



Rice Fortification: Quality and Cost

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Photo: Yamanaka Tamaki/Flickr



Fortified rice quality is critical to success

Storage

Preparation

Acceptability

Absorption

Impacted by: choice of fortificant forms, choice of fortificant mixture, fortification technology



Stability during storage



Limited losses during preparation: washing, cooking, discarding excess water



Acceptability to consumer: appearance (shape and colour), taste



Availability for absorption by the body

Efficacy

Effectiveness

Courtesy of Saskia de Pee, WFP, Rome



What should it cost to produce a fortified kernel?

Theoretical incremental cost increase of fortified rice.

At a 1:100 blend ratio \$11.00/MT

At a 1:200 blend ratio \$7.62/MT

ISOLATED KERNELS (Core M/C from Europe)	500 Kg/h	6000 Hrs/Annum	3,000,000 Kg/Yr			
	Isolated kernel facility (500 kg/h), 20 hrs/day and 300 days/Annum, Generally a European sourced facility					
Cost head towards Expenses	Value	Unit	Mult. Factor	Unit	Kernel costs	Unit
Capital Expenses						
Buildings and Civil needed for Extrusion	7,000,000	Rs Invest	12.00%	% Annual	0.004	\$/kg
Accessory equipment such as boilers,	4,800,000	Rs Invest	13.50%	% Annual	0.003	\$/kg
Machinery and equipment (Hot/Warm extrusion)	98,000,000	Rs Invest	13.50%	% Annual	0.060	\$/kg
Laboratory equipment,	2,000,000	Rs Invest	13.50%	% Annual	0.001	\$/kg
Total Capital Investments	111,800,000				0.068	\$/kg
Costs On Raw Materials						
Rice brokens	2,850,000	Kg	21	Rs/kg	0.273	\$/kg
Micro Nutrient Premixes (5% addition)	150,000	Kg	400	Rs/kg	0.274	\$/kg
TOTAL COST OF RAW MATERIALS					0.547	\$/kg
Costs On Operations						
Civil Maintenance	7,000,000	Rs Invest	2%	% Annual	0.001	\$/kg
Equipment maintenance	102,800,000	Rs Invest	3%	% Annual	0.014	\$/kg
Power, KWH	680,000	KWH	8	Rs/KWH	0.024	\$/kg
Process inputs (water/steam), equiv in Kg/Yr at 6	1,200,000	Kg	0.9	Rs/kg steam	0.005	\$/kg
TOTAL COST OF OPERATIONS	9,584,000				0.044	\$/kg



Photo: Steve Evans/Flickr

Examples of the current costs of purchasing fortified kernels

Country	Retail price of rice (USD/MT)	Increase in retail price of fortified rice compared to non-fortified rice (USD/MT)*	Percentage increase in retail price
Bangladesh	\$480-783	\$22	2.7-4.4%
India	\$530***	\$9**	1.7%
Solomon Islands, A	\$815-1000	\$28	2.7-3.3%
Solomon Islands, B	\$815-1000	\$10	1-1.2%

Legend

Yellow: vitamins and minerals plus vitamin A
Red: 2-3 vitamins and/or minerals (basic formula)
Green: vitamins and minerals

*Fortified kernel costs only, no blending

**India 2018 standards

***India retail price range \$400-2,700 USD/MT