



Institut fir Biologesch Landwirtschaft
an Agrarkultur Luxemburg a.s.b.l.

ENVIRONMENTAL CHALLENGES AND CHANCES IN AGRICULTURE

Environmental Implementation Review – Luxembourg
Country Dialogue

Dr. Stéphanie Zimmer (IBLA – Institute for Organic Agriculture Luxembourg)

Luxembourg, 12th October 2017

AGRICULTURE: MAIN ENVIRONMENTAL CHALLENGES IN EIR

Biodiversity:



- 46% of the habitats' biogeographic assessments were unfavourable-bad (EU27: 30%) in 2013 and only 25% were favourable (EU27: 16%)
- 34% of the species' assessments were unfavourable-bad (EU27: 18%) and 19% were favourable (EU27: 23%)

Soil protection:



- Soil water erosion rate in 2010 of 2,09 tonnes per ha per year (EU28: 2,46t)
- No data available for indicators such as soil organic matter decline, pressures on soil biology and diffuse pollution

Air quality:



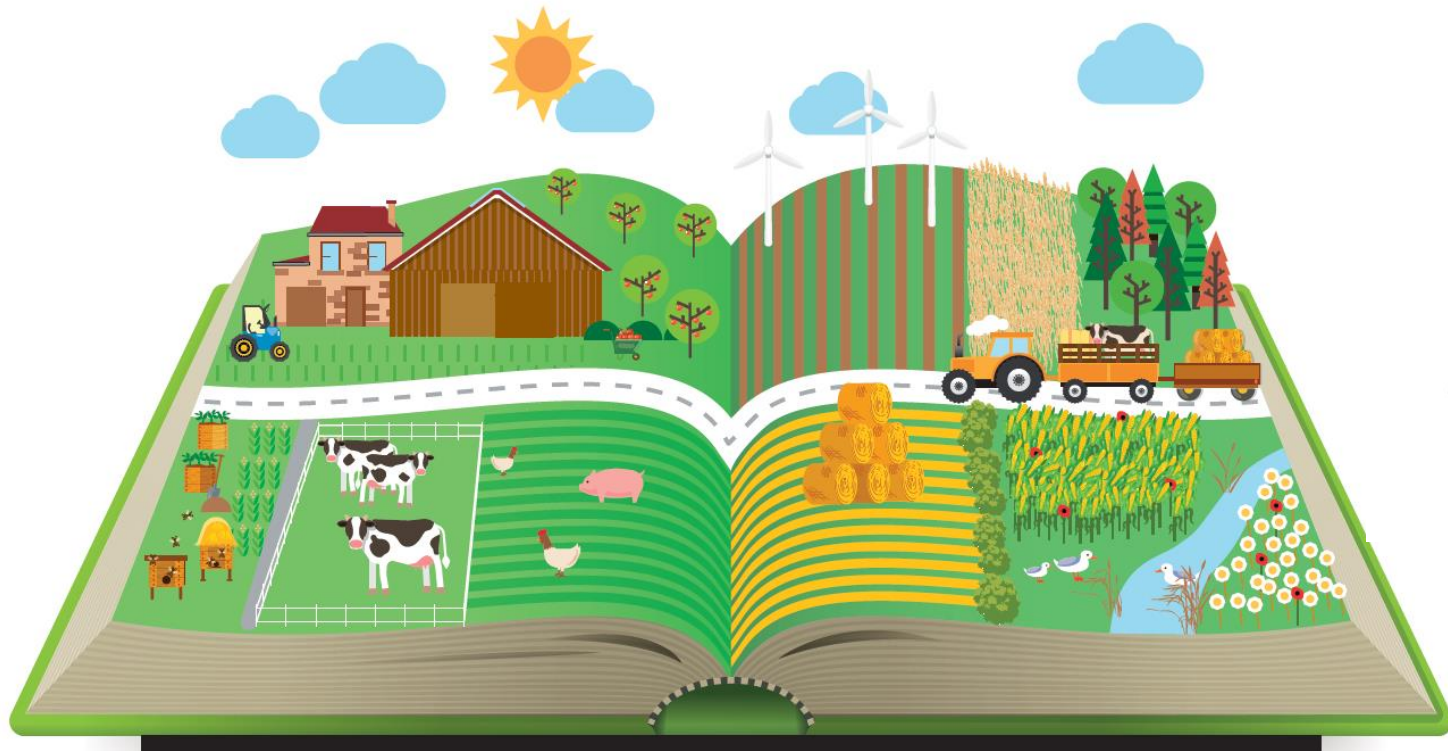
- Agriculture not mentioned in report

Water quality



- Main pressures are point sources from agriculture. Implementation of the Nitrate Directive, but pollution of nitrates is still a matter of concerns.
- Pesticide problematic not mentioned in report

CHANCE: ORGANIC FARMING



NUTRIENT EFFICIENCY: NITROGEN

Key figures	Values organic compared to conventional		
	Dairy cattle	Suckler cow	all
	%	%	%
N Input (kg N/ha)	30%	40%	34%
Purchased fertilizer	0%	0%	0%
Purchased feed	13%	20%	14%
Other type of purchase	36%	40%	37%
Nitrogen fixation	Na.	Na.	Na.
N Output (kg N/ha)	41%	63%	49%
Sale of meat	30%	63%	41%
Sale of milk	62%	Na.	62%
Sale of arable products	28%	69%	48%
Other sales	Na.	Na.	Na.
N Balance (kg N/ha)	26%	32%	28%
Yields (Eur/ha)	55%	91%	65%
Yield of beef	22%	81%	48%
Yield of milk	65%	0%	65%
Yield of arable products	119%	137%	127%
N-Efficiency	179%	225%	189%

- N- input of organic farms was 34% of N-Input of conventional farms
- N-output: Organic 49% of conventional output
- N-balance of organic farms was 28% of conventional N-balance (without N-fix)
- N-input-efficiency (gained income in Euro per unit N-Input): Organic 89 % more efficient than conventional

Schader et al., 2011

FODDER AUTARKY

Key figures	Organic farms		Conventional farms	
	Dairy cattle	Suckler cow	Dairy cattle	Suckler cow
	absolute	absolute	absolute	absolute
Protein XP				
Intake	432.2	704.1	783.3	660.2
Purchased	45.62	77.45	397.9	121
Own production	386.6	626.6	385.4	539.2
Autarky (%) ¹	94.8	89.3	52.26	79.07

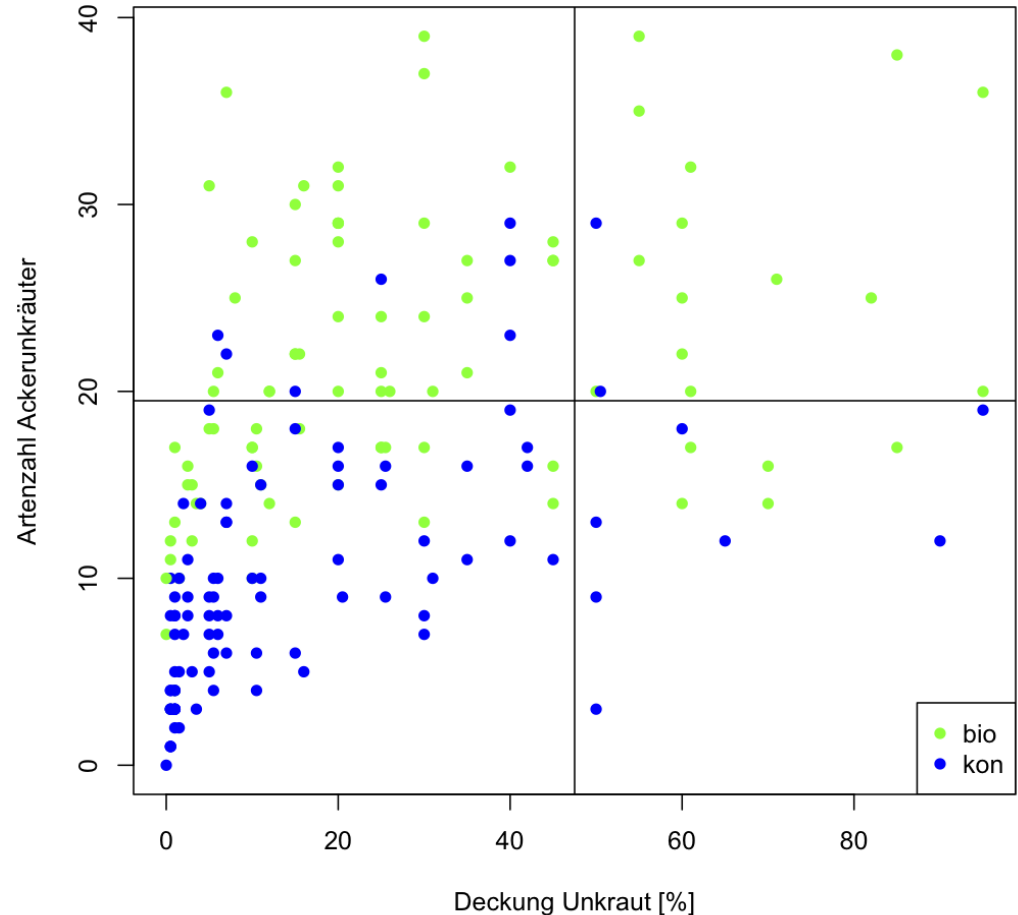
- Differences in particular for dairy cattle
- **Autarky protein: Organic 95%, Conventional 52 %**

Schader et al., 2011

BIODIVERSITY

- Organic: Already at lower coverage rate, high species numbers
- In average 17,6 species more on organic arable land
- Number of red list species on organic arable land twice as high than on conventional arable land
- Higher number of species in organic intensive grassland than in conventional
- Amount of species rich grassland twice as high for organic farms compared to conventional farms

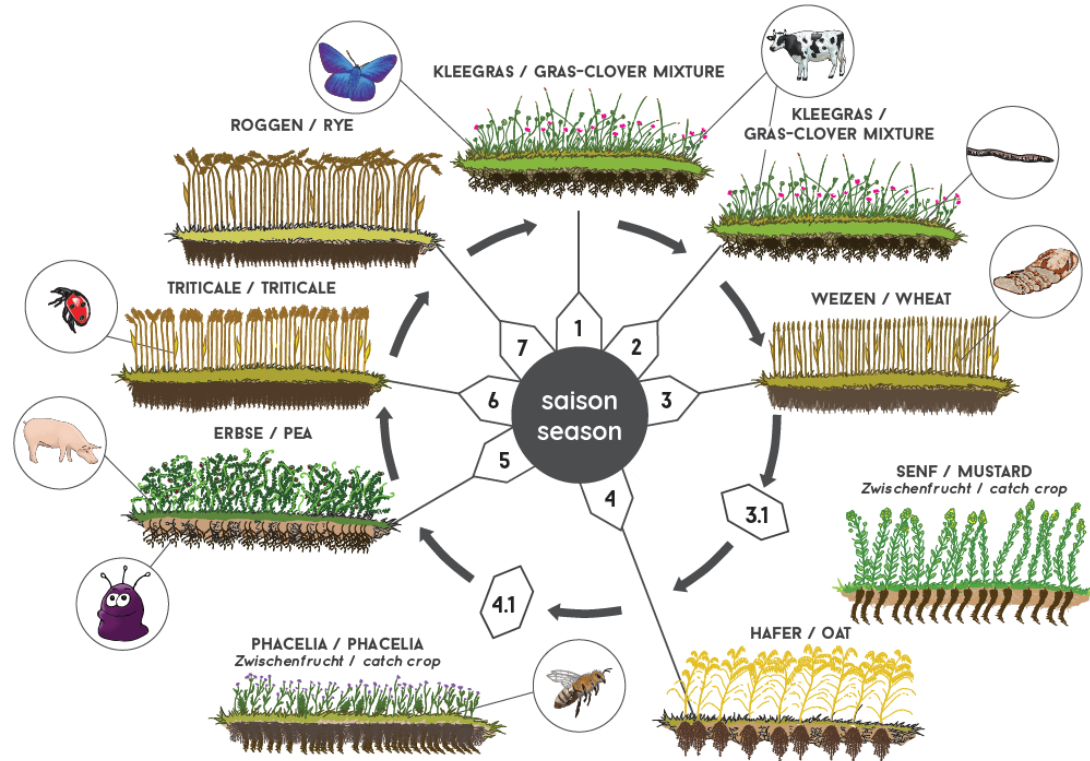
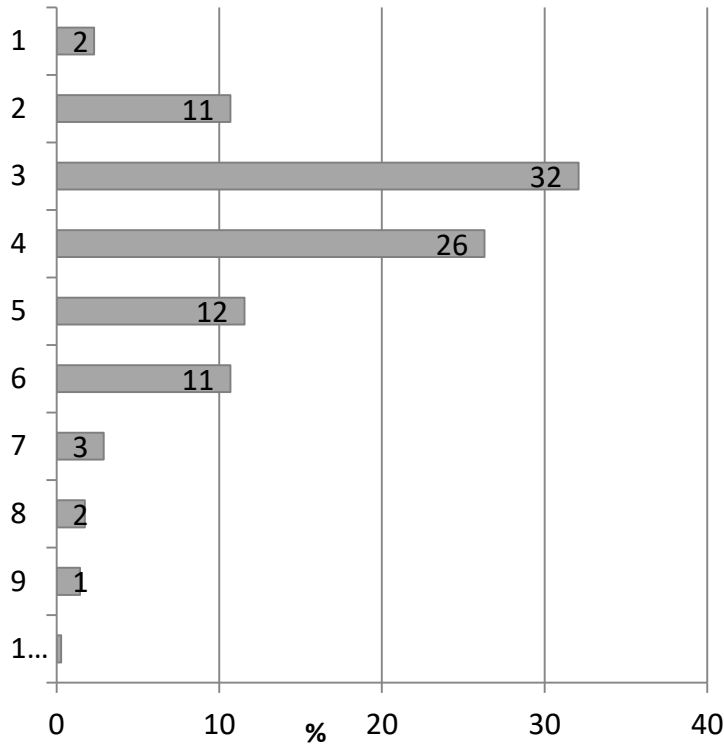
Artenzahl Ackerunkräuter / Gesamtdeckung Unkräuter



Schader et al., 2011

CROP BIODIVERSITY

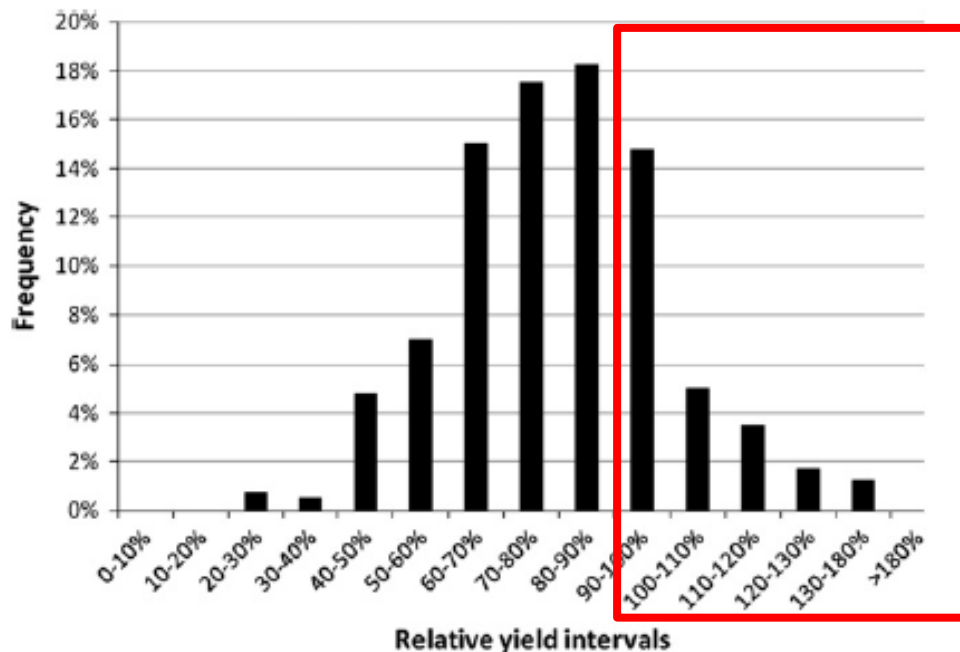
Number of crop rotation elements n=346



- Average number of crop rotation elements:
- All farms: 3,9 Elements
- Conventional farms: 3,9 Elements
- Organic farms : 5,3 Elements

Zimmer et al., 2016

PRODUCTIVITY OF ORGANIC FARMS



- Potential not fully exhausted
- Dependent of site
- Research in organic farming still very young (since 1990)

Fig. 1. Frequency of occurrence of relative yields of organic vs. conventional agriculture, grouped in 10% intervals.

	Number of studies	Relative yield of organic
All studies	362	80%
Longer converted land	66	84%
Swiss, Austria	16	88%
Developing countries	33	84%
Tropics	29	86%

De Ponti et al., 2011, Agricultural Systems
 Prof. Niggli (FiBL)

NEED OF REASEARCH



NEED OF ADVICE



Knowledge transfer from science to practice

WATER AND AGRICULTURE

Fair trading practices

Human safety & health

Responsability

Transparency

Quality of life

Farm management



Water quality

Soil quality

Air quality

Risk management

Biodiversity

Local producement

Profitability

EVERYBODY WANTS TO BE SUSTAINABLE

2012 HIGHLIGHTS Global Sustainability

Food

In France, McDonald's is the #1 restaurant where children eat fruit.



100 MILLION

In the U.S., we anticipate introducing 100 million cups of fruit into children's diets through the Happy Meal®.

95%

of McDonald's restaurants offer Happy Meals with a fruit, vegetable or low-fat or fat free dairy option.

Sourcing

100% of our coffee served in Europe, Australia and New Zealand comes from Rainforest Alliance Certified® or UTZ Certified farms.



We are founding board members of the **GLOBAL ROUNDTABLE FOR SUSTAINABLE BEEF** and also participate in sustainable beef initiatives in Australia, Brazil and the U.K.

100% of our suppliers have signed our Code of Conduct.

Planet



We are enabling improved control of heating and cooling systems, lighting and signage through **ENERGY MANAGEMENT** systems.

5.1% decrease in energy used per guest count (estimated restaurant average kWh/GC).

Community

In 2011, our local economic impacts totaled

\$2.1 BILLION

40% Increase in **LOCAL ECONOMIC INVESTMENTS** in eight of our top nine markets.

People

We strengthened alignment around the important role of our **EMPLOYEE VALUE PROPOSITION**, which emphasizes friends and family, flexibility and future.



86% of our managers feel the person they report to supports their professional development.

% Increase in number of worldwide top management team who are women.

This document includes information from 2012 Sustainability Highlights and unless otherwise noted in the Highlights, figures represent our top nine markets. Percent changes reflect progress from 2010-2011.

SAFA GUIDELINES: „WHAT IS SUSTAINABILITY?“

GOOD GOVERNANCE

CORPORATE ETHICS	Mission Statement	Due Diligence		
ACCOUNTABILITY	Holistic Audits	Responsibility	Transparency	
PARTICIPATION	Stakeholder Dialogue	Grievance Procedures	Conflict Resolution	
RULE OF LAW	Legitimacy	Remedy, Restoration & Prevention	Civic Responsibility	Resource Appropriation
HOLISTIC MANAGEMENT	Sustainability Management Plan		Full-Cost Accounting	

ENVIRONMENTAL INTEGRITY

ATMOSPHERE	Greenhouse Gases	Air Quality		
WATER	Water Withdrawal	Water Quality		
LAND	Soil Quality	Land Degradation		
BIODIVERSITY	Ecosystem Diversity	Species Diversity	Genetic Diversity	
MATERIALS & ENERGY	Material Use	Energy Use	Waste Reduction & Disposal	
ANIMAL WELFARE	Animal Health	Freedom from Stress		

ECONOMIC RESILIENCE

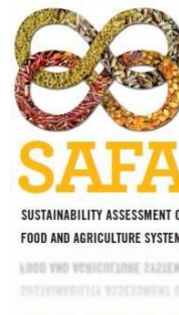
INVESTMENT	Internal Investment	Community Investment	Long-Ranging Investment	Profitability	
VULNERABILITY	Stability of Production	Stability of Supply	Stability of Market	Liquidity	Risk Management
PRODUCT QUALITY & INFORMATION	Food Safety	Food Quality	Product Information		
LOCAL ECONOMY	Value Creation	Local Procurement			

SOCIAL WELL-BEING

DECENT LIVELIHOOD	Quality of Life	Capacity Development	Fair Access to Means of Production		
FAIR TRADING PRACTICES	Responsible Buyers		Rights of Suppliers		
LABOUR RIGHTS	Employment Relations	Forced Labour	Child Labour	Freedom of Association & Right to Bargaining	
EQUITY	Non Discrimination	Gender Equality	Support to Vulnerable People		
HUMAN SAFETY & HEALTH	Workplace Safety and Health Provisions		Public Health		
CULTURAL DIVERSITY	Indigenous Knowledge		Food Sovereignty		

SAFA Guidelines:

- 4 dimensions
- 21 themes
- 58 sub-themes, each with a specific sustainability goal (“target-oriented”)



SMART: BRIDGING THE GAP



smart
sustainability monitoring
and assessment routine

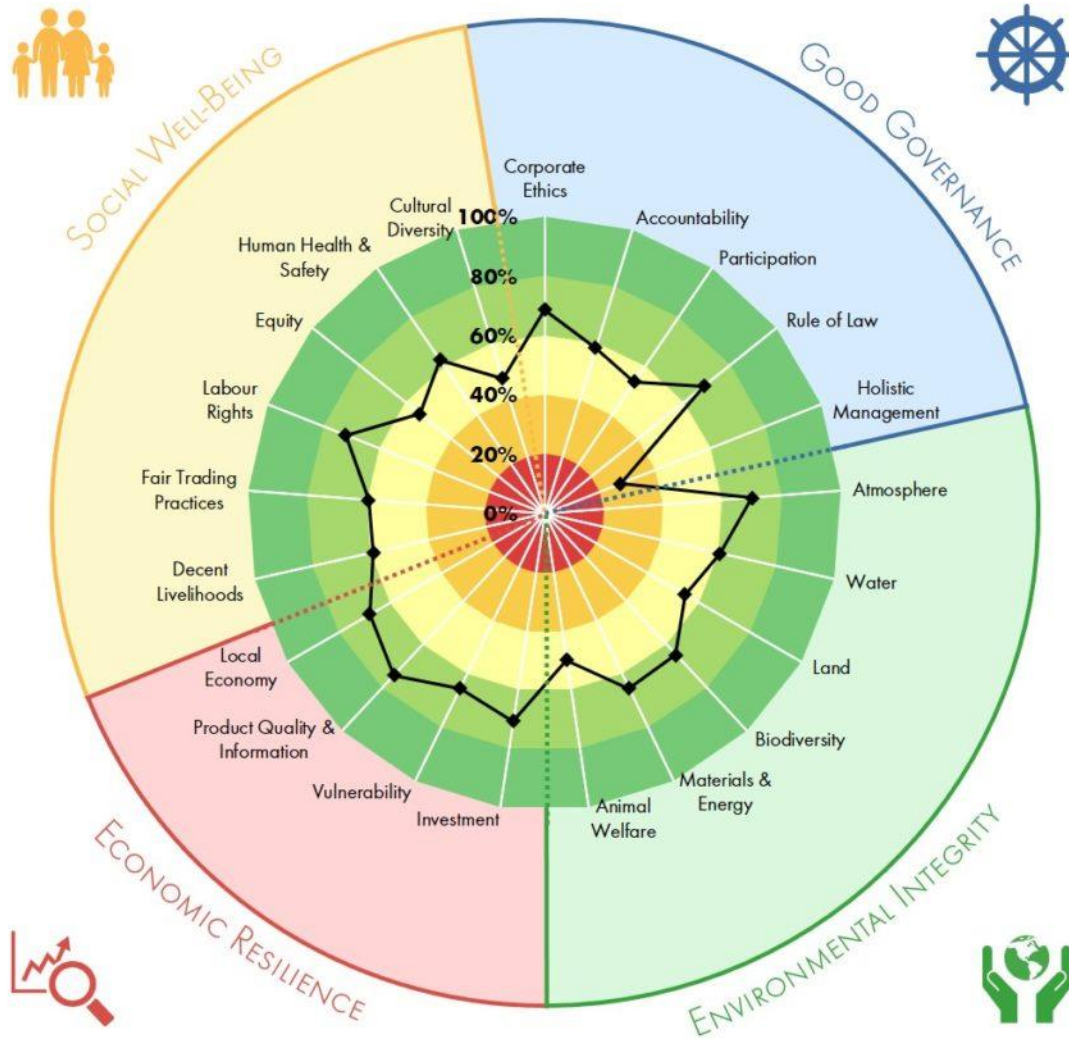
SAFA: Theory

Practice

GOOD GOVERNANCE			
COMPLIANCE ETHICS	Mission Statements	Due Diligence	
ACCOUNTABILITY	Human Rights	Responsibility	Transparency
PARTICIPATION	Stakeholder Dialogue	Grievance Procedures	Conflict Resolution
RULE OF LAW	Integrity	Remedy, Restitution & Reconciliation	Civic Responsibility
ROBUST MANAGEMENT	Sustainability Management Plan	Full Cost Accounting	
ENVIRONMENTAL INTEGRITY			
ATMOSPHERE	Overfertilisation	Air Quality	
WATER	Water Withdrawal	Water Quality	
LAND	Soil Quality	Land Degradation	
BIODIVERSITY	Ecosystem Diversity	Species Diversity	Genetic Diversity
MATERIALS & ENERGY	Mineral Use	Energy Use	Waste Reduction & Disposal
ANIMAL WELFARE	Animal Health	Freedom from Stress	
ECONOMIC RESILIENCE			
INVESTMENT	Internal Investment	Community Investment	Long-Term Investment
VULNERABILITY	Stability of Production	Stability of Supply	Stability of Market
PRODUCT QUALITY & INFORMATION	Food Safety	Food Quality	Product Information
LOCAL ECONOMY	Value Creation	Local Procurement	
SOCIAL WELL-BEING			
DECENT LIVELIHOOD	Quality of Life	Capacity Development	Fair Access to Means of Production
FAIR TRADING PRACTICES	Responsible Buyers		Rights of Suppliers
LABOUR RIGHTS	Employment Relations	Harvest Labour	Child Labour
EQUITY	Non-Discrimination	Gender Equality	Support to Vulnerable People
HUMAN SAFETY & HEALTH	Workplace Safety and Health Protection		Public Health
CULTURAL DIVERSITY	Indigenous Knowledge		Food Sovereignty



SMART: RESULTS



SMART: RESULTS

SUBTHEME: WATER QUALITY



OBJECTIVE:

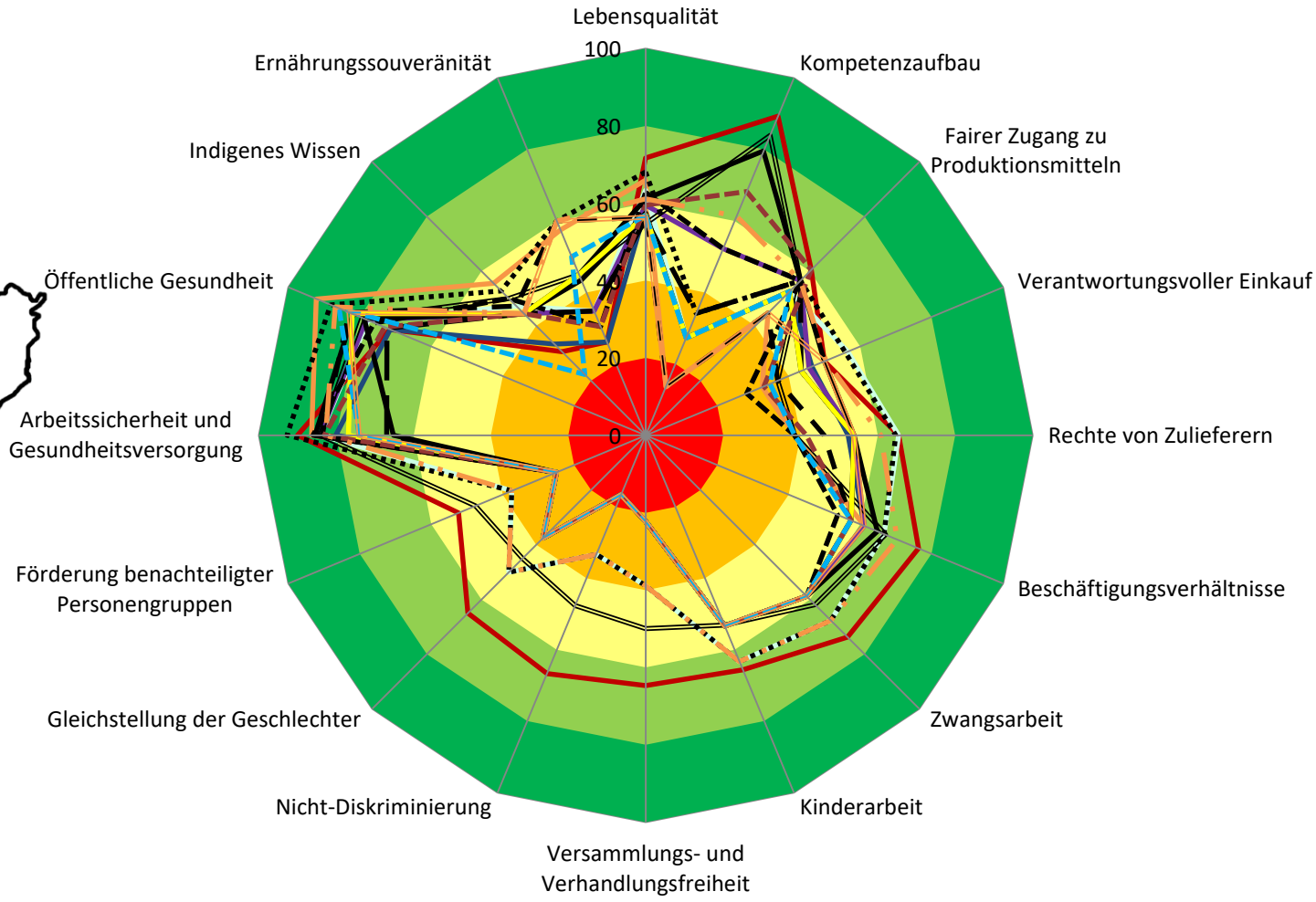
The release of water pollutants is prevented and water quality is restored.

Target achievement: 76 % of the sustainability target were achieved

<p>↑ Wastewater arising on the farm is always correctly discharged.</p>	<p>↓ The farm does not use systems which allow for precise fertilisation.</p>
<p>↑ No pesticides were used or the pesticides used are not considered to be more than slightly toxic to aquatic organisms according to the "PAN Pesticide Database".</p>	<p>↓ The farm uses mineral P-fertilisers, which do not or only partly comply with the limits of heavy metals and uranium.</p>
<p>↑ All waste materials from plant protection products and veterinary medicines are properly disposed of.</p>	<p>↓ A small part of the area of permanent grassland is under intensive management.</p>
<p>↑ No pesticides are used or the pesticides used are not considered to be very persistent in water (half-life > 60 days) according to the "PAN Pesticide Database".</p>	<p>↓ No catch crops are planted or only on an immaterial part of the arable land.</p>
<p>↑ There is no danger of direct point source emissions of nutrients and pollutants to the atmosphere and water bodies (incl. wells and drinking water sources) on the farm and its utilized areas.</p>	<p>↓ The farm rarely uses draghose or injection systems to apply slurry.</p>



ASSESSING AGRICULTURE SUSTAINABILITY OF LUXEMBOURG BY SMART



ALIGNING CONSUMER DEMANDS AND AGRICULTURAL PRODUCTION FOR SUSTAINABLE FOOD SYSTEMS



Paper FiBL: Nature communications

IBLA: Development of a research project in this field: **SustEATable**

PhD Thesis included in the project

LITERATURE

- Schader, Christian; Müller, Adrian; Zimmer, Steffi; Aendekerck, Raymond; Liroy, Rocco; Reding, Romain; Conter, Gerard; Adam, Simone; Dahlem, Richard und Moes, Georges (2011) Vergleichende ökonomisch-ökologische Analyse von biologisch und konventionell wirtschaftenden Betrieben in Luxemburg („öko-öko“). Institut für Biologische Landwirtschaft an Agrarkultur Luxemburg (IBLA), L-Munsbach und Forschungsinstitut für biologischen Landbau (FiBL), CH-Frick
- Zimmer, S., Liebe, U., Didier, J.-P., Heß, J. (2016). Luxembourgish farmers' lack of information about grain legume cultivation. *Agron. Sustain. Dev.* 36. doi:10.1007/s13593-015-0339-5

THANKS FOR YOUR ATTENTION

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