Evaluation of animal production sustainability with IDEA in the Mediterranean context.

M. Marie\textsuperscript{1*}, G. Srou\textsuperscript{1,2}, N. Bekhouche\textsuperscript{1,3}, \textsuperscript{1}ENSAIA-INPL-Nancy, B.P. 172, 54505 Vandœuvre lès Nancy cedex, France, \textsuperscript{2}Université Libanaise, Horch Tabet, Beyrut, Lebanon, \textsuperscript{3}INA-El Harrach, 16200 Algiers, Algeria.
\textsuperscript{*}marie@ensaia.inpl-nancy.fr

Abstract

The IDEA (Indicateurs de Durabilité des Exploitations Agricoles, or Farm Sustainability Indicators) method has been implemented for sustainability assessment of small ruminant production systems in Lebanon, and dairy cows farming systems in Algeria. This method is based on 40 indicators representing the agro-ecological, socio-territorial and economic dimensions of the farming system’s sustainability. In the context of the Lebanese small ruminant pastoral or agro-pastoral systems, 3 indicators have been omitted (stocking density, N balance, financial autonomy) and 9 have been adapted by modification of the scores (1 for diversity, 2 for space organisation, 3 for farming practices, 1 for quality of products, 1 for employment and services, and economical efficiency). For zero-grazing dairy cows in Mitidja, where conditions are closer to those observed in systems for which IDEA has been designed, modifications concern 8 indicators. Difficulties to compute indicators arose from: i) unavailability or uncertainty of information such as those related to fertilisation, pesticide use, or economical data, ii) different scales for local references such as land surface, or iii) land use in pastoral systems.

This presentation shows the approach used for adapting the method to these contexts, while keeping its ability to fit the criteria of assessment methods, namely sensibility, specificity, robustness. A typology of systems according to their sustainability is presented.
Evaluation of animal production sustainability with IDEA in the Mediterranean context.

**Introduction**

- Why assessing sustainability
  - Diagnosis
  - Comparison/reference (group, objective)
  - Dynamics of systems
  - Quality sign (label)
  - Responses (managers, decision makers)
Sustainability representations

Indicators

- An indicator quantifies and simplifies phenomena and helps us understand complex realities
- Represent:
  - State (how, present)
  - Pressure (why, past)
  - Response (what, future)
Indicators

source: OECD 1993

Presentation of the IDEA method

- Indicateurs de Durabilité des Exploitations Agricoles (IDEA) = Farm Sustainability Indicators
Presentation of the method

- Objectives (16):
  - Consistency
  - Adaptability
  - Biodiversity
  - Non-renewable resources management
  - Soils preservation
  - Water preservation management
  - Atmosphere preservation
  - Landscape preservation
  - Product quality
  - Quality of life
  - Ethics
  - Local development
  - Citizenship
  - Human development
  - Employment
  - Animal welfare

Presentation of the method

- Biotic = agro-environmental
- Biodiversity
- “component”
- Agricultural practices
- Space organisation
- “scale”
Presentation of the method

Agro-environmental sustainability
- Bio-diversity
- Land management
- Agricultural practice
- Products quality
- Employment & services
- Ethics & human development

Social sustainability
- Viability
- Independency
- Transmissibility
- Efficiency

Economical sustainability

Source: Zahm et al. 2006 (after Vilain 2003)
Presentation of the method: socio-territorial scale

<table>
<thead>
<tr>
<th>Components</th>
<th>Indicators</th>
<th>Maximum values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality of the products and land</td>
<td>Quality of foodstuffs produced</td>
<td>Maximum total of 33 sustainability units</td>
</tr>
<tr>
<td></td>
<td>Enhancement of buildings and landscape heritage</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Processing of non-polluting wastes</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>Accessibility of space</td>
<td>6</td>
</tr>
<tr>
<td>Social involvement</td>
<td>Social involvement</td>
<td>4</td>
</tr>
<tr>
<td>Employment and services</td>
<td>Health</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Education and training</td>
<td>Maximum total of 33 sustainability units</td>
</tr>
<tr>
<td></td>
<td>Services, with activities</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Contribution to employment</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Collective work</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Proactiveness to sustainability</td>
<td>3</td>
</tr>
<tr>
<td>Ethics and human development</td>
<td>Constituency to world food balance</td>
<td>Maximum total of 34 sustainability units</td>
</tr>
<tr>
<td></td>
<td>Training</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>Labour intensity</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>Quality of life</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Isolation</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Recreational facilities and safety</td>
<td>6</td>
</tr>
<tr>
<td>Grand total</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

source: Zahm et al. 2006 (after Vilain 2003)

Presentation of the method: economical scale

<table>
<thead>
<tr>
<th>Components</th>
<th>Indicators</th>
<th>Maximum Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economic viability</td>
<td>Available income per worker in relation to national legal minimum wage</td>
<td>20 maximum 30 units</td>
</tr>
<tr>
<td></td>
<td>Economic specialization rate</td>
<td>10</td>
</tr>
<tr>
<td>Independence</td>
<td>Financial autonomy</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Reliance on direct subsidies from CAP and indirect economic impact of risk and income quotas</td>
<td>10 25 units</td>
</tr>
<tr>
<td>Transferability</td>
<td>Operating capital (not taking account values of land)</td>
<td>20 20 units</td>
</tr>
<tr>
<td>Efficiency</td>
<td>Operating expenses as a proportion of production value</td>
<td>25 25 units</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

source: Zahm et al. 2006 (after Vilain 2003)
Presentation of the method

Adaptation of the method to the Mediterranean contexts

- Climatic conditions
- Roughage scarcity
- Dependence on importations
- Importance of pastoral systems
- Specific references
Small ruminant systems in Lebanon

Dairy farms in Algeria
Modifications to the original IDEA method for Algerian dairy farms:

### A5 Cropping patterns

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Villain 2003</th>
<th>Bekhouche 2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>No crop &gt; 20% of surface</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>25% -</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>30% -</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>35% -</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>40% -</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>45% -</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>50% -</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>&gt; de 50%</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>If mixed crop :</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Villain 2003</th>
<th>Bekhouche 2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>No crop &gt; 0.5 UGB/ha SFP</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>0.5 to 1.4 UGB/ha SFP</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>1.4 to 1.8 UGB/ha SFP</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>&gt; 1.8 UGB/ha SFP</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>If mean size &lt;6ha :</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

### A6 Dimension of fields

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Villain 2003</th>
<th>Bekhouche 2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>No field greater than :</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>8ha :</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>10ha :</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>12ha :</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>14ha :</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>&gt; 14ha :</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>If mean size &lt;10ha :</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

### A9 Stocking rate

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Villain 2003</th>
<th>Bekhouche 2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stocking rate</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>&lt; 0.5 UGB/ha SFP</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.5 to 1 UGB/ha SFP</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 to 1.4 UGB/ha SFP</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt; 1.4 UGB/ha SFP</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.4 to 2 UGB/ha SFP</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt; 2 UGB/ha SFP</td>
<td></td>
<td></td>
</tr>
<tr>
<td>If mean size &lt;10ha :</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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Modifications to the original IDEA method for Algerian dairy farms:

![Graph showing UGB/SFP distribution]

- > 3 UGB/ha SFP
- Moy 4.11 UGB/ha SFP
- Min 0.3 UGB/ha SFP
- Max 11.2 UGB/ha SFP
Modifications to the original IDEA method for Algerian dairy farms:

- Agro-environmental scale:
  - Cropping patterns
  - Dimension of fields
  - Stocking density
  - Animal welfare
  - Soil protection
  - Irrigation

- Socio-territorial scale:
  - Contribution to employment

- Economic scale:
  - Economic specialisation
  - Transferability

Adaptations for Lebanese small ruminants systems

142 elementary variables from 129 production systems into 41 indicators

Non computed indicators
Indicators with modified parameters

Diversity
Species organisation
Farming practices
Products quality
Employment & services
Ethics
Economy
Agro-environmental
Socio-territorial
Economical

Sustainability of the system
Adaptations for Lebanese small ruminants systems

- The scales and weighting have been changed for 36 indicators as a function of local specificities
- The computing modalities have been modified for 21 indicators
- 4 indicators have not been computed (2 for lack of data: fertilisation and stocking density, 2 for non pertinence (!?): hygiene & security, and financial autonomy)

Evaluation of the method

- Indicators criteria
  - Reflect values, future vision
  - Actionable
  - Measurable (data collected)
  - Valid (measures what it is supposed to)
  - Reliable (consistency of measures)
  - Sensitivity
  - Robustness
  - Non redundancy
Evaluation of the method: sensitivity (small ruminants in Lebanon)

Agro-Environmental scale

Socio-Territorial scale

Marie, Srour, Bekhouche: Sustainability assessment with IDEA
Evaluation of the method: sensitivity (small ruminants in Lebanon)

Economical scale

Overall sustainability (minimal value of the 3 scales)
Evaluation of the method: (small ruminants in Lebanon)

**Agro-Environmental / Socio-Territorial**

![Graph showing relationship between Agro-Environmental and Socio-Territorial sustainability](image)

**Agro-Environmental / Economic**

![Graph showing relationship between Agro-Environmental and Economic sustainability](image)
Evaluation of the method (small ruminants in Lebanon)

Sustainability in Algerian dairy farms (N. Bekhouche)
Sustainability in Algerian dairy farms (N. Bekhouche)

Typology of sustainability (small ruminants in Lebanon)

Srour 2006
Typology of sustainability (small ruminants in Lebanon)

Production system and sustainability

Srour 2006
Sustainability assessment with IDEA in Mediterranean countries:

- Small ruminants
  - Lebanon, farming system, G. Srour (2006)
  - Algeria, farming system, B. Ziki
  - Lebanon, food chain, R. El Balaa

- Cattle
  - Algeria, farming system, Mitidja, Annaba: N. Bekhouche; Setif: A. Bir; Tizi Ouzou: S. Bouzida.
  - Algeria, territory, Z. Far
  - Algeria, food chain, K. Ouakli
  - Tunisia, farming system, K. Kraiem (*this Meeting, L1.5*)

Conclusions

- Unavailability or uncertainty of some information (fertilisation, pesticide, economic, ...)
- Subjectivity of some parameters
- Unavailability of references specific to the situation
- Weighting of indicators as a function of the importance of a factor in the specific situation
Conclusions

- Focus research on sustainability indicators pertinent in semi-arid/arid conditions
- Set up a common assessment tool (for inter-systems or inter-national comparisons)
- Analysis of production systems in relation to sustainability