

School Feeding: Nutrition Delivery Options and Program Evaluations

Topics for Discussion

- Food basket development
- Challenges for developing school lunch programs
- Success factors
- Monitoring and evaluation
- Capacity building and sustainability

Food Basket Development

- Impact on dish attributes
 - taste, texture, mouth feel
- Nutritional benefits
 - why use soy in basket?
- Incorporation into local dishes
- Cost

Food Basket Cost Comparison

Basic Ration	Grams	Price (\$)	Protein (g)	Energy (Kcal)
Rice	225	0.11	15.975	821.25
Beans	50	0.04	11.8	165
Corn Soy Blend	15	0.01	2.58	56.355
Total		0.162	30.355	1042.605
Soy Alternative	Grams	Price (\$)	Protein (g)	Energy (Kcal)
Rice	225	0.11	15.975	821.25
Beans	25	0.02	5.90	82.50
Textured Soy Protein	25	0.02	15.13	100.00
Corn Soy Blend	15	0.01	2.58	56.36
Total		0.161	39.58	1060.11
Percentage Change		-1%	30%	2%

NSRL Case Study – WISHH India

Healthy Soy Healthy Children

Nutritional Enhancement of School Lunches in India

Vijaya Jain, MS, RD, CDN

National Soybean Research Laboratory
University of Illinois, Urbana- Champaign
Urbana, IL



National Soybean Research Laboratory
Expanding the size, scope, and profitability of the U.S. soybean industry





“ Education without children’s health is missing the heart of the matter”

C. Everett Koop M.D.

Former Surgeon General of the United States



National Soybean Research Laboratory

Expanding the size, scope, and profitability of the U.S. soybean industry



Malnutrition in India



Population: 1.13 billion

Poverty rate: 27.5%

Underweight children under age 3: 46%

Stunted children under age 3: 46%

Infant mortality: 57 deaths per 1,000 live births

Anemia among children (6-35months): 79%

Symptoms Of Malnutrition

What happens when children are malnourished?

- Atrophy & shrinkage of brain
- Impaired mental & physical development
- Increased learning disabilities
- Reduced IQ
- Stunted growth
- Nutritional deficiencies resulting in blindness, weakened immune systems, increase in frequency and type of infections,
- Hormonal imbalances

Cost to the Child

- Preterm birth, infant mortality, low birth weight
- Growth retardation, stunted growth, reduced IQ
- Impaired physical & mental development
- Nutritional deficiencies resulting in blindness, weakened immune systems, increase in frequency and type of infections
- Hormonal imbalances
- Reduced earning capacity: up to 10% decrease in life long earnings (World Bank, 2006)

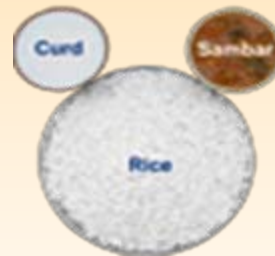
Cost to the Mother

- Maternal malnutrition was one of the most important factors contributing to death during pregnancy or childbirth (Mitra & Choudry 2002)
- Over 100,000 women worldwide die each year as a result of iron- deficiency anemia alone (UNICEF 2004)
- Deficiencies of iodine, folate, vitamin A, zinc, and protein also dramatically increase risk of maternal and infant mortality

Recommended Dietary Allowances for Infants & Children

Age	Calories	Protein
Infants 0-6 months	108/Kg	2.05g/Kg
6-12months	98/Kg	1.65g/Kg
Children 1-3 years	1240	22 grams
4-6 years	1690	30 grams
7-9 years	1950	41 grams
Boys 10-12 years	2190	54 grams
Girls 10-12 years	1970	57 grams
Boys 13-15 years	2450	70 grams
Girls 13-15 years	2060	65 grams
Boys 16-18 years	2640	78 grams
Girls 16-18 years	2060	63 grams

Soy in the School Lunches



Soy In The School Lunches

- Whole soybeans: added to soups, casseroles, salads
- Soy flour: bakery products, sauces, breading, unleavened breads, soups
- Textured soy protein: meat alternatives, rice, corn, wheat entrees
- Soy milk, yogurt, cheese: plain or flavored
 - Soy nuts: as a snack

NATIONAL SCHOOL LUNCH PROGRAM



- India mandated a National School Lunch program in 2004 for over a hundred million school children.
- State Governments are trying to meet this mandate
- Currently, only about a third of those children are actually benefiting from the program
- The program faces the challenge of meeting the protein target (12gms. per child per day)

WISHH SCHOOL LUNCH PROGRAM: BANGALORE

Names of Schools:

- Sri Sadguru SaiBaba School, Madivala
- Mathru, residential school for the visually impaired children
- Parikrma Humanity Foundation (3 schools)

Number of children: 1500

Acceptability tests: 89% acceptance rates

Soy enhanced rice and sambhar being served in all schools since March 2007

Adding Soy in Rice and Sambhar



Children eating Soy Enhanced Rice & Sambhar



ISKCON FOOD RELIEF FOUNDATION

- Mid-day meal program established in 2004 in Mumbai, India
- State government provides rice and Rs.1.25 per student per day
- Actual cost of a meal is approximately Rs. 6.00
- ISKCON now serves soy enhanced Kichadi to over 40,000 school children in government schools in Mumbai



National Soybean Research Laboratory

Expanding the size, scope, and profitability of the U.S. soybean industry



THE AKSHAYA PATRA FOUNDATION

Vision: No child in India shall be deprived of education because of hunger

Started in 2000, serving 1500 children in 5 schools

Currently serves over 850,000 underprivileged children in over 4,000 schools across 5 states

Food is prepared daily in centralized, automated kitchens and transported to the schools in custom built vehicles

Program goal: Serve 1 million children by the year 2010



National Soybean Research Laboratory

Expanding the size, scope, and profitability of the U.S. soybean industry



Preliminary Results

Acceptability survey completed with 500 children in classes 6 and 7 for current school lunch menu

Acceptability survey repeated with same 500 children after soy products were added in the same school lunch menu

Results indicate children preferred soy enhanced rice items better than regular rice items

Nutritional analysis of lunch menus indicated increase in protein of 35% for Sambhar. Increments in protein for the rice items ranged from 30% to 350%



National Soybean Research Laboratory

Expanding the size, scope, and profitability of the U.S. soybean industry



AKSHAYA PATRA NUTRITION ANALYSIS

SAMBHAR

Serv. Size (gm)	Class	WITHOUT SOY				WITH SOY				
		Calories	Protein, gm	Carb., gm	Fat, gm	Calories	Protein, gm	% Change	Carb., gm	Fat, gm
227		132	7.28	24.44	1.13	127	9.80	35%	21.92	1.18
100		58	3.21	10.76	0.55	56	4.32	35%	9.65	0.52
256	High Sch.	148	8.22	27.55	1.41	143	11.06	35%	24.7	1.33
192	Middle Sch.	111	6.16	20.66	1.06	108	8.29	35%	18.53	1
171	Prim. Sch.	99	5.49	18.40	0.94	96	7.39	35%	16.5	0.89
128	Nursery	74	4.11	13.77	0.70	72	5.53	35%	12.35	0.67

VEGETABLE PULAV

Serv. Size (gm)	Class	WITHOUT SOY				WITH SOY				
		Calories	Protein, gm	Carb., gm	Fat, gm	Calories	Protein, gm	% Change	Carb., gm	Fat, gm
227		162	1.78	5.86	14.89	99	2.99	68%	4.38	3.56
100		72	0.78	2.58	6.56	44	1.43	83%	1.93	6.59
144	High Sch.	104	1.12	3.71	9.44	64	2.06	84%	2.78	9.49
108	Middle Sch.	78	0.84	2.79	7.08	48	1.54	83%	2.08	7.12
98	Prim. Sch.	71	0.76	2.53	6.43	43	1.40	84%	1.89	6.23
72	Nursery	52	0.56	1.86	4.72	32	1.03	84%	1.39	4.74

BESIBELE BATH

Serv. Size (gm)	Class	WITHOUT SOY				WITH SOY				
		Calories	Protein, gm	Carb., gm	Fat, gm	Calories	Protein, gm	% Change	Carb., gm	Fat, gm
227		173	7.56	21.89	6.35	182	9.48	25%	23.04	6.38
100		74	3.22	9.33	2.70	81	4.18	30%	10.15	2.81
151	High Sch.	112	4.86	14.09	4.07	122	6.31	30%	15.33	4.24
113	Middle Sch.	84	3.64	10.54	3.05	92	4.72	30%	11.47	3.18
101	Prim. Sch.	75	3.25	9.42	2.72	82	4.22	30%	10.25	2.84
76	Nursery	56	2.45	7.09	2.05	62	3.18	30%	7.71	2.14

PULIYOGRE

Serv. Size (gm)	Class	WITHOUT SOY				WITH SOY				
		Calories	Protein, gm	Carb., gm	Fat, gm	Calories	Protein, gm	% Change	Carb., gm	Fat, gm
227		125	1.87	5.65	10.57	137	4.01	114%	6.93	10.62
100		55	0.83	2.49	4.66	60	1.77	113%	3.05	4.68
136	High Sch.	75	1.13	3.37	6.34	82	2.41	113%	4.15	6.36
103	Middle Sch.	57	0.85	2.56	4.80	62	1.80	112%	3.14	4.82
91	Prim. Sch.	50	0.76	2.27	4.24	55	1.61	112%	2.78	4.26
68	Nursery	37	0.56	1.69	3.17	41	1.20	114%	2.07	3.18

SWEET PONGAL (JAGGERY)

Serv. Size (gm)	Class	WITHOUT SOY				WITH SOY				
		Calories	Protein, gm	Carb., gm	Fat, gm	Calories	Protein, gm	% Change	Carb., gm	Fat, gm
227		332	2.28	67.17	6.48	374	9.46	315%	71.46	6.62
100		148	1.01	29.59	2.85	165	4.17	313%	31.48	2.92
81	High Sch.	120	0.82	23.97	2.31	134	3.38	312%	25.5	2.37
61	Middle Sch.	90	0.62	18.05	1.74	101	2.54	310%	19.2	1.78
54	Prim. Sch.	80	0.55	15.98	1.54	89	2.25	309%	17	1.58
41	Nursery	61	0.41	12.13	1.17	68	1.71	317%	12.91	1.2

SWEET PONGAL (SUGAR)

Serv. Size (gm)	Class	WITHOUT SOY				WITH SOY				
		Calories	Protein, gm	Carb., gm	Fat, gm	Calories	Protein, gm	% Change	Carb., gm	Fat, gm
227		180	0.96	36.08	3.60	198	4.32	350%	38.09	3.66
100		79	0.42	15.89	1.58	87	1.90	352%	16.78	1.61
173	High Sch.	137	0.73	27.49	2.73	151	3.29	351%	29.03	2.79
130	Middle Sch.	103	0.55	20.66	2.05	113	2.47	349%	21.81	2.09
116	Prim. Sch.	92	0.49	18.43	1.83	101	2.20	349%	19.46	1.87
87	Nursery	69	0.37	13.82	1.37	76	1.65	346%	14.6	1.4



National Soybean Research Laboratory

Expanding the size, scope, and profitability of the U.S. soybean industry



Chart 1

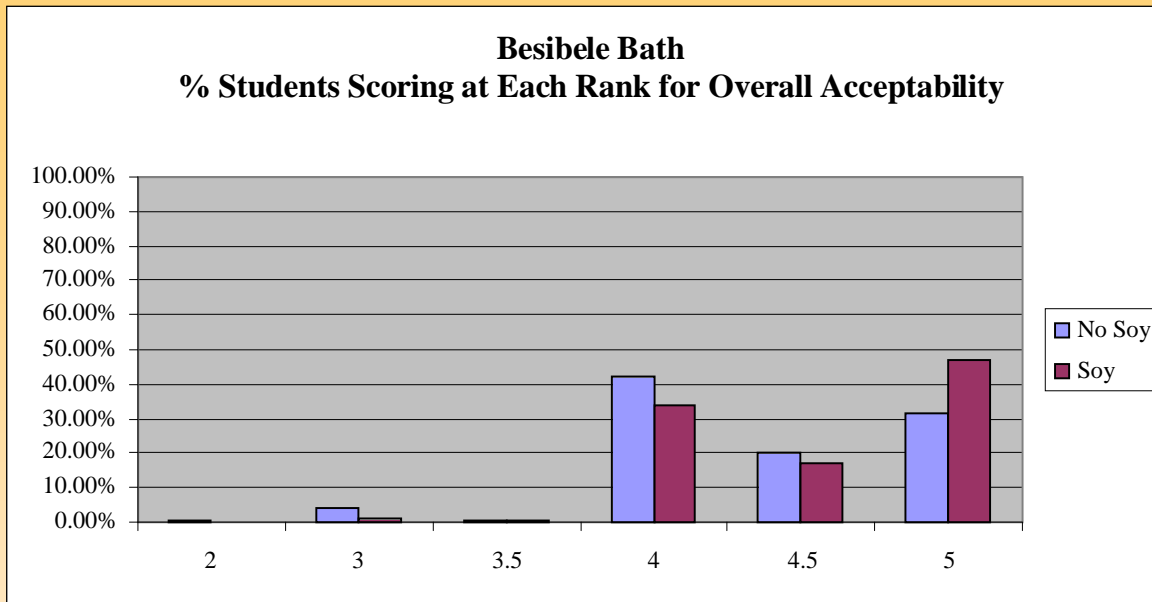


Chart 2

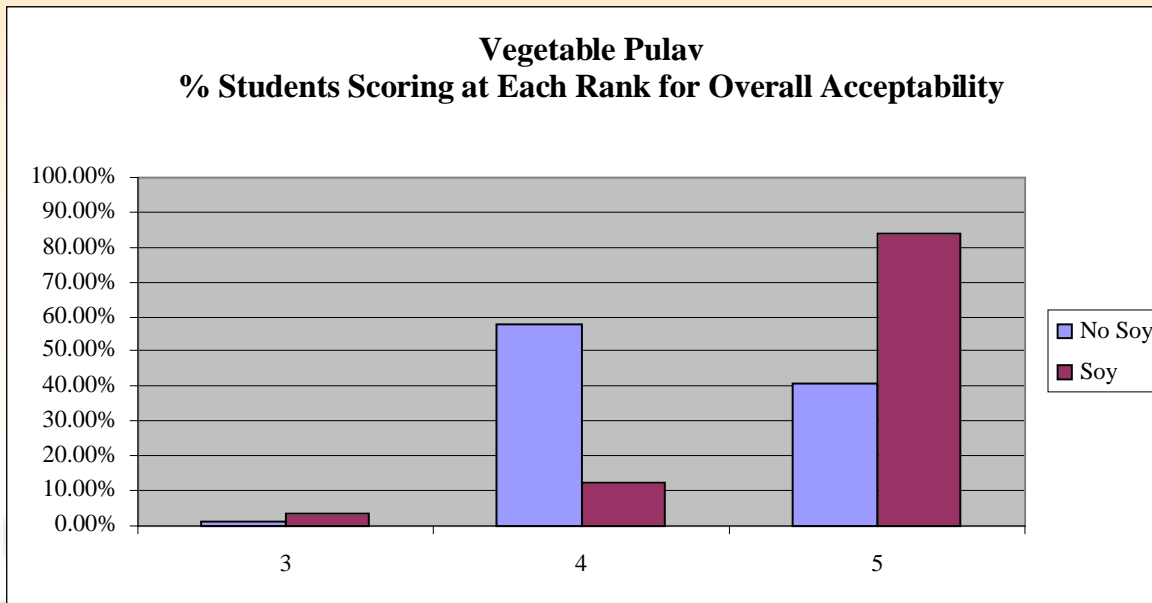


Chart 3

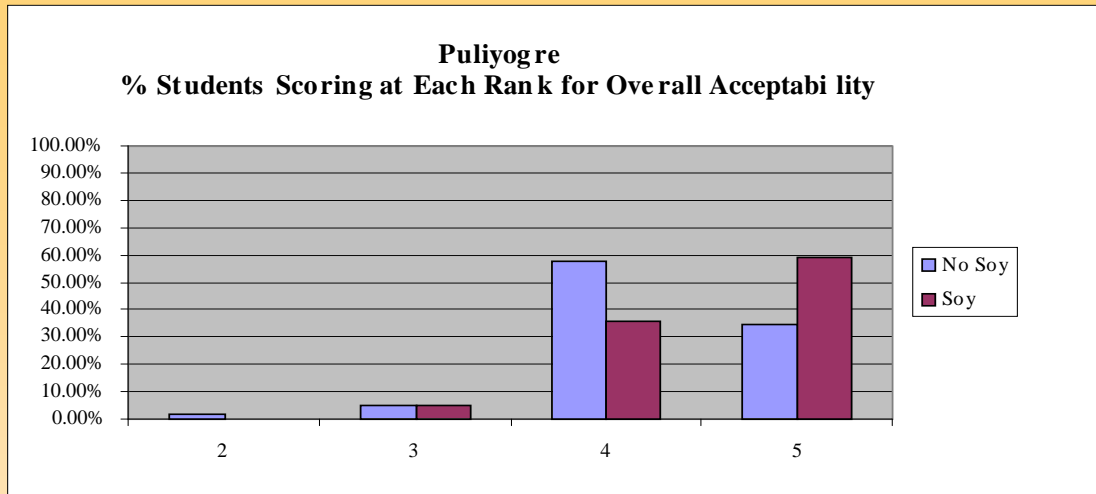
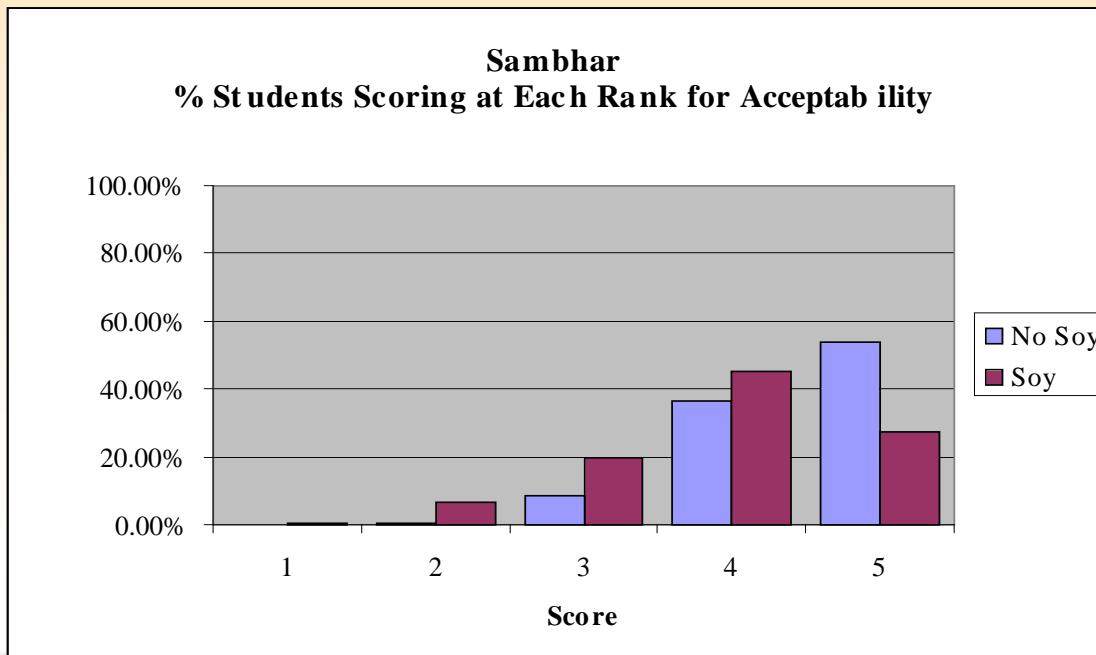


Chart 4





Invest in Children

Easy to accomplish

Education

Basic health care

Availability of proper complementary foods

Pre-school and elementary school feeding

It pays for itself

Improves social life

Increased productivity



National Soybean Research Laboratory

Expanding the size, scope, and profitability of the U.S. soybean industry



CONCLUSION

“Good nutrition is the cornerstone of the survival, health, and development of current and future generations”

“Well-nourished children perform better at school, become healthier adults, and can offer a better start in life to their own children”



National Soybean Research Laboratory

Expanding the size, scope, and profitability of the U.S. soybean industry



Topics for Discussion

- Food basket development
- Challenges for developing school lunch programs
- Success factors
- Monitoring and evaluation
- Capacity building and sustainability