

Purer Ingredients Lead to Safer More Nutritious Pet Food

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Two important trends are being observed in pet foods today. The first trend is the humanization of pet food with the preference of consumers for pure and nutritious pet food that has been proven through scientific studies. The second trend is heightened awareness of product safety. The FDA has a zero-tolerance policy for *Salmonella* in pet diets, but *Salmonella* contamination continues to be the leading cause of recalls of pet food¹. *Salmonella* contamination of dry pet food has been directly linked to human infection - often in small children.²

Researchers in academia and the industry continue to evaluate new methods to reduce the contamination risk through the study of where the contamination occurs³ and the evaluation of the efficacy of new additives⁴. Contamination of pet food most often occurs through contamination of the chicken fat ingredient, since it is typically added to coat the extruded pellet after the high temperature kill step in the process. Relatively low water activity products like chicken fat were once thought to not harbor *Salmonella*, but it is now known that if water is present (and it is almost always present due to water in transfer lines and vessels used during transportation) *Salmonella* can survive and grow in standard chicken fat.⁵

We have taken a fundamentally different approach to reduce the risk of *Salmonella* contamination of chicken fat. Instead of utilizing additional additives, we have aligned with consumer's desire for purer components in their pet's diet. We have found that *Salmonella* utilizes the non-fat components in chicken fat (organic impurities, trace metals, salts, etc.) to grow and multiply, and we have invented a process to remove those impurities from standard chicken fat. The resulting purified fat is clear with low levels of insoluble impurities and is light in color (picture below).

¹ FDA Website

² Barton Behravesh, et. al. *Pediatrics* Vol 126, No. 3, September 2010, 477-483.

³ Trinetta, Valentina, et. al. *Transl. Anim. Sci.* 2019 Jun 19;3(4):1369-1374.

⁴ Dhakal, J.]anak, *Journal of Food Protection*, Vol. 82, No. 11, 2019, 1864–1869

⁵ Finn, Sarah, Et al. .. *Frontiers in Microbiology* 2013 4, Article 331, 1-15



Standard Chicken Fat Impurities Removed by Process Gold Shield® Refined Chicken Fat

As can be seen in Table 1, the new process does not alter the fatty acid composition, but it does remove trace metals, salts, and organic impurities (like nucleic acids, proteins, etc). Metals such as iron and magnesium are reduced beyond detectable levels and salts like phosphate and sulfate are reduced significantly.

Refined Chicken Fat: Typical Analysis vs. Standard Chicken Fat						
	Refined Chicken Fat	Standard Chicken Fat		Refined Chicken Fat	Standard Chicken Fat	
Moisture (Avg wt-%)	0.40	0.18	Fatty Acid Profile (Avg wt-%)			
Insolubles (Avg wt-%)	0.08	0.24		C12 Lauric Acid	0.06	0.05
Unsaponifiabiles (Avg wt-%)	0.99	0.92		C14 Myristic Acid	0.56	0.63
Total MiU (Avg wt-%)	1.47	1.33		C14:1 Myristoleic Acid	0.17	0.18
Free Fatty Acids (Avg wt-%)	2.75	3.15		C16 Palmitic Acid	23.90	24.32
Peroxide Value (meq/kg)	0.70	0.70		C16:1 Palmitoleic Acid	6.64	6.58
				C16:2 Hexadecadienoic Acid	0.00	0.02
Metals and Salts				C17 Margoric Acid	0.11	0.09
Iron (ppm)	<1.0	1.8		C17:1 Maraoleic Acid	0.08	0.03
Magnesium (ppm)	<1.0	4.2		C18: Stearic Acid	5.83	5.99
Calcium (ppm)	5.1	15.9		C18:1 Oleic Acid	39.90	39.94
Phosphorus (ppm)	6.4	280.9		C18:2 Linoleic Acid	20.39	19.73
Sodium (ppm)	2.0	48.0		C18:3 Linolenic Acid	1.25	1.22
Potassium (ppm)	4.6	82.4	C20 Archidic Acid	0.06	0.08	
Sulfur (ppm)	26.3	43.2	C20:1 Eiscosenoic Acid	0.33	0.29	
			Total FFA (wt-%)	99.28	99.10	
FAC Color	Golden Yellow to Light Brown					
Physical Appearance	Mobile Liquid					
Flavor/Odor	Neutral/Bland					

Table 1. Comparison of Gold Shield® Refined Chicken Fat to standard chicken fat

We have then compared the performance of the purified fat to the standard fat for multiple attributes. A key finding found in head-to-head *Salmonella* challenge studies, showed that purer chicken fat produced with tight specifications (as shown in Table 1) is resistant to *Salmonella* growth. We have exposed both standard chicken fat and Gold Shield® Refined Chicken Fat in water in the presence of a tetrazolium dye to

Salmonella cells. Tetrazolium reduction is considered to be proportional not only to the number of cells present but also to their metabolic activity.⁶ We then observed the



Figure 1. Comparison of *Salmonella* growth in Gold Shield® Refined Chicken Fat to standard chicken fat

changes in optical density. A graph of the results is shown in Figure 1. The curve for the standard chicken fat shows a steady increase in optical density as the *Salmonella* cells metabolize, grow, and multiply. The curve for Gold Shield® Refined Chicken Fat is flat which shows no cell growth, directly attributable to the lack of essential nutrients in the refined fat.

We also found that purer chicken fat also is more stable to air oxidation. Oxidized fat has been shown to have detrimental effects on canine health including on growth rate and immune functions.⁷ Our new process removes catalysts for oxidation (e.g., metals and enzymes). This results in a fat that is less susceptible to air oxidation

⁶ Braissant, Olivier, et. al. *Frontiers in Microbiology*, Nov. 2020 Vol 11, 1-25.

⁷ Tureck, J. et al. *J. of Nutritional Biochemistry*, Vol. 14, Issue 1, Jan. 2003, p. 24-31

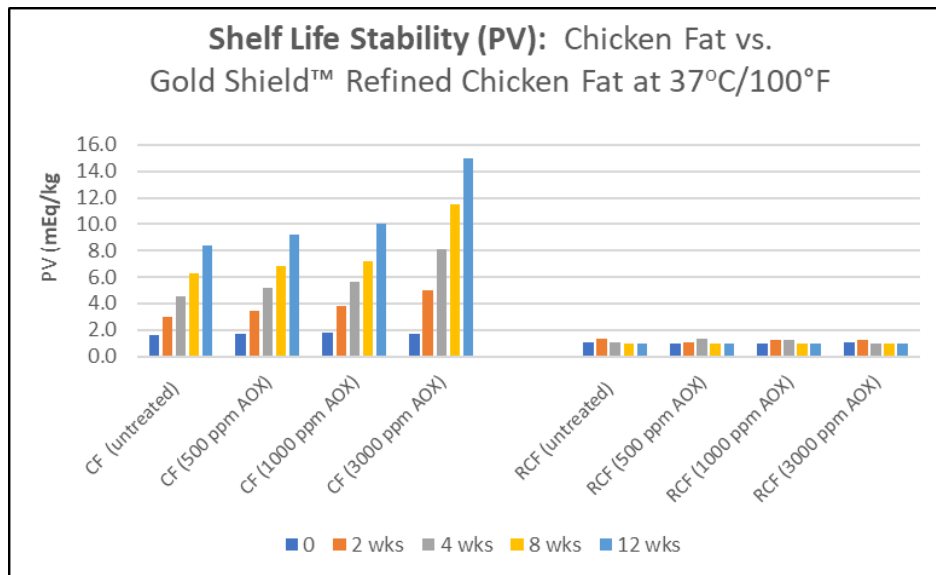


Figure 2. Comparison of PV in Gold Shield® Refined Chicken Fat to standard chicken fat

over time and has a longer shelf life. Comparison of peroxide value (PV) over time of fats stored at 37°C is shown in Figure 2. No significant oxidation of Gold Shield® Refined Chicken Fat was observed over 12 weeks at this temperature. Again, purer products can lead to the need for fewer additives (in this case, antioxidants) and provide a safer more nutritious ingredient.

We believe that a better approach to meeting the needs of today’s consumers is to understand the inherent causes of key issues (like *Salmonella* growth and air oxidation). Then by applying this understanding, it is possible to provide purer ingredients that are both safer and more nutritious than the less pure standard ingredients. This ultimately better meets the needs of both pet food manufacturers and the consumer.