

# Which Traits For Human Consumption?

*Consumer perception*

JB Traversac – INRA Paris



Carla Moita Brites – INIAV

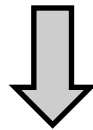


# Context

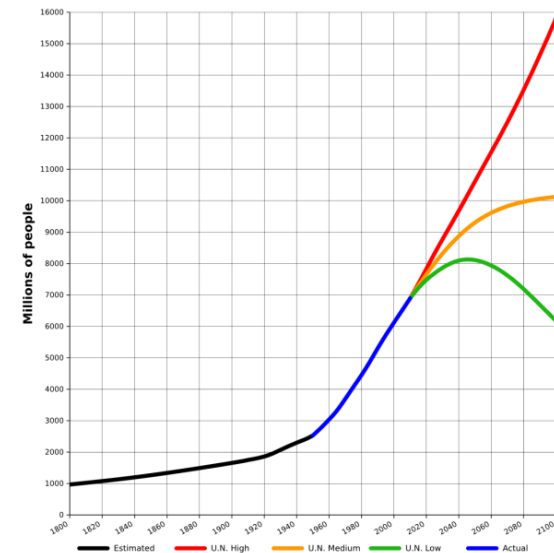
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## SOCIETAL CONCERNS & PUBLIC POLICIES

huge increasing demand for proteins



Interrogations in the ways to **SATISFY**  
**POPULATION NEEDS & LIMIT ENVIRONMENTAL**  
**PRINT**



## Context

2

### PP & NGO STRATEGIES: A SET OF PROPOSALS

$\alpha$ . Limit the meat consumption  
a free-meat day  $\rightsquigarrow$  vegetarian diet



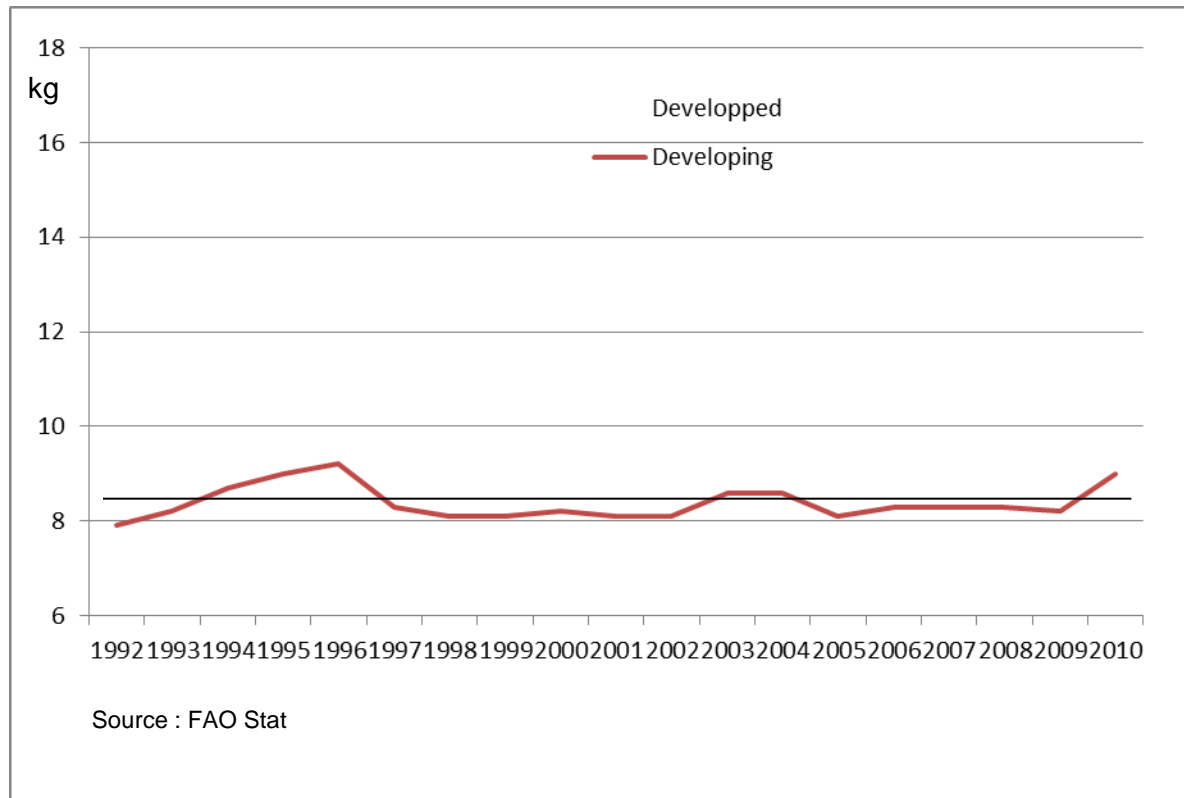
**MULTIPLE PUBLIC  
HEALTH  
IMPLICATIONS**

$\beta$ . Develop alternative products  $\hookrightarrow$  Novel Protein Foods

- S1. Traditional plant protein uses (tofu, dhal, etc.)
- S2. Novel Protein Food [fraction of seeds and reincorporation]
- S3. Insect based products

# Trends in legume consumption

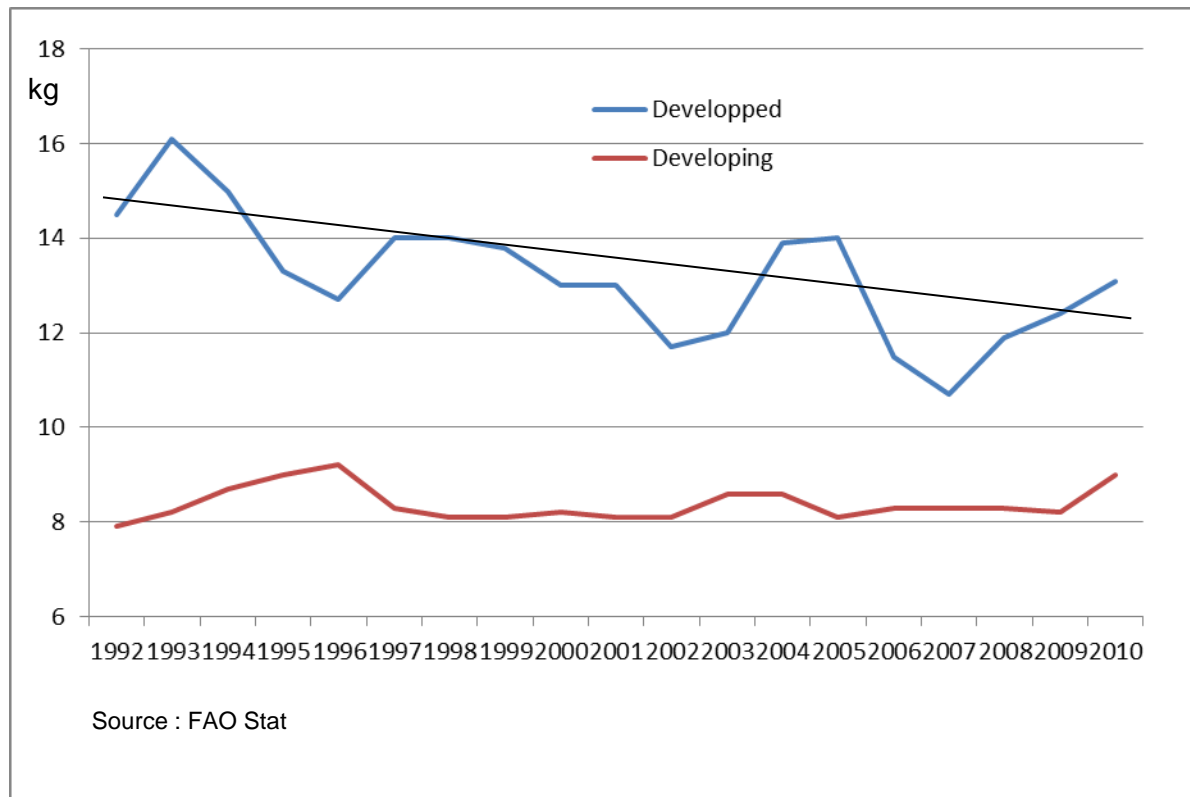
Per capita pulse production (1992-2010)



$$\frac{dc}{dt} = 0$$

# Trends in legume consumption

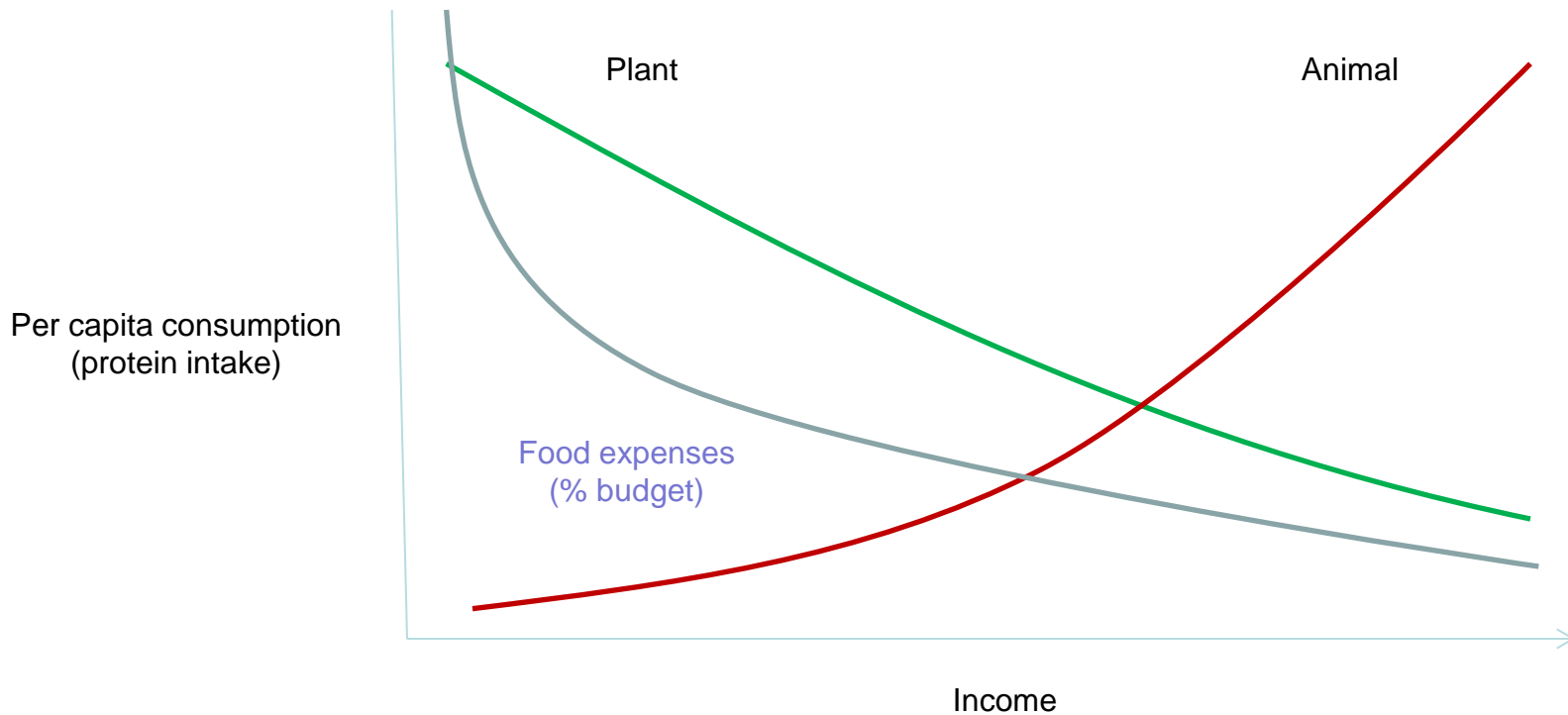
Per capita pulse production (1992-2010)



$$\frac{dc}{dt} = -0,38$$

# Theoretical situation

Legume consumption by level of earning



*CLeg f (revenue : cultural habits)*

# Protein cost: winner plant, .... And meat take all

1

## DRAMATIC COST DIFFERENCES

processed protein food based on soybeans and **MEAT PROTEIN**: the environmental impacts associated with primary production and processing are a factor 4.4-> 100 to the disadvantage of meat

energy use for **FISH PROTEIN** may be up to a factor 14 more than for protein of vegetable origin

(Reijnders and Soret, 2003)

the efficiency of the transformation of vegetable into **ANIMAL FEED** varies between 2.2 and 2.7 kg of feed per kg

(Carlsson-Kanyama and Faist, 1999)

# Protein cost: winner plant, .... And meat take all

2

## STILL A PREFERENCE FOR MEAT

Stable preferences for meat and meat attributes:

meat **TASTE** better  
*“meat is tasty, not  
legume “*

(D. Tomé, 2014)

role of **ODOUR** in the  
memory of pleasant  
and unpleasant meal

(Schleidt et al.,1988)

**CULTURE** importance  
and meat **STATUS** in a  
social context

(Rothschild, 1999)



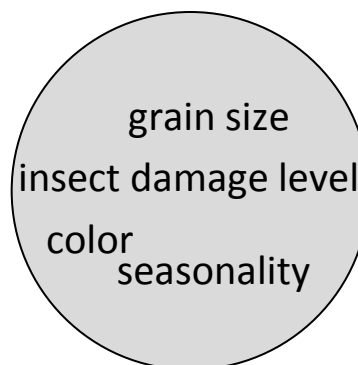
# Economy and marketing research

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## HEDONIC PRICES OF LEGUMES

Hedonic prices of  
cowpea in Central-  
Africa markets  
between 1996 and  
2000

(Langyintuo et al. 2003, 2004)



**63-97% OF PRICE VARIABILITY**

lack of scientific  
studies in developed  
countries

# Economie and marketing research

2

## GENETIC MODIFIED ACCEPTABILITY OF PLANT PROTEIN

GM acceptability and food safety for biotechnologies in Norway (oil), China (rice), Japan (Tofu, noodles)

(McCluskey 2003)

- discount for GM food in Japan and Norway / ~ 49 %
- premium for GM rice in China

# Economie and marketing research

3

## LEGUME ACCEPTABILITY

### QUALITATIVE SURVEY IN PULSE IN MUNICH AND BERLIN (KLEMCKE ET AL. 2013):

mostly  
positive terms  
associated to  
pulses

flatulence is not an  
explanation of the  
non willingness-to-  
buy

preparation  
time is too  
constraining  
for 9% of  
the  
respondent

organoleptic  
perception of  
lentil and bean  
soup are  
positive

“good for  
health”,  
contribution to  
vitamin and  
protein are  
mentioned

Flatulence do not block  
out legume in qualitative  
studies but consumer do  
not consume legumes

(Canglobal 2001;Ipsos, 2010)

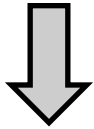


# Perspectives

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## THE RELATIVE PREFERENCE FOR MEAT

Legumes: the protein of the poor



association of **LEGUMES** and  
**DEVELOPING COUNTRIES** meal

Preference for meat is a construction:  
important marketing funds and subsidies to  
sustain the meat supply chains

# Perspectives

3

## CHANGE IN CONSUMER BEHAVIOR

**HEALTH** seems to be the widely given reason for changing consumption habits, reducing meat in the diet or even avoiding meat altogether

(Latvala et al., 2012).

Food safety crises and livestock diseases altered both consumer and political **CONFIDENCE** in the meat chain

(Garnier et al. 2003)

Consumers underestimate the **ECOLOGICAL IMPACT** of animal production

(Vanhonacker et al. 2013; de Boers 2011, 2012)

# Consumer perception

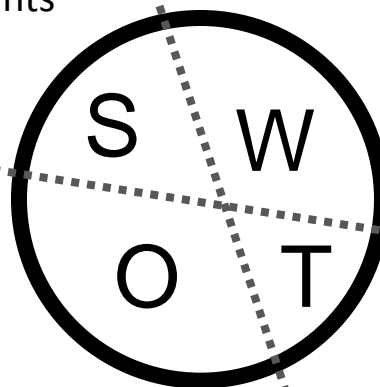
## GRAIN LEGUMES CONSUMPTION

### Strengths

- Environmental friendly
- Incidence of diet related diseases
- Health benefits: protein, fiber, antioxidants

### Opportunities

- Explore genetic diversity
- Benefit from young generation highly-educated in sustainable & healthy foods
- Create value from messages: vegetarian, locally grown or certified 'bio'
- Create value from "convenience" or "ease of preparation"



### Weaknesses

- Consumption is fairly low
- Many people do not know how to prepare
- Rejection by unpleasant sensory perception (bitterness and astringency)

### Threats

- Overall price instability
- Soya bean competition from non EU countries

## HOW TO PROMOTE GRAIN LEGUMES CONSUMPTION?

### BY PROCESSING TECHNOLOGIES

#### Dehulling

remove off flavors,  
improve palatability



#### Milling

increase water  
absorption, pasting  
properties and food  
applications



#### Pre-cooking and canning

increase “convenience”  
or “ease of preparation”



## HOW TO PROMOTE GRAIN LEGUMES CONSUMPTION?

### BY PROCESSING TECHNOLOGIES

#### Germination

increase digestibility



**Vacum pressure  
cooking** improve  
palatability



#### Extrusion

induce protein  
denaturation and  
starch gelatinization  
increase resistant  
starch and  
“convenience”



**Extraction of  
ingredients for food  
applications** (e.g.  
protein and starch as  
concentrates and  
isolates)





LEGumes for the  
Agriculture of TOMorrow



## HOW TO PROMOTE GRAIN LEGUMES CONSUMPTION?

### BY MARKETING

- Highlight factors such as **sustainability, great tasting, weight management** and **convenience**
- Communicate information on the **health benefits**, as well as **how to cook** a variety of “great tasting”
- Communicate information of **recipes** and **variety of dishes** that can be made, types of products available, and ways to cook basic recipes
- Promotional efforts must emphasize **HEALTH, TASTE, CONVENIENCE**

## HOW TO REVEAL CONSUMER PREFERENCE FOR LEGUMES

### Experimental economics

**A SET OF 100 CONSUMERS RANDOMLY CHOSEN**

**BASIC PRINCIPLES**

- 3 stage of tests  
2 types of information to estimate: WTB & WTP
- a constraint of preference revelation: consumer information is costly
- 3 types of results/informations:  
hedonic note / purchase choice WTB / price WTP

**↪LINK WITH SENSORY ATTRIBUTES**

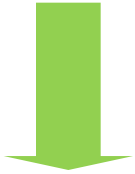
# HOW TO REVEAL CONSUMER PREFERENCE FOR LEGUMES

## Process of experimental economics

Blind test + Extrinsic Information = Complete information



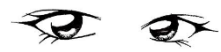
5 fortified bread



Hedonic note  
Purchase or not  
Price (WTP)



Informations Environmental  
& health assertions



Purchase or not  
Price (WTP)



Bread & Informations



Hedonic note  
Purchase or not  
Price (WTP)