

## **UPDATE: GI Conditions and Nutrition Changes with 'New' Esbilac® Powder**

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### **Abstract**

PetAg is the manufacturer of Esbilac® Milk Replacer that originally was developed for orphaned puppies and has since become a base for formula used with some wildlife species. In late 2008, PetAg changed to a different manufacturing facility to return to using a single-step spray drying process for the Esbilac® powder, versus a multi-step process. They believed that returning to this drying method, one that is used with most of their other products, was a small, unnoticeable improvement that often occurs in manufacturing. That was indeed the result in many cases as owners of puppies using Esbilac® powder and some wildlife rehabilitators who use Esbilac® as a base formula for wild mammals in rehabilitation did not report any differences.

Other rehabilitators, however, reported that the juvenile wild orphans fed formula made with the 'new' Esbilac® developed more gastrointestinal problems than normal. After working to eliminate other variables that could cause the gastrointestinal upsets, some tried switching to different milk replacers made by PetAg and others. After the switch, they reported that most of the gastrointestinal problems resolved quickly. Research to understand what could be causing gastrointestinal upset when wildlife is fed the 'new' Esbilac® and to find solutions has revealed additional symptoms, as well as nutrient and kcal changes in the product. More complete information is available at <http://www.ewildagain.org/Nutrition/nutrition.htm>.

In mid-July, 2009, wildlife rehabilitators began to report that some small mammals in rehabilitation, especially squirrels, that were fed formula made with Esbilac® Milk Replacer developed gastrointestinal problems. These problems ranged from bloat to soft stool to involuntary diarrhea. Other rehabilitators reported that wild mammals being fed the same Esbilac® had shown no gastrointestinal upset that they believed was related to the product.

### **Various factors affect GI health**

Since many factors may cause bloat, soft stool and diarrhea in wildlife, the rehabilitators observing gastrointestinal problems first tried addressing those possibilities. They made sure the animals were warmed and fully hydrated before introducing formula, fed a correct amount for the species, age and weight, and the appropriate number of feedings per day (i.e., not overfeeding), allowed enough time between feedings for animals to digest their food, treated for parasites, avoided medications that cause or aggravate gastrointestinal upset, and so forth. If these rehabilitators used volunteers to help feed animals, they emphasized effective and consistent feeding protocols and supervised more closely to prevent husbandry related issues. Some of the stool problems were

quickly and completely corrected, which confirmed that some of the gastrointestinal symptoms being observed were not related to the Esbilac®.

### Considering potential product related causes

Other animals with gastrointestinal upset did not improve after the above husbandry ('non-product') changes were made. Some rehabilitators contacted PetAg, the manufacturer of Esbilac®. PetAg explained that they had changed to a single-step drying process in December, 2008. They were confident in the method since the single-step drying process is the same that PetAg has used with many of their other products, and with Esbilac® prior to 1993.

PetAg said they had not altered the Esbilac® recipe or contents. Also, the guaranteed analysis had, they said, stayed the same. They explained that a single-step drying process tends to result in 1-3% more digestible proteins and fats. While some rehabilitators using the 'new' Esbilac® confirmed that they still did not see any unexplained stool problems, others continued to have gastrointestinal disorders in many of their animals when feeding them the new Esbilac® (see insert box for lot numbers).

#### Pet Ag's Lot Codes

They use a 'Julian date' to assign lot codes. Such that 3528E is comprised of 3 components: 352-8-E. The **352** indicates the day of the year (or December 18 in a non-leap year). The **8** refers to the year (or 2008). The **E** refers to Esbilac. For example, a lot code of 0189E indicates a lot later than 3528E since it was produced on January 18, 2009.

Lot numbers of the 'new' Esbilac® include: **3528E, 0919E, 0929E, 1639E and any later numbers with a 9 at the end (i.e., XXX9E).**

### Some initial adjustments

PetAg said that perhaps some animals needed more time to adjust to the new Esbilac®, which was more digestible and thus slightly richer in fats and proteins. They suggested temporarily diluting the formula a bit more (1 part Esbilac® powder to 2½ or 2¼ parts water). In addition, PetAg explained that the 'single-step dry' Esbilac® was no longer an instant mix formula. Very hot water is required to aid its dissolving and it should be mixed for at least a minute (and not in a blender). Strive for accurate measurements.

In addition to the above changes, the Esbilac® made with the single-step drying process produces a lighter-textured product that tends to settle more in the package. This compaction can result in a product that is more tightly packed in the bottom of the package or can (up to 10% difference between the top and bottom of the package). Such compression could cause the formula to be more concentrated when measured and mixed. PetAg encouraged rehabilitators to turn the can over several times to make sure the powder was evenly distributed and not 'packed tightly' when measured.

### More symptoms and possible causes

Rehabilitators tried these suggested changes. Unfortunately, the gastrointestinal problems continued even after adjustments to the measuring, mixing process and dilutions suggested by PetAg. Gastrointestinal upset seemed worse with younger

animals (i.e., eyes closed) and those compromised due to other health problems (e.g., injuries, wounds).

Some rehabilitators reported that many of the sick animals showed little or no weight gain. This was not surprising since animals with gastrointestinal upset often have difficulty absorbing adequate nutrition. They also reported that the squirrels seemed more ravenous than expected. Again, this did not seem surprising for animals on diluted formula since they would be getting slightly less nutrition due to the dilution. However, some rehabilitators observed that squirrels fed the full-strength new Esbilac® also acted hungrier than on the old Esbilac®.

The authors and a few other rehabilitators responded by weighing the new Esbilac® hundreds of times to compare the dry weight of the new and the old Esbilac® powders by dipping the measuring scoop provided by PetAg in the Esbilac® can and then leveling off the top. The PetAg staff also weighed the product at their facility. The new Esbilac® weighs 7% less. Calculating the nutrition and kcals (energy) revealed that the new Esbilac® contains up to 10% less of certain nutrient values and 7% less kcals when mixed in the

1 part Esbilac® powder to 2 parts water ratio than the old Esbilac®. The chart at right shows that this recent decline in

Mix ratio	Typical analysis date	Solids	Protein	Fat	Carb	ME kcal / cc	Dry Weight 1 TBSP
1:2	09/2004	17.3%	5.9%	7.6%	2.4%	0.94	6.36
1:2	08/2007	16.4%	5.8%	7.0%	2.5%	0.88	5.95
1:2	08/2009	15.3%	5.7%	6.3%	2.5%	0.82	5.53
	Change 2004 to 2007	-5.2%	-1.7%	-7.9%	4.2%	-6.4%	-6.4%
	Change 2007 to 2009	-6.7%	-1.7%	-10.0%	0.0%	-6.8%	-7.1%
	Change 2004 to 2009	-11.6%	-3.4%	-17.1%	4.2%	-12.8%	-13.1%

product weight and some nutrient component values has been a 5-year trend. This information has been compiled from the Typical Nutrition Analysis available on request from PetAg.

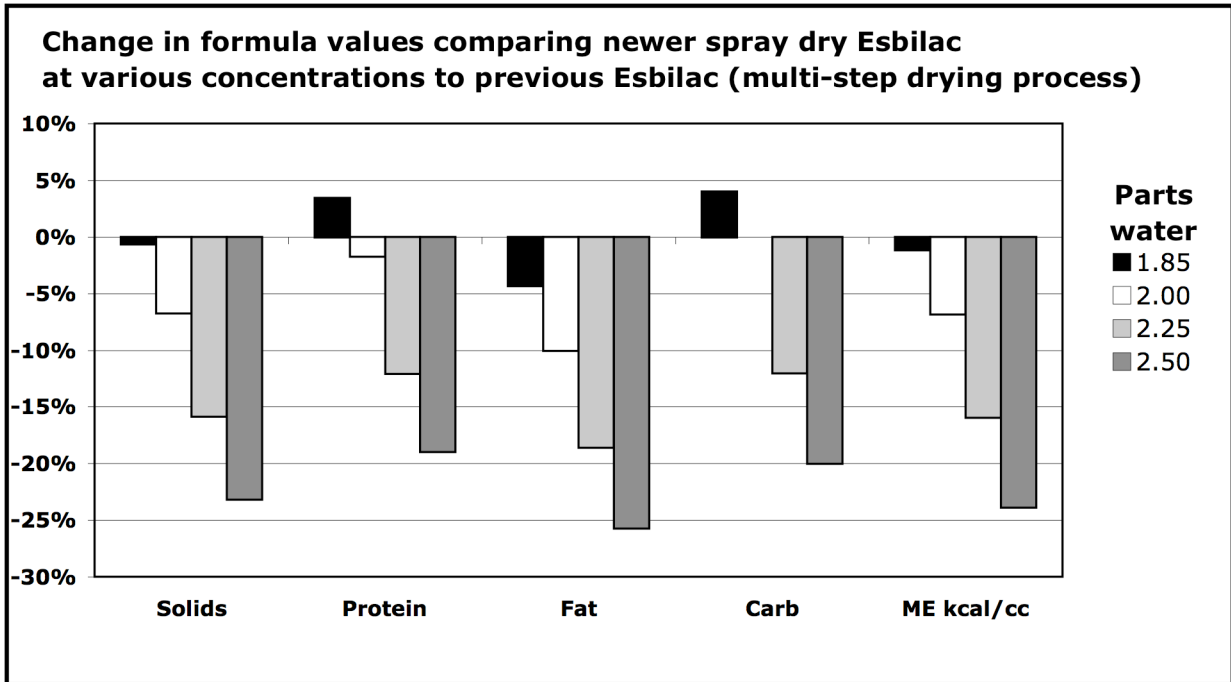
The natural tendency would be to increase the amount of powder in the formula to compensate for this decline in nutrient and calorie content. The table and chart below show that 1 part new Esbilac® powder to 1.85 parts water actually provides composition values reasonably close to the values of the 1:2 formula using the old Esbilac®. However, since some rehabilitators have reported diarrhea in their animals when fed the new Esbilac formula diluted with 2 parts water, further decreasing the amount of water in order to approach the nutritional values of the old Esbilac seems counterproductive.

In order to eliminate gastrointestinal problems, the water in a formula using the new Esbilac has been increased slightly instead. However, the table below and the chart on the

following page show that using more water results in significant deficits of

Mix ratio		Solids	Protein	Fat	Carb	ME kcal/cc
1:2.00	Old Esbilac	16.4%	5.8%	7.0%	2.5%	0.88
1:1.85	New Esbilac	16.3%	6.0%	6.7%	2.6%	0.87
1:2.00	New Esbilac	15.3%	5.7%	6.3%	2.5%	0.82
1:2.25	New Esbilac	13.8%	5.1%	5.7%	2.2%	0.74
1:2.50	New Esbilac	12.6%	4.7%	5.2%	2.0%	0.67

both nutrients and calories. This may help to explain the reported 'unusual hunger' and slow growth when the formula is mixed with two parts water, and can certainly explain



the more desperate hunger and 'failure to thrive' when the formula was diluted with greater than two parts water for more than a couple of feedings.

Using higher dilutions for a few feedings or even a couple of days as an animal adjusts to a formula is certainly acceptable and often necessary. However, continuing to feed a more dilute formula for a longer time could significantly lower nutrient and kcals and result in both short and long term health concerns.

Other concerns could potentially develop later in wild animals fed a nutritionally deficient formula, such as with their fur, teeth, bones, and overall health. It is, however, possible that the addition of supplementary products may increase some of the nutrition and kcals (i.e., adding products with more fats, such as Multi-Milk or whipping cream, when the squirrels are older). Also, older juveniles animals with their eyes open are eating solids and thus obtaining more nutrition from additional sources. A single-source diet like formula could be one of the reasons why infant animals, such as the eyes-closed squirrels that receive all their nutrition from the new Esbilac® with its reduced amount of kcals and nutrients, are experiencing slower growth. Factors such as formula kcals, nutrients, dilutions, number of feedings, and amounts fed can make a big difference in the health and survival of extremely young and small animals.

Recovering the nutritional and energy difference could be accomplished in several ways, but each option has its own challenges. Mixing the powder with less than 2 parts water

Squirrels make up the most small mammal cases that are in rehabilitation at this time of year since squirrels that are born in summer and orphaned or injured are arriving at rehabilitation facilities and being fed milk replacers, such as Esbilac®. However, wildlife rehabilitators who are still feeding Esbilac® to other young wild mammals in rehabilitation have reported similar concerns with opossums, raccoons, and rabbits.

makes it more concentrated and may affect digestion and hydration. Since the stomach capacity of many small mammals, such as squirrels, is about 5% of their body weight, increasing the amount fed per feeding does not work. Feeding more times a day may be problematic as well, since it will decrease time for the animal to adequately digest the previous feeding. Increasing the number of feedings also would add time and work for the caregivers.

### **More searching for causes**

Some rehabilitators also reported that it was difficult for the squirrels in gastrointestinal distress to maintain hydration, most likely due to their diarrhea. A few rehabilitators said that some squirrels had green and involuntary stool. While this could have been a sign of parasites such as *Giardia*, the stool problem did not resolve when the squirrels were treated for parasites. These rehabilitators and their veterinarians wondered about bacterial infection.

Rehabilitators asked PetAg whether the Esbilac® powder might have overheated while warehoused and shipped during the summer heat and possibly have spoiled. PetAg tested the Esbilac® packages in their warehouse and labs and did not find any rancidity prior to shipping. PetAg said that most people opening the package of Esbilac® powder would immediately notice if a product was rancid due to its strong odor. Rehabilitators did not report a rancid smell.

Several veterinarians conducted fecal cultures on stool from wildlife with continuing diarrhea. While bacteria did appear in some of the culture sensitivities, this could have resulted from the animals having infections prior to being fed the Esbilac® or having developed the bacteria due to a secondary problem (i.e., long-term diarrhea), rather than resulting from bacteria in the product. PetAg and their independent labs did not find bacteria in the new Esbilac® powder from their facilities when it was tested originally or recently. PetAg presently is collecting Esbilac® powder submitted from rehabilitators with sick animals and having it tested at an independent laboratory.

PetAg explained that the U.S. based facilities they use for manufacturing and the single-step drying process also are used by the manufacturers of human infant milk replacement formulas. These facilities have stringent manufacturing and quality control standards and are monitored closely by the FDA. PetAg performed many quality tests on each lot of manufactured products, as well as having each product and lot tested by independent labs. These labs confirmed that the new Esbilac® met standards and did not contain bacteria. In addition, PetAg states on their website that they do not use any milk products from China. Independent laboratories test all PetAg products to confirm that they do not contain melamine, the substance that caused the massive pet food recall in 2007.

### **Examining more cases**

As rehabilitators continued to search for other causes of and solutions to the gastrointestinal problems in their animals, the authors collected information from many of them regarding these on-going efforts. Much of the current information comes from 20+ rehabilitators in 8 states caring for over 150 squirrels with gastrointestinal disorders while

on the 'new' Esbilac®. These rehabilitators have worked to eliminate other possible factors that could have caused the stool problems besides the Esbilac® made with the single-step drying. When they tried using this Esbilac® at several different dilutions, they continued to see gastrointestinal problems, ravenous appetites, and poor growth and development.

These rehabilitators learned from others that they had observed rapid improvement in their animals after switching from the new Esbilac® to the Esbilac® made with the former, multi-step process produced prior to December, 2008, as well as other products. So, in late August, after trying to eliminate all other possible causes of the gastrointestinal problems in their animals, the rehabilitators switched to the 'old' Esbilac® for a few of their sick squirrels and opossums in rehabilitation. Almost all the animals recovered quickly and had normal stool in 24 hours. They changed their remaining animals to the 'old' Esbilac® and saw similar dramatic improvements in 24 hours.

Some rehabilitators confirmed that they, too, had seen rapid recoveries after switching from the new Esbilac® powder to other products, such as Zoologic® Milk Matrix 33/40. Interestingly, Zoologic® Milk Matrix 33/40 was the Esbilac® formula used with puppies and many wild orphans prior to 1993. Zoologic® Milk Matrix 33/40 has the same ingredients as Esbilac®, but contains only vegetable fats (and no butter fats).

### **Initial conclusion**

The fact that the gastrointestinal problems resolved so quickly when rehabilitators made no other change than to use different milk replacement products that met the animals' nutritional, caloric and digestive needs strongly suggests that something is different with the new Esbilac® product in addition to changes in nutrient levels and energy values.

### **Next steps**

Rehabilitators who see good health and no gastrointestinal problems when feeding the new Esbilac® may certainly choose to continue to use it. They will likely, however, want to consider adjusting for the decrease in nutrition and kcals. While rehabilitators are trying to identify appropriate and effective adjustments, we believe that is still too early in the process to know the exact changes to make in order to address the concerns with the new Esbilac®. Plus, additional adjustments may be required for any changes based on species, age of animal, health of the animal, and so forth. Each rehabilitator should continue their normal practice of monitoring the health and development of every animal in their care.

**Rehabilitators who observe gastrointestinal or other problems when using the new Esbilac® may want to consider switching to another product that meets the animal's nutritional and digestive needs, such as Zoologic® Milk Matrix 33/40.** In addition, rehabilitators should consider other factors that also can affect the animal's health (see resources listed below).

## Continuing data collection

In the meantime, we will continue researching these issues and provide information on our website, [www.ewildagain.org](http://www.ewildagain.org), as information is reported to us. We also will share our findings with PetAg. If you would like to offer observations on your own experiences with the new Esbilac® that has been available since spring 2009 or ask questions, contact us at [wrehabproject@aol.com](mailto:wrehabproject@aol.com). In addition, the Nutrition calculator with revised kcals and other resources will continue to be expanded on [www.ewildagain.org](http://www.ewildagain.org).

Contact information for PetAg is available at [www.PetAg.com](http://www.PetAg.com). It is useful to include the product name and lot number of the package included in the communications.

*Thanks to all the wildlife rehabilitators and veterinarians caring for and working with wildlife, and an extra thanks to those sharing information and helping with this research.*

## Resources

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- Nutrition calculator. Provides nutrition and kcal information on milk replacement products and a downloadable calculator in Excel for easy use. Download at [www.ewildagain.org](http://www.ewildagain.org).

## Authors

Allan and Shirley Casey, co-founders of WildAgain Wildlife Rehabilitation, Inc. in Evergreen, Colorado, have been licensed rehabilitators since 1986. The Casey's conduct research on a variety of rehabilitation related subjects, including nutrition, wildlife health, rehabilitation regulations, and trends. They have written over 100 articles for rehabilitation and veterinary publications, as well as the *Squirrel Rehabilitation Handbook*. They have presented over 100 sessions at conferences and given 50+ training programs and seminars on rehabilitation topics around the US. [www.ewildagain.org](http://www.ewildagain.org)

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