Eidgenössisches Departement für Wirtschaft, Bildung und Forschung WBF Agroscope



# Sustainability assessment test under real time condition (SustainFarm)

Andreas Roesch, Aurelia Nyfeler-Brunner, Gérard Gaillard

LCA Research Group, Agroscope, Switzerland







- ✓ Sustainable food production along the entire value chain is of great importance
- ✓ Consideration of all three pillars of sustainability: economic, ecologic and social
- √ Focus on the farm level (primary production)
- ✓ Quantitative indicators as mean of implementation
- ✓ Analysis of the entire process: from data acquisition to visualisation of the results
- ✓ Check feasibility, acceptance and expected benefits











- Sample of typical Swiss farms (arable, mountain, lowland fattening farms)
- > Two test phases (2016, 2018)





## 2 Material/Methods



non-renewable energy resources

Phosphorus & Potassium

Land use (occupation)

Water requirement (fresh water)

Greenhouse gas emissions

Eutrophication (aquatic)

Eutrophication (terrestrial)

Acidification (aquatic)

Acidification (terrestrial)

**Ecotoxicity** 

**Biodiversity** 

Soil quality

#### **Economic dimension**

Profitability: Earned income per family labour unit

Profitability: Total return on capital

Liquidity: Cashflow-turnover rate

Liquidity: Dynamic gearing ratio

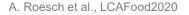
Stability: Fixed assets to total assets

Stability: Equity to fixed assets ratio

#### Social dimension

Workload in terms of time

Landscape quality: diversity and aesthetics





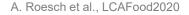
## 2 Material/Methods: Pilot farms

#### Characteristics of 12 pilot farms (test phase I, 2016):

- All numbers are mean values of the farm groups
- The chosen farm types are typical production systems for Switzerland

	Number	UAA	Arable land	Grass land	EFA	Livestock units
	#	ha	ha	ha	%	LU
Arable farms	5	34.2	30.3	5.0	18.8	5.4
Mountain farms	3	35.7	5.2	28.5	23.2	51.5
Lowland fattening farms	4	22.0	5.9	16.0	10.2	83.3

UAA=Utilised agricultural area, EFA=Ecological focus area





#### 2 Material/Methods

- Ecologic: SALCA Swiss Agriculture LCA (Gaillard and Nemecek, 2009); SimaPro Biodiversity: IP-Suisse credit point system (Jenny et al. 2013)
- ➤ Economic: Bookkeeping data (from which financial ratios have been derived)
- ➤ Social: ART Work Budget (Schick *et al.* 2007); landscape quality according to Schüpbach *et al.* (2020)





# 2 Material/Methods - Questionnaire

#### Main objective:

Determine the farmer's perception on acceptance, feasibility and benefits (informative value)

Questionnaire contains questions on

- (i) General questions on sustainability
- (ii) Information/ feedback during the entire course of the project
- (iii) Data acquisition and data amount
- (iv) Support during the project
- (v) Expected impact of the project (on future farming activities)



## 3 Results - Correlations

EDha					×	×	X	- 0.8
0.97	GWPha				×	×	×	- 0.6
0.96	0.98	LOha			×	×	×	- 0.4
0.97	0.99	0.99	Acidha		×	×	×	0.2
0.69	0.65	0.62	0.67	Eutrha		×	×	- 0
0)*(2	<b>≫</b> 4	0≫7	o <b>X</b> 3	0.78	Toxha		×	0.4
-3×4	-0×29	-0∕2€6	-0×29	-0>€5	-0.78	BD	×	0.6
-0∕€3	-0∕4	-0∕€3	-≫3	o <b>≫</b> \$	-0042	- <b>∳</b> ∕(3	BQ	0.8

EDha= Energy demand per ha, GWPha= Global warming potential per ha, LUha=Land occupation (use) per ha, Acidha=Acidification potential per ha, Eutrha= Aquatic eutrophication N per ha, Toxha=Terrestric ecotoxity potential per ha; BD= Biodiversity score, BQ=soil quality indicator



#### 4 Discussion/ Recommendation

- > Provide a discussion platform for farmers with similar agricultural activities
- Provide recommendation for actions and practical advice to achieve a more sustainable production
- Provide user-friendly data entry forms and easy available help
- Implement comprehensive plausibility checks
- > Input data: Use units the farmkeeper is familiar with
- > Analyse option for reducing the model's complexity:
  - drop some indicators (-> only when correlated)
  - use of default values (lowers site-specific statements)







- Sustainability method SALCAsustain is feasible under real time condition
- ➤ Data collection and quality control is too time-consuming
- ➤ Acceptance by farmers is given, but could be improved by different measures
- ➤ Still room for methodological improvement (e.g. human well-being, animal welfare)
- Technical implementation has to be improved -> Project SALCAFuture





























andreas.roesch@agroscope.admin.ch



**Agroscope** good food, healthy environment www.agroscope.admin.ch





















