



Alliance



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

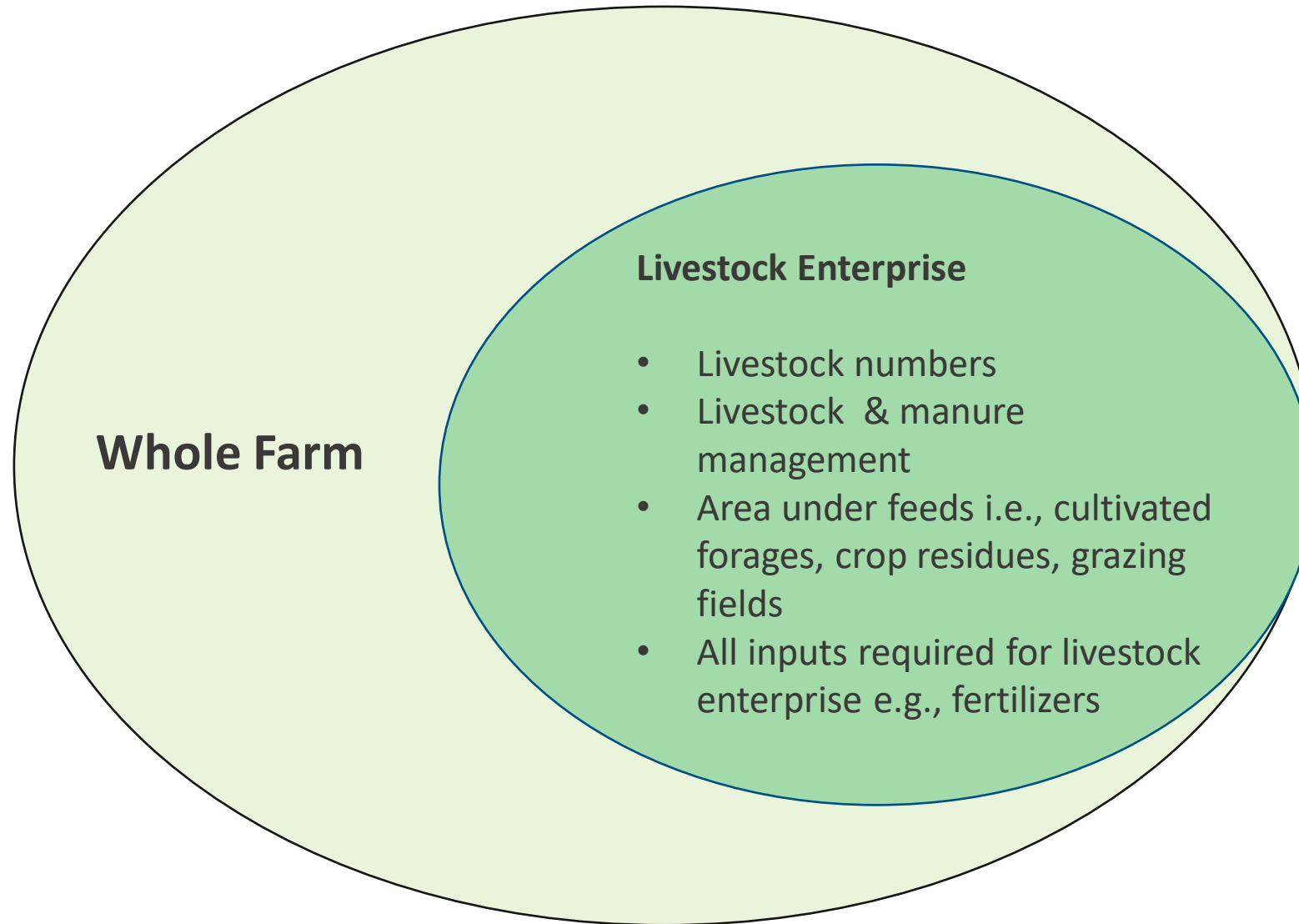
CLEANED

Comprehensive **L**ivestock **E**nvironmental
Assessment for Improved **N**utrition, a
Secured **E**nvironment and Sustainable
Development along Livestock and Fish
Value Chains

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

-  Land requirements
-  Soil Impacts
-  Water impacts
-  GHG emissions and carbon sequestration
-  Economics

CLEANED Systems Boundary



CLEANED Input Data Requirements



Land, soil & climate	Annual precipitation	mm/yr	1570
	Rainy season	no of months/year	6
	Soil type	FAO	Haplic Acrisols
	SoilN	g/kg	0.45
	SoilC	g/kg	7.5
	Soil clay	%	42.70
	Bulk density	g/cm ³	1.33
	Soil depth	m	2
ET0	mm/year	1460	
Climate zone			Tropical Moist



- 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

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

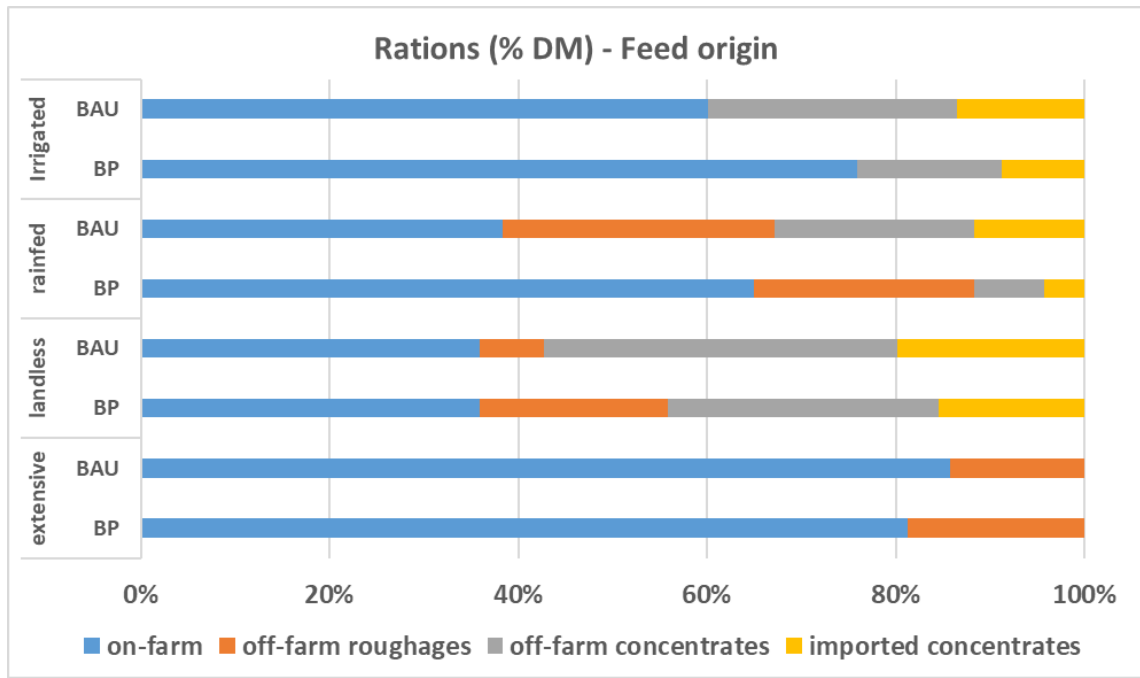
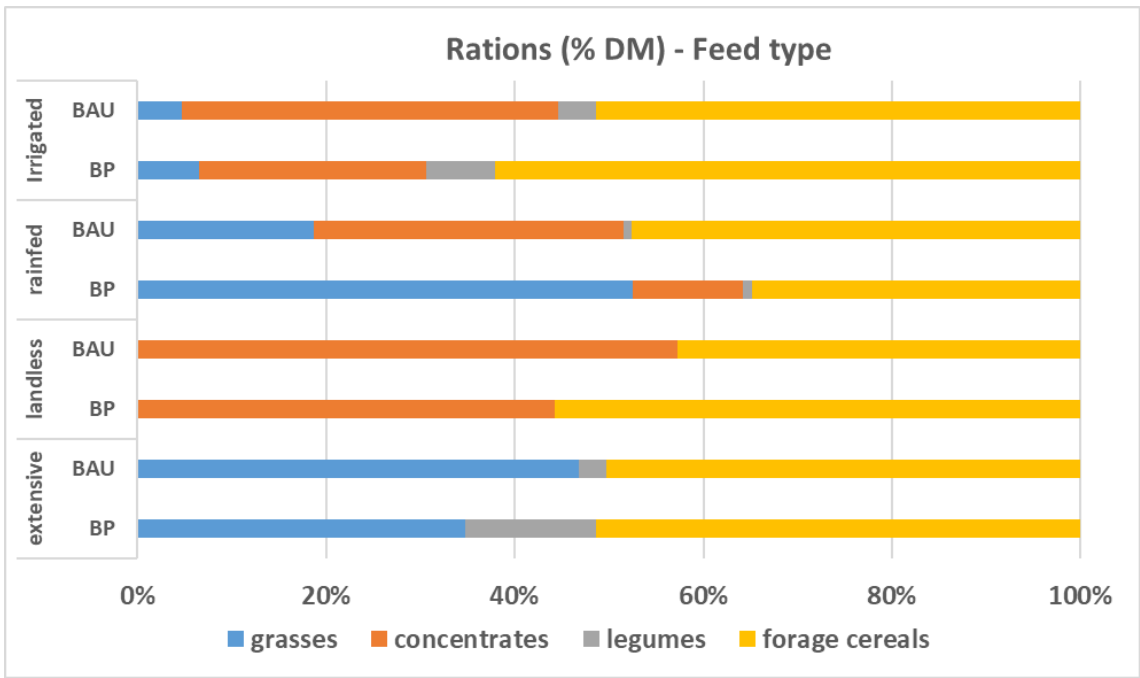
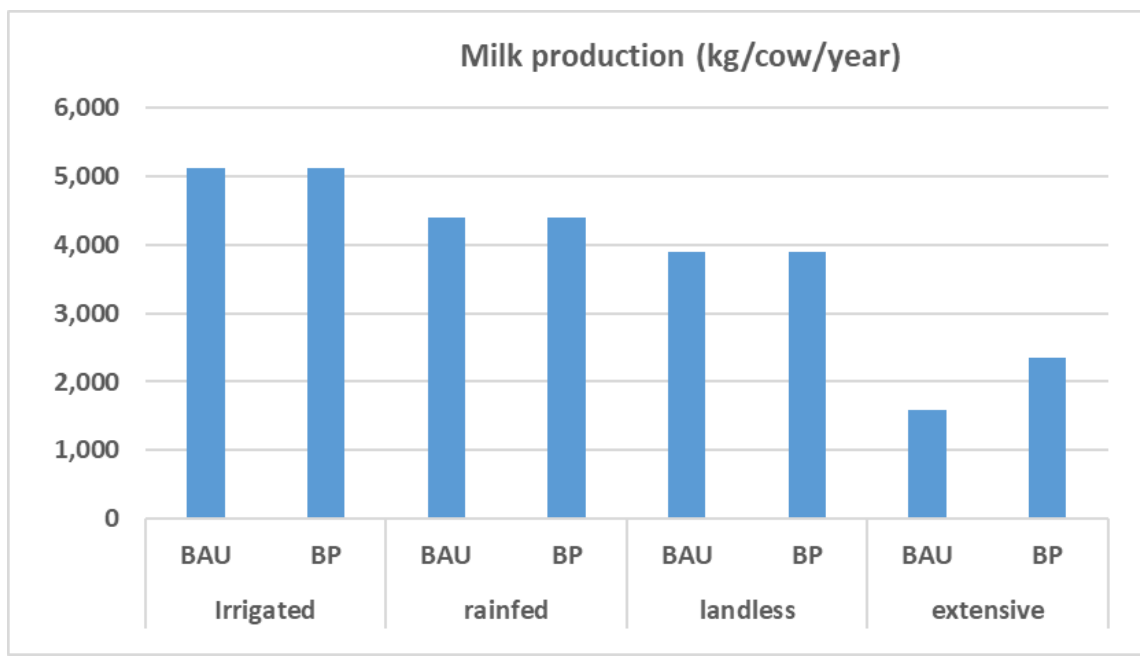
Example Jendouba - Rations

Four livestock/feed-forage systems:

- Irrigated
- Rain-fed
- Landless
- Extensive

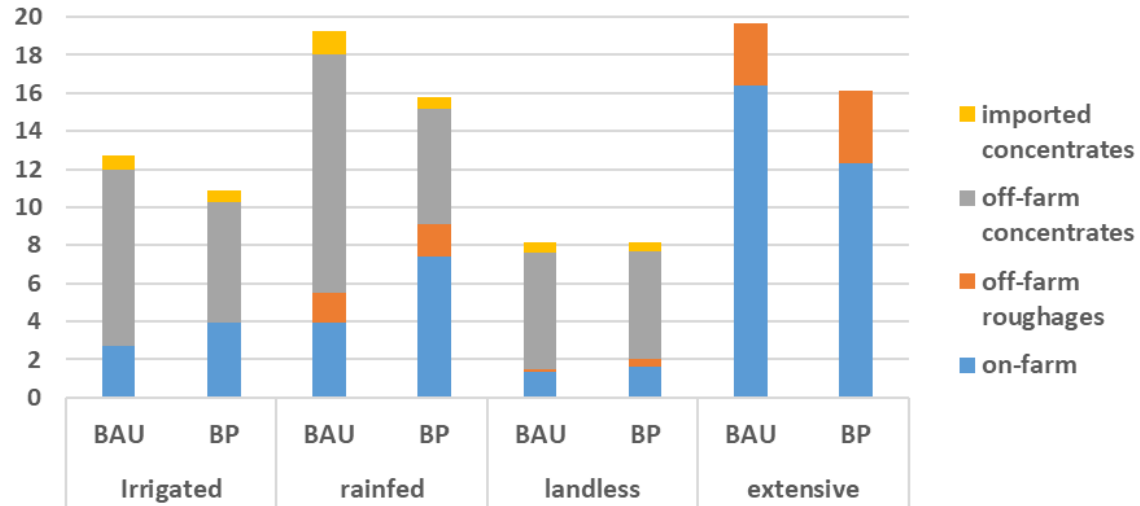
Best Practices

- Reduction of concentrates (26%)
- Increase legumes and forage cereals (89%)

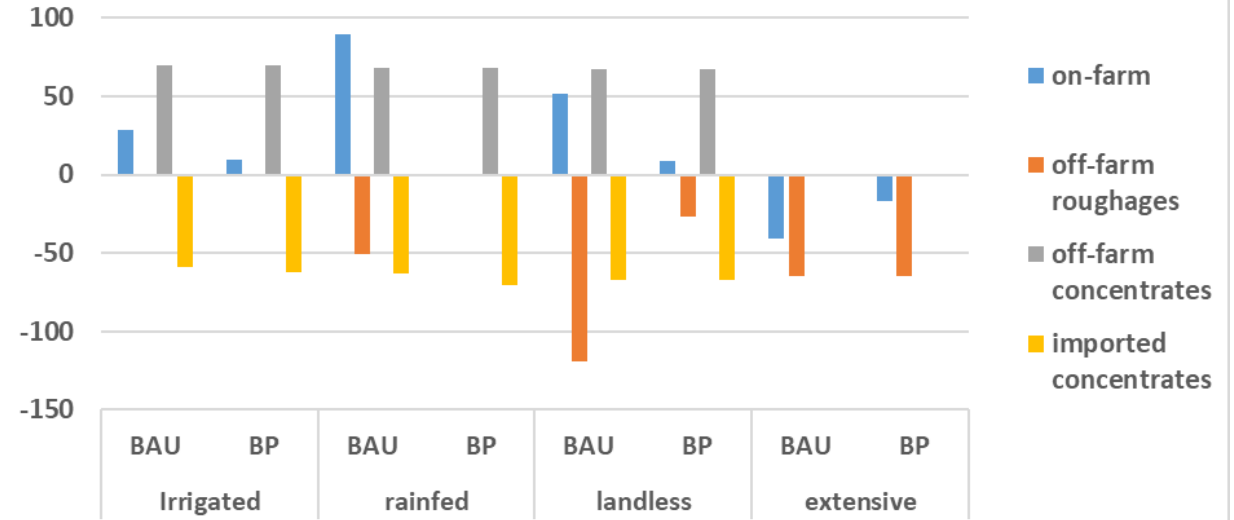


Example Jendouba - Impacts

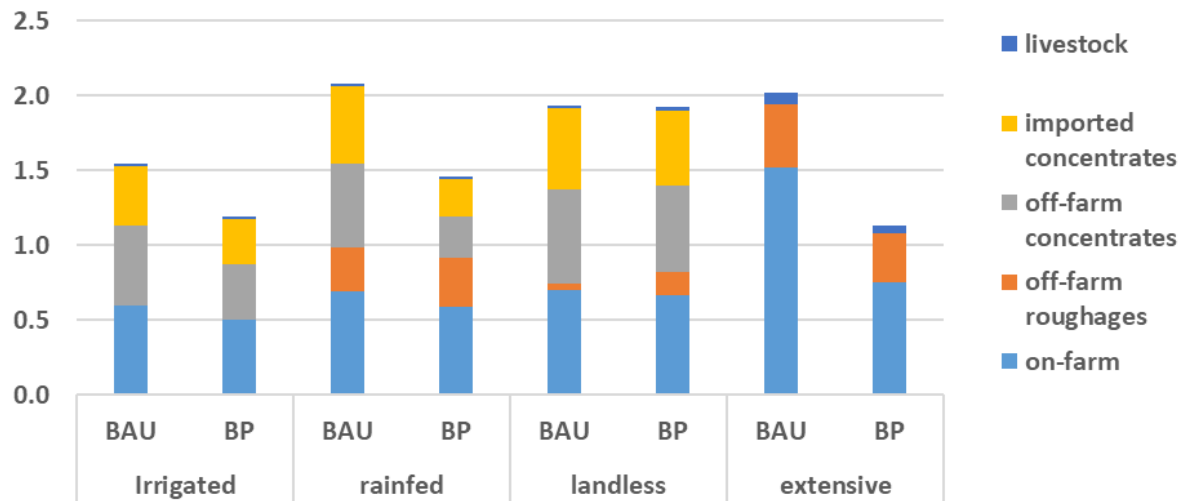
Land requirement (ha)



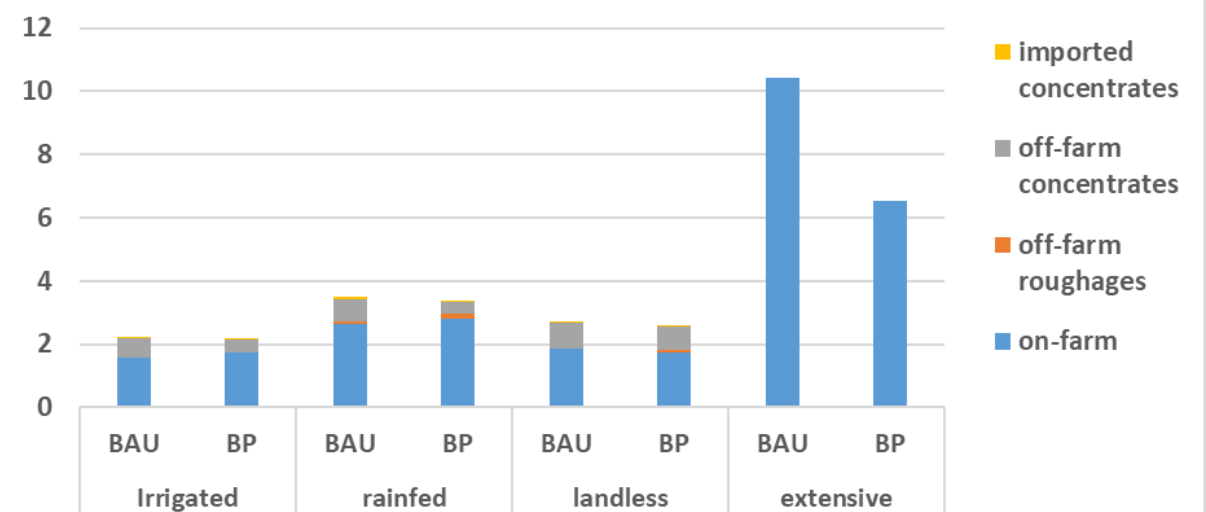
N balance (kg/ha)



Water requirement (m³/kg of milk)



GHG emissions (kg CO₂e/kg of milk)



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:

Mukiri, J.; Notenbaert, A.; Paul, B.; Mwema, E.; van der Hoek, R. (2020) CLEANED Workbook [Web site]. International Center for Tropical Agriculture (CIAT). Nairobi, Kenya. Retrieved from:

<https://cleanedtraining.netlify.app/>

CLEANED: How-it works brief

Mwema, E., Boukpepsi, G., Van der Hoek, R. and Notenbaert, A. 2021. Assessing the environmental impacts of livestock production using the CLEANED approach. How-it-Works Brief. Nairobi, Kenya:

Alliance of Bioversity International and CIAT. <https://hdl.handle.net/10568/116681>

Journal paper:

Notenbaert et al. (2020). Towards environmentally-sound intensification pathways for dairy development in the Tanga region of Tanzania. *Regional Environmental Change*.

<https://doi.org/10.1007/s10113-020-01723-5>

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