



WildAgain Wildlife Rehabilitation, Inc. Evergreen, Colorado.

## Fox Valley 32/40 (2022 sample) – Part 2. Reflections on the product.

Some who read the lab and performance tests presented in [Part 1](#) for the updated testing of Fox Valley 32/40 may ask “...OK, lots of interesting data, but what does it all mean for wildlife formula?” Or they may ponder “...why would I look into this if nothing seems to have changed?”

There are plenty of reasons to take a closer look at Fox Valley 32/40 milk replacer powder, even though: the manufacturer says it has not changed, the label is the same, and many of the lab test values show only very small changes. While the product has [seemed unchanged for years](#), it may have changed during late 2022 and early 2023. Manufacturers are supposed to update package labels for the product formulation or ingredients within 6 months of any changes – but there is no apparent penalty for noncompliance for up to 2+ years. The product may change in the future and it helps to compare with tested powder samples of previous years. Many rehabilitators want a deeper understanding of (and more detailed test results of) a product that has been used for decades. And they may want to know how those results compare with other products, besides minimal label disclosures and cost information. Some want to understand more about how efficiently the product performs when reconstituted from a powder to a liquid. They may be interested in learning techniques to potentially improve effectiveness with the animals, such as with modified mixing and reconstituting protocols.

Some rehabilitators are seeking and considering new research and insights about species milks, use of milk powders, ingredients, and strategies to improve effectiveness with animal development and health (e.g., oligosaccharides, microbiota). Others are exploring ways to blend powders and other ingredients to arrive at a closer match to species milks. Others are wondering about growth or health issues with the young on formula, and strategies to improve animal health – even with a product seemingly ‘unchanged’ for decades. There are many reasons rehabilitators are evaluating their practices, even with products they and others have used with a high degree of confidence for years.

### Key highlights of Fox Valley 32/40

1. No apparent change in the product formulation in 10+ years. Still based on cow milk. [Fats](#) still from vegetable oil. [Protein](#) primarily from casein. [Dietary minerals](#) still present in acceptable concentrations. No pre- or pro-biotics, or preservatives, are added.

2. Still fairly close to the [Guaranteed Analysis-GA](#), although fat has increased about 5% recently to just over 40%. Even though a very slight change, the [WildAgain Formula Calculator](#) now contains these new values from the 2022 test sample in the drop-down menu to assist in reviewing prior formula recipe calculations.
3. Texture continues to be very fine, granular and non-sticky. This still results in [measurement error when measuring by volume \(scooping\)](#). Weighing the powder eliminates this needless error. Interestingly, the product has gradually become slightly heavier over the years.
4. Since high protein milk powders, such as casein, have [poor reconstitution properties](#), it is not surprising that the product demonstrated only very minimal wetting and sinking in 5 minutes, when adding the powder to the warm water (in that order as directed by the label and following WildAgain's test protocol) when reconstituting the powder to a liquid. A very thorough 5-minute hand whisk/stir is still required to submerge and separate the unwetted powder that settles to the bottom. While the powder then appears visually to be completely dispersed, it is still *not* completely reconstituted at this point, with almost 7% of the powder remaining dry. Fortunately, the product shows a 90% improved reconstitution when allowed to rest in the refrigerator for eight hours prior to use.

## Ingredients/composition

As mentioned, this milk powder is still based on cow's milk, and fats are derived from vegetable oil. More detailed fatty acid profile tests reveal that the fats are almost 90% saturated fat. This could suggest the primary type of vegetable oil in the product is palm kernel oil(?) as it has one of the highest levels of saturated fats of all vegetable oils. Palm oil is also less costly than coconut oil (which is also high in saturated fat) and it has the best shelf stability. This would be consistent with the product testing very low on Peroxide Value (a measure of rancidity presence and progression) over the last several years. Refrigerated storage is still best to ensure freshness and help to prevent onset of rancidification.

## The product appears to have no *added* probiotics or prebiotics.

Research is expanding at an increasing rate on understanding and describing the critical importance of the microbiome (collection of microorganisms in a singular environment, like bacteria in the gastrointestinal tract) and microbiota (the wider community of microorganisms and the *entire* habitat). This research has expanded the understanding of the many important aspects and processes of digestion, health, growth, development and much more in humans and other species. While early research placed considerable focus on the bacteria in the gastrointestinal tract, it has significantly expanded beyond the study of the bacteria in the GI tract to many more aspects. This growing understanding of the microbiome promotes potential uses of select probiotics and prebiotics.

**Probiotics.** Some manufacturers have begun incorporating several beneficial bacteria into milk replacers for human infants and mammal species to support the microbiome in the form of *probiotics*. Fox Valley has *not* included probiotics in 32/40, but for decades has sold a separate probiotic supplement (LA 200)

that contains the fermentation product *Lactobacillus Acidophilus*. The manufacturer suggests adding it to prepared formulas to “help maintain the natural balance of intestinal micro-organisms” and for use during and after antibiotic treatment. Recent research on microbiome functions shows the microbiome is much more complex and has many essential functions, beyond following antibiotic use. The need for more diversity and richness in the microbiome likely requires the inclusion many other critically needed bacteria other than simply a single probiotic, e.g., *L. Acidophilus*.

While some microorganisms are common across species, there are also differences among species, development stage, health and individuals. There are further variations in composition depending on diet and even region of the country, influenced by regional habitat differences. This means that a one-size-fits-all single fermentation product (such as *L. Acidophilus*) may miss the mark and provide minimal benefit at best. The newly formulated Esbilac® and KMR® products that have seven specific fermentation products added, though that also may fall wide of the mark in matching specific species needs. Some of the more targeted strategies include reintroducing, supplementing and balancing the specific gut microbiome of the species, functions and needs (still in early stages of understanding) and include practices such as use of transfaunation and inoculants.

**Prebiotics.** Mammal milks include both digestible and indigestible carbohydrates. Oligosaccharides, one of the indigestible carbohydrates, have several essential functions: providing a protective barrier for the epithelial lining in the GI system (and helping protect it from pathogens), immune development, microbiome support, aiding gastrointestinal mobility, and serving as ‘food’ for essential GI bacteria and probiotics. Since whole liquid milk ingredients include some oligosaccharides (though limited in cow milk), it is possible that dried skim milk included as a Fox Valley 32/40 ingredient may provide some level of oligosaccharides in the powder.

Since commercial production of milk-based oligosaccharides has not been available with animal milk replacers, indigestible carbohydrates (some of which are called *prebiotics*) have been manufactured from plants (in the form of fibers) to serve that function and have recently been added to several milk replacer formulations. While the Fox Valley 32/40 lab test indicates 1.5% of fiber is present, no *added* prebiotics are specifically disclosed on the label. Some rehabilitators have recently begun blending other milk replacers that include *prebiotics* with Fox Valley 32/40 in an attempt to increase the oligosaccharides (e.g., Tailspring puppy or kitten milk replacers) and concurrently achieving a closer overall match of nutritional composition to the species milk.

### **Reconstitution is excellent, but *not* from a quick “...mix, stir and feed...”**

None of the milk replacers tested by WildAgain prove to be ‘instant mix’ formulations as suggested on the product labels. While this notion of user convenience is appealing, it consistently fails to provide a final liquid formula that is acceptably free of only minimal amounts of residual dry powder. Additional steps are required.

As shown in Figure 1 below, the formula appears to be completely mixed with no apparent dry powder particles after allowing the powder to wet for 5 minutes followed by a 5-minute hand whisk. It also appears to be a very smooth liquid (Figure 2) when the formula is gently poured onto the 500µm sieve and supported on the mesh by the surface tension of the liquid.

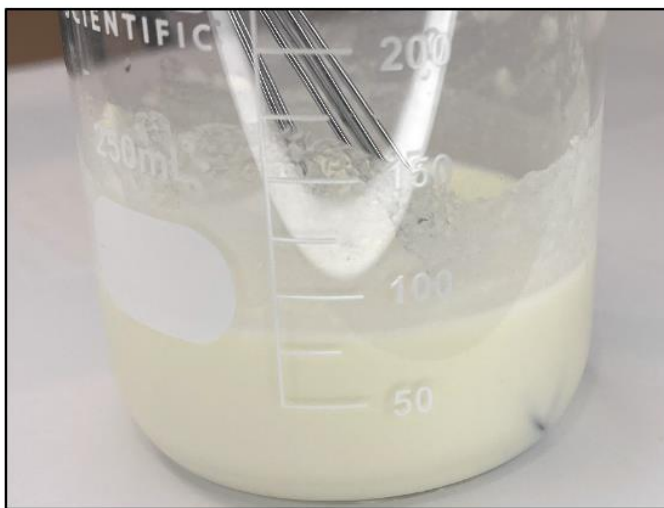


Figure 1. Fox Valley 32/40 mixed 1:2 water and hand whisked 5 minutes to smooth consistency.



Figure 2. Fox Valley 32/40 formula poured onto 500 $\mu$ m sieve. Suspended on mesh by surface tension.

However, this was found incorrect after breaking the surface tension of the formula to allow the liquid to flow through the sieve. Figure 3 shows the amount of dry powder that had not wetted and was trapped by the sieve. Further, in Figure 4, even more powder that had not fully wetted was trapped in the smallest sieve (125  $\mu$ m) as wet sludge of material that exceeded 125 $\mu$ m in particle size. The sieves retained a total of 6.8% of dry powder when not allowed to rest to fully reconstitute. This results in almost 7% of the nutrients in the formula recipe less likely to be in a form to be digested and utilized.



Figure 3. Fox Valley 32/40 residue remaining on 500 $\mu$ m sieve after water spray to break surface tension.

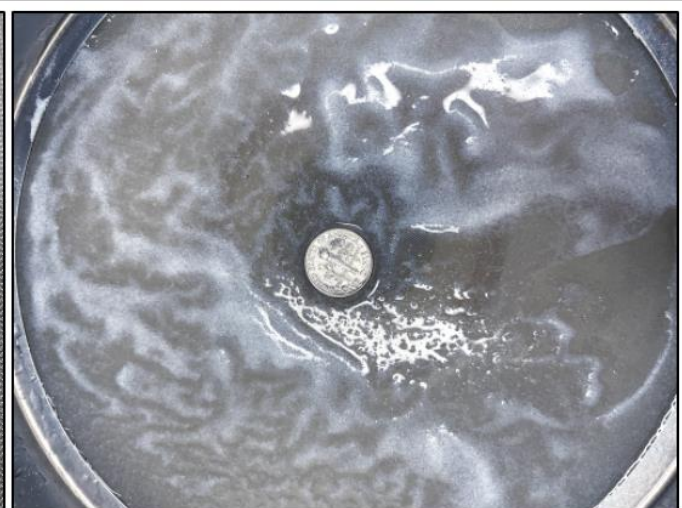


Figure 4. Fox Valley 32/40 residue remaining on 125 $\mu$ m sieve after water spray to break surface tension.

The most critical and final step in [reconstituting the powder to a liquid](#) (after wetting, sinking and stirring/whisking), is [an 8-hour resting period](#) following preparation (mixing) to final use (feeding). Testing found that this improves final reconstitution by 89% for Fox Valley 32/40. Not allowing the rest period, and instead quickly preparing for an instant use/feeding, results in almost 7% of the powder remaining dry and not fully reconstituted.

Effective reconstitution affects the amount of nutrition available, digestibility and more. There are several steps involved in [reconstitution - including wetting, sinking, stirring, and resting](#). It may take a little planning and time to prepare the formula in advance and allow it to rest in the refrigerator for 8 hours. However, doing so can significantly affect and improve the health, growth, and development of the wild orphan mammal.

To summarize the steps of effective reconstitution: (1) add the powder to warm water and allow up to 5 minutes to wet and sink, (2) hand stir or whisk until no dry clumps of powder are visible, (3) allow the prepared formula to rest in the refrigerator for 8 hours prior to use.

## **The product label description misleads**

The Fox Valley 32/40 label describes it as a 'milk replacer for Eastern Cottontail, Squirrels and Opossums' and provides mixing instructions of 1 part powder to 2 parts water to make formulas for those species. That seems to suggest that the prepared formula will equally and completely meet the nutritional needs of each of those species. [Published scientific milk composition analyses for those species](#) show the mother's milks are very different. Thus, the recommended 1:2 formula recipe does not match the nutritional requirements for any of those three species, which is not uncommon with many other milk replacers that suggest a simple 1:2 ratio of powder to water.

However, hundreds of rehabilitators have used Fox Valley 32/40 effectively as part of a [blend with other milk powders and fats](#) to create a formula recipe that achieves a closer match to various species' milk composition for 10+ years. It is expected that this blending practice will continue – particularly as rehabilitators choose products to blend based on their nutritional composition, probiotics and natural prebiotics.

## **Suggested feeding amounts and frequency.**

The product label further suggests feeding amounts and frequency for Eastern Cottontails, Squirrels and Opossums. While those suggestion are attempts to be helpful, experienced rehabilitators know that there are many more factors involved in deciding feeding amounts and frequency. Considerations include size of the animal, age, developmental stage, hydration level, digestion rate and completeness, weight gain, stool, and much more. Decisions of the amount to be fed at each feeding includes many more factors as well, such as weight (grams), stomach capacity, GI function, growth rate, and amount of solids needed per feeding. The number of feedings per day requires more understanding of the kcals in the formula and the energy requirements of the growing animal, as well as knowledge of the species, health and development stage. Protocols resulting in poor reconstitution of the milk replacer (such as simply mix with water and instantly feed) affects the required number of feedings per day, due to a reduced amount of nutrition available. Providing the feeding amounts and frequency may be well-intended, but it is too vague and not species specific to be helpful - and could create digestive issues.

## **Storage**

The 2022 Fox Valley 32/40 sample that was tested demonstrates very acceptable shelf-stability testing at a PV=3 at 142 days since manufacture, which is [well within established guidelines for edible oils \(<10\)](#).

This continues the trend of acceptable PV levels in several samples tested over the past several years. Close attention to product freshness and proper handling and [storage](#) remains a key defense in order to prevent the onset of rancidification. Proper storage protocols generally include refrigeration (or freezing) of the powder in airtight containers and away from sunlight and oxygen (excess air).

## **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.

**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 ‘off-label’ use.** Fox Valley 32/40 is a milk replacer powder marketed and labeled for use with squirrels, cottontails and opossums. These and all other mammal species’ milks have a different percentage of protein and fat than ‘32/40,’ as well as different requirements of carbohydrates, kcals, etc. than this product may provide. Rehabilitators should review published scientific [milk composition analysis studies for their species](#). Recipe modifications are generally needed 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.

**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**

[Fox Valley 32/40](#) is a powdered milk replacer manufactured and marketed for use with wildlife in rehabilitation, specifically squirrels, cottontails and opossums.

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.

## Resources

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