



TECHNICAL BRIEF: OVERVIEW OF COMFA+FISH INSTANT PORRIDGE MACRONUTRIENTS

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BACKGROUND

Multiple micronutrient powders—globally standardized prepackaged vitamin/mineral sachets distributed by donors such as the United Nations International Children's Emergency Fund (UNICEF)—have helped reduce global rates of stunting and anemia among vulnerable infants and young children (IYC), yet have had less impact on protein malnutrition. In contrast, dried fish powder (DFP) made from pelagic small fish such as Kapenta (*Limnothrissa miodon* and *Stolothrissa tanganicae*) **provide important macro- and micronutrients even when consumed in small quantities that accommodate IYC's tiny tummies.**

Therefore, DFP is a promising means by which to increase the nutrient density of complementary foods consumed daily by IYC—such as high carb/low protein traditional maize porridge that is, of necessity, widely consumed on a daily basis by IYC in resource-limited families across sub-Saharan Africa. DFP provides high-quality animal-sourced protein, lipids (e.g., essential fats and fat-soluble vitamins such as vitamins A, D, E, and K), and other nutrients such as zinc and vitamin B12. Our goal is to incorporate a small amount of locally sourced DFP into a complementary instant porridge that is 1) both tasty/acceptable to vulnerable IYC (and other household members) and 2) will fill protein and micronutrient gaps among such IYC.



After Sensory Panel III, a participant has her infant sample ComFA+Fish Vanilla Instant Porridge. Photo by K. Ragsdale, Mississippi State University

SCALING FISH POWDER IN ZAMBIA ACTIVITY

To help us reach this goal, our Scaling Fish Powder for Adoption in Rural Zambia activity builds directly upon results from FishFirst! Zambia: Research for Development and Scaling Staple-Fish Products for Enhanced Nutrition in the First 1,000 Days of Life (2020-2023). These results included a nutrient analysis of locally sourced Kapenta DFP, two sensory panels of dishes fortified with a DFP-based protein/micronutrient blend we call **Complementary Food for Africa+Dried Fish Powder (ComFA+Fish)**, collaboration with our private sector partner in Zambia, Sylva Food Solutions, to produce ComFA+Fish Plain and Vanilla Instant Porridges, and a third sensory panel to test the acceptability of the porridges among adults prior to testing their acceptability among IYC in 2024. For Sensory Panel I, caregivers (N=42) evaluated seven attributes—aroma, appearance, texture, taste, sweetness, convenience, and overall acceptability—of four ComFA+Fish dishes. For Sensory Panel II, 42 caregivers evaluated IYC's "global liking" of ComFA+Fish Complementary Maize Porridge. For both panels, the dishes were **highly acceptable** to a majority of participants. A nutrient analysis

of Kapenta and Sensory Panels I-II results are available in *Public Health Nutrition* at doi.org/10.1017/S1368980023002586. For Sensory Panel III, adults used the seven attributes to evaluate ComFA+Fish Plain Instant Porridge (N=40) and Vanilla Instant Porridge (N=38). Both of the porridges were **highly acceptable** to a majority of participants (see tinyurl.com/2sejjudx). For Sensory Panel IV-V (pending), adults (N=40) and IYC/caregiver pairs (N=30 pairs) will evaluate both the ComFA+ Fish Plain and Vanilla Instant Porridges. Below, we present data on the instant porridges' macronutrient composition for IYC ages 6–8 months, 9–11 months, and 12–23 months.

COMFA+FISH INSTANT PORRIDGE MACRONUTRIENTS: INFANTS AT 6–8 MONTHS

At this age, infants should continue to be breastfed, and breast milk should provide approximately 400 calories (kcal) per day, which equals approximately 65% of estimated kcal needs. For the average healthy breastfed 6–8-month-old, complementary food should be provided two to three times per day. For 6–8-month-olds, the reference weight for the calculations below is 7.9–8.9kg (male infants).

- **Kcal:** One ComFA+Fish Instant Porridge sachet two times per day provides 377 kcal, which equals approximately 50% of the estimated kcal needs for 6–8-month-olds.^{1,2}
- **Protein:** One ComFA+Fish Instant Porridge sachet two times per day provides 10.8g of protein, which equals approximately 100% of the estimated protein needs for 6–8-month-olds.³⁻⁵
- **Lipids:** One ComFA+Fish Instant Porridge sachet two times per day provides 1.66g total fat, which equals approximately 5% of the estimated fat needs for 6–8-month-olds.^{1,3,5}

COMFA+FISH INSTANT PORRIDGE MACRONUTRIENTS: INFANTS AT 9–11 MONTHS

At this age, infants should continue to be breastfed. For the average healthy breastfed 9–11-month-old, complementary food should be provided three to four times per day. For 9–11-month-olds, the reference weight used for the calculations below is 9.3–10kg.

- **Kcal:** One ComFA+Fish Instant Porridge sachet three times per day provides 565 kcal, which equals approximately 60% of the estimated kcal needs for 9–11-month-olds.^{1,2}
- **Protein:** One ComFA+Fish Instant Porridge sachet three times per day provides 16.2g of protein, which equals 134% of the estimated protein needs for 9–11-month-olds.³⁻⁵
- **Lipids:** One ComFA+Fish Instant Porridge sachet three times per day provides 2.49g total fat, which equals approximately 7.3% of the estimated fat needs for 9–11-month-olds.^{1,3,5}

COMFA+FISH INSTANT PORRIDGE MACRONUTRIENTS: IYC AT 12–23 MONTHS

At this age, IYC should continue to be breastfed through age 23 months, but the caloric contribution from breastmilk is not as significant as for younger IYC. For the average healthy breastfed 12–23-month-old, complementary food should be provided three to four times per day. For 12–23-month-olds, the reference weight used for the calculations below is 10.3–13.75kg.

- **Kcal:** Two ComFA+Fish Instant Porridge sachets three times per day provides 1,131 kcal, which equals approximately 100% of the estimated kcal needs for 12–23-month-olds.^{1,2}
- **Protein:** Two ComFA+Fish Instant Porridge sachets three times per day provides 32.4g of protein, which equals 270% of the estimated protein needs for 12–23-month-olds.³⁻⁵
- **Lipids:** Two ComFA+Fish Instant Porridge sachets three times per day provides 4.98g of total fat, which equals approximately 14% of the estimated fat needs for 12–23-month-olds.^{1,3,5}

COMPARISONS OF COMFA+FISH INSTANT PORRIDGE MACRONUTRIENTS AND OTHER PRODUCTS (PER 100G OF DRY WEIGHT)

- **ComFA+Fish Instant Porridge**.....377 kcal, 10.8g protein, 1.66g fat
- **Enfagrow**.....432 kcal, 16g protein, 16.2g fat
- **Pediasure**.....440 kcal, 12g protein, 18g fat
- **Tom Brown PLUS**.....354 kcal, 7.27g protein, 2.76g fat <https://tinyurl.com/2x5eyfk2>
- **Tom Brown**.....406 kcal, 21.8g protein, 2.3g fat www.lolagreen.eu/en/a/tom-brown

- **Tombrown (by Bliss)**404 kcal, 24g protein, 8.7g fat tinyurl.com/4undsvm4

CONCLUSIONS

Based on the analyses presented in this brief, we plan to adjust the ComFA+Fish Instant Porridge formulation to ensure that recommended serving sizes meet recommended dietary reference intake (DRI) values without compromising flavor, texture, and other attributes prior to Sensory Panels IV-V (pending). We will also seek funding to complete a shelf-life study of the reformulated ComFA+Fish Instant Porridge.

REFERENCES

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- ² Patel JK, Rouster AS. *Infant Nutrition Requirements and Options*. [Updated 2023 Aug 8]. In: StatPearls [Internet]. Treasure Island (FL), USA: StatPearls Publishing. 2024 Jan. www.ncbi.nlm.nih.gov/books/NBK560758/
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ABOUT THE FISH INNOVATION LAB

The Fish Innovation Lab supports the United States Agency for International Development’s agricultural research and capacity building work under Feed the Future, the U.S. Government’s global hunger and food security initiative. Mississippi State University is the program’s management entity. Blue Aquaculture Consulting, Pwani University, Texas State University, University of Rhode Island, Washington University in St. Louis, and WorldFish serve as management partners.

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