Assessment of Livestock Farming Systems in Harsh Environment

Approaches adopted by farmers through management practices

Alary V., El Mourid, A., Lecomte, Ph., M., Nefzaoui, Waterhouse, T., Wright, I., Gibon, A.

EAAP, Cairo, sept. 2002
Severe environmental constraints in harsh environment (source: FAO/IIASI 2002)

<table>
<thead>
<tr>
<th>Severe constraints</th>
<th>Developing countries</th>
<th>Developed countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Too cold</td>
<td>2.7 %</td>
<td>29.6 %</td>
</tr>
<tr>
<td>Too dry</td>
<td>34.4 %</td>
<td>15.8 %</td>
</tr>
<tr>
<td>Too steep</td>
<td>12.8 %</td>
<td>10.2 %</td>
</tr>
<tr>
<td>Poor soils</td>
<td>60.9 %</td>
<td>70.7 %</td>
</tr>
<tr>
<td>Total constraints?</td>
<td>76.3 %</td>
<td>80.9 %</td>
</tr>
<tr>
<td>Uncertainties</td>
<td></td>
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</tr>
</tbody>
</table>
Why focusing on such environments considered as marginal?

• At world level:
  – extensive animal production is still providing more than 40% of animal protein (1995)

• In the South:
  – drylands areas support 20% of the global human population
  – Risk of desertification
  – Protein deficit

• In the North:
  – New consumers needs such as environment preservation, animal welfare, quality food, etc.
Objective

• LFS approach and its hypothesis:
  – Improvement of livestock production systems must be consistent with farmers’ strategies and the environmental constraints at the whole farm level

• Objective:
  – To assess advantages and limitations of LFS approach to understand & suggest appropriated solutions for Livestock Production Systems in harsh environment
  – To assess the potential ways for their improvement in a development prospective
Methodological approach

Management at the household level

Management of farming system: Crop&livestock system

Institutions & Policies

Implications for the research & development

Social & Society

Management of livestock systems
Mountaneous area in Central Pyrenees
- Pastural highland
- Seasonal transhumance
- Abandon of highland
- Social change: environmental conservation, quality food

(INRA)

WANA
- Grazing rangeland
- Degradation of range land
- Occasional transhumance
- Increasing importance of alternative resources & purchased inputs

(ICARDA, NARS)

Sub-sahara
- Traditional system based on common rangeland
- Permanent transhumance

(CIRAD-Emvt)
### Herd management - Similarities and Contrasts (1)

<table>
<thead>
<tr>
<th></th>
<th>NORTH</th>
<th>SOUTH WANA</th>
<th>SOUTH Sub Sahara</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Breed</strong></td>
<td>Gasconne/ Tarasconnaise</td>
<td>Barbarine, Awassi</td>
<td>Ankolé</td>
</tr>
<tr>
<td><strong>Herd composition</strong></td>
<td>Goat &amp; sheep With Cattle</td>
<td>Sheep &amp; Goat</td>
<td>Cattle + Sheep &amp; Goat</td>
</tr>
<tr>
<td><strong>Products</strong></td>
<td>Fattened and store lambs, cheese</td>
<td>Fattened or non lamb + milk &amp; cheese</td>
<td>Milk, meat, wool, manure, drought power</td>
</tr>
<tr>
<td><strong>Reproductive period</strong></td>
<td>Autumn -→ winter</td>
<td>Autumn/ spring</td>
<td>All the year</td>
</tr>
<tr>
<td><strong>Culling practices</strong></td>
<td>Depending on reproduc. performance over the years</td>
<td>Depending on drought conditions</td>
<td>Absence</td>
</tr>
<tr>
<td><strong>Grazing land</strong></td>
<td>+++</td>
<td>+</td>
<td>++++</td>
</tr>
<tr>
<td><strong>Feeding reserve</strong></td>
<td>++</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td><strong>Supplementation</strong></td>
<td>+</td>
<td>++++</td>
<td>+</td>
</tr>
</tbody>
</table>
Attributes of sustainable herd management in harsh environment

- Local hardy breed
- Multi species
- Reproductive period
- (De) Stocking/selling
- Culling practice
- Low annual productivity
- Alternative resources
- Capture incentives

Maximised grazing use

- Flexibility

Maximised long term socio-economic and ecological benefit

- Adaptation of Animal to available resource
- Risk minimization at long term

Low cost at short term

Adaptation of Animal to available resource

Risk minimization at long term

Flexibility
### Farming & Household systems - Similarities and Contrasts (2)

<table>
<thead>
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<th>NORTH</th>
<th>SOUTH WANA</th>
<th>SOUTH Sub Sahara</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Farming systems</strong></td>
<td>Fodder crops</td>
<td>Cereal crop</td>
<td>Cereal crop : food</td>
</tr>
<tr>
<td></td>
<td>Intensive livestock systems</td>
<td>→ Food &amp; Feed Fruit trees</td>
<td></td>
</tr>
<tr>
<td><strong>Household System</strong></td>
<td>Women : off farm activity ; take care of intensive system</td>
<td>Men : emigration</td>
<td>Men : grazing ; emigration</td>
</tr>
<tr>
<td>- off farm</td>
<td></td>
<td>Children : grazing</td>
<td></td>
</tr>
<tr>
<td>- intra household organisation</td>
<td>Men : Extensive system</td>
<td>Women : care, milking, feeding</td>
<td>Women : milking, feeding, care, marketing ;</td>
</tr>
<tr>
<td><strong>Community level</strong></td>
<td>Access to pasture highland</td>
<td>Access to communal/collective rangeland</td>
<td>Regulation of access to range land</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Traditional rules as inheritance</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Agreement between community members</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Saving club…</td>
</tr>
</tbody>
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Attributes of sustainable farming management in harsh environment

Herd management
- Local hardy breed
- Multi species
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- (De) Stocking/selling
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- Low annual productivity
- Alternative resources
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Farmers’ strategies
- Maximised grazing use
- Maximised long term socio-economic and ecological benefit
- Low cost at short term

Farming and household management
- Flexibility
- Resilience
- Diversification
- Social mechanism

Maximised long term socio-economic and ecological benefit
- Farmers’ strategies
- Diversification
- Social mechanism
Farming system management - Implications for R&D (3)

- Social & Institutional & policies environment
- Off farm activities opportunities
- Market
- Resource
- Herd management
- Cropping system
- Farm and Off farm projects
  Trajectory / history of the family
  Family labour organisation
Herd management - Implication for R&D (3)

- Maximized benefit from the natural resource & alternative resources & Minimized cost
  - To question the appropriateness of technologies to:
    - Synchronize the individual female production
    - Use higher feeding regime
- Strategies related to herd management (selling, culling) are designed for coping with a wide range of climatic variations over the years:
  - To question the appropriateness of technologies or policies that maximize short term profit

**Boost research on:**

A. Bio-technical systems: Technology that improve flexibility/resilience in the time

B. Bio-economic: Social & institutional mechanisms/organization

C. Interaction between A and B → degree of acceptance of the technologies
Farming system management - Implications of R&D (3)

Social & Institutional & policies environment

Technology

Off farm Activities Opportunities

Market

Resource

Herd management

Cropping system

Farm and Off farm project
Trajectory / history of the family
Family labour organisation

Community / regional level
Farming system management - Implications for R&D (3)

- **Whole farming system** approach:
  - Advantages:
    - Integrated research: biologists, agronomists, animal production scientists, socio-economists, even anthropologists …
    - Integration between the bio-technical and bio-economical levels
  - Limitation:
    - « Community approach »: implication of all stakeholders
    - Constraints to implement « holistic » approach and approach the global dynamic (time dimension)

- **Modeling approach:**
  - Advantages
    - To formalise/deepen the systemic approach in a prospect view
    - To assess impacts of technologies package & appropriated policies
  - Limitations:
    - Trade off between short term welfare and long term sustainability
    - Adoption of technology depend not only on technical and economic optimum
    - Off farm activities
    - Problem of full aggregation at the community level
Farming system management - Implications for R&D (3)

- **New indicators** to assess the efficiency and sustainability of these systems & to develop appropriated technologies
  - Productivity is not sufficient
  - Need to approach the flexibility/resilience as main key factors or indicators of efficiency and sustainability -> time dimension
Farming system management - Prospects for the areas in question (3)

• **North/ Central Pyrenees:**
  – Highlands grazing neglected and abandoned: valorisation of traditionnal system and shepherd status

• **South/ Sub Sahara:**
  – Social conflict: need to revitalize vs institutionalize the complex social and traditional organisations;
  – New technologies to increase the flexibility/resilience/opportunities (as Trypanosomoasis control techniques)

• **WANA:**
  – problem of degradation of pastureland + increasingly supplementation: need to valorize alternative resources to restore/rehabilitate the natural resource, decrease the desertification process and decrease the market dependance & farmer vulnerability