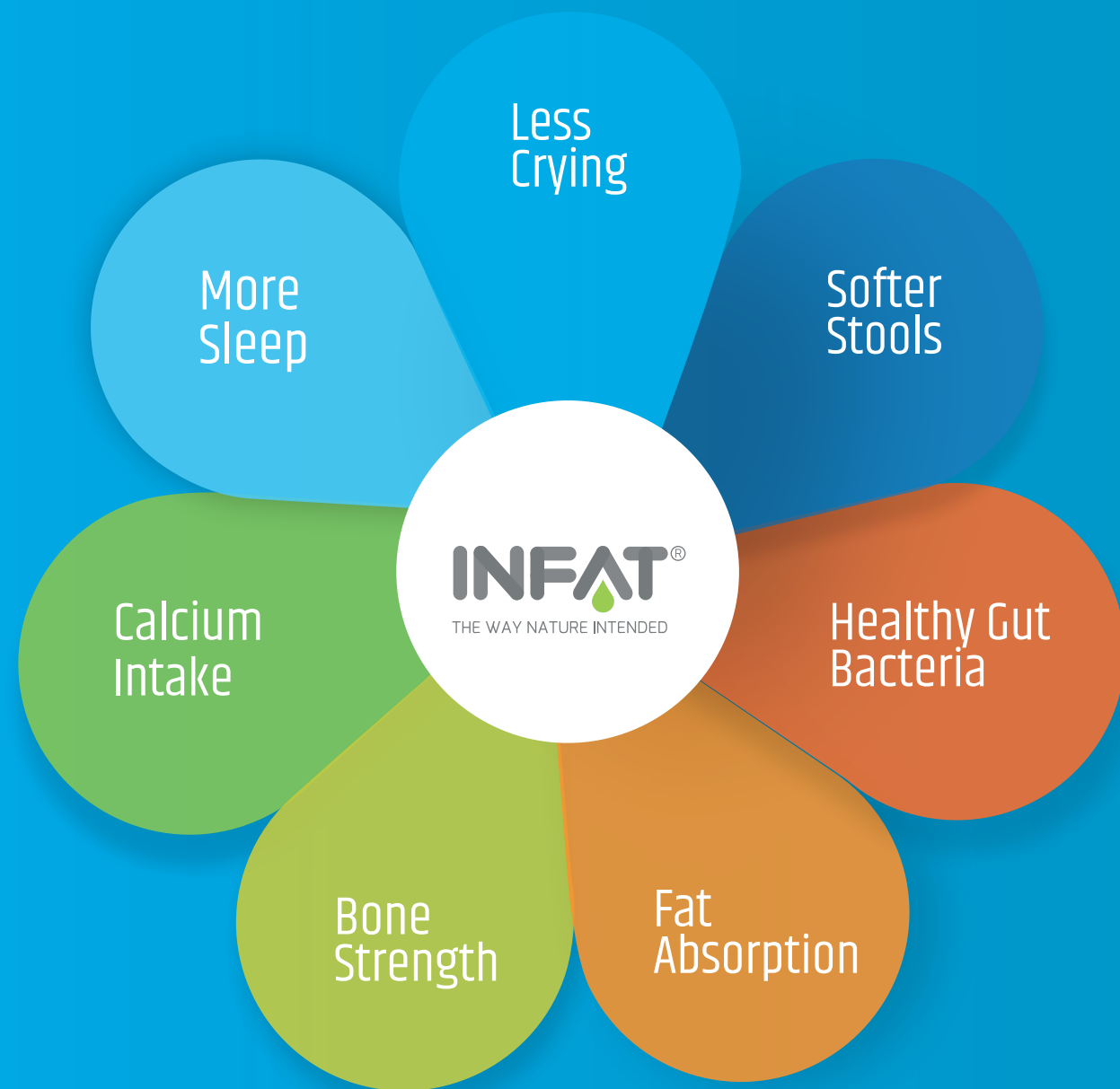


# INFAT<sup>®</sup>

THE WAY NATURE INTENDED

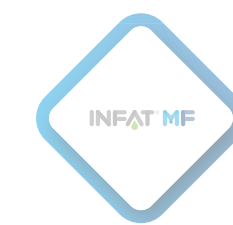
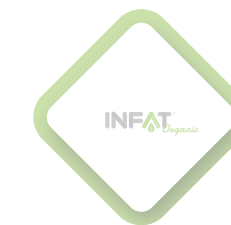
Our product portfolio -  
New and innovative INFAT<sup>®</sup> grades



Joint venture of AAK & IFF  
**ADVANCED  
LIPIDS**







# INFAT<sup>®</sup>

## A unique *sn2* palmitate ingredient with 7 benefits

### Human milk is the best nutrition for infants

Human milk provides the optimal nutrition for infants. It offers perfectly balanced nutrition, naturally meeting the needs of growing infants in the first months of life. In human milk, the fat provides about 50% of the energy newborns require for proper development and growth.

### *sn2* palmitate - a unique feature of human milk

Human milk research has revealed a unique structure where palmitic acid, one of the most abundant fatty acids found in human milk, is usually attached (70-80% of the time) to the middle position in the glycerol back-bone. This typical structure is found in human milk of women all over the world, regardless of nutritional diet, ethnicity or age, suggesting that it may serve an important function.

### INFAT<sup>®</sup> OPO - Enhances *sn2* palmitate level

INFAT<sup>®</sup>, a specially structured vegetable oil with palmitic acid bound to the middle position of the triglyceride (TG), also known as *sn2* position, was developed for infant formula to elevate its *sn2* palmitate level, so it is closer to human milk fat structure.





# INFAT<sup>®</sup> has been clinically tested to bring multiple benefits to babies



## Calcium Intake

Calcium is a crucial mineral and is obtained only through our nutrition. It is found mainly in our bones and the primary need for dietary calcium during early infancy and childhood, is to enhance bone mineral deposition. Calcium soaps can be formed when a baby is fed with a formula with low *sn2* palmitate. A clinical study on healthy term newborns demonstrated that INFAT<sup>®</sup> may support calcium intake by reducing the level of fecal saponified fatty acids compared to a standard formula [1].



## Improved Bone Parameters

Providing optimal nutrition during childhood may be essential for reaching the highest possible peak bone mass. A clinical study on term newborns demonstrated that the bone parameters (expressed as speed of sound) in newborns fed for 12 weeks with infant formula containing INFAT<sup>®</sup>, were significantly higher compared to the control formula [2]. Thus, INFAT<sup>®</sup> has a beneficial role in bone development during early life.



## Reduced Infant Crying

Crying is a basic, instinctive response in babies. However, sometimes crying may be related to abdominal discomfort, and a nutritional choice may impact a baby's comfort. Two clinical studies demonstrated that INFAT<sup>®</sup> affects the infant crying pattern during the first weeks of life even in addition to prebiotics. INFAT<sup>®</sup> was shown to reduce crying duration and frequency [4, 5], mainly during afternoon and evening hours. Study results suggest that INFAT<sup>®</sup> has a beneficial effect on the well-being of formula-fed infants.



## Increased infant sleep duration

Sleep is a natural activity of the brain and is especially important during early development. A clinical study carried out in China demonstrated that infants fed with INFAT<sup>®</sup> containing formula had longer daily sleep duration compared with the control fed infants [5].

### References

- 1) Bar-Yoseph, F., et al. *J Pediatr Gastroenterol Nutr.* 2016. 62(2): p. 341-7.
- 2) Litmanovitz, I., et al. *Calcif Tissue Int.* 2013. 92(1): p. 35-41.
- 3) Yaron, S., et al. *J Pediatr Gastroenterol Nutr.* 2013. 56(4): p. 376-81.
- 4) Litmanovitz, I., et al. *BMC Pediatr.* 2014. 14: p. 152.
- 5) Bar-Yoseph, F., et al. *Clinics Mother Child Health.* 2017. 14(2).
- 6) Beghin L., et al., *Clin Nutr.* 2019. 38(3):1023-1030.



## Fat Absorption

Typically, babies triple their weight and double their height during their first year. Such rapid growth requires a high-fat diet, with frequent feedings and efficient fat and calcium absorption. A clinical study on healthy term newborns demonstrated that INFAT<sup>®</sup> affects fatty acid absorption even in addition to prebiotics. INFAT<sup>®</sup> was shown to reduce the level of fecal saponified fatty acids compared to a standard formula [1], suggesting that it supports both fatty acid and calcium absorption.



## Beneficial Gut Microbiota

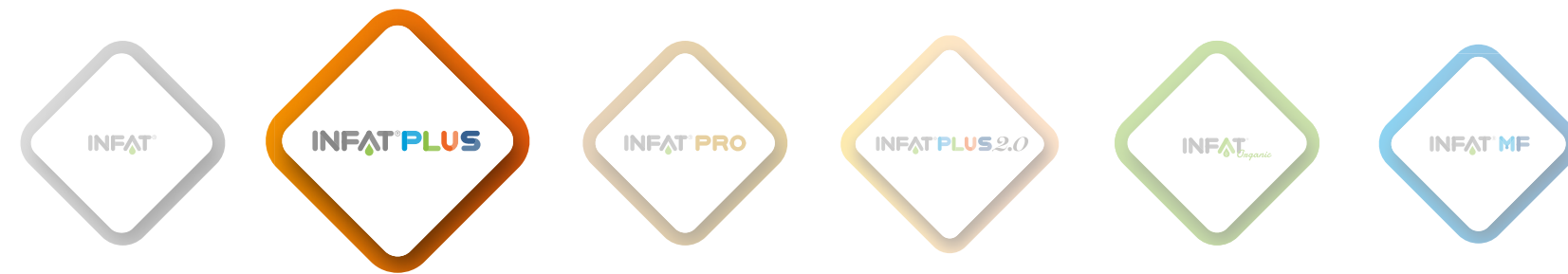
A clinical study on healthy term newborns demonstrated that INFAT<sup>®</sup> has a positive effect on the intestinal microbiota composition during the first weeks of life by increasing the abundance of Lactobacillus and Bifidobacteria in the stool after 6 weeks [3].



## Softer Stools

While a healthy, breastfed baby's stool is typically frequent, with a very runny consistency, a formula fed baby's stool is usually less frequent and more solid. This can lead to pain and discomfort. A clinical study demonstrated that the percentage of infants with hard stools were 23.8% in the control group (standard vegetable oil) but only 14.3% in the group consuming INFAT<sup>®</sup> [4].





## INFAT<sup>®</sup> PLUS

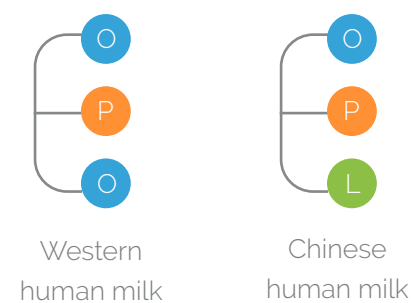
### An innovative fat blend, designed to be closer in structure to Chinese human milk fat

#### The best choice for Chinese infant formula

INFAT<sup>®</sup> PLUS, the innovative fat blend developed by Advanced Lipids, is designed to be closer in structure to Chinese human milk fat, and complies with GB standard 30604-2015 for OPO.

#### OPO and OPL – the most abundant triglycerides in human milk fat

Oleic acid (18:1n-9) is the major unsaturated fatty acid in human milk and is mostly esterified at the TG *sn*1,3 positions (outer). With palmitic and oleic acid being the most abundant fatty acids in human milk, the TGs with the structure Oleic-Palmitic-Oleic (OPO, 18:1n-9-16:0-18:1n-9) are among the major TG species in human milk and represent an estimated ~12% of total TG species.

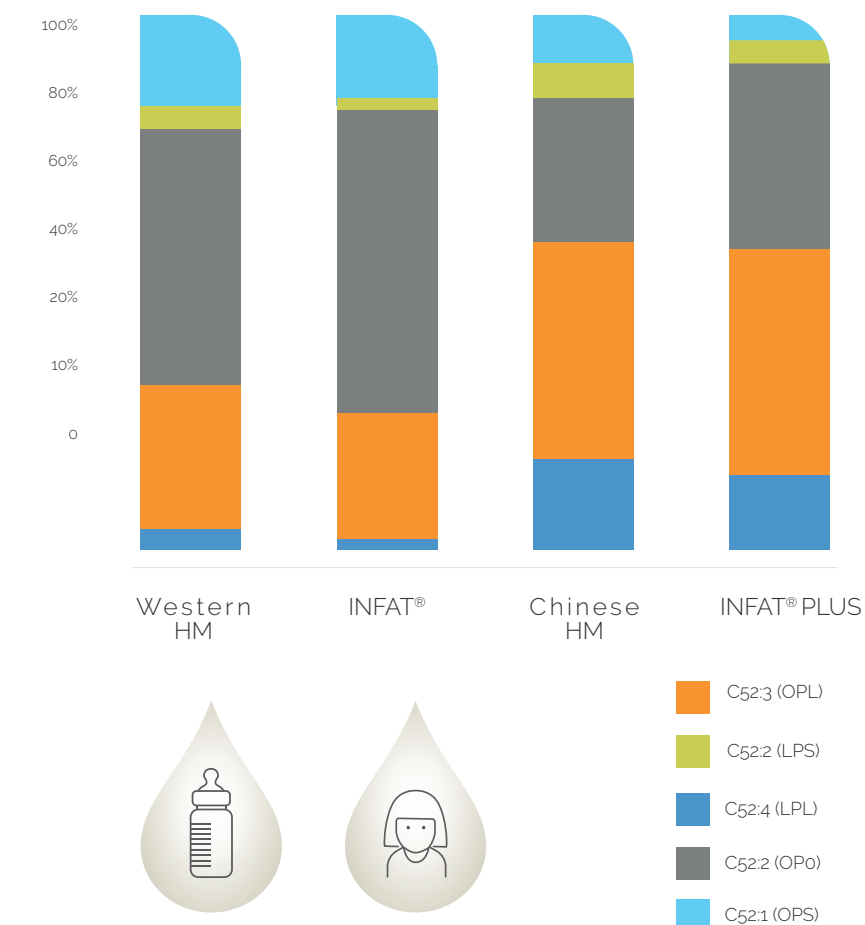


However, data collected from a human milk study in China [1] suggests that in China the major TG species found is Oleic-Palmitic-Linoleic (OPL, 18:1n-9-16:0-18:2n-6), and this contrasts with the TG profile in human milk collected in other places, such as Finland [1], Spain [2] or Denmark [3], where the level of OPO is higher than OPL. The basis for this difference has not been fully evaluated yet but may be related to nutrition.

#### INFAT<sup>®</sup> PLUS – designed to be closer to Chinese human milk fat

In most infant formula produced today, the fat component is based on vegetable oils, where most of the palmitic acid is positioned on *sn*1 or *sn*3, and not on *sn*2. INFAT<sup>®</sup> is a specialty fat ingredient with palmitic acid bound to the *sn*2 position developed for infant formula. INFAT<sup>®</sup> PLUS is a unique offer not only enriched with *sn*2 palmitate, but also with an OPL/OPO ratio which is closer to that found in Chinese human milk fat.

Figure 1: Level of OPO and OPL, as well as all major TG species, as part of the C52 fraction of the TG in human milk from Western lactating mothers compared to Chinese lactating mothers [1-4]. INFAT<sup>®</sup> PLUS is specifically designed to be closer to the TG structure found in Chinese human milk fat.



#### References

1. Kallio H. et al., Food Chem, 2017, 233:351
2. Pons S.M. et al., Eur J Clin Nutr, 2000, 54:878
3. Zou X. et al., Food Chem, 2013, 61:7070





## INFAT<sup>®</sup> PRO

### An INFAT<sup>®</sup> grade with higher level of palmitic bound to mid- position, for babies growth and comfort

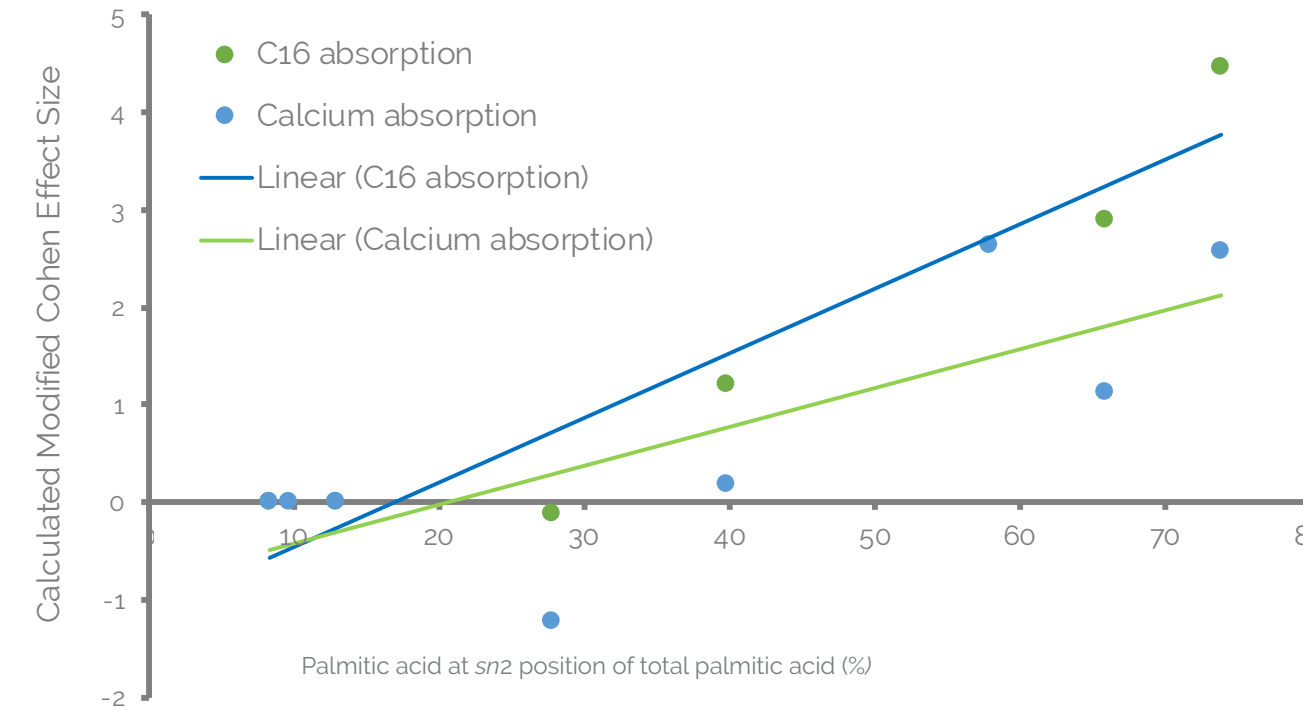
INFAT<sup>®</sup> PRO is a new grade specially formulated to reach a higher concentration of palmitic acid in the middle position of the triglyceride than INFAT<sup>®</sup>, and by adding INFAT<sup>®</sup>PRO to the formula, *sn2* palmitate level will be closer than ever to human milk.

Higher concentration of *sn2* palmitate, and thus higher absorption of palmitic acid, has been shown in multiple studies to reduce the formation of calcium soaps in baby's stool.

With INFAT<sup>®</sup> PRO, manufacturers can offer infant formulas that have the optimal type of fat where it matters most.

Figure 2 shows the correlation between the level of palmitic acid (C16:0) in the milk or formula triglyceride *sn2*, position and infant fatty acid and calcium absorption, calculated as a modified Cohen's effect size.

The results show that progressively increasing level of C16:0 at *sn2* position on the triglycerides, leads to a dose-dependent increase in both fat and calcium absorption. The reduction in fecal calcium soaps is accompanied by a decrease in the incidence of harder stools.

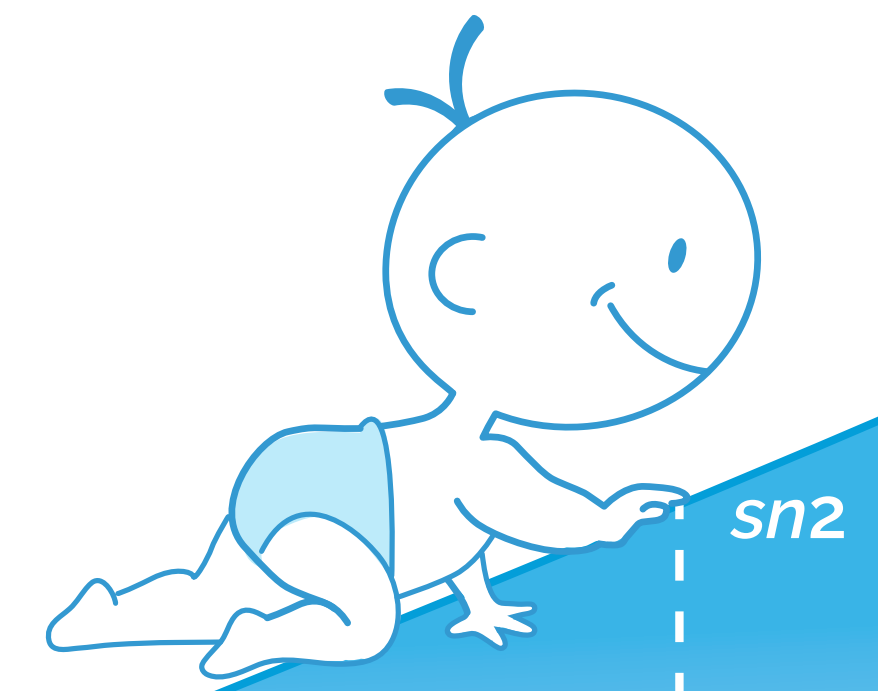


The percentage of C16:0 in formula triglycerides (x-axis) was plotted against the mean percentage of C16:0 absorption (green circles) or calcium (blue circles) reported in clinical studies with preterm and term infants to derive the Cohen effect.

**Figure 2**

Modified Cohen's effect size (Cohen 1988) was calculated for fat and calcium absorption out of the RCT's: Carnielli, et al. 1995; Carnielli, et al. 1996; Lucas, et al. 1997; Kennedy, et al. 1999; and Lopez-Lopez, et al. 2001

Graph was adapted from Bar-Yoseph, F., Lifshitz, Y., and Cohen, T., Review of *sn-2* palmitate oil implications for infant health. Prostaglandins Leukot Essent Fatty Acids, 2013, 89(4): p. 139-43.



Standard formula

Formula containing INFAT<sup>®</sup>

Formula containing INFAT<sup>®</sup> PRO

Human milk





## INFAT<sup>®</sup>PLUS 2.0

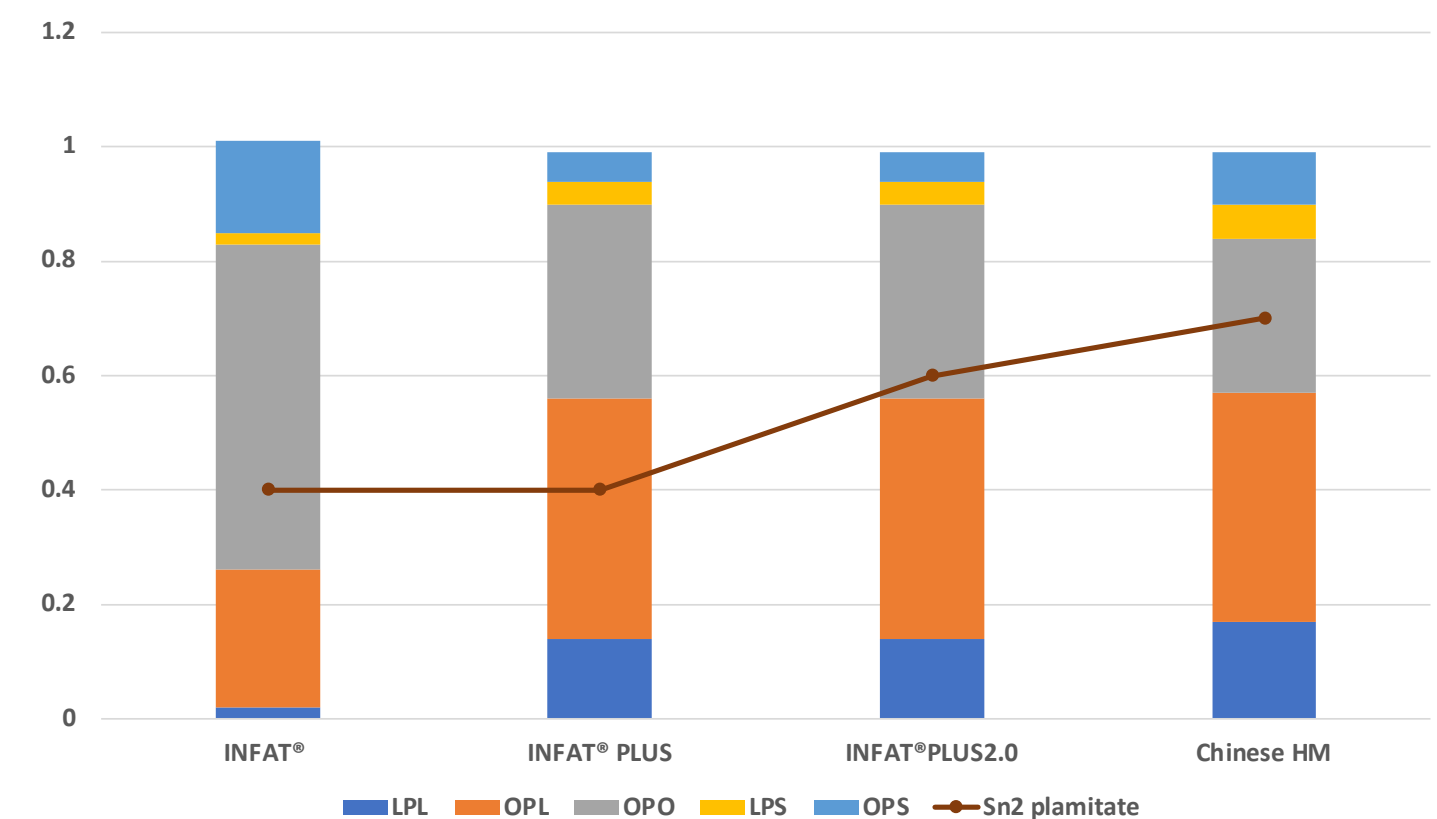
INFAT<sup>®</sup>PLUS 2.0, combining Chinese human milk fat structure with very high *sn2* palmitate level

INFAT<sup>®</sup>PLUS 2.0 combines the benefits of INFAT<sup>®</sup>PLUS with the high *sn2* level of INFAT<sup>®</sup>PRO. An innovative fat blend developed by Advanced Lipids designed to be closer to Chinese human milk fat, by offering a combination of high *sn2* palmitate together with an OPL/OPO ratio that is found in Chinese human milk.

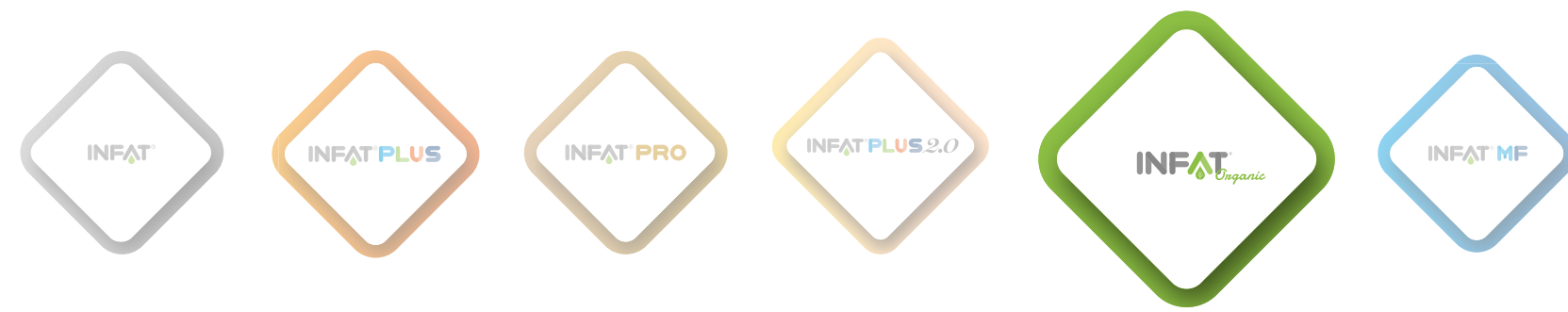
Figure 3 represents the C52 triglyceride profiles (including OPO, OPL, LPS, LPL and OPS) in INFAT<sup>®</sup>, INFAT<sup>®</sup>PLUS, INFAT<sup>®</sup>PLUS 2.0 and Chinese human milk fat, as well as the suggested level of *sn2* palmitate.

INFAT<sup>®</sup>PLUS 2.0 is specifically designed to be closer to the TG structure found in Chinese human milk fat with higher concentration of palmitic acid bound to the triglyceride mid-position, compared to INFAT<sup>®</sup>PLUS, making it a unique premium offer.

Figure 3: The C52 TG profile and *sn2* palmitate level







## A premium solution for the fast-growing consumer trend towards healthy, natural and organic ingredients.

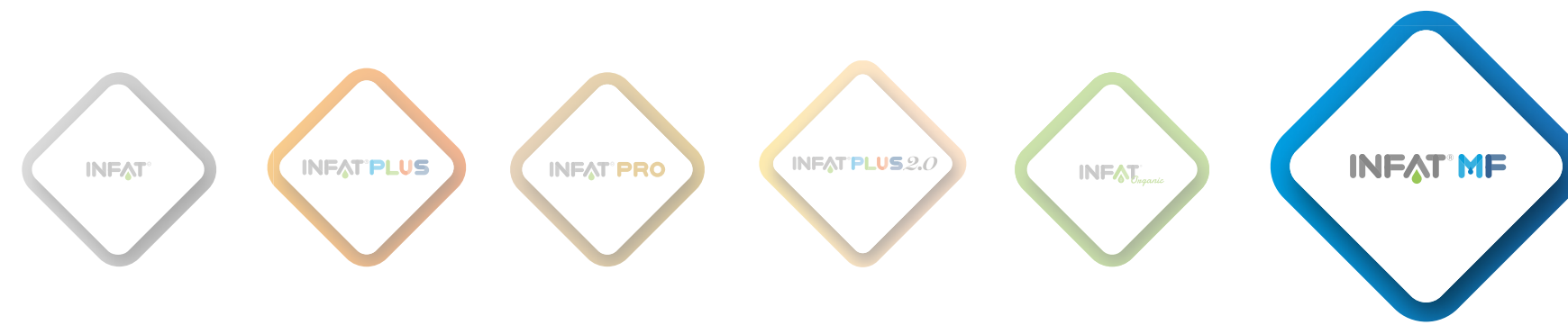
As birthrates have decreased globally, the infant formula market space has become very competitive, forcing infant formula producers to innovate. INFAT® Organic offers manufacturers a premium solution aligned with consumer trends. An organic *sn2* ingredient designed to be added to infant formula to increase its *sn2* palmitic level, INFAT® Organic is certified by China and in Europe, also recognized organic by Australia, New Zealand and USA.

The push towards organic solutions begins with consumer preferences. Market research by IFF and numerous reports published by Mintel and others clearly show that this trend is becoming very significant. Today, when parents are asked what they are looking for in formula, they place safety and assurance, scientific substantiation as well as natural, healthy, organic and non-GMO at the top of the list.

As the competitive environment drives the infant formula market towards premiumization, and formula producers look to innovate and differentiate, INFAT® Organic offers a perfect solution—responding to both consumer preferences and the market need for differentiation.







## INFAT<sup>®</sup> MF

Combines the benefits of vegetable and milk fat, creating an enriched ingredient that provides infants with the nutritious fat they need for healthy growth and comfort.

### INFAT<sup>®</sup> MF - A vegetable-based fat component enriched with milk fat

INFAT<sup>®</sup> MF is a blend offered by Advanced Lipids. The combination of INFAT<sup>®</sup> and milk fat brings the best of two worlds to infants: the optimized calcium and fat absorption made possible by the special vegetable-based fat structure of INFAT<sup>®</sup>, together with the fatty acid structure derived from milk fat. This unique combination enables manufacturers to offer enriched formulas that support comfort and a more natural taste.

### Double the Advantage

With INFAT<sup>®</sup> MF, infant formula manufacturers can offer mothers a dual advantage: a superior vegetable-based fat component enriched with milk fat.

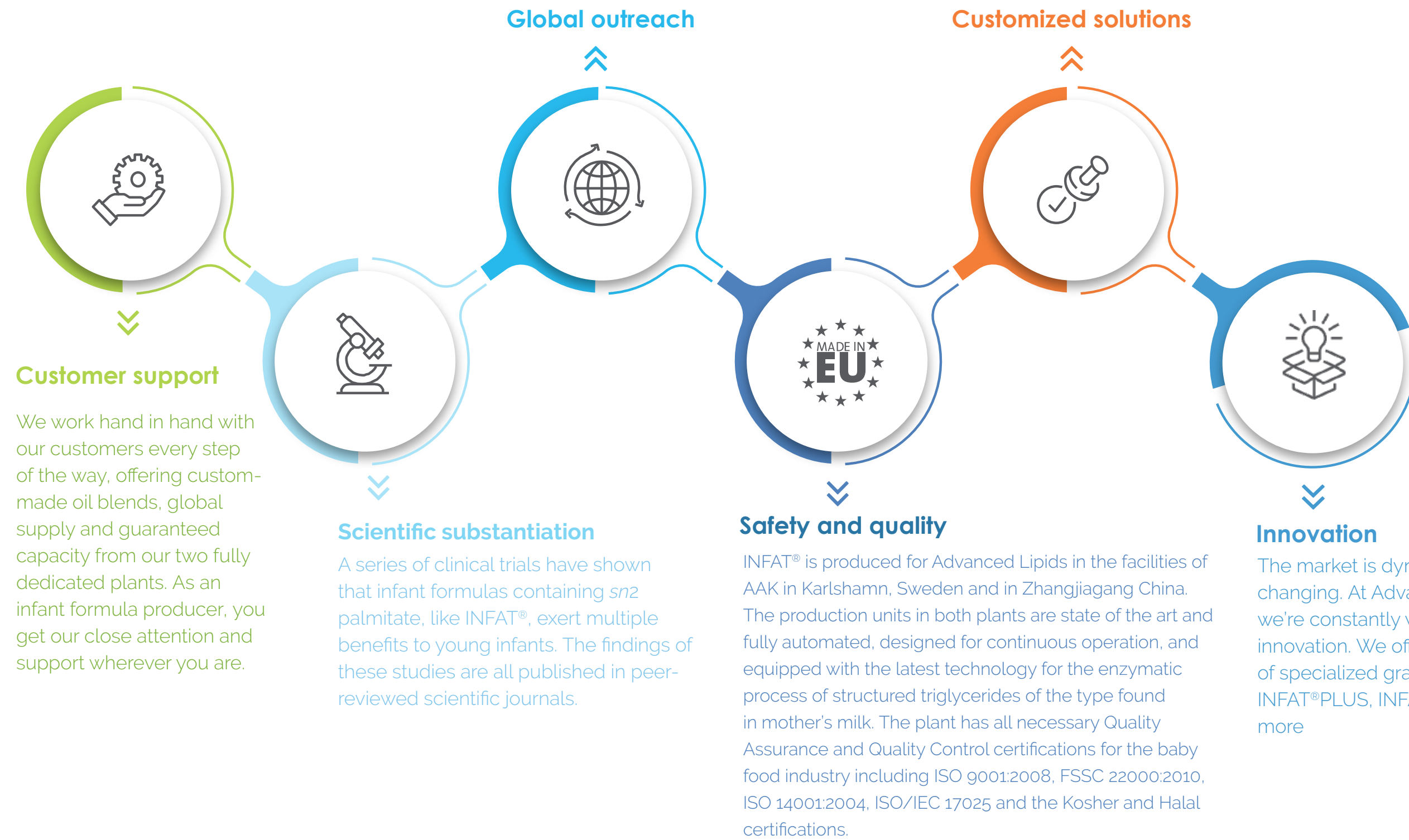


This blend of INFAT<sup>®</sup>MF, combining vegetable oil and milk fat brings the best of both worlds



# Advanced Lipids Value Proposition

When you work with Advanced Lipids, you've got a world-class partner that offers you:



Download the brochure



## About Advanced Lipids

Advanced Lipids is a joint venture between AAK, a global provider of value-adding plant-based oils and fats solutions to the infant formula industry and many other industries, and IFF, an industry leader in food, beverage, scent, health, and biosciences. Bringing IFF, an international collective of thinkers who combine science and creativity together with AAK's international strength in food safety, sustainability, production and logistics, Advanced Lipids offers a unique package of clinical research, development, flexible blending, quality, and logistics.