



**Malnutrition
Matters**
FOOD TECHNOLOGY SOLUTIONS

Improved Food Security with Local Processing of Soy

Using VitaGoat & SoyCow Systems



MM: Improved Food Security with Local Processing of Soy

- Malnutrition is highest in rural areas
- Roads and industrial infrastructure are poor in rural areas
- Small-scale local processing is ideal:
 - Lowest-cost complete protein foods are produced in the local communities
 - VitaGoat and SoyCow food enterprises provide employment for unskilled women
 - Enterprises become self-sufficient within one year
- Other low-cost, simple health interventions can be provided in tandem
 - Micro-nutrient fortification (1/4 cent per dose)
 - De-worming medicine (4 cents per year)



Soy milk being made near Eldoret, Kenya

Why are Soyfoods Ideal for Development?



- Large variety of locally processed low-cost foods
 - Soymilk, tofu, soy yogurt, sour soymilk (low-cost dairy alternatives)
 - Okara (soybean pulp) can be added to foods or sold for feed
 - Provides local jobs & training through sustainable micro-enterprise
- Nutritional Uses
 - Safe hydration through high-temperature process
 - Micronutrient delivery capability
 - Ideal HIV/AIDS protein nutrition and weaning foods
- Environmentally friendly
 - 20 times more efficient with respect to land and energy usage
 - Up to 10 times more efficient with respect to water usage

Energy Efficiency in Production (measured in kcal)²



School children getting soymilk in Uganda

Energy Efficiency

A fundamental way to examine the environmental cost of these different methods of food production is to examine total energy use involved in production. Soy protein is a highly efficient source of protein based on return of energy use versus other proteins.

² “Diet, Energy and Global Warming”; Gidon Eshel and Pamela A. Martin; Department of Geophysical Sciences, University of Chicago, Chicago, Illinois (December 2005)

Water Efficiency in Production ¹ (measured in tons)



Grinding soaked soybeans in Tanzania, before making soymilk

Water Consumption

Soy uses far less water than other forms of “quality” or “complete” proteins. This has the effect of saving over 4 million gallons of water for each ton of soybean produced.

¹ *Virtual water trade to Japan and in the world*, T. Oki, M. Sato, A. Kawamura, M. Miyake, S. Kanae, and K. Musiake



Environmental Sustainability & Increased Income: Local Cultivation of Soybeans

- Numerous studies have shown that soybeans can greatly benefit small landholders in many regions in Africa
 - can be added as an alternate crop to prevalent maize and cassava
 - Can directly increase farmer's income through sale of the soy crop for local use
 - Can indirectly increase the farmer's income via improved Nitrogen fixation and resultant productivity increase for maize and cassava
 - Improves the soil and reduces need for fertilizer

Site Status – February 2010

MOROCCO

GUINEA

LIBERIA

GHANA

BENIN

NIGERIA

CHAD

C.A.R.

CONGO

CONGO (DRC)

ANGOLA

NAMIBIA

SOUTH AFRICA

LIBYA

EGYPT

ALGERIA

MALI

NIGER

SUDAN

SUDAN

UGANDA

KENYA

TANZANIA

MALAWI

MOZAMBIQUE

ZAMBIA

ZIMBABWE

SOUTH AFRICA

TURKEY

IRAQ

IRAN

TAJIKISTAN

AFGHANISTAN

PAKISTAN

CHINA

BANGLADESH

INDIA

SOMALIA

Arabian Sea

Bay of Bengal

BRAZIL

HONDURAS

GUATEMALA

COLOMBIA

THAILAND

KOREA

USA

143

Existing

(2002 - 2009)

44

Committed

(2010)

1

3

2

2

1+2

1

1

5

11+5

2

1

7+3

6

4+4

8

3

1

7+3

6

4+4

2+4

8

3

5

1

17

1

1

1

1

2+1

59

20

2

VitaGoat & SoyCow Installations

Existing

(2002 - 2009)

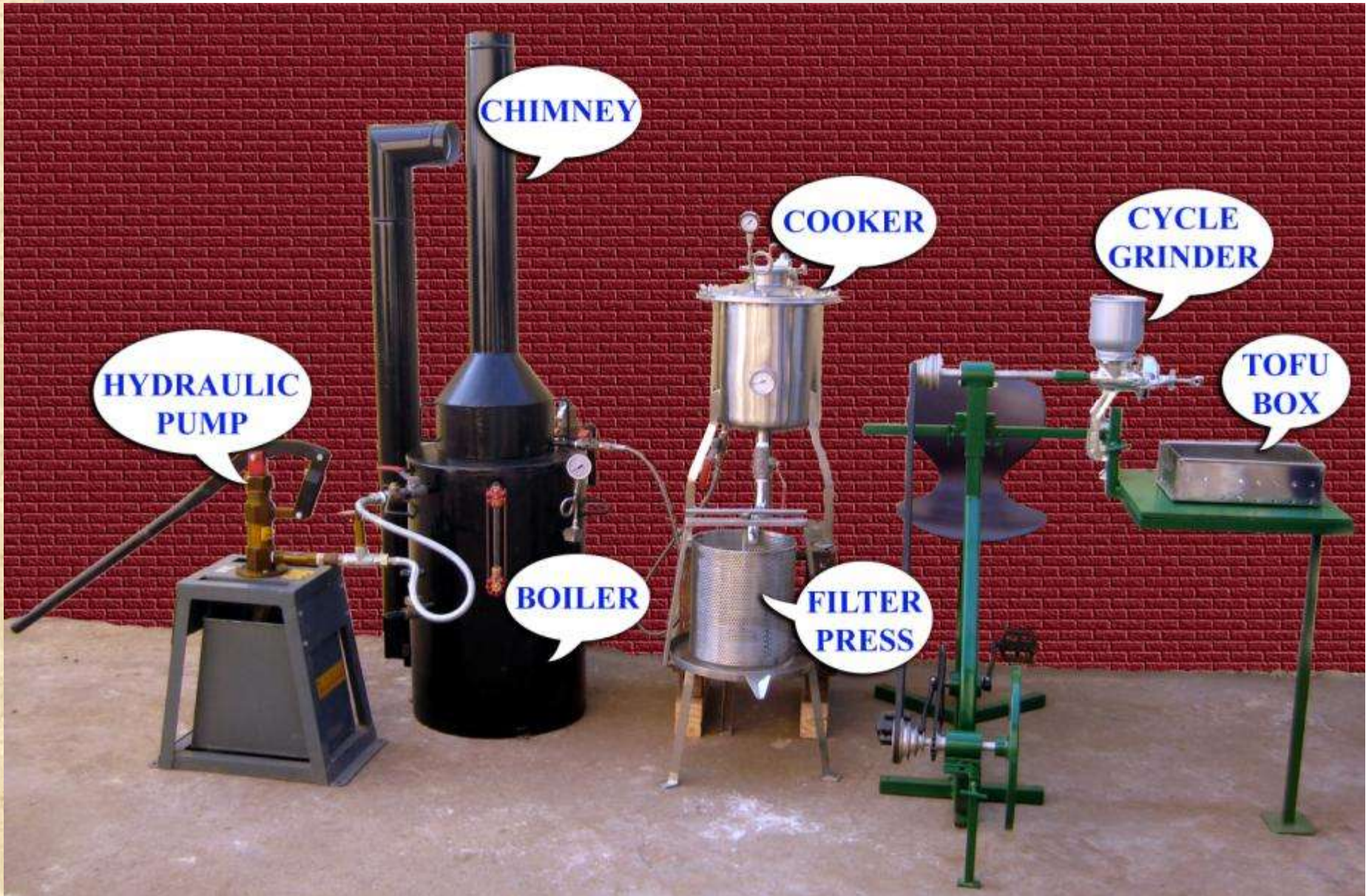
44

Committed

(2010)

INDIAN OCEAN

The VitaGoat System



The VitaGoat vs Rural Dairy in Africa

Monthly Output : 5,000 L milk	11 dairy cows	VitaGoat	Difference
Capital Cost	\$16,100	\$5,800 (incl shipping, etc)	\$11,500
Annual maintenance (milking machine for cows)	\$350	\$370 (gaskets, valves...)	\$20 / year
Input costs / month: 30 days for cows & calves, 25 days for VitaGoats)	\$1,761 Feed, water, labor, vet ,electricity	\$1,278 Soybeans, water, labor,sugar, fuel	\$535
Production Cost per liter:	41 cents	27 cents	14 cents / liter
Farm-gate price:	47 cents / L	30 cents / L milk 70 cents / L yogurt	-- 17 cents / liter + 13 combined
Rent, license fees, building maintenance	\$500	\$250	
Total Cost per month	\$2,380	\$1,642	
Gross revenue per month : milk / yogurt	\$2,333	\$3,000	
Other revenue: calves, okara	\$684	\$460	
Producer's profit per month	\$638	\$1,818	\$1,180

Real VitaGoat - Eldoret, Kenya

Monthly Output : 1,200 L milk	VitaGoat	Notes
Capital Cost	\$5,800	Including duties, shipping, etc
Annual maintenance	\$180	
Input costs per month (12 days / month)	\$307 Soybeans, water, sugar, fuel, labor	3 days / week 100 L / day
Production Cost per liter:	27 cents	
Rent, license fees + commission	\$75 + \$120	
Total operational cost	\$517	
Farm-gate price:	40 cents / L milk 80 cents / L yoghurt	70 cents / liter on a combined basis
Milk Revenue / month + okara	\$840 + \$115	Okara sold for \$1.15 / batch
Net profit per month	\$438	