CLEANED: A tool for ex-ante assessment of environmental impacts of livestock production – A case study on dairy production in Tunisia

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Agenda

• The CLEANED tool
• Case of Sidi Bouzid, Tunisia
  • Baseline
  • Scenarios with best practices/ forage and feed options
• Conclusions
Comprehensive Livestock Environmental Assessment for Improved Nutrition, a Secured Environment and Sustainable Development along Livestock and Fish Value Chains

• rapid ex-ante environmental impact assessment tool
• lets users explore multiple impacts of livestock enterprises
CLEANED Systems Boundary

Whole Farm

Livestock Enterprise

- Livestock numbers
- Livestock & manure management
- Area under feeds i.e., cultivated forages, crop residues, grazing fields
- All inputs required for livestock enterprise e.g., fertilizers

https://kindling.xyz/next-systems/systems-thinking/
CLEANED Input Data Requirements

- Body weight
- Herd composition
- Litter size
- Annual growth rate
- Daily mgt
- Manure mgt

- SOC
- Bulk density
- Clay content (%)
- Eto
- Soil N
- Soil depth & type
- Annual precipitation
- Rainy season

- Crop yields
- Harvest index
- N content
- Cover factor
- Crop coefficient
- Crop areas & residue mgt
- Crop inputs

- Feed basket quality (DM, CP, ME, DE)
- Feed basket composition

### Land, soil & climate

<table>
<thead>
<tr>
<th>Annual precipitation</th>
<th>mm/yr</th>
<th>1570</th>
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<tbody>
<tr>
<td>Rainy season</td>
<td>no of months/year</td>
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<tr>
<td>Soil type</td>
<td>FAO</td>
<td>Haplic Acrisols</td>
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<tr>
<td>SoilN g/kg</td>
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<tr>
<td>SoilC g/kg</td>
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<td>Soil clay %</td>
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<td>Bulk density g/cm3</td>
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<td>Soil depth m</td>
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<tr>
<td>ETO mm/year</td>
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<tr>
<td>Climate zone</td>
<td>Tropical Moist</td>
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</tbody>
</table>

- Annual precipitation: 1570 mm/yr
- Rainy season: 6 months/year
- Soil type: Haplic Acrisols
- Soil N: 0.45 g/kg
- Soil C: 7.5 g/kg
- Soil clay: 42.70%
- Bulk density: 1.33 g/cm³
- Soil depth: 2 m
- ETO: 1460 mm/year
- Climate zone: Tropical Moist
Tunisia case

Dairy sector

- Several productivity and competitiveness challenges (strong dependence on expensive external inputs)
- Inadequate/unsustainable management of natural resources (water, soil)

Study

- Based on individual surveys, focus group discussions and soil and water quality analyses, baseline (BAU) and “best practice” (BP) scenarios were developed for each farming system.
- Assessment of the current environmental, climate and economic impacts of smallholder dairy farms in the project intervention areas
- Ex-ante impact assessment of proposed interventions (“best practices”)

Intensive dairy production systems in Tunisia depend to a large extent on off-farm (feed) resources. Therefore, the impact assessment distinguished four different “feed origins”: on-farm, off-farm roughages, off-farm concentrates and imported concentrates.

Training of partners on the CLEANED tool
Example Jendouba - Rations

Four livestock/feed-forage systems:
- Irrigated
- Rain-fed
- Landless
- Extensive

Best Practices
- Reduction of concentrates (26%)
- Increase legumes and forage cereals (89%)
Example Jendouba - Impacts
Next steps

- Assessment of other scenarios with other feeds, other livestock breeds, other management practices (crops, livestock, manure)
- Region and country-wide extrapolation of farm level results

- Currently based on Excel, developing R version (allowing integration of spatial, climate and other data, crop and feed databases, “automated” comparison of different scenarios)

For further discussion

- Suggestions for improvements
- What is needed for application on a wider scale
- Possibilities to integrate with other farm-level assessment tools
Some references

CLEANED workbook:

CLEANED: How-it works brief

Journal paper:

CLEANED website: https://alliancebioversityciat.org/tools-innovations/cleaned