

Nordic workshop on product environmental footprint (PEF) of meat and milk - Beef production (red meat PEFCR)

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Outline – Data requirements for beef production at farm

1. Most relevant impact categories
2. Most relevant life cycle stages
3. Data quality requirements
4. Visualization of the effect of critical parameters to key impact categories
5. Data and model availability in Finland

1. Most relevant impact categories identified in PEF pilot screening study for red meat (Nov 2015)

Based on ILCD and ReCiPe methods

- **Climate change**
- **Marine eutrophication** (nitrate at feed production)
- **Terrestrial eutrophication** (ammonia at housing and feed production)
- **Acidification** or particulate matter (ammonia at housing and feed production)
- **Land use**

1. Selected impact categories for communication in red meat PEFCR (version 1.4)

Based on reliability and relevance (by technical secretariat)

Table 4-2: Currently selected impact categories for communication.

Impact category	Main contributing elementary flows
Terrestrial eutrophication	Ammonia at farm and cultivation > 90% rest is energy related
Acidification	Ammonia at animal farm and cultivation >80 %, rest is energy use related NO _x , Sox
Climate Change	CH ₄ , CO ₂ from LUC, N ₂ O, fossil carbon related emissions

- No additional guidance on how to report effects on biodiversity as in dairy PCR

2. Most relevant life cycle stages of beef production of which good quality data is needed

According to PEF screening study on red meat (Nov 2015) (and supported by other scientific work)

1. **Feed production**

- Suckler cow and fattening system
- Incl. grazing

2. **Digestion of feed** (methane) for climate impact category

3. **Housing** (ammonia) for particulate matter, acidification and terrestrial eutrophication (due to ammonia)

4. **Use phase** due to electricity production

3. Estimating data quality according to PEF average of 6 areas, score 1 to 5

$$DQR = \frac{TeR + GR + TiR + C + P + M}{6}$$

- TeR: Technological representativeness
- GR: Geographical representativeness
- TiR: Time – related representativeness
- C: Completeness
- P: Precision/uncertainty
- M: Methodological appropriateness and consistency

3. Data quality requirements in red meat PEFPCR (Version 1.4) – most high requirements highlighted

Table 5-1: Overview of what data shall be used, and related sections in this PEFPCR. The DQR applies irrespective of the access to primary data.

	Process	Access to primary data	No access to primary data	Data quality rating (DQR)
Processes completely or partially run by PEF operator	1. Slaughtering, cutting and packing	→ <i>section 5.3.1</i>	No PEF possible	DQR < 1.6
	2. Inbound transport to slaughterhouse	Primary data on fuel use or on transport means and distance → <i>section 5.3.4</i>	Declare and justify estimate of transport distance and connect to secondary data. → <i>section 5.3.4</i>	DQR < 3
	3. Outbound transport from slaughterhouse to retail	Primary data on fuel use or on transport means and distance → <i>section 5.3.5</i>	Declare and justify estimate of transport distance and connect to secondary data → <i>section 5.3.5</i>	DQR < 3
Processes not run by PEF operator but relevant for results	4. Animal farming	Supplier specific data derived according to the requirements in this PEFPCR → <i>section 5.4</i>	Apply secondary data according to decision tree → <i>section 5.4</i>	DQR < 1,6
	5. Feed	Supplier specific data derived according to the requirements in this PEFPCR → <i>section 5.4</i>	Secondary data based on national statistics → <i>section 5.4</i>	DQR < 3

3. Data quality requirements for feed in red meat PEFCR (Version 1.4) (minimum score allowed <3)

Table 5-16: DQR feed

Quality level	Quality rating	Accuracy Feed Composition AFC
Very good	1	All feed ingredients use data points, all nutritional analysis data points,
Good	2	Feed ingredients up to 95% of composition (assumed to be representing 100% composition) ; all nutritional analysis data points,
Fair	3	Feed ingredients up to 95% of composition; nutritional analysis data for N and C
Poor	4	Feed ingredients up to 75% of composition; nutritional analysis data for N
Very poor	5	Feed ingredients up to 50% of composition; no nutritional analysis data (defaults are used for all)

3. Data requirements of animal farming in red meat PEFCR (Version 1.4): Requirement on mass balances

Table 5-10: Mass balances to be calculated.

	Intake	Retention				Excretion
	Input of all Feed	Output of all Living animals	Output of all dead animals	Output of animal products (wool/milk)	Stock changes (0 in a steady state)	Manure
Mass weight as is	Always	always	always	always	always	always
Mass <u>dm</u>	Always	always	always	always	always	always
N	Always	always	always	always	always	always
P, Zn, Cu	If manure application and/or grazing in system boundaries	If manure application and/or grazing in system boundaries	If manure application and/or grazing in system boundaries	If manure application and/or grazing in system boundaries	If manure application and/or grazing in system boundaries	If manure application and/or grazing in system boundaries

3. Data quality requirements for animal farm in red meat PEFCR (Version 1.4) (minimum <1.6)

Table 5-17: DQR animal farm. NO PEF = No PEF study is possible with this DQR score

Quality level	Quality rating	C	TiR	P	TeR	GR
Very good	1	All data points as mentioned in sections 5.4.2.3 to 5.4.2.7 are included	Data ³ cover exactly the time period in the scope of the study	≤ 10%	The technology(ies) is/are specific for the farm(s) in scope and all data points are calculated for this technology	The data cover the specific region(s) of production in scope of study on the basis of weighted share
Good	2	All data points necessary to calculate N, P, C, Zn and Copper related emissions are included but no energy and materials use data	Data partially cover the time period in the scope of the study	10% to 20%	The technology(ies) is/are specific for the farm(s) in scope and but some minor flows are based on average data	The data cover the specific region(s) of production in scope of study but unweighted
Fair	3	All data points necessary to calculate N, C, related emissions are included but no energy and materials use data	Data are not older than 2 years with respect to the time period in the scope of the study	20% to 30%	Modelled farming technologies are similar to the farms under study	The data partially cover the region of production
Poor	4	NO PEF possible	Data are not older than 4 years with respect to the time period in the scope of the study	30% to 50%	NO PEF	NO PEF

5.4.2.3 Mass and N, P balance of animals at farm (intake, retention and excretion)

5.4.2.7 Allocation

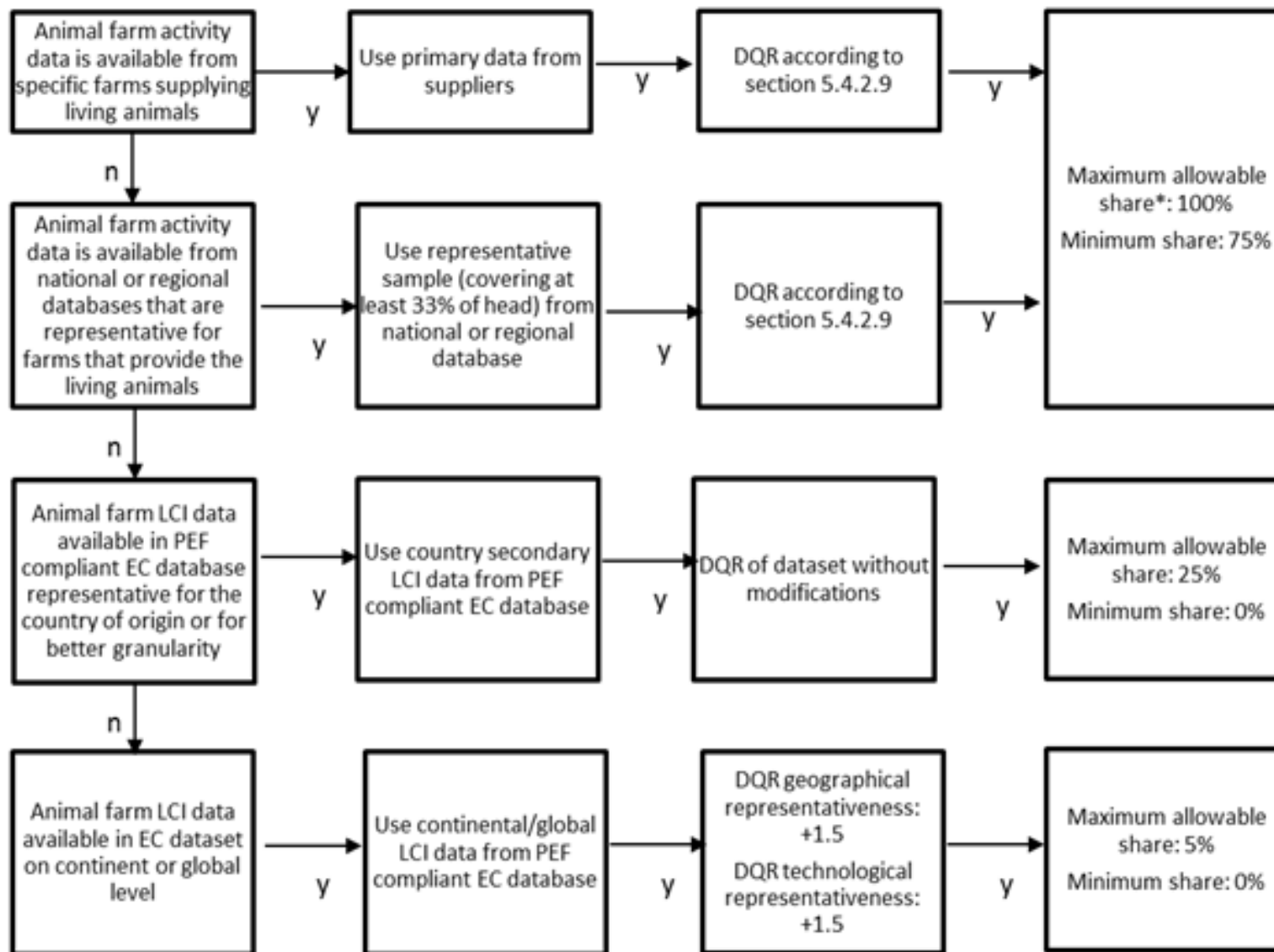


Figure 5-1: Data to be used and maximum share of allowable data per source. *the shares refer to the share of environmental impacts due to emissions on the farm.

Notes to figure 5-1 of previous slide (from red meat PEFCR (Version 1.4))

- A national or regional database is considered representative if the data is based on at least 33% of overall head in the region or country
- The maximum allowable share of a data source shall be determined on the basis of the relative contribution to the overall impact of the animals during animal farming
 - When sourcing from multiple countries
 - When assessing impacts of breeding or fattening systems
 - Etc.
- Global or EU average datasets may only be used to fill minor data gaps and should not drive more than 5% of the animal farming impacts.

Data quality achieved in pilot screening study on beef

Table 5-6: Summary of the data quality assessment (DQA) per EF impact category.

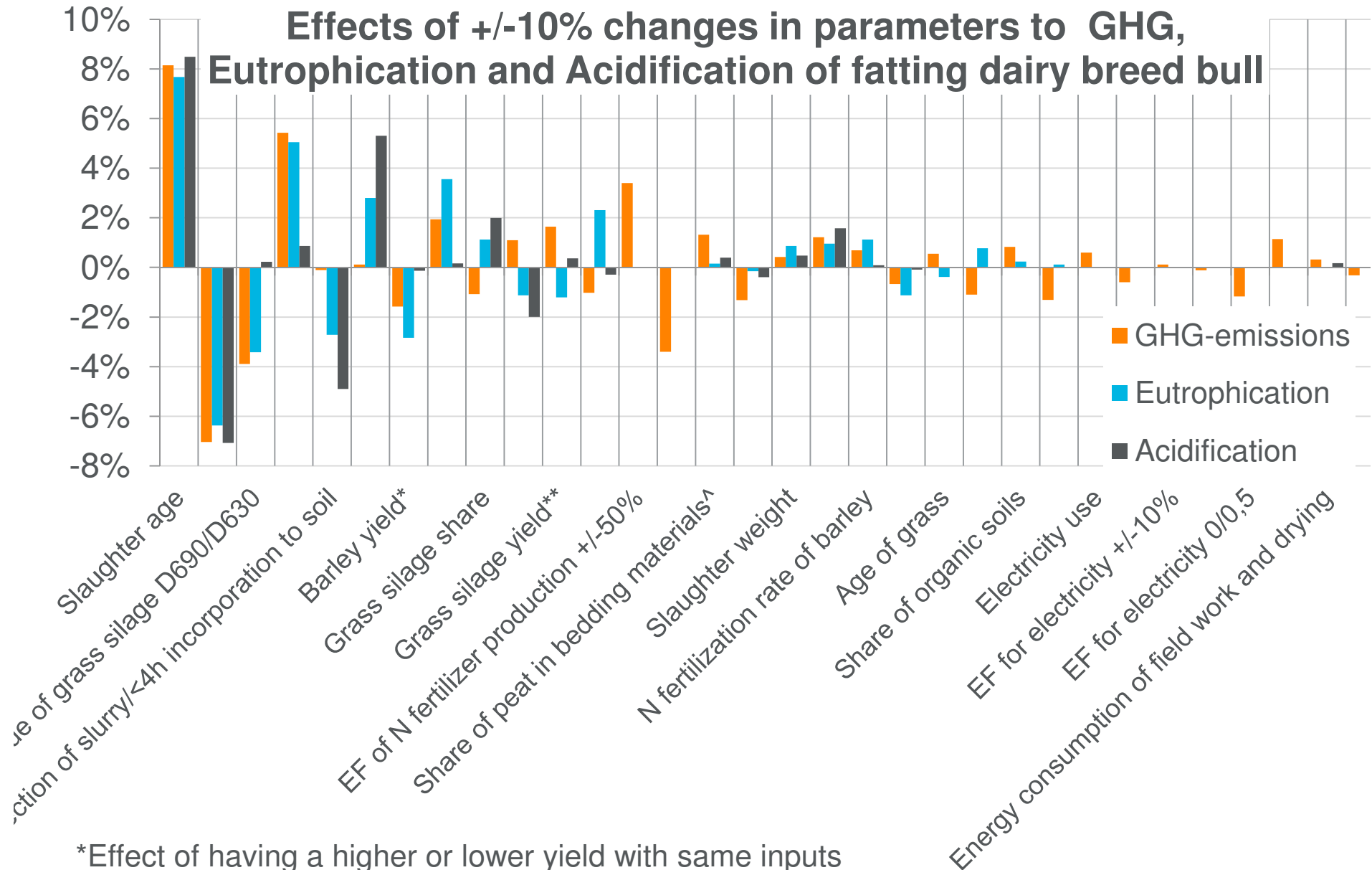
Flow	Contribution	DQI	Score
Total DQI Climate change	90.09	2.46	Good
Total DQI Ozone depletion	90.7	1.91	Very good
Total DQI Human toxicity, cancer effects	93.88	2.41	Good
Total DQI Human toxicity, non-cancer effects	91.09	2.26	Good
Total DQI Particulate matter	90.61	2.33	Good
Total DQI Ionizing radiation HH	93.54	1.75	Very good
Total DQI Photochemical ozone formation	90.52	2.37	Good
Total DQI Acidification	90.29	2.35	Good
Total DQI Terrestrial eutrophication	91.31	2.35	Good
Total DQI Freshwater eutrophication	94.58	2.34	Good
Total DQI Marine eutrophication	90.24	2.27	Good
Total DQI Freshwater ecotoxicity	93.93	2.24	Good
Total DQI Land use	90.55	2.28	Good
Total DQI Water resource depletion	91.77	2.75	Good
Total DQI Mineral, fossil & ren resource depletion	90.72	3.11	Fair

4. Effect of changes in critical parameters of the most relevant life cycle stages

Assessment of the following critical parameters in primary production of beef affecting the most relevant life cycle stages

- Slaughter age and –weight fattening animals and suckler cow
 1. In feed production:
 - Feed conversion rate
 - Amounts of feeds
 - Yield and rate of fertilization
 - Manure spreading
 2. In digestion of feed (methane):
 - Amounts of feeds
 - Digestibility of feeds
 3. In housing (ammonia):
 - Type of manure storage

Effects of +/-10% changes in parameters to GHG, Eutrophication and Acidification of fattening dairy breed bull

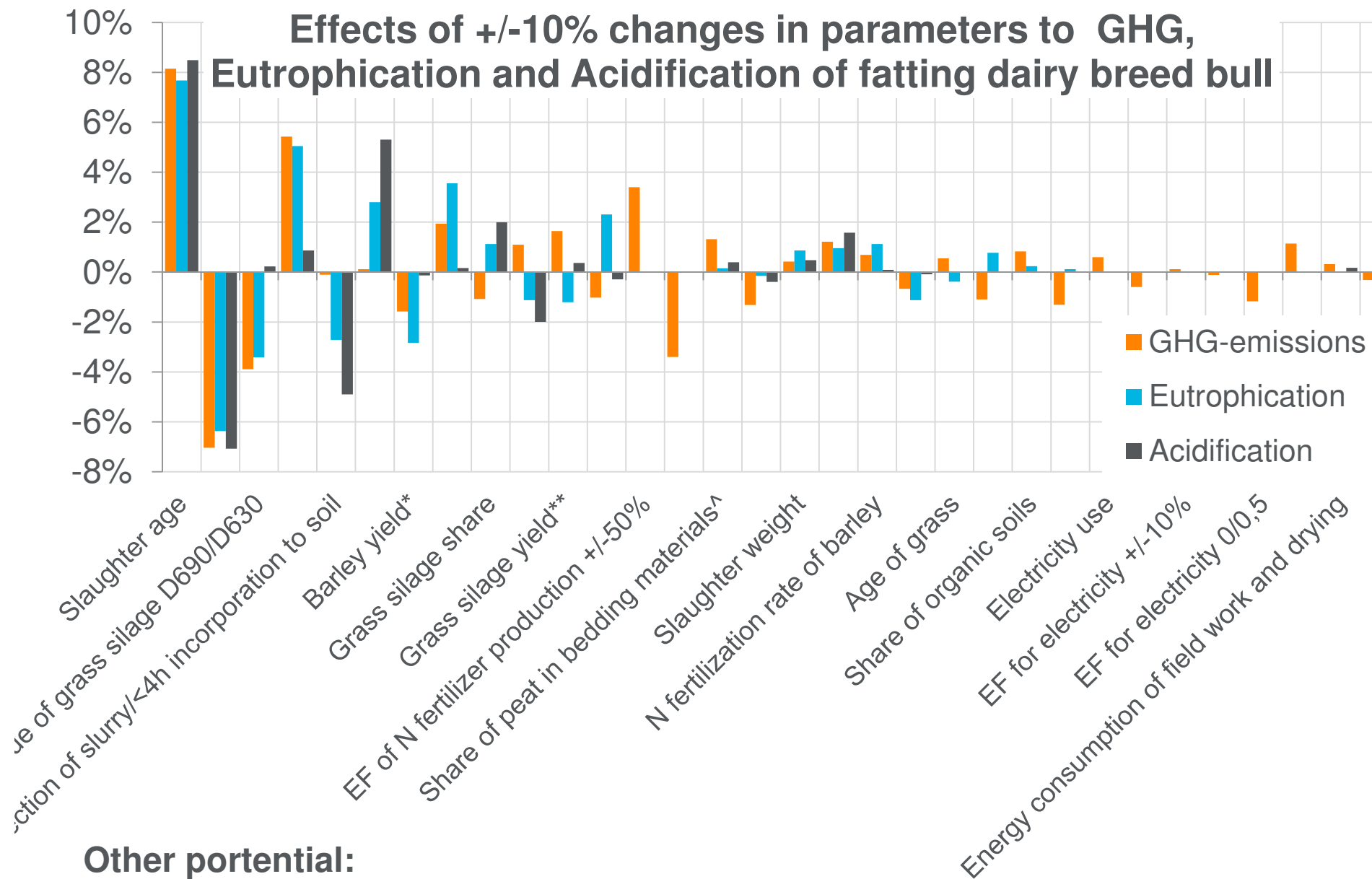


*Effect of having a higher or lower yield with same inputs

**Effect of having a higher or lower yield taking into account needed additional inputs

^ Beef breed bull with solid storage

Effects of +/-10% changes in parameters to GHG, Eutrophication and Acidification of fattening dairy breed bull



Other portential:

- Parameters affecting allocation: no. of calvings, slaughter age of cows
- Stocking rate

Data availability - in Finland

- Slaughter age and –weight
 - Beef breed bulls and heifers by breed available
- Feed production
 - Extension service database: for research purposes only?
 - National statistics on yields
 - Fertilization rates: no data, max allowed rates?
 - Energy consumption at field work: defaults from national research institutes available
- Feed characteristics
 - Defaults available at Finnish database (values acquired by Luke research, no data from Finnish farms)
- Energy use at farm: not available
- Bedding materials: not available
- Fertilizer production: Yara Finland guarantee for N fertilizer production

Availability of specific emission models - in Finland

- NIR report (national monitoring): most models and parameters available
- NIR and NH₃ specific nutrient excretion models: not available
- NH₃ models: not all available

Thank you!

