



Developing and Using Optimal Foods for Young and Malnourished Children

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Requirements for foods for young (malnourished) children

- High energy and nutrient density
- Good bioavailability of MNs
- High protein content, quality and bioavailability
- Adequate fat content and quality (n6:n3)

Complementary foods of many children in developing countries

- Largely plant-based diet
 - Does not provide all nutrients and active-substances required
 - Anti-nutrients: limiting bioavailability of MNs
- Few animal source foods and fortified foods
- Underlying factors for limited dietary quality:
 - Availability
 - Affordability
 - Time for preparation and feeding

Improving dietary quality, options

- Increase use of locally available (commercial) foods, homestead food production, intensive nutrition education
- Processing and preparation techniques to lower fibre & phytate content (dehulling, germination, fermentation)
- Home-fortification
- Enzymatic treatment (malt, phytase)

Modifying RUTF to a RUF for moderately malnourished children

Modify from...

- 30% full fat milk powder
- 25% ground peanuts
- 15% soy bean or rapeseed/canola oil
- 28% sugar (lactoserum, maltodextrin)
- 2% V&M incl type II nutrients

...to, options

- Lower milk content
- Replace with whey conc.
- Use soy protein isolates
- Use other legumes instead of peanuts (hence, replace both protein and oil)

Comments/Drawbacks

- Minimum milk content unknown
- Whey availability linked to cheese production
- If milk contains growth factor, soy protein at disadvantage
- Protein content of lentils and beans is comparable to soy beans and peanuts, but have very little fat, and relatively high amounts of phytate and other anti-nutrients
- Texture, consistency and homogeneity to be adapted

Improving FBF for young (malnourished) children

Limited complexity

- Add DSM for promoting growth (10%?)
- Soy: dehulling
- Improve MN profile (more MNs and higher amount)

More complex and costly

- Use soy protein isolates instead of (dehulled) soy
- Degermed and dehulled maize flour (loss: 25%)
- Add sugar and oil during processing to increase energy density and EFA content, and compensate for oil lost when using soy protein isolates rather than beans

Worth exploring: use of phytase to reduce phytate

- Soaking FBF ingredients together with phytase before extrusion cooking and drying (requires equipment: conditioner and dryer)
- Add phytase to the processed dry product, requires waiting time after preparing porridge
- Add phytase to prepared product (i.e. home-fortification)

Note: options 2+3 require permission for use of phytase in young children and either waiting time for phytase to act in porridge, or phytase active at low pH of stomach

Complementary Food Supplements

- Adding high-quality nutrients to the diet to bridge gap between content and requirement, whether local diet or food ration
- Categories:
 - MNP (+ protein) (+enzymes) = supplementary
 - LNS <20 g (~110 kcal) = supplementary
 - LNS, 45 g (~250 kcal) = RUF, partly replacement
 - LNS, 90 g (~500 kcal) = RUF, mostly replacement

Costs – US\$

	Per daily dose	# dosages required, 6-23 mo or treatment	Total cost
MNP	0.025	225 (150/yr)	5.6
MNP++	0.045?	225 (150/yr)	10.1
LNS, 20g	0.11 (NB)	180 (6-11 mo)	19.8
LNS, 45g	0.20 (PD) / 0.13 (IRUFC)	120?	24 / 15.6
LNS, 90g	0.41 (PN) / 0.33 (SP) / 0.26 (IRUFC)	120?	49.2 / 39.6 / 31.2

Cost guesses - combined with diet

		g/d (dry weight)	Cost/child/d	CFS, cost	Cost/d
Staple diet	350 USD/MT	125	0.044	+ LNS 45 g + 0.2 / + 0.13	0.244 / 0.174
CSB	550 (650) USD/MT	125	0.069	+ LNS 20 g + 0.11	0.179
CSB + oil + sugar + DSM	1050 USD/MT	120	0.126	+ phytase? + 0.04?	0.166
Average, moderately diverse, diet	1000 USD/MT	130	0.130	+ MNP + 0.025	0.155
RUTF	4400 USD/MT	130	0.572		0.572

What is WFP doing?

- Improving FBF for general use (dehulling soy, improving MN-specs)
- Developing improved FBF for young (malnourished) children (DSM, oil, sugar)
- Using and developing CFS (MNP, RUF)
- Working on
 - Ensuring production capacity
 - Development (nutrition and food technology)
 - Impact assessment (anemia, growth, stay in SFP)
 - Advocacy for use and program guidance
 - Gaining experience with use under program circumstances





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Questions that arise

- Which commodities to exchange in which programs, or should programs be modified?
- Availability of new commodities
- Acceptability of new commodities
- Sharing with other hh members (treatment vs prevention)
- Can two kinds of the same food be distributed and prepared (FBF+DSM)?

Development of special dietary solutions for young (malnourished) children is exciting, and very much needed

- Tasks ahead:
 - Advocacy
 - Addressing production constraints
 - Determining exact role for each food, and agree on use it in the meantime
 - Building up programmatic experience

