



Which animal do farmers need for tropical mixed farming systems?

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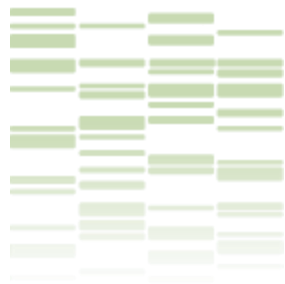
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Which animal do farmers need for tropical mixed farming systems in the Caribbean?

Nathalie Mandonnet & Team Ceresita

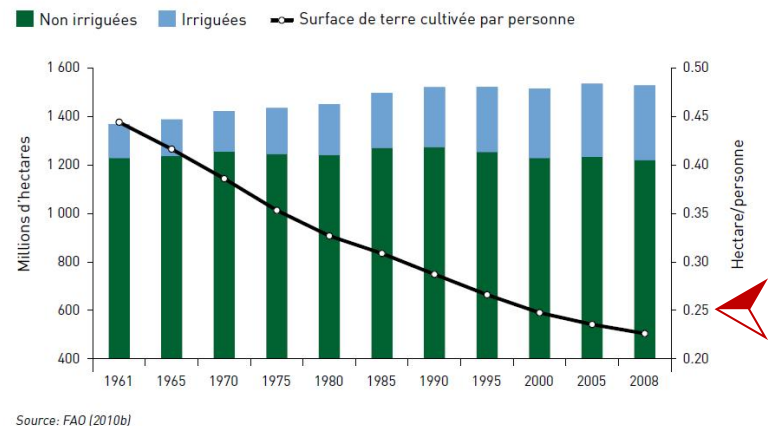
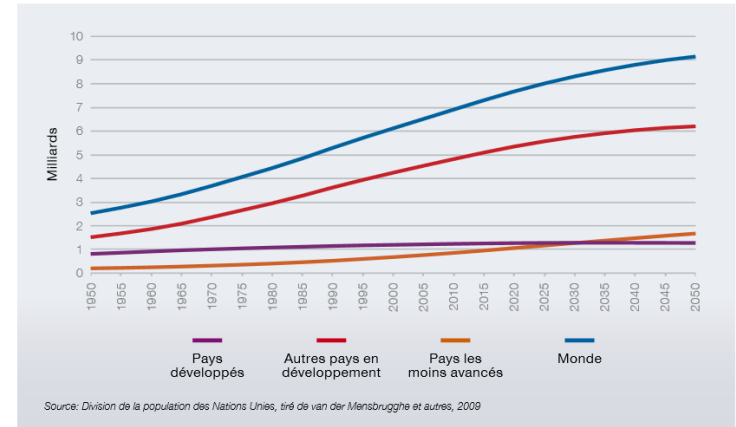
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Major issues of agriculture in the Global South

- World population will reach 9 billions by 2050
+50% in Global South
- Limited increase of arable land surface
 - Decreased land availability for crops and livestock production /inhab
- Crucial need of increased agriculture efficiency to reach food sovereignty

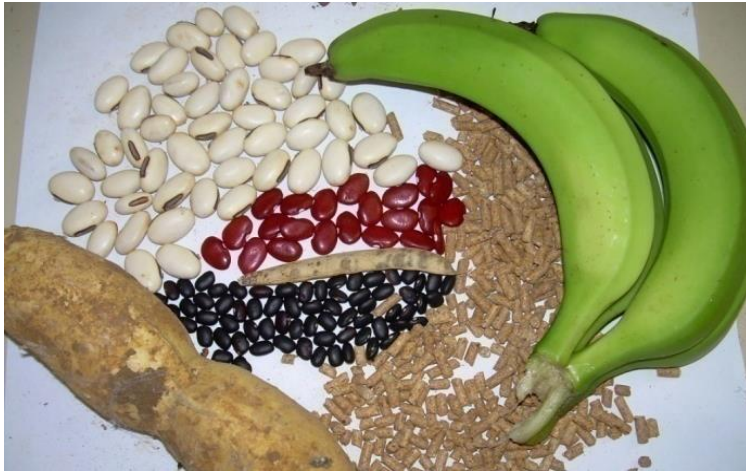


Key role of animal in the food chain

- Importance of livestock production
 - to cover protein needs, to add value to non-usable land for crops production and to enhance the biological recycling processes
- Importance of agroecological approach
 - to meet efficiency and sustainability for food sovereignty



Three principles for efficient livestock production in the tropics



Based on the observation and evaluation of **mixed farming systems (MFS)** in the Caribbean:

On the farm,

1. Give priority to food on feed
2. Promote the right animal at the right place
3. Favour farmers' wills and skills

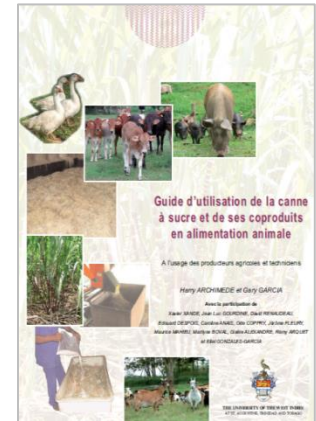
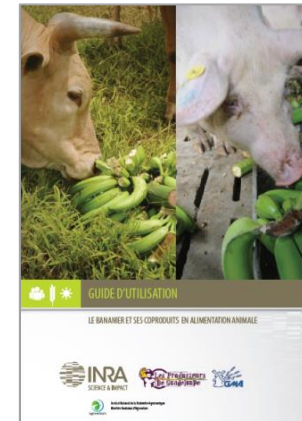
Priority to food on feed

1. Optimize a human food system in which the animal protein is *only* one component

- Dual food crop plants (eg bananas, sweet potatoes, cassava, cereal, peas...),
- Recycle crops co-products as feed and energy.

2. Choose adapted plant resources to the agro-pedo-climatic environment of the farm

- Evaluation of the local biodiversity (from dual food to legume fodder trees)



Coproducts and non conventional plants user guides

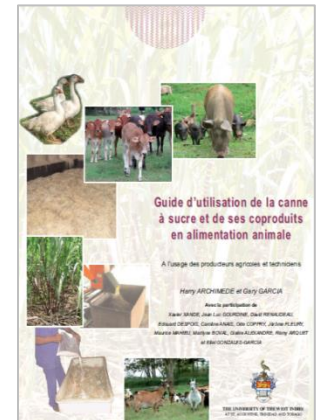
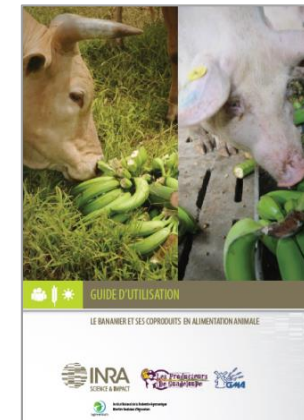
Priority to food on feed

3. Match the animal with the plant resources available on the farm

- Account for differential physiological abilities between ruminants and monogastric
 - Ruminant : development of non usable lands, low feed conversion and greenhouse gaz production
 - Monogastric: efficient feed conversion, competing with human food

4. Promote domestication of natural process with smart and robust technologies

- Single cell protein production (algae, fungi, bacteria) for livestock protein supplementation
- Methane fermentation and lactic acid fermentation to produce energy while allowing effluent depollution, mitigation of greenhouse gas, and forage preservation.



Coproducts and non conventional plants user guides

The right animal at the right place



Mixed farming INRA Gardel

1. Prioritize low-input local adapted breeds (instead of high-input/ specialized exotic breeds)

Constraints: Variability of amount and quality of feed, biotic and abiotic stress

- Optimize responses laws (production and adaptation) of conventional livestock
- Enhance the potential provided by the non-conventional animals



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The right animal at the right place



Mixed farming INRA Gardel

2. Enhance diversity within the flock (genetic, physiological status) to “empower” the existing diversity of the system

- Associate in the flock animals with complementary requirements/potentials (feeding behaviors, pathological susceptibility) to minimize the risks, optimize the resources,
- Develop genetic for low input systems/ balanced animals



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Farmers' wills and skills



1. Design a **system consistent** with farmer's wills and skills
 - Optimisation of integration of productions in the MFS
 - Combine biotechnical and organizational innovations (smart agriculture)
 - *Raise the self-sufficiency*
 - *Raise the level and quality of life*
2. **Organize an area for hybridization** of research knowledge and traditional know-how
 - Promote co-conception and living labs
3. Adapt **public policies** and transform the consumer as **consum'actor**



Research issues for INRA at the animal and system levels

- **Adaptation:** characterize a A/S in equilibrium with the farm environment
 - Ex genetic control of adaptation in Creole breeds
- **Resilience:** define and design the animal/system able to make/allow the right compromise under stress
 - Ex: genetic control of nutrient allocation in pig under heat stress, importance of production and ecosystemic services integration in resilience of MFS
- **Efficiency:** multicriteria evaluation and optimization at the A/P/S levels
 - Ex: feeding strategies, integrated control of animal health, co-conception of MFS
 - La recherche prend ses responsabilités

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