

Alert KMR® Users: Test Results of KMR® (2021)

WildAgain continues to perform periodic testing of powdered milk replacers used by wildlife rehabilitators. Four individual lots of KMR® produced in 2021 were recently tested. Rehabilitators were using these lots during the summer of 2022, well within the expiration period. Most of the lab test results on the KMR® were within expected range for proximates (i.e., solids, proteins, fats) and dietary minerals (i.e., calcium, phosphorus). However, the test results showed elevated rancidity, potentially resulting in unpalatability and adverse health conditions.

The test results reveal the presence of more unsaturated fats than prior years, specifically oleic acid. The higher percentage of unsaturated fats can increase the chance of earlier rancidification, before the quoted shelf-life of 24 months. This can occur especially if the product has been improperly handled or stored as it has moved through the supply chain, or even with the end user (e.g., exposed to heat and air).

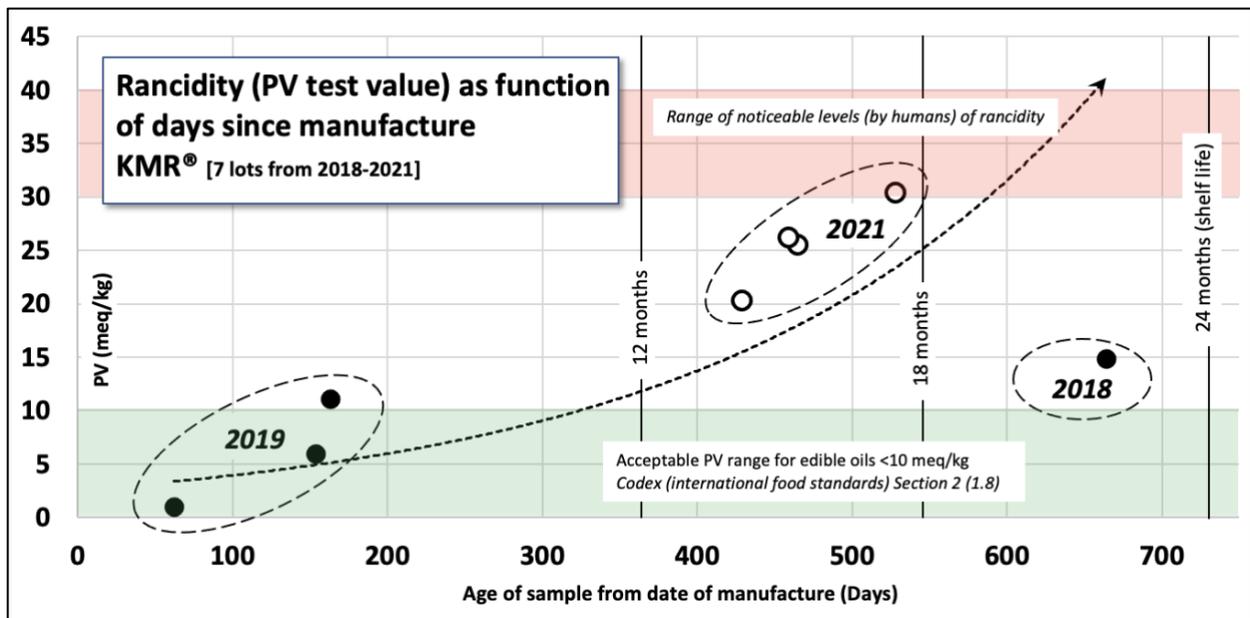
The test results suggest that the formulation of KMR® may have already been changed over the last several years (pre-2022). Thus while unknown, it is possible that the 2021 KMR® might be an 'early release' of the newly announced 2022 formulation, though not reflected on the 2021 label. These current test results may serve as a baseline to compare to PetAg®'s KMR® reformulation (2022). Future lab testing of the 2022 KMR® may also provide useful clues and insights. Meanwhile, 2021 KMR® lots should be closely examined for off or foul odors ([How to detect](#) and ['fussy' eaters](#)).

Again, what is rancidity?

Briefly stated, rancidity is a condition produced by aerial oxidation of unsaturated fats in foods/oils, marked by an unpleasant odor and flavor. As rancidification progresses, it can cause the product to become unpalatable, produce adverse health conditions, and provide less nutrition. Rancidity is different than bacterial contamination and/or toxins, but all may show similar symptoms.

KMR® product testing

The four lots of KMR® were tested using a standard Peroxide Value (PV) test [AOAC 965.33] by the independent lab. The Codex (international food standards) maximum PV level for edible oils is **10**. As shown in the chart below, the lots tested between **20 – 30**, which is 2 - 3 times HIGHER than the standard of 10. *[For comparison, [GME® lots previously tested showed a pattern of rancidity with PV's 2 - 6 times higher the standard, with one lot as high as 14 times higher; chart included at the end of this article.](#)]*



These elevated PV results were unexpected, as lots made in 2018 and 2019 were within the standard or just slightly above. There could be a single or multiple factors that could explain these results for the 2021 lots.

Change in product formulation?

The KMR® 2021 label lists vegetable oil as the second ingredient, indicating it is a primary ingredient. Since many plant-based oils are included in the designation of vegetable oil, it is unclear which specific oils are present in KMR®. Oils higher in unsaturated fatty acids have an increased tendency towards rancidity than saturated fats. A fatty acid profile test may provide clues to suggest which specific oils could be present in a product, as discussed below, and which might be less stable with a shorter shelf-life.

WildAgain ordered fatty acid profile assays for some milk powders submitted for lab testing. The fatty acid profile provides a summary breakdown of saturated and unsaturated fatty acids, as well as the concentrations of individual acids.

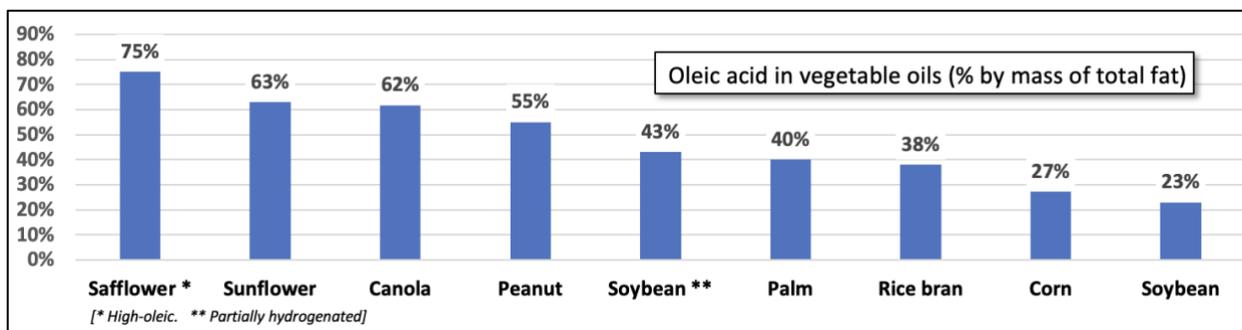
Test results of KMR® produced in early 2021 indicate a 45% increase in the unsaturated fats in the profile compared to KMR® made in 2016, with the monounsaturated fats doubling in concentration as shown in the chart below. This is consistent with an industry trend to use natural antioxidants such as tocopherols, rosemary, and other unique ingredients. Even though KMR® contains some of these antioxidants, they may only be partially preventing or impeding the progression of the oxidative effects of the higher concentration of unsaturated fatty acids. Food antioxidants directly neutralize free radicals generated during the oxidation process, reduce peroxide concentrations, repair oxidized membranes, and bind iron to reduce the production of reactive oxygen species. The following chart shows how the 2021 KMR® lot compared to other milk powder tests, including KMR® from 2016.

Fatty Acid Composition - Percent of total fat (dry powder basis - as tested AOAC 996.06)							
	FV32/40	Esbilac (pre-22)	Esbilac 2022	KMR (2016)	KMR (2021)	MannaPro Kid Goat	Wombarro Rabbit
Saturated	88%	24%	18%	35%	26%	52%	64%
Polyunsaturated	2%	15%	24%	25%	23%	12%	8%
Monounsaturated	10%	60%	57%	26%	51%	36%	27%
Trans fatty acids	0%	1%	0%	15%	0%	1%	1%
Total	100%	100%	100%	100%	100%	100%	100%

The following table shows the profile of the major fatty acids in various powdered milk replacers used by rehabilitators. It shows a change to a predominant and increased concentration of oleic acid (C18:1 *Cis*) in the KMR® from the earlier concentration from 2016 to 2021, doubling to comprise 50% of the total fat in the 2021 product.

Fatty Acid Composition - Percent of total fat (dry powder basis - as tested AOAC 996.06)							
	FV32/40	Esbilac (pre-22)	Esbilac 2022	KMR (2016)	KMR (2021)	MannaPro Kid Goat	Wombarro Rabbit
Caprylic (C8:0)	5.3%	0.3%	0.1%	0.4%	0.3%	1.5%	7.8%
Capric (C10:0)	5.3%	0.6%	0.3%	0.9%	0.7%	1.5%	16.4%
Lauric (C12:0)	38.3%	0.8%	0.4%	1.2%	0.8%	10.5%	2.2%
Myristic (C14:0)	20.4%	3.0%	1.5%	3.8%	3.3%	7.0%	9.0%
Palmitic (C16:0)	13.3%	11.3%	9.6%	16.7%	13.2%	20.7%	20.2%
Stearic (C18:0)	4.3%	5.9%	4.9%	10.1%	5.6%	10.1%	6.8%
Oleic (C18:1 <i>Cis</i>)	9.1%	59.2%	56.8%	25.1%	50.0%	33.0%	24.2%
Linoleic (C18:2 <i>Cis</i>)	2.1%	13.7%	21.5%	21.3%	20.5%	10.5%	4.7%
Linolenic (C18:3 <i>a</i>)	0.1%	1.6%	2.5%	3.1%	2.5%	0.6%	2.3%
Other Fatty Acids	1.8%	3.6%	2.3%	17.4%	3.2%	4.6%	6.3%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

The next table shows various plant-based oils and their concentrations of oleic acid. The KMR® label lists generic 'vegetable oil' as a predominant ingredient. The USDA website offers clues as to which one or more oils are included in such a formulation (*US National Nutrient Database, Release 28 United States Department of Agriculture. May 2016*).



The overall total crude fat content in both KMR® lots (2016 and 2021 on a dry matter basis) tested appears unchanged at 28%. This suggests that the makeup (formulation) has changed over that five-year period - which also changed the fatty acid profile, resulting in a current higher level of overall

unsaturated fats. This could also explain why the 2018 sample, even nearing the end of its 24-month shelf life, still only tested slightly above the standard PV level. However, caution seems appropriate even if the KMR 2021 container is unopened and within the expiration date, but especially if more than 12 months past date of manufacturer (check the lot number).

Note: PetAg® has announced a change in the formulation of KMR® in 2022, as evidenced by a new product label and list of ingredients. FDA/AAFCO pet food regulations allow for up to 6 months for the label to reflect a product reformulation, yet full compliance with this disclosure may extend to two years. With that in mind, might the older labeled cans actually be an 'early release' of the new formulation? Could the new formulation contain the higher concentration of oleic acid? If so, could that explain the elevated PV results in 2021 manufactured lots? Future lab testing of the 2022 KMR® may provide useful clues and insights. The acid profile is not disclosed on the label. WildAgain has not yet obtained a sample of the 2022 KMR® with the new label for independent lab testing, so the proximate analysis and fatty acid profile of the new formulation is unknown as of September 2022.



Storage and handling?

Published research has consistent recommendations for transport, storage, and handling of high-fat content oils and foods, including powdered animal milk replacers. Basically, the products should be kept away from heat; kept tightly sealed and packaged to prevent contact with the air and light; and consumed promptly and certainly within the recommended shelf life. As rehabilitators are aware, some of these factors are controllable – some are not. Assuming newly-made lots of KMR® were rancid-free when they left the PetAg® manufacturing facility, supply chain conditions are mostly unknown and largely uncontrollable. Distribution networks involving warehouses and trucks may not be temperature-controlled. Online resellers may or may not use temperature-controlled facilities. Commercial delivery services and USPS may not use temperature-controlled vehicles, which is especially concerning in summer months in many regions.

Rehabilitators should be guided by the KMR® label storage instructions, which indicates storing in a cool, dry place for unopened product; storing an opened product refrigerated for 3 months; or storing frozen for 6 months. Again, heat and exposure to air will accelerate the rancidification process for these high-fat products, especially those with high unsaturated fat levels such as KMR®.

Could improper storage from the date of manufacture until the date of testing caused the four 2021 lots to have an elevated PV result? Perhaps, but probably not all four, which were obtained from different sources. However, it could suggest that the product is less stable than advertised, with a useable shelf life considerably shorter than 24 months.

Conclusion and suggested action steps

It appears that over the last several years (pre-2022), the formulation of KMR® has been changed to include a higher level of unsaturated fats, specifically oleic acid. This likely increases the odds of early-onset product rancidification, much sooner than the quoted shelf-life of 24 months. This is especially likely if the product has been improperly handled during distribution, through the supply chain, or even by the end user.

Some suggested action steps include:

- 1.) Purchase milk replacer powders that are as fresh as possible, preferably less than 3 months old. Learn how to determine the manufacture date from the lot number ([click here](#)). Ask the vendor for the specific lot number for the can or bag to be purchased. Insist on freshness.
- 2.) Give preference to vendors who can describe how and when they: receive product shipments; store until resale (methods and timing); and ship to the end user.
- 3.) If the product must be shipped, consider ordering during cooler months – though that may mean a longer time between manufacturing and use. Consider expedited shipment to reduce time in transit.
- 4.) Upon receipt, consider two important steps. First, make a note/photo of the lot number and even the product label in case later issues emerge. Keep notes during the use of that lot, especially if abnormalities are observed or suspected in the health of the animal. Second, quickly store properly in a cool or refrigerated environment. Freeze unopened containers to preserve freshness. This practice should be used by *anyone* handling the milk powders. Minimize exposing the milk powder to warm temperatures, light and air. Keep that in mind and use caution if considering repackaging the powder into smaller containers for storage or ‘sharing’ among rehabilitators, as even brief exposures to air can contribute to or accelerate the rancidification process.
- 5.) After opening a new container, attempt to determine the presence of rancidity. First, do the sniff test ([click here](#)). It is also good practice to sniff *all* milk powders *every* time they are *reopened*, and to become familiar with their normal odor for comparison. Check the powder in a room without strong scents. Remember, as shown in the first chart above, the odor of rancidity is usually undetectable by humans until the PV is in the 30-40 range. Second, notice any reluctance of healthy rehab animals who have normally eaten willingly to now refuse formula made from a newly opened container. They will likely detect rancidity more quickly and at lower PV levels, since animals have a much more developed and sensitive sense of smell than humans and may quickly notice a difference. Third, consider having a professional lab perform the standard PV test to assay the peroxide value of the milk powder.
- 6.) If the wild animals start showing GI issues, changes in activity and behavior, lack of expected weight gain, or other health issues (within 3 – 8 days) *when nothing else has changed other than a recently opened or started container of milk powder*, consider halting use of that container. Check with other rehabilitators using that same product and/or lot number for similar issues. While rancidity can cause reluctance to eat, reduced activity, slower growth, and GI disorders, these conditions may also be caused by other factors (such as respiratory conditions, endoparasites, formula recipe and reconstitution, feeding practices, some medications and more).
- 7.) Rehabilitators may use a formula recipe that blends multiple milk replacers to better match the species-specific milk, especially since many of the commercially available products are formulated specifically for domestic species, such as KMR® is for kittens. ([Click here for mixing guidelines for blended recipes.](#)) The goal of blending milk powders (and adding supplemental ingredients) is to adjust the levels of solids, proteins, fats, dietary minerals, and kcals to match the species – and possibly even obtain a target concentration of specific fatty acids (i.e., caprylic, capric). Feeding

any product with a higher PV poses a high risk if the animal is very young and/or has compromised health, even as part of a 'blend'. If using a milk replacer powder that has a low PV level that is *not* noticeable to humans (PV greater than 10 but less than 30), some level of rancidity can be inadvertently introduced into the blended formula. Although the adverse effects of a rancid ingredient can be only partially minimized through the dilutive nature of a blend, it is likely less harmful than if the rancid product was the sole ingredient in a recipe.

PV test results for GME®

