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Towards an LCA-based environmental management of meat producing farms

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ART **Overview**

- Background
- Data and Method
- System description
- Results
- Conclusions

ART **Background**

- **In the food chain**
 - *Farming often has an important share of the environmental impacts*
 - *Governments try to limit harmful impacts through regulations and bans*
 - *The farmer carries out, he obeys the laws*
- **For a successful environmental management in agriculture**
 - *Self-responsibility of farmers needs to be enhanced*
 - *Information for the farmer is required*
 - ⇒ *Life cycle assessment as a tool for environmental management***

ART Objectives

- Assessment of the **environmental impacts** of
 - *beef and*
 - *pork producing farms in Switzerland.*
- *Product LCA of meat*

ART **Material and Methods**

- Data from project „Life cycle assessment – Farm accountancy data network“ (LCA-FADN); from 113 farms, year 2007:
 - *31 farms with beef production*
 - *17 farms with pork production*
- Limitation: Gross profit of this product group “meat”, i.e. beef production or pig fattening, accounts for at least 3% of the total farm gross profit
- Method and calculation tool
 - *SALCA (Swiss Agricultural Life Cycle Assessment) developed by the LCA research group at Agroscope Reckenholz-Taenikon ART*
- Functional unit
 - *1kg beef or pork (live weight) at the farm gate*

ART System description (for pork)

Household

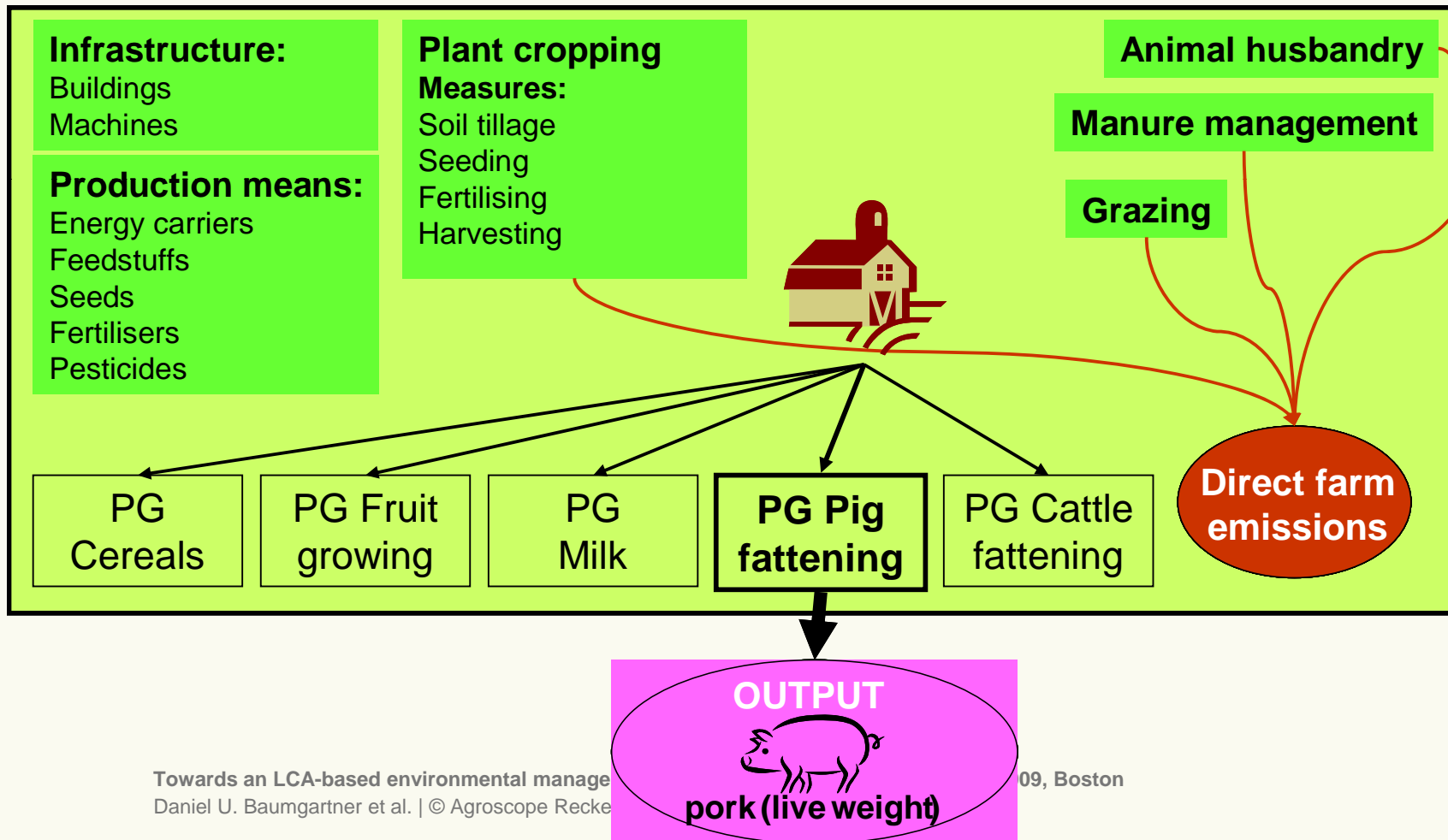
Farm shop

Agro-Tourism

Product transformation

Work for third parties

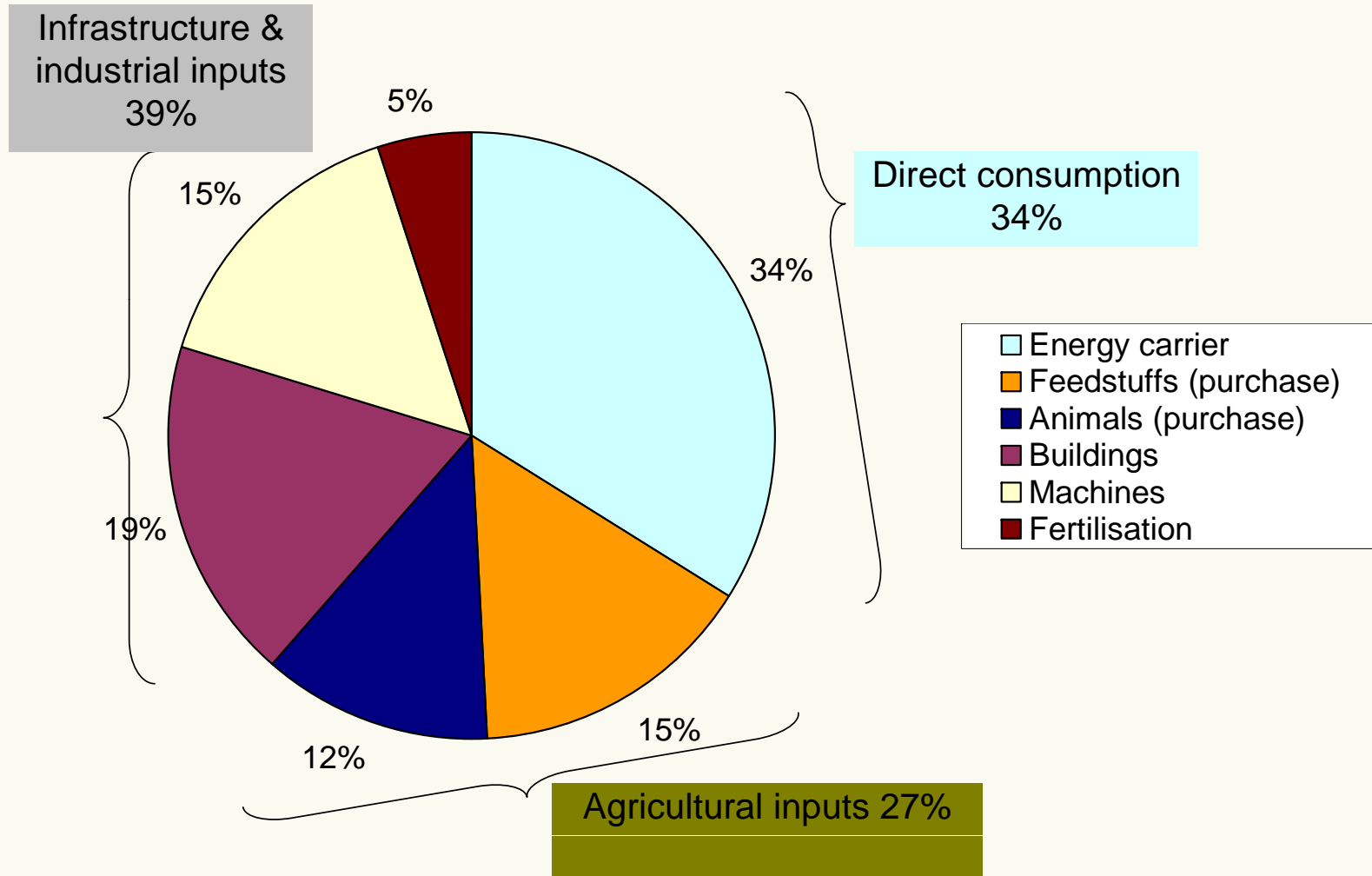
Non-agricultural activities





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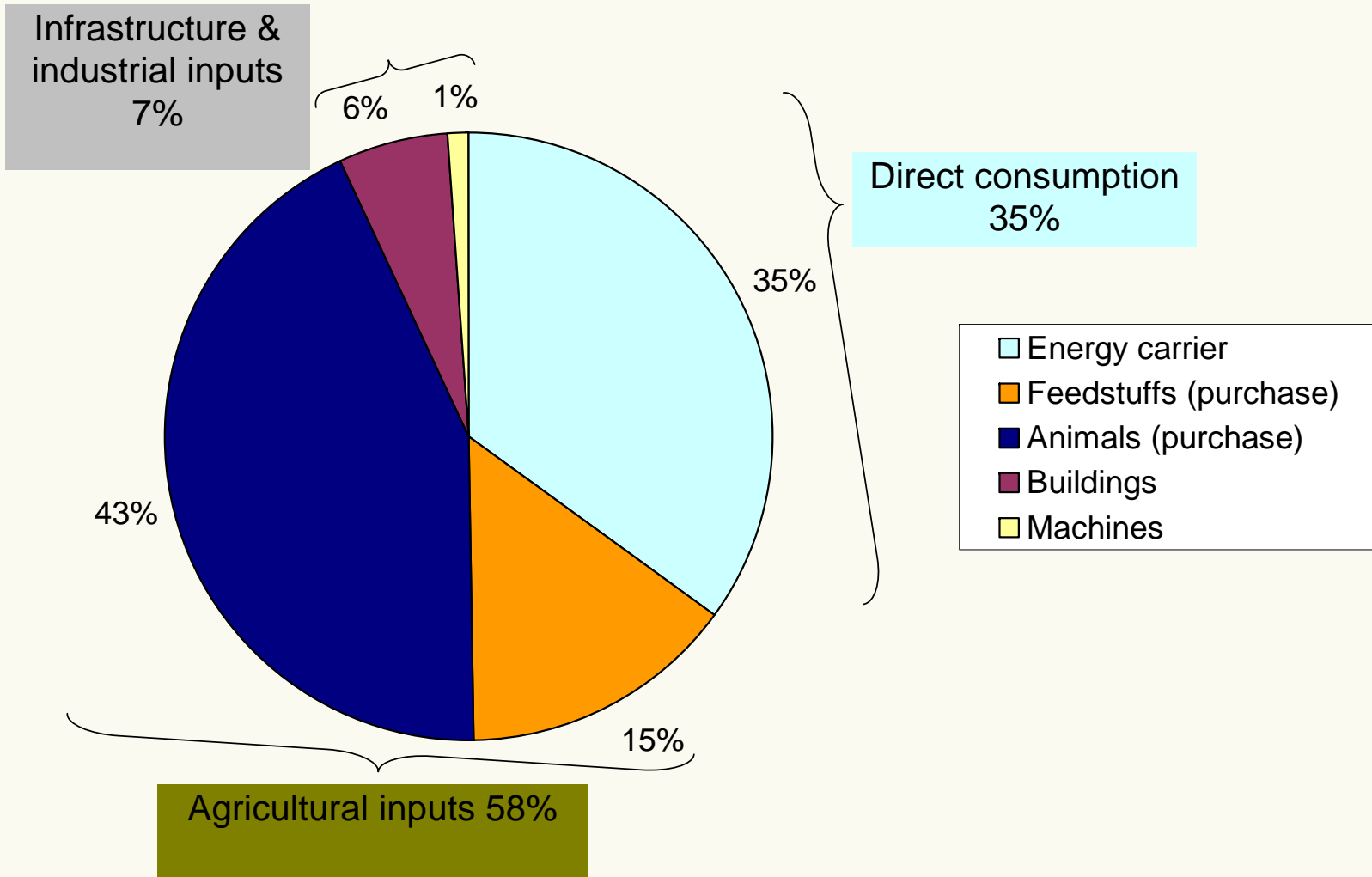
The „energy pie“: Example of beef (per kg live weight)





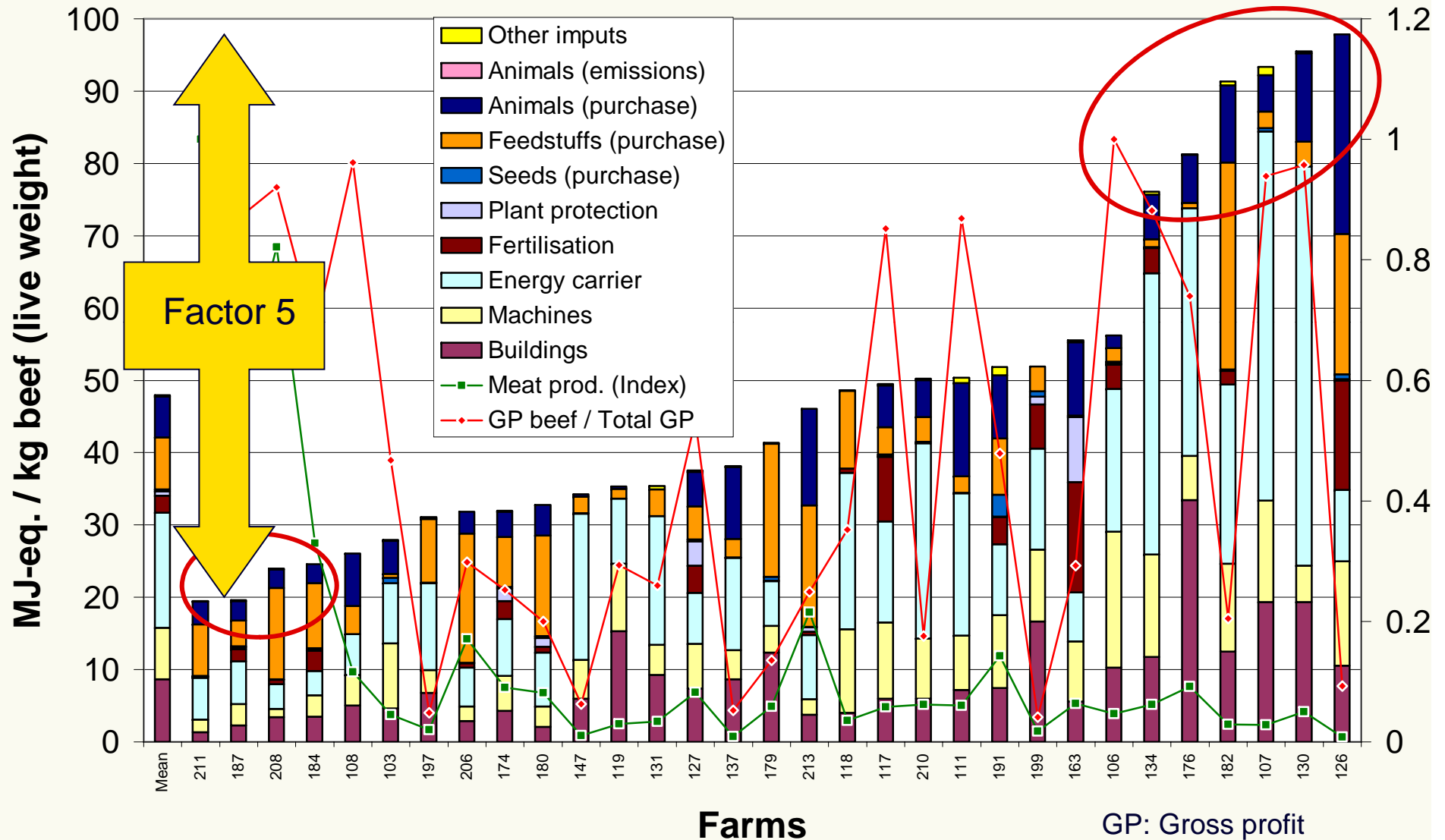
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The „energy pie“: Example of pork production (per kg live weight)





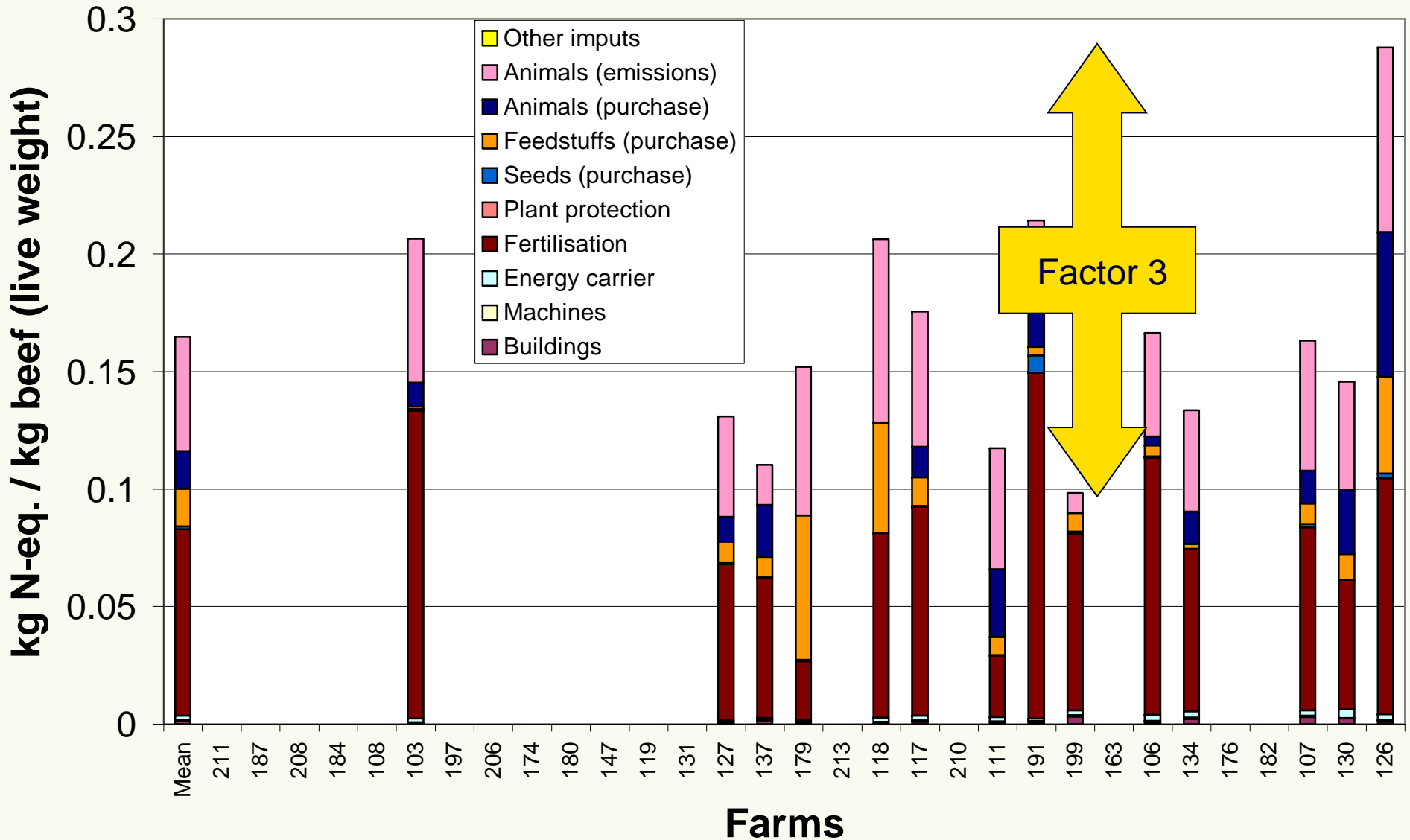
ART First results: Energy demand for beef





ART

First results: Eutrophication for beef



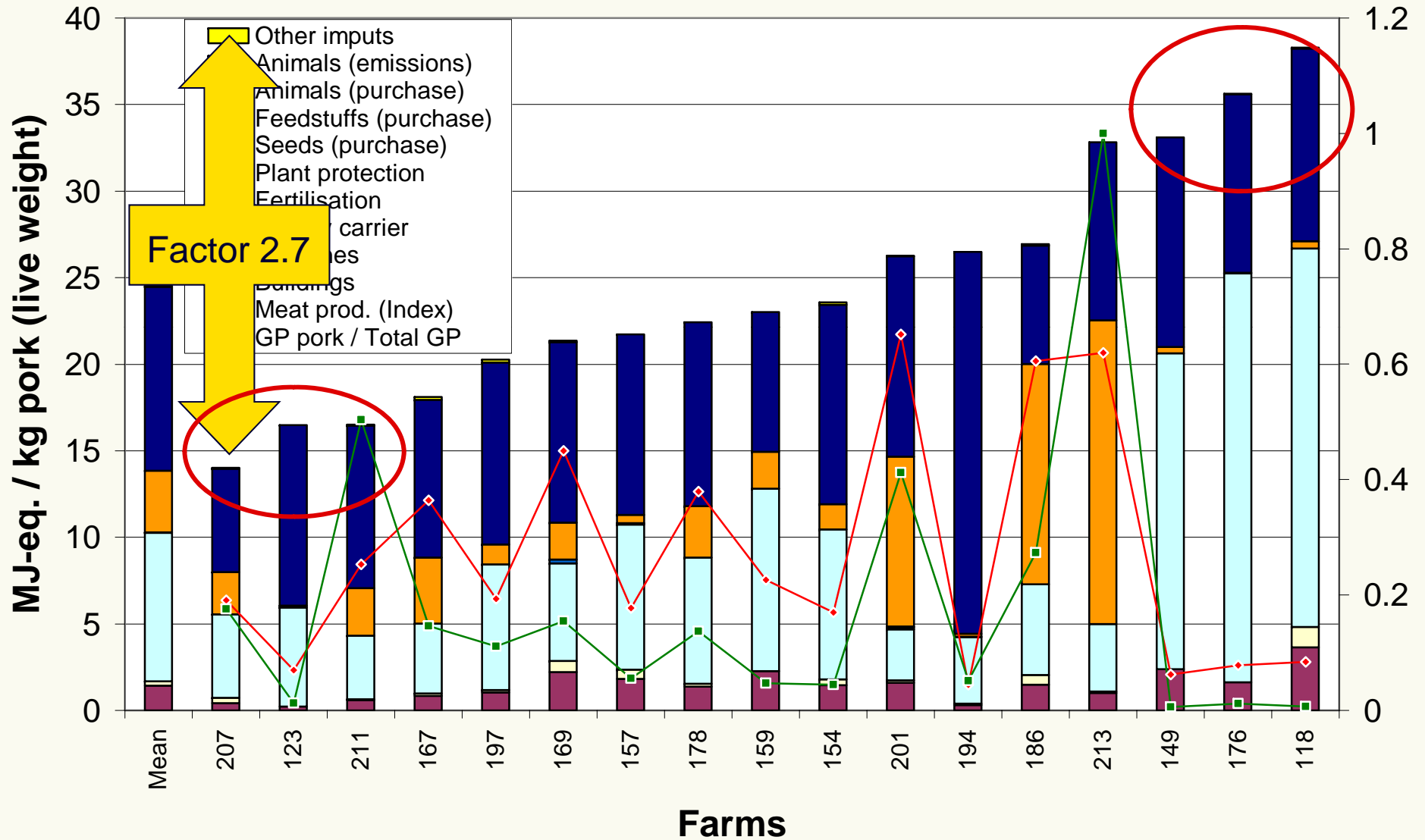
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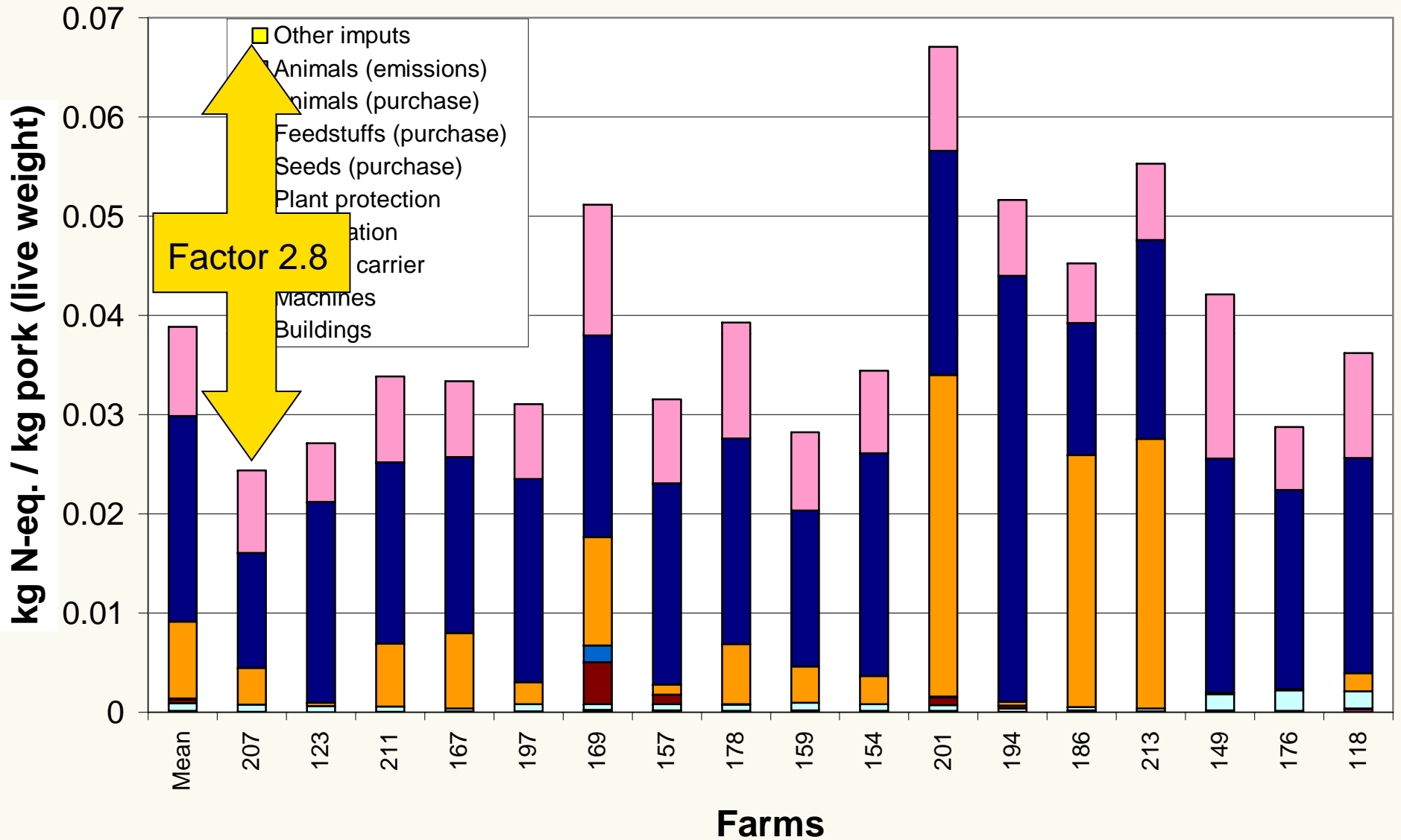
First results: Energy demand for pork





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First results: Eutrophication for pork



ART Overview of results

Beef production					
Farm	Energy	GWP	Eutroph	AET	TET
Mean	100	100	100	100	100
211	40	62	n.a.	52	160
187	40	59	n.a.	45	44
208	49	72	n.a.	63	280
184	51	70	n.a.	71	157
108	54	97	n.a.	60	154
103	58	108	125	63	15
197	64	48	n.a.	59	158
206	66	82	n.a.	73	266
174	66	82	n.a.	100	195
180	68	80	n.a.	90	420
147	71	75	n.a.	64	7
119	73	55	n.a.	83	11
131	73	50	n.a.	64	95
127	78	102	70	79	73
137	79	81	66	78	66
179	86	113	92	108	17
213	96	77	n.a.	84	97
118	101	141	125	148	112
117	103	144	106	153	49
210	104	75	n.a.	72	77
111	104	128	71	91	15
191	108	107	129	108	43
199	108	81	59	121	31
163	115	137	n.a.	139	26
106	117	125	100	106	14
134	158	136	80	113	34
176	169	98	n.a.	141	23
182	190	104	n.a.	140	165
107	194	141	98	116	26
130	199	144	88	128	27
126	204	212	174	275	228

Pig fattening					
Farm	Energy	GWP	Eutroph	AET	TET
Mean	100	100	100	100	100
207	57	60	62	64	83
123	67	67	69	77	16
211	67	76	87	78	103
167	73	82	85	80	216
197	82	80	79	80	53
169	87	104	131	96	99
157	88	82	81	78	21
178	91	95	101	91	138
159	93	85	72	84	81
154	96	92	88	96	66
201	107	128	172	139	24
194	107	116	132	121	22
186	109	121	116	116	529
213	133	149	142	124	200
149	134	124	108	122	15
176	145	108	73	120	11
118	156	123	93	125	15

Legend:

	very favourable
	favourable
	similar
	unfavourable
	very unfavourable
	n.a.

Energy	Energy demand
GWP	Global warming potential
Eutroph	Eutrophication
AET	Aquatic ecotoxicity
TET	Terrestrial ecotoxicity

ART Preliminary conclusions (1)

- **Environmental impact** per kg meat is **for beef** between **2 and 4 times greater** than **for pork**, due to
 - *Greater need of space, slower growth, lower feed conversion rate, higher methane emissions.*
 - *Variability within the impact categories of beef production is greater than for pig fattening because differences in production are much larger:*
 - Cattle fattening includes **all production types** from intensive (in barn, with concentrated feeds) and low input (suckler cows feeding on marginal land).
 - Pig fattening is a **more standardised** production system, relying on purchase of piglets and use of concentrated feedstuffs (own and purchased)
- The most important input groups, i.e. **hot spots** of each impact category **can be identified**
 - *Main **starting points** for improved environmental management*

ART **Preliminary conclusions (2)**

- Direct consumption on farm accounts for about 1/3 of total energy demand
→ *Considering the **upstream chains** (agricultural and industrial inputs including infrastructure) of meat producing farms in a life cycle approach is crucial.*
- Great variability between the farms
→ *There is **optimisation potential***
- Reasons for high environmental impacts vary according to the assessed environmental impact and depending on the farm
→ *Identifying **improvement measures** requires a life cycle management and consulting of farms on a **individual level***
- It is possible to obtain low impacts in all impact categories
→ *farm manager has **scope of action** for his environmental management*



Thank you for your attention!

Acknowledgements:

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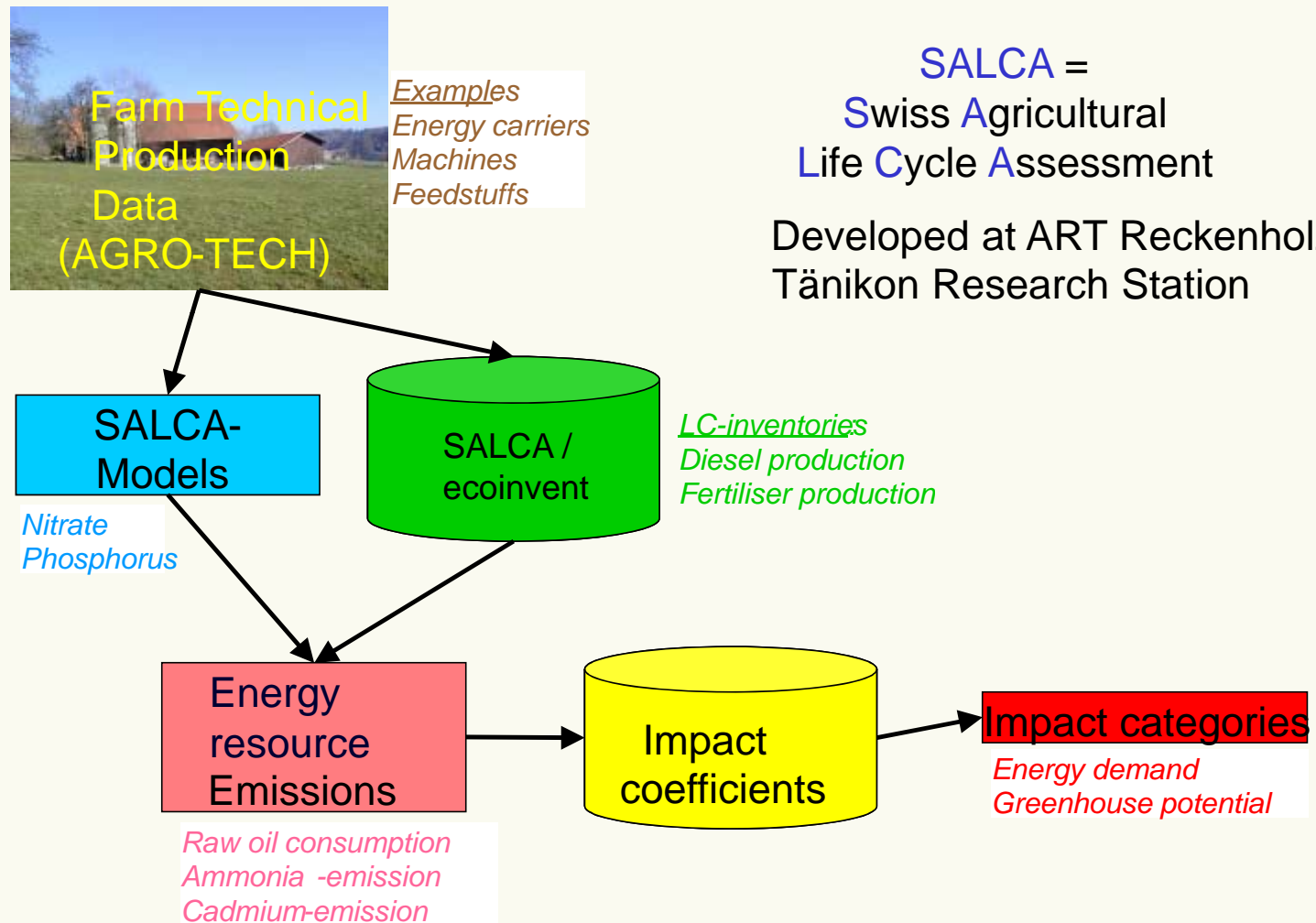
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ART Project LCA-FADN (1)

LCA of a farm according to SALCA



SALCA =
Swiss Agricultural
Life Cycle Assessment

Developed at ART Reckenholz-
Tänikon Research Station