

For formula-fed infants  
For healthcare professional use only



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# Sanulac Nutritionals Research Update

*Sn-2* palmitate. More than just softer stools.

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# Overview

Recent evidence suggests that in addition to softer stools, bone mineral content at 4 months may be increased in infants fed *sn*-2 palmitate enriched formula. Here we take a closer look at one of the largest studies to date investigating the comparative effects of infant formula containing different levels of *sn*-2 palmitate.<sup>11</sup>

In human milk, one of the main saturated fatty acids (palmitic acid), is found predominantly in the middle (*sn*-2) position of the triglyceride. This structure is known as *sn*-2 palmitate. A greater proportion of *sn*-2 palmitate is associated with softer infant stools and increased absorption of calcium and fatty acids.<sup>1,2</sup> The recently published Béghin (et al) study helps to improve our understanding on the fate of the previously observed increase in calcium absorption, by measuring the bone mineral content of infants fed infant formula containing increased proportions of *sn*-2 palmitate.<sup>11</sup>

## Study Summary

**Study Title:** Growth, stool consistency and bone mineral content in healthy term infants fed *sn*-2 palmitate-enriched starter infant formula: A randomised, double-blind, multicentre clinical trial.

Béghin L et al Clinical Nutrition. 2019 June;38(3):1023-1030

**Study Population:** Healthy term infants (37-42 weeks gestation) aged 1 to 7 days at enrollment.

**Number of subjects:** n=488

**Study Design:** Randomised, double-blind, multicentre trial with three parallel groups

**Methods:** The infants were exclusively formula-fed from 1 week to 4 months with one of three study formula: **1) Control formula\* (CF)** with 16% of total palmitate in the *sn*-2 position, **2) Experimental formula 1 (EF1)** with 43% of total palmitate in the *sn*-2 position, **3) Experimental formula 2 (EF2)** with 50.9% of total palmitate in the *sn*-2 position. Weight gain, stool consistency and digestive tolerance were monitored throughout the study period and bone mineral density was measured by dual-energy x-ray absorptiometry at 4 months of age.

**Results:** Bone mineral content at 4 months was significantly higher in the infants fed the experimental formulae (EF1 p= 0.0012 and EF2 p=0.0002) when compared to the control formula. Intention-to-treat analysis also showed softer stools in the *sn*-2 palmitate enriched formula groups when compared with the control formula (</=0.01) up to 2 months of age.

**Conclusion:** Formula enriched with *sn*-2 palmitate increases bone mineral content at 4 months of age and is safe and well tolerated.

**What this study adds:** Previous research has suggested that calcium absorption is improved with infant formula enriched with *sn*-2 palmitate.<sup>7-10</sup> This large study provides further clarification on the fate of calcium absorbed from *sn*-2 palmitate enriched formula, by showing an increased bone mineral content when compared to standard infant formula.

\*Standard infant formula with innate levels of palmitic acid in *sn*-2 position

**IMPORTANT STATEMENT:** Breastfeeding is best for babies. It has benefits for the infant, such as reducing infection risk, and for the mother. It is important to have a healthy balanced diet in preparation for, and during breastfeeding. Infant formula is designed to replace breast milk when an infant is not breastfed. Breastfeeding can be negatively affected by introducing partial bottle-feeding, and reversing a decision not to breastfeed is difficult. Infant formula must be prepared and used as directed. Unnecessary or improper use of infant formula, such as not properly boiling water or sterilising feeding equipment, may make your baby ill. Social and financial implications, including preparation time and the cost of formula, should be considered when selecting a method of infant feeding.

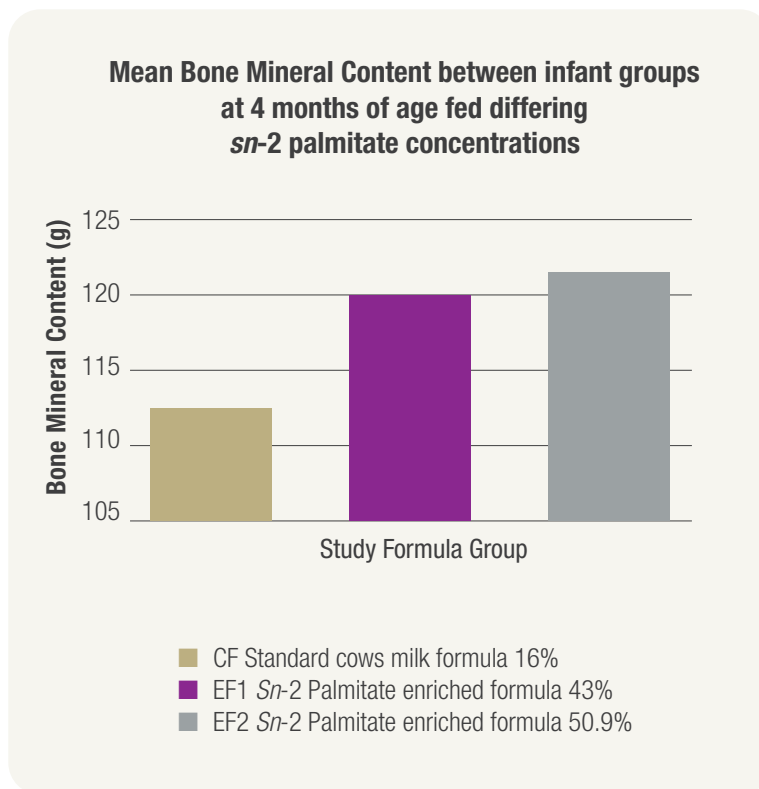
“The studies have consistently shown that a higher *sn*-2 palmitate proportion in formula is associated with improved absorption of calcium and fat...”

- ESPGHAN 2019<sup>7</sup>

Infancy is an important stage for calcium intake as it is deposited into bone at a proportionately higher rate during the first year of life compared to other life stages.<sup>4</sup> Studies have suggested that the calcium found in human milk is absorbed at a higher rate than from typical cows-milk based formula.<sup>4-6</sup>

A number of studies have indicated that calcium and fatty acid absorption is improved with infant formula containing increased proportion of *sn*-2 palmitate.<sup>7-10</sup>

It was less clear whether the observed improvement in calcium absorption contributed to an increased bone mineral content. Recent research findings have improved knowledge in this area.<sup>11</sup>

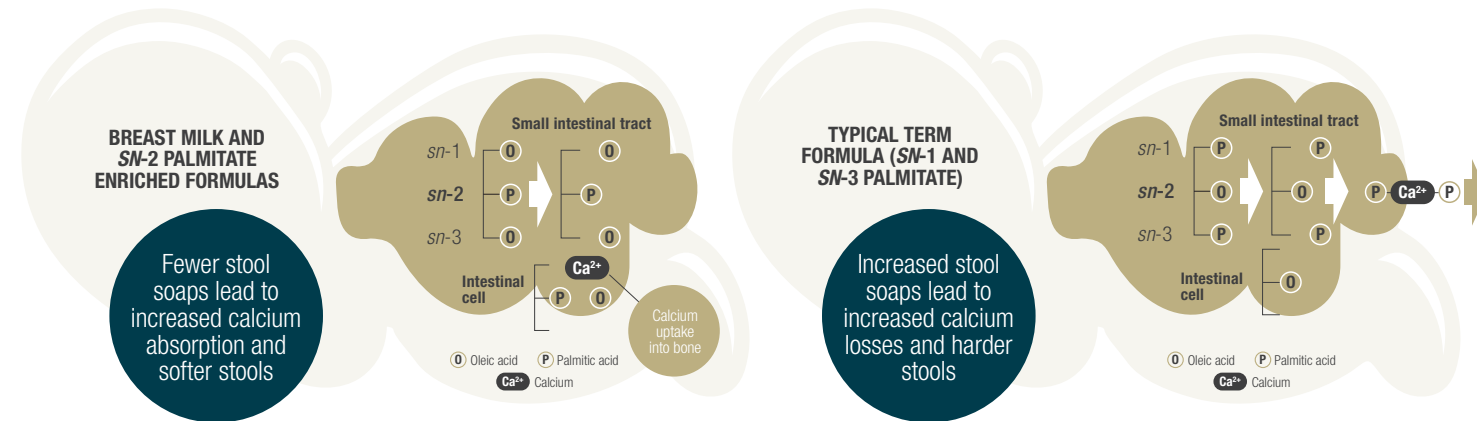


Adapted from Beghin et al, 2019. Standard CF cows milk formula mean 112g +/- 19g (16% of total palmitate at *sn*-2 position), EF1 (43% of total palmitate at *sn*-2 position) 110g +/- 20g, EF2 (50.9% of total palmitate at *sn*-2 position) 121 +/- 20. EF1 vs CF p= 0.0012, EF2 vs CF p=0.0002

### What is *sn*-2 palmitate?

Triglycerides in human milk are unusual as the fatty acids are bonded in a distinctive order. One major fatty acid in human milk, palmitic acid, is mainly (~70%) located at the *sn*-2 (middle) position on the triglyceride.<sup>1,2</sup>

This typical structure is referred to as ***sn*-2 palmitate** and may help explain the improved bioavailability of some nutrients in breast-milk.<sup>1,3</sup>



Adapted from Carnielli et al 19963, Kennedy et al.19999, Yao et al. 201412, Bar-Yoseph et al 20132 and Beghin et al 2019<sup>11</sup>

### Increased *sn*-2 palmitate in infant formula significantly improves bone mineral count (BMC)<sup>11</sup>

A recent large (n=488) randomised study investigated the effect of increasing *sn*-2 palmitate content of infant formula on bone mineralisation in healthy term infants 1-7 days old.<sup>11</sup>

Bone mineral content at 4 months of age was found to be significantly higher for the *sn*-2 palmitate enriched formula groups (vs control formula EF1 p=0.0012, EF2 p=0.0002) measured by dual-energy x-ray absorptiometry scan (DEXA).<sup>11</sup>

In addition, the infants fed *sn*-2 palmitate enriched formula experienced softer stools to 2 months of age.<sup>11</sup>

### How does an increase in *sn*-2 palmitate help improve calcium bioavailability?

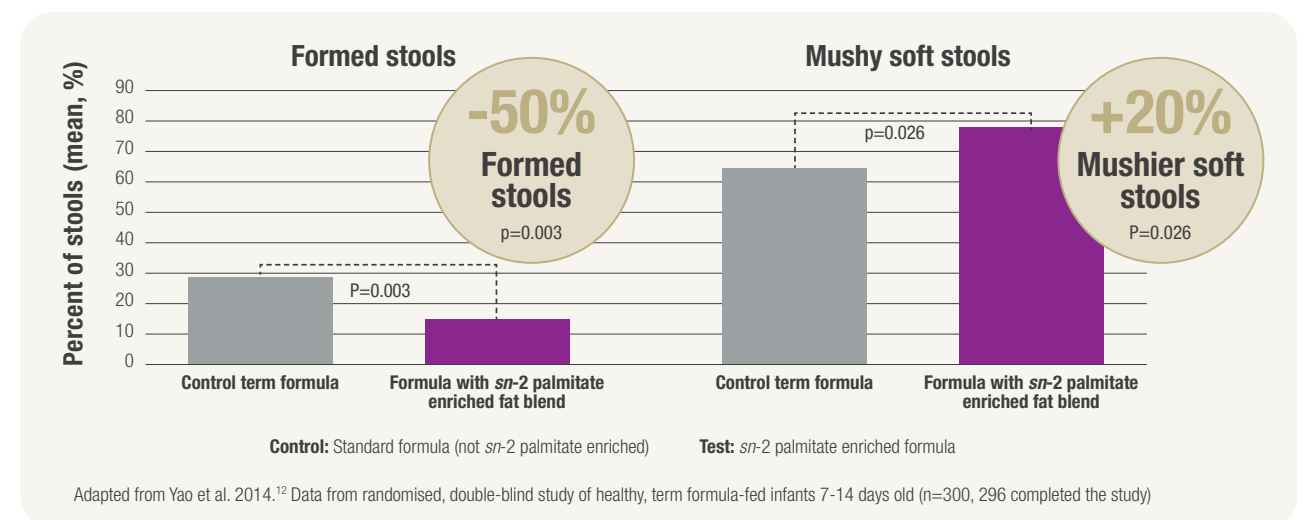
The increase in *sn*-2 palmitate in infant formula provides a way to decrease the proportion of *sn*-1 and *sn*-3 palmitate content. Palmitic acid bound at the *sn*-1 and *sn*-3 position are associated with the formation of insoluble calcium-palmitate soaps which may prevent absorption of calcium, increase calcium losses and contribute to the formation of harder stools.<sup>1,2,12</sup> In contrast, palmitic acid bound at the *sn*-2 position is better absorbed leading to less calcium palmitate soaps, increased calcium absorption and softer stools.<sup>1,2,11,12</sup>

### Increased calcium absorption also related to softer stools

Several studies have demonstrated increased stool softness in infants fed *sn*-2 palmitate enriched formula.<sup>9,11,12</sup> In an 8-week double-blind randomised study of healthy term infants 7-14 days old (n=75 for control, n=74 for *sn*-2 palmitate enriched formula, n=75 for human milk), infants receiving the *sn*-2 palmitate enriched formula had 50% less formed stools and 20% more mushy soft stools.<sup>12</sup>

### Key Summary

- Enrichment of infant formula with increased *sn*-2 palmitate is associated with improved absorption of calcium and fat.<sup>3,7-10</sup>
- Recent research indicates that increased *sn*-2 palmitate content of infant formula, significantly increases bone mineral content.<sup>11</sup>
- *Sn*-2 palmitate enriched infant formula may help soften stools.<sup>9,11,12</sup>



Adapted from Yao et al. 2014.<sup>12</sup> Data from randomised, double-blind study of healthy, term formula-fed infants 7-14 days old (n=300, 296 completed the study)

# S-26 Alula Gold Newborn

Providing nutritional support for the 4 key pillars of  
Paediatric development and function



## Digestion

- S-26 Alula Gold Newborn is enriched with *sn*-2 palmitate. (0.33g/100mL).
- *Sn*-2 palmitate enriched infant formula may result in softer stools.<sup>9,11,12</sup>
- *Sn*-2 palmitate enriched infant formula is associated with increased bone mineral content at 4 months of age and increased calcium bioavailability.<sup>7-11</sup>
- Easy to digest whey dominant, whole (intact) protein.<sup>13,14</sup>
- Whey:casein ratio 65:35



**References:** 1. Innis, S.M., 2011. Adv Nutr, 2(3), pp275-283 2. Bar-Yoseph, F., et al. 2013. PLEFA 89(4), PP 139-143. 3. Carnielli, V.P., et al. 1996, JPGN, 23(5), pp 553-560 4. IOM (Institute of Medicine). 2011. Dietary Reference Intakes for Calcium and Vitamin D. Washington, DC: The National Academies Press. 5. NHMRC 2014, Nutrient Reference Values for Australia and New Zealand: Canberra, NHMRC 6. Hicks et al. 2012, BMC Pediatrics, 12:118 7. Bronsky J, et al. J Pediatr Gastroenterol Nutr. 2019 May;68(5):742-760. 8. Nowacki, J et al Nutr J. 2014 Nov 5;13:105 9. Kennedy K et al, Am J Clin Nutr. 1999 Nov; 70(5): 920-7 10. Litmanovitz, I. et al, Calcif Tissue Int. 2013 Jan;92(1):35-41 11. Béghin L, et al. Clin Nutr. 2019 Jun;38(3):1023- 1030 12. Yao, M. et al. JPGN 2014;59: 440-448 13. Lönnerdal, B.,2003. Am J Clin Nutr, 77, pp. 1537S-43S 14. Martin, C., Ling, P. & Blackburn, G., 2016, Nutrients, 8 (279), pp. 1-11

