

Comparative Analysis of Fat Particle Size in Commercial Infant and Growing up Formulas in Hong Kong

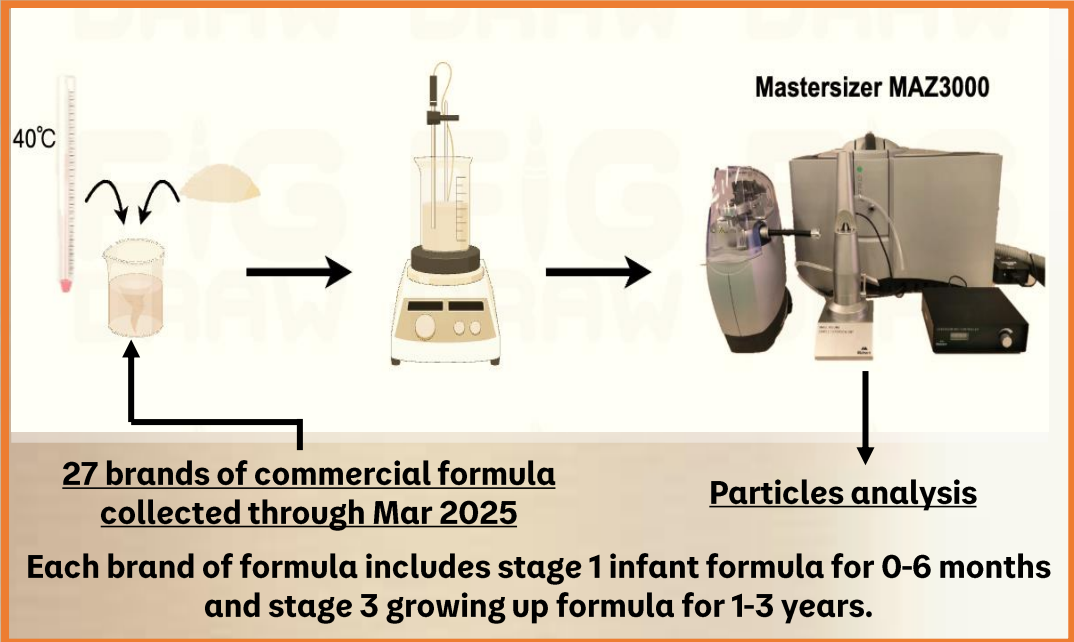
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Background

Human milk (HM) is recognized as the optimal source of nutrition for infants. According to the 'Breastfeeding Survey 2023' by the Department of Health, only 18.2% of infants in Hong Kong are exclusively breastfed at six months¹, suggesting a high prevalence of mixed feeding involving formula. Fat is a crucial energy source in early infancy, yet there are distinct differences in lipids characteristics between HM and infant formula². HM contains large lipid globules, with a mode diameter averaging 3-5 µm surrounded by a complex triple layered phospholipid native membrane³. By contrast, lipids droplets in most conventional formula powders are much smaller, with a mode diameter of 0.5 µm and are mostly protein coated³. This study aims to evaluate the fat particle size in commercially formula powders available in Hong Kong market.

Study design and method



Result

➤ Size distribution

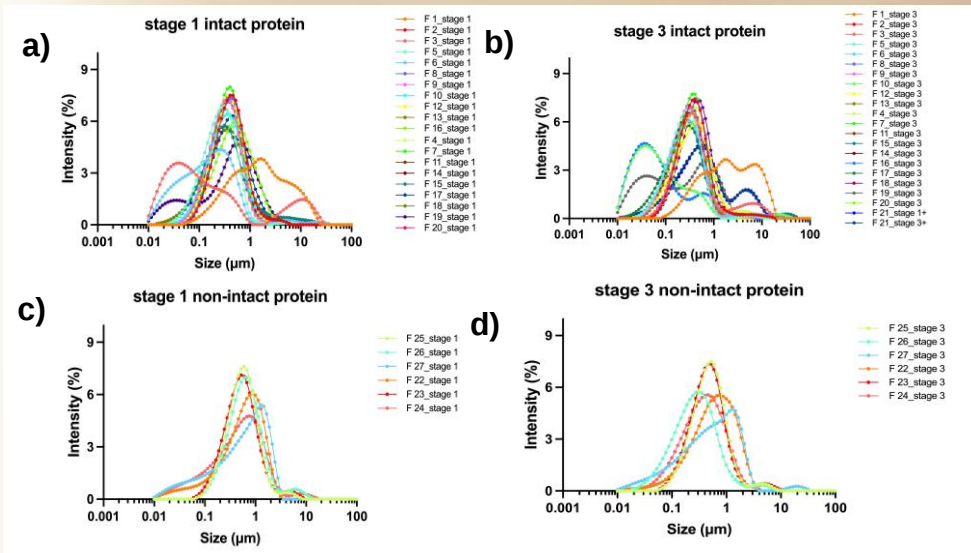


Figure 1: Particle size distribution of commercially available formula powders. a) Stage 1 with intact protein; b) Stage 3 with intact protein; c) Stage 1 with non-intact protein; d) Stage 3 with non-intact protein

➤ Average size D [4,3]

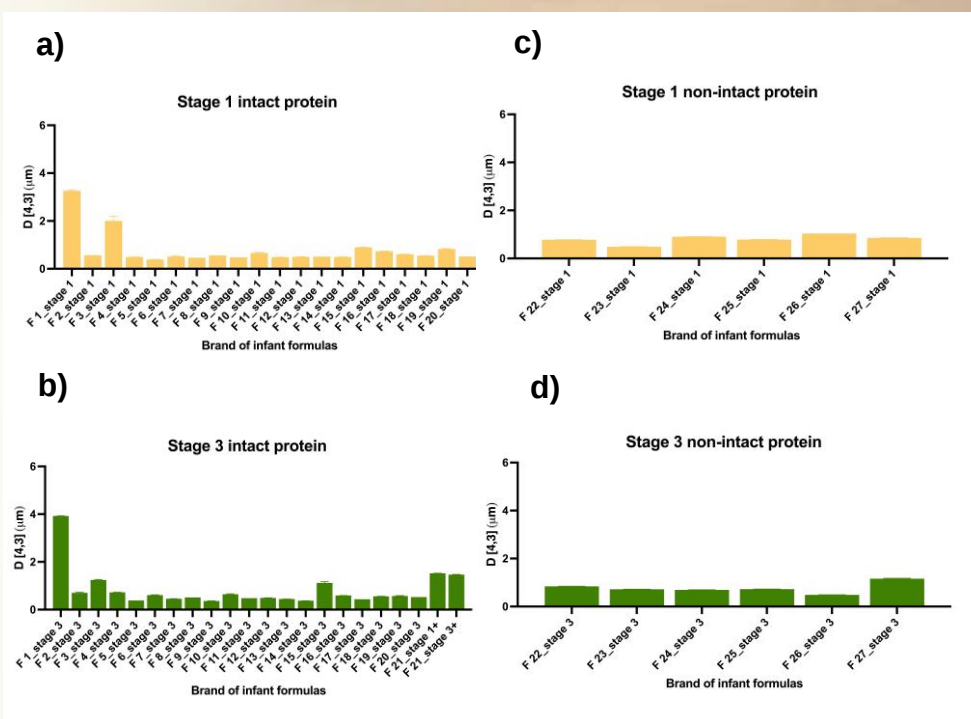


Figure 2: Particle average size of commercially available formula powders. a) Stage 1 with intact protein; b) Stage 3 with intact protein; c) Stage 1 with non-intact protein; d) Stage 3 with non-intact protein

Conclusion

Most commercial formulas contain small lipid particles, with the exception for one brand (F 1) that utilizes a patented controlled process (Nuturis)* resulting in larger lipid size, which is closer to the reported size of human milk fat globule⁴.

* A technology that mimics the 3D lipid globules, larger in size and with phospholipid-coated membrane

Reference

1.Breastfeeding Survey 2023; 2. Michalski M.C., et al. (2005). *J Dairy SCI*, 88(6), 1927-1940.; 3. Gallier S., et al., (2015). *Colloids Surf B Biointerfaces*, 136, 329-39. 4. Wei W., et al., (2019). *J Agricultural and Food Chemistry*, 67, 13922-13928