest 8 hours after mixing and before feeding. Wetting performance was very good (in less than 5 minutes) but showed poor sinking. Hand stirring/whisking for 5 minutes successfully submerged the powder and dispersed almost all of the dry powder.
6. The product appears to be very shelf-stable. It has a very low Peroxide Value, tested at 14.5 months post manufacture, indicating almost no presence of rancidity. The instructions do not indicate that refrigeration is required after opening (only to store in a cool dry place in an airtight container). However, it is advisable to store any high-fat content milk replacer (once opened) in the refrigerator or freezer to prevent the onset or progression of rancidity.
7. Though not a test result, availability and price are both considerations for this imported product. Choices of online vendors is very limited. The product is available in 380- and 1,000-gram boxes. When comparing current pricing, Wombaroo Rabbit is about 5-10% higher than PetAg® replacers, and about 80% above Fox Valley prices. These comparisons are for the larger-sized containers from each of the manufactures, ranging from 2.2 to 5 pounds, depending on the product. [Note: Wombaroo is extremely expensive in the 380gr (6.3oz) box.]

## **How it compares to cottontail milk (A) – Overall major components**

Since the goal is to compare the formula to cottontail milk, one must know the composition of the major components of cottontail milk. While studies of cottontail milk analysis can be found in scientific publications, another way for wildlife rehabilitators to quickly access the studies of species-specific nutrition profiles and other resources is to visit WildAgain's formula and feeding section (<https://www.ewildagain.org/wildlife-formula-and-feeding>). Major components are provided by species (such as cottontails), either by particular scientific study or an average of several studies for that species. There is also an option to input published milk composition studies for other species, such as the snowshoe hare or blacktailed jackrabbit, when using the WildAgain formula calculator to compare recipes to the species' milks.

The diagrams that follow show how 2 different recipes (using only the product and water) compared to cottontail rabbit mothers' milk when using the WildAgain Formula calculator. Both

show a remarkably close ‘proportional’ match of the nutritional components [except for carbs which is a calculated value (not lab tested), as the residue after subtracting all the other components such as protein, fat, minerals, etc.]. The recipe on the left is as mixed according to the package instructions. However, while an excellent proportional match (most components in the mid 90% range), years of empirical data consistently suggests that a recipe that produces >75% total solids is generally too thick and condensed for digestion by young animals – and can result in health problems. The recipe on the right, which adds 50% more water, has an equally balanced proportional match. However, this recipe provides a less dense/thick concentration of total solids in the formula, which usually proves to be more digestible.

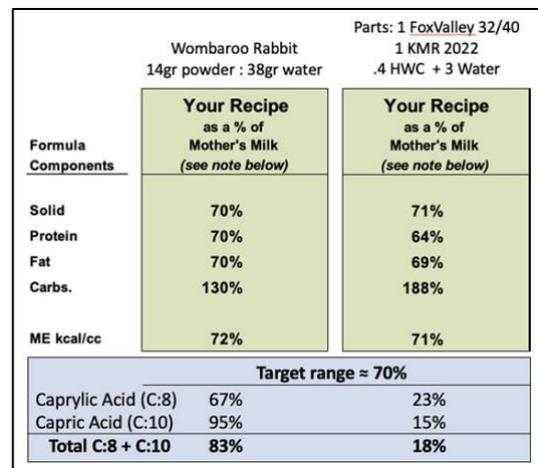


### How it compares to cottontail milk (B) –Caprylic and Capric fatty acids

Research into cottontail milk has shown that it contains a remarkably high concentration of the medium chain triglycerides of Caprylic (C:8) and Capric (C:10) fatty acids. Research has shown that these two fatty acids provide quickly digestible and utilizable energy for young rabbits, as well the benefit of antimicrobial properties.

The Wombaroo Rabbit Formula’s ingredient list indicates that it contains ‘milk oil fatty acids.’ Since milk oil cannot be extracted from cottontail milk to use as an ingredient, Wombaroo was contacted by a rehabilitator to inquire about the source of their “milk oil.” Their response was that their product “...uses a manufactured blend of caprylic and capric acids. The source and composition of the blend is proprietary information, but it is designed to replicate the milk oil fatty acid composition naturally present in rabbit’s milk.”

The addition of these ingredients would presumably mean a relatively higher concentration of C:8 and C:10 than other milk replacers. The diagram at right shows that Wombaroo (mixed as described earlier – straight out of the box but with the addition of 50% more water, or 14 grams of powder to 38 grams of water) provides a close match on C:8 and a slight excess on C:10 (as shown in the blue shaded box). A comparison to a blend of other commonly used products that shows a relatively close proportional match on solids, protein, fat, etc., but fails to provide a sufficient concentration of C:8/C:10 that would match mother’s milk. [Note: Recipes shown above are for illustrative purposes only and are not meant to be recommendations from WildAgain for cottontail formulas.]



## How it compares to cottontail milk (C) – other nutrients

As mentioned in Part 1, Wombaroo Rabbit Milk Replacer includes whole milk solids which generally retain the original minerals, vitamins and key carbohydrates found in whole milk. The product is also supplemented by the addition of various cow's milk fractions that have been previously separated, such as whey proteins and casein. During the separation processing, critical nutrients such as minerals and vitamins are generally removed. Additionally, vegetable oils are added, which have also been previously processed. As mentioned in Part 1, this product tested slightly lower in [Calcium](#) (at .99% concentration) than some of the other cow's milk based milk replacers (generally >1.0%) and within range of [Phosphorus](#). The Ca:P appears to be within acceptable range at 1.19. The overall ash value (all minerals) at 5.12% also appears acceptable for a powdered milk replacer.

The absence of some of these key nutrients requires replacement, as is noted on the label of the box with the added vitamins and minerals. However, some other key nutrients (such as certain oligosaccharides) may be missing or present in levels that are lower than needed to promote health and growth. Supplementation may be considered through inclusion of certain commercially available products.

## Other factors that can affect success of any powdered milk replacer product

**Product quality, availability, and costs.** Availability and the ease of obtaining a product may be factors – but will vary depending on things such as manufacturing capacity, supply chain issues, distributors, storage, and shipping. Quality control is another factor – and, as with all products, continues to deserve monitoring by the end user in its performance with the wild mammal orphans. Cost of the product is certainly another factor that will influence purchase and usage over other similar milk replacers. With the current scarcity of the new formulation, cost comparisons are not something WildAgain can provide at this time.

**Effective rehabilitation practices** are always important (e.g., hydration, providing supplemental heat for neonates or those with compromised health, minimizing stress, treating parasites, keeping accurate and thorough daily and records).

**Effective feeding practices.** Feed considering the appropriate amount and frequency for the species (e.g., do not over- or underfeed during a 24-hour period) and use clean and appropriately sized feeding utensils. Equally as important is monitoring stool - frequency, amount, and consistency. This can provide direct clues as to whether the milk replacer (product and formula recipe) is working successfully with the specific species, age, developmental level, and overall health of the animal.

**Modifications for wildlife use.** Wombaroo Rabbit Milk Replacer is developed and sold for use with rabbits. It contains 37% protein, 42% fat and other nutrients. All other mammal species milks have a different % composition of protein, fat, carbohydrates, kcals, etc. Rehabilitators

should review published scientific [milk composition analysis studies for their species](#). Recipe modifications are generally needed in order to create a closer match to the milk of the wild mammal species in their care. Calculating formulas for different species can be a complex and time-consuming exercise – consider using the Wildlife Formula Calculator. Some rehabilitators who used Wombaroo Rabbit Milk Replacer with cottontails reported positive results when the formula was carefully adjusted to the species milk (e.g., through dilution or addition of MCT oil). Also remember that considerable care **MUST** be taken with any supplementation product (e.g., type, source, ingredients, manufacturing method, digestibility, quality) and amount, otherwise, serious problems can develop.

**Modifications through blended formulas.** Many times, matching mother’s milk can be more closely achieved by blending several milk replacer powders and possibly adding other ingredients. Since individual powdered milk replacer products will reconstitute in slightly different ways, specific blending protocols should be followed to do so effectively and safely. This means reconstituting each powder individually and combining only after each has fully reconstituted in liquid form. ([Mixing Guide](#))

**More.** Stay alert to and consider expanding research related to nutrition, health and more that can affect these topics, such as microbiome, glycans, oligosaccharides, manufacturing changes.

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## Disclosures

Wombaroo Rabbit Milk Replacer is manufactured and sold for orphaned kits, large litters, or when mother's milk is limited.

Product assays performed by the independent lab, as presented in Part 1, and referred to here in Part 2, adhere to the *Official Methods of Analysis of AOAC INTERNATIONAL* (Association of Official Analytical Chemists) and the *Official Methods and Recommended Practices of the AOCS* (American Oil Chemists Society).

The authors have no conflicts of interest with the independent lab, or any of the products or manufacturers discussed in this article.

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*The labelling guidance in AS 5812 [as revised 2017] has been developed to reflect and align with other existing global standards such as those in Europe and the US and help companies comply with Australian consumer law. The Australian Competition and Consumer Commission (ACCC) has a central role in promoting competition and ensuring fair trading.*

*[Excerpted ] "...The Standard advises that pet food labels list the ingredients (with the exception of water) in descending order (by weight) and states: "Ingredients will be presented in an informative and consumer friendly manner"...A further requirement is that the statement of ingredients shall list food additives, including advising if flavours, colours, preservatives, vitamins and minerals are added. The Standard specifically requires that where preservatives such as sulphur dioxide or sulphites are included these shall be identified on the label, by inclusion of their common, prescribed, proprietary name..."*

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