The ambition

Having a quantitative tools for:

1. Revisiting the past
   (quick and synthesized multi-scales and multi-subjects scans)

2. Debating the future
   ...from scenarios descriptions (own or external qualitative conjectures)
   reflected / summarized into few quantitative parameters

Future
+ 45 years
(2005 => 2050)

Past
- 45 years
(1960 => 2005)

Global consistency?
(equilibrium between biomass uses & resources...)

Impact of variants?
(populations, composition of diets...)

Implications?
(international trade, GHG sink/emissions water & energy consumptions...)

The account book
(from national to global)

Food Biomass RESOURCES

Food Biomass USES

some land & aquatic SPACES

with some levels of PRODUCTIVITY

some Food PRODUCTION

some co-products
some ‘free’ spaces

some human POPULATIONS

with some levels of FOOD intakes

some Imports/Exports

some Waste

some Animal Feed

some Non-Food USES

.../

some Non-Food productions/potentials (+VANA)

some environmental impacts

.../...
The unit of account

Balance sheets in:

- FOOD CALORIES (or equivalent, for oilcakes, molasses...)
  - Broken up into Carbohydrates (4 kcal/g)
  - Proteins (4 kcal/g)
  - Fats (9 kcal/g)
  - Past only (1961-2003)

- Tonnes (or m³) of DM in specific cases
  - Fibers, rubber...
  - Wood (fuel or industrial)

The geographical coverage

- 156 entities (806 countries since 1961) => 99% land / population (many islands and few other too badly-informed area-like Afghanistan- set aside...)
- with an instantaneous aggregating system into various "regions"
  - Total WORLD
  - Developed / developing countries
  - The 8 MEA regions
  - ... / ...
  - The 87 regions of the GTPA model

Data imported, checked & recomputed until today (via the SAS software):

- 3000 items (areas, populations, productions, imports/exports...)
- 42 years (1961-2003) or more
- 246 countries
- ~ 30 millions values

The items

- Foodstuffs & their by-products (oilcakes... wools, leathers...)
  - 120 product lines of Faostat1 (Commodity Balances)
  - Re-computed into 5 categories (after conversion into calories):
    - Cereals: wheat, rice, barley, maize...
    - Sugar crops: sugarcane, sugar beet...
    - Pulses: beans, peas...
    - Oilseeds: soybean, groundnut, coconut...
    - Roots & tubers: cassava, potato...
    - Fruits & vegetables: apple, onion...
    - Stimulants: cocoa, coffee, alcohol...
    - FIBRES (cotton, jute...)
    - OTHER (tobacco, rubber...)
    - PLANTS
    - Ruminant Animals
      - Meats: bovines, goat, mutton...
      - Milk, Butter, Animal fats...
    - Monogastric Animals
      - Meats: poultry, pig...
      - Eggs...
    - Freshwater items (Fishes...)
    - Marine items (Demersal & Pelagic fishes... Fats...)
    - Forest
      - Fuel wood
      - Industrial wood...

- Databases Structuring and Coding System (excluding ModelProdAni)
  - Basis for traceability of all computations
  - Quasi-immediate updating when new data
  - Live simulations and collective debate of scenarios (Inputs & Outputs)
  - Making models (functions of animal/vegetal productions...)
  - Feeding/Enriching models of economic equilibrium (Synthesizing, interlinking, visualizing millions of past data...
The models for animal productions

- 2 separated & interlinked categories of animal productions:
  - Prod_Rumi (Gkcal) = f(x1,x2,x3..., Prod_Mono)
  - Prod_Mono (Gkcal) = f(x1,x2,x3..., Prod_Rumi)

- Key explaining factors (x1, x2, x3...):
  - Feed of vegetal origin (Gkcal)
  - Feed of animal origin (Gkcal)
  - Pasture area (1,000 ha)
  - Agricultural active population (1,000 persons)
  - Tractors (units)

- Several models obtained:
  - linear / quadratic
  - CalTot / CalPro (unit for Production unit, unit for Feed...)
  - with/without Dummies (region, year)
  - with/without Trend ("technical progress")
  - region-based (state regions) or type-based (agricultural/industrial, extensive/intensive...)
  - ...
Part II
From past trends (1961-2003) to scenarios (2050)

1. From Average World Increases...
2. ...to Large Regional Disparities
3. From a 2003 Balance Sheet
4. ...to Few Questions for 2050

---

From average world increases (1961-2003)
- The world population doubled
- The world apparent food supply increased from 2450 to 3010 kcal/day
- Cultivated area +13%
- Pasture area +11%
- Land productivity +123%
- Labour productivity +53%

---

Increasing food trade...
Balance of vegetal food trade (Export – Import)
- needle point graph showing trade trends

---

...to regional disparities
- Highest land productivity in ASIA
- A labour productivity boom in OECD

---

Note: 10,000 kcal =
- ~ 2.4 kg of soybean
- ~ 2.8 kg of rice milled
- ~ 2.9 kg of pea
- ~ 3.0 kg of wheat
- ~ 15.0 kg of potato
- ~ 58.8 kg of tomato
But large disparities between regional apparent food availabilities

**OECO**
- Animal proteins: 71 g/day on 125 (60%)
- Animal fats: 89 g/day on 165 (55%)

**Sub-Saharan Africa**
- Animal proteins: 12 on 60 g/day (20%)  
- Animal fats: 10 on 48 g/day (20%)

...to few basic questions for 2050

To what extent will change...
- the population? (7 to 11 billions people)
- the calories intakes per capita?
- the composition of the diets (vegetal/animal, macro/micro-nutrients...)
- the non-food demand for agricultural commodities?
- the Cultivated Pastures Forests distribution?
- the biomass yields?
- the yield drivers? (water, fossil energies, phosphates...)
- .../

From a 2003 balance sheet...

From questions to scenarios