RESEARCH ISSUES FOR CROP-LIVESTOCK INTEGRATION IN MIXED FARMING SYSTEMS IN THE TROPICS: A REVIEW.

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CONTEXT

- Global context: Agricultural aims
  - Produce more and better.
  - Adapt to a constraint and changing world.

- Specific context: Mixed Farming Systems (MFS)
  - MFS = Combining livestock and cash crops at farm level.
  - Predominant in the tropics.
  - Good model to answer agricultural goals?

- Scientific context: Crop-livestock integration (CLI)
  - CLI = Integrated management of both crop and livestock productions.
  - Renewed interest in this new context
  - Permit to improve efficiency and resiliency of MFS?
OBJECTIVES

- Objectives of the study
  - Review of scientific literature.
  - Analyse research approaches on CLI.
  - Identify issues for further researches.

- Scope of the study:

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<td>Mixed Farming Systems</td>
<td>Specialized Systems</td>
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<td>Crop-Livestock Integration</td>
<td>Independent management</td>
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<td>Farming system approach</td>
<td>Analytical approach</td>
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<td>Tropical climates</td>
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- Results of the study
  - 80 scientific papers identified
  - Geographic areas: Africa > Asia > South America
  - Characterise main research approaches on MFS and CLI.
  - Specific considerations on Crop Livestock Integration analyse.
CURRENT RESEARCH APPROACHES

- Classification of research approaches
  - = Farming system research framework
  - + Research issues approaches
  - - Designing papers

Adapted from Giller et al., 2011
CURRENT RESEARCH APPROACHES

1. Descriptive approaches:
   - Characterisation of system components
   - Subject: Drivers, Farming Systems, Crop Livestock Integration
   - Methodology: Conceptual framework, case study, typology
CURRENT RESEARCH APPROACHES

2. Explanatory approaches:
- Analysis of interaction between components
- Subject: Drivers influence on resource allocation, on MFS, on CLI
- Methodology: Comparative study, experimentation
CURRENT RESEARCH APPROACHES

3. Exploratory approaches:
- Analysis of system performances and improved scenarios
- Subject: resources tradeoffs, CLI intensity
- Methodology: Scenario analysis, impact assessment
4. Integrated approaches:
- Analysis of whole interactions: Drivers <-> MFS <-> CLI <-> Performances
- Subject: Resource use efficiency, sustainable intensification
- Methodology: Models, combination of methodologies
**Crop Livestock Integration Analysis**

**Conceptual Framework**
- Physical and organizational dimensions
- Integration gradient

**Drivers relationship**
- Intensification stage
- Integration gradient

**Production system**
- Livestock 1
- Crop 1
- Crop 2
- Livestock 2

**Practices**
- Animal feeding, Organic fertilization and Energy production

**Performances**
- Economic: Productivity, efficiency
- Social: livelihood, resiliency
- Environmental: GHG, biodiversity

**Resource flows**
- Resources network analysis
- Diversity and integration of flows
- Efficiency of resources use
Crop Livestock Integration Analysis

- Resource flows network analysis
  - To analyse network size, activity and organisation
  - Understanding flows into the system (integration)
  - Link them to external flows (Input/Output analysis)

- Self-Sufficiency
- Efficiency of resources use
- Productivity
**Crop Livestock Integration Analysis**

- **Resource flows network analysis**
  - To characterise diversity and integration
  - Diversity in terms of number of flows
  - Integration in terms of intensity of flows

- **Self-Sufficiency**
- **Efficiency of resources use**
- **Productivity**
DISCUSSION AND PERSPECTIVES

- **Interest of integrated approaches**
  - Importance of understanding drivers influence on MFS and CLI practices
  - Explore CLI improvement and associated performances

- **Interest of CLI characterization**
  - CLI as a complex network of resources
  - Network organisation and diversity conduct to different performances
  - Resources in terms of efficiency rather than productivity

- **Phd research framework:**
  - Comparative study on contrasted socioeconomic contexts:
    - Guadeloupe (FWI) - Cuba (Caribe) - Brazil (Amazonia).
  - Holistic approach:
    - Drivers, CLI and performances (Farming system analysis).
  - Multicriteria analyse:
    - Resources Network analysis (Efficiency and resiliency).
THANK YOU

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OBRIGADO

GRACIAS
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