Harmonization of methods behind environmental footprint of feed- a report from a Nordic workshop

AUTHORS

Hanne Møller, Troels Kristensen, Sanna Hietala, Anna Woodhouse and Jennifer Davis

YEAR

2021

List of Contents

1. Introduction

In the Nordic countries, there is an ongoing work to standardize and harmonize the carbon footprint and product environmental footprint (PEF) calculation methods for raw feed materials and compound feeds. Individual initiatives have been taken in the Nordic countries and there is the development of the Product Environmental Footprint (PEF) methodology by the EU commission, which aims to harmonize the methodology to calculate carbon footprint of products and services. Based on the general guidelines has the PEFCR" Feed for food producing animals" been developed (https://ec.europa.eu/environment/eussd/smgp/pdf/PEFCR_feed.pdf) and a database is now under implementation through The Global Feed LCA Institute (https://globalfeedlca.org/about-gfli/about-the-gfli/). The PEFCR gives information on compound feed in the context of PEF studies of animal products but is not intended to be used for comparison between producers, only either between alternatives (e.g., feed ingredient, sourcing,) or over time (e.g., trend monitoring).

This report is written by the NordPEF group, which are agricultural LCA scientist working in a Nordic project to support implementation of Product Environmental Footprint (PEF) in agricultural sector in the Nordics. The group consist of Anna Woodhouse, RISE (Sweden); Sanna Hietala, LUKE (Finland); Troels Kristensen, Aarhus University (Denmark) and Hanne Møller, NORSUS (Norway). The work is funded by the Nordic Council of Ministries and national ministries (MMM/FI) and environmental protection agencies (EPA/SWE) via the Nordic Environmental Footprint (NEF) group.

A previous report from the NordPEF group wrote about the complexity in general when collecting data from primary production (Hermansen et al., 2017) and the aim of this workshop was to look more specifically into the area of feed, harmonization of methods and stage of implementation in the Nordic countries.

2. The workshop - presentations

On the 25th of November 2020, the online workshop took place with approximately 50 attendees from the Nordic feed industry and other stakeholders, see appendix for participating companies. After a short introduction by Anna Woodhouse, NordPEF coordinator, Claus Saabye from DAKOFO, and present acting secretary for FEFAC, talked about the status on implementing the PEFCR "Feed for food producing animals" through the development of the GFLI database. The database has free access to PEF standardized measure of emissions from feed production divided into 14 different emission categories for more than 1200 key feed ingredients. At present it is not possible to access background data and the data is verified by a "technical group", but there is no third-party verification.

Margareth Opheim from the Norwegian feed company, Felleskjøpet Norway, presented the climate smart calculator for livestock production that is the national tool for calculating the carbon footprint used by farmers and consultants in Norway. Margareth presented the type of data used in the tool. For feed production, primary data is used for home produced feed and secondary data from GFLI, for purchased feed. There is a wish to harmonise the assessment within the industry and on a national level as well as on a Nordic and EU level. Access to updated secondary data is important, hence maintenance of databases is important.

Nikolaj Ingemann Nielsen at SEGES - Denmark - shared how they use carbon footprint of feed in support tools and advisory services for dairy farmers. In the feed ration program NORFOR, carbon footprints for all common roughage, grain and concentrates used in Denmark are included, based on the work by Mogensen et al (2018). National statistics data for crop production in Denmark has been

used to calculate the carbon footprint for feed ready to be fed at the farm, based on the methods in PEF, but with some deviations. At present LUC is not included and soil carbon sequestration is reported separately. In future, the plan is to have tools with farm specific data for home produced feed, and to get data for purchased feed from general databases through the suppliers.

Martin Laurentz from Lantmannen – Sweden – informed that carbon footprints for compound feed have been available from Lantmannen since 2010. The learning has been that there is a need for Swedish feed production data, and more farm specific data including environmental footprints that takes farm mitigation initiatives into consideration. A set of climate data on specific Swedish/local feed ingredients is therefore expected to be introduced by all companies in Sweden by 1. January 2021 together with a new carbon footprint tool.

3. Discussion

The NordPEF group invited the Nordic feed industry to the workshop in order to strengthen a Nordic dialog in relation to initiatives within use of climate documentation of feed and clarify if we can achieve harmonization by use of Product Environmental Footprint Category Rules (PEFCR) standards for feed. Among the participants, there was a general agreement of relevance of the topic and in some of the Nordic countries, there is ongoing effort to include carbon footprint of feed as part of climate calculators.

There are major differences in how far and how the different feed producers and other stakeholders in the Nordic countries have come in using PEF or equivalent systems. However, it was a clear message that when consumers and other actors request environmental documentation, it puts pressure on the feed suppliers to establish a system.

Data quality is crucial. PEF uses a Data Quality Rating (DQR), which includes a semi-quantitative assessment of the quality criteria of a dataset, including the proportion of primary and secondary data. The advantage of using secondary datasets is that there will be equal conditions for all suppliers in the same market. When a method opens up for both secondary data and supplier data, it requires a review system, which approves data, or the source behind data in general, before they are used. However there seem to be a general agreement about that case (farm, region) specific data is needed in order to stimulate growers and feed industry to introduce mitigation in the production lines.

Although the PEFCR recommends a number of impact categories, there has so far been focus only on climate footprints and secondly on soil sequestration and land use/land occupation.

3.1 Activities in the Nordic countries

In Norway, a climate calculator (Klimasmart landbruk) has been established at farm level, which means that there is a great demand for climate footprints on feed and raw materials for feed. The feed suppliers have therefore collaborated to create a common system, which follows the methodological principles in the PEF “Feed for food producing animals”. In connection with the project, a separate list has been prepared of the climate footprint for the most important raw materials. In addition, they use GFLI data and their own specific data if it can be documented that they follow the PEF methodology.

In Denmark, similar work is progress, where SEGES and Organic Denmark is developing a climate calculator (Landbrugets Klimaværktøj) with the aim to give all farmer an annual climate report based on farm specific production data for livestock in combination with average data for feed production. A major effort has been to get production data from all type of farming – livestock and arable – in the same format. Result both at the LCA - and at the national inventory perspective will be calculated. In the first version (planned year 2021) carbon footprint for grain and other type of concentrates is based on data from GFLI, while roughage is based on average Danish production condition and taken from Mogensen et al. (2018). The Danish feed industry is expected to provide the farmers with carbon footprint data from GFLI from year 2021.

Sweden started early with the efforts to document the climate footprint of feed, but at that time the work with PEFCR for feed was not completed and thus this work does not follow specific guidelines. Växa Sverige is an advisory service group mainly for dairy and beef producers, which are developing a carbon footprint calculation tool for their customers. The calculation tool does not follow the PEF guidelines but the standard way of calculating a carbon footprint based on IPCC guidelines and ISO methodology. Foder och Spannmål (The Feed and Cereals Association) is an industry association for companies that manufacture and trade in feed, cereals, seeds, fertilizers, plant protection products and other agricultural inputs. The association has developed a set of rules for the industry on how to calculate the carbon footprint of feed to facilitate that carbon footprint information communicated to customers is calculated in a similar way. The methodology is, as for Växa Sverige, not aligned to PEF, but based on IPCC guidelines and ISO methodology.

In Finland, PEFCR for feed for food producing animals has been applied only in livestock related projects when there has been demand in following PEF guidelines. Publicly available LCAs of feed raw materials are not yet available for companies or research to use, even if the interest towards these would be great. Currently the national data on feed production is collected and best available from extension services data, which is not publicly or readily available. Efforts are made towards harmonizing the LCA assessment of feed, together with all agri-food products, in a large recently initiated national project. The project brings together both research, consultants and businesses to discuss and find solutions for harmonized methods. Potentially the project will lead to initiation of feed database according to PEFCR or at least to harmonized method supported throughout the chain.

3.2 The Nordic perspective in GFLI

Across the Nordic countries the GFLI database (https://globalfeedlca.org/gfli-database/) is taken as the starting point for carbon footprint of specific feed. The carbon footprints of GFLI are free to use but not for commercial purposes. In order to illustrate the variation in relation to the Nordic conditions has the NEF group looked at the values for some selected feed types, listed in the table 1. Major differences were noticed between LUC emission between Nordic countries, the reasons for this were discussed with experts behind the database (expert consultation Mike van Paassen, Blonk Consultants AFP/GFLI, 19th Feb 2021). Currently, the LUC emissions in GFLI database are based on FAO statistics on land use from year 2013 and before that. This is to be improved in the following versions. Yet, currently the LUC emissions are reported comparably high for Finnish wheat and rye. This is due to monitored land use change prior to 2013 from grassland to arable land and allocated to the expanded crops. Currently the trend is the opposite and land used for grassland is expanding.

Table 1 Illustration of the Nordic perspective in the GFLI data by carbon footprint values for selected important feed, g CO_2 eq per kg at farm and land occupation m^2 per kg.

Feed	No in GFLI	Country	Carbon footprint incl LUC, g CO_2 eq	Carbon footprint excl LUC g CO_2 eq	Land occupation, m^2
Barley	24	DK	364	364	1,4
	39	SE	361	361	1,8
		NO			
	27	FI	485	485	2,3
Oat	318	DK	388	376	1,6
	331	SE	390	390	2,1
		NO			
	321	FI	471	471	2,5
Wheat	867	DK	392	390	1,1
	886	SE	436	434	1,3
	881	NO	582	578	1,9
	870	FI	951	534	2,2
Rye	494	DK	359	359	1,4
	508	SE	310	310	1,4
	504	NO	502	487	1,8
	497	FI	867	599	2,9
Rape seed	428	DK	711	711	2,7
	441	SE	918	918	3,5
	438	NO	1318	1318	5,3
	429	FI	1544	1544	7,7

The figures in table 1 illustrates variation between countries, and some trends and differences that would be interesting to investigate by getting access to the production data, but outside the scope of this report.

4. Conclusion

Accuracy in terms of specific, updated data versus the practicality of including carbon footprint in livestock product documentation, farm and industry planning is highly important. In this aspect it is important to be aware of that the aim of PEFCR for feed is to provide LCI data as input for livestock and not meant to be used for comparison between producers. As an intermediate product compound feed has different functions in nutrition of livestock. Thus, comparison of products can only be done if the functions and the nutritional quality and the target animal are the same. By providing openly available LCA databases for feed raw materials, feed LCA's are brought more easily accessible for companies to apply for own products. Yet, the databases should be transparent and uniform in methods, how the interpretation of PEFCRs are brought into results. Currently, the databases can rely on rather old data which can lead to outdated, misleading results. As the PEFCRs are used not only to provide product environmental information to consumers, but they are used by companies to improve products' environmental profile, the data quality and harmonization of the data collection methods and interpretation of PEFCRs' should become more transparent.

References

PEFCR Feed for Food Producing Animals, 2018. Available at: https://ec.europa.eu/environment/eussd/smgp/pdf/PEFCR_feed.pdf

GFLI. 2021. Feed data base. https://globalfeedlca.org/

Hermansen, J.E., Kristensen, T., Sonesson, U., Woodhouse, A., Pulkinen, H., Møller, H., 2017. Life cycle inventory data from farms: Need for secondary and life cycle inventory data for use in Product Environmental Footprint (PEF) of livestock products in The Nordic Countries, Nordiske Arbejdspapirer ; 2017:921 , Nordic Council of Ministers, Copenhagen

Mogensen, L., Knudsen, M. T., Dorca-Preda, T., Nielsen, N. I., Kristensen, I. S., Kristensen, T., 2018. Bære-dygtighedsparametre for konventionelle fodermidler til kvæg - metode og tabelværdier. DCA rapport nr. 116 - marts - 2018. Aarhus Universitet. DCA - Nationalt Center for Fødevarer og Jordbrug. https://dcapub.au.dk/djfpublikation/djfpdf/DCArapport116.pdf

Appendix

A1 Participant list by organisation

Norway	Finland	Denmark	Sweden
Organisation	**Organisation**	**Organisation**	**Organisation**
NMBU/TINE	Satarehu	Aarhus Universitet	Lantmännen
Felleskjøpet Fôrutvikling AS	Hankkija Oy	SEGES	Växa/Norfor
Felleskjøpet	Lantmännen Agro	DAKOFO	Skira
Fiskå Mølle	A-Rehu Oy	DLG	RISE
Norgesfôr	Hankkija Oy	Arla	
Klimasmart Landbruk	Feedex	Danish Crown	
Konstad			

A2 Workshop program

13.00 Welcome to the workshop / Anna Woodhouse, RISE

13.05 Short introduction on PEF – present status / Claus Saabye Erichsen, DAKOFO, Denmark

13.20 Different examples from industry and organisations to highlight different issues

10 minutes each

- Norwegian feed suppliers input to the climate-smart agriculture calculator / Margareth Opheim, Felleskjøpet Fôrutvikling, Norway
- Use of Enviromental Footprint for feed in support tools and agricultural advisory / Nicolaj Ingemann Nielsen, SEGES, Denmark
- A common method to calculate carbon footprint of feed / Martin Laurentz, Lantmannen, Sweden

14.15 Discussion (moderator: Hanne Møller, NORSUS)

A3 Barley in GFLI

Table A.1. Barley in GFLI

Product name	Source	Global warming - Including LUC (kg CO2 eq / ton product)	Global warming - Excluding LUC (kg CO2 eq / ton product)	Land use (m2a crop eq / ton product)
Alfalfa, dried, at farm/CA-ON Economic S	GFLI Canada	149,80	149,80	1157,54
Alfalfa, dried, at farm/CA-QC Economic S	GFLI Canada	154,02	154,02	750,75
Alfalfa, dried, at farm/CA-WE Economic S	GFLI Canada	119,75	119,75	1350,80
Alfalfa, production mix, at farm/CA Economic S	GFLI Canada	125,59	125,59	1289,14
Animal meal, beef, from dry rendering, at plant/RER Economic S	GFLI EU	698,02	652,81	164,75
Animal meal, pig, from dry rendering, at plant/RER Economic S	GFLI EU	656,88	562,16	302,04
Animal meal, poultry, from dry rendering, at plant/RER Economic S	GFLI EU	1233,44	741,10	663,89
Barley distillers grains, dried, from ethanol production, at plant/RER	GFLI EU	892,69	892,67	1114,13
Barley grain, dried, at farm/AR Economic S	GFLI EU	4370,04	475,46	2217,90
Barley grain, dried, at farm/AT Economic S	GFLI EU	368,92	368,92	1556,90
Barley grain, dried, at farm/AU Economic S	GFLI EU	808,94	542,31	3602,31
Barley grain, dried, at farm/BE Economic S	GFLI EU	432,11	432,11	935,96
Barley grain, dried, at farm/BG Economic S	GFLI EU	441,00	441,00	2185,61
Barley grain, dried, at farm/CA Economic S	GFLI EU	420,17	420,17	2267,35
Barley grain, dried, at farm/CA-AT Economic S	GFLI Canada	309,87	309,87	2360,56
Barley grain, dried, at farm/CA-ON Economic S	GFLI Canada	265,54	265,54	2175,89
Barley grain, dried, at farm/CA-QC Economic S	GFLI Canada	243,42	243,42	2270,69
Barley grain, dried, at farm/CA-WE Economic S	GFLI Canada	285,95	285,95	2167,78
Barley grain, dried, at farm/CH Economic S	GFLI EU	391,27	391,27	1224,38
Barley grain, dried, at farm/CZ Economic S	GFLI EU	445,54	445,54	1725,08
Barley grain, dried, at farm/DE Economic S	GFLI EU	403,47	403,47	1234,53
Barley grain, dried, at farm/DK Economic S	GFLI EU	364,55	364,55	1428,04
Barley grain, dried, at farm/EE Economic S	GFLI EU	547,78	547,78	2743,98
Barley grain, dried, at farm/ES Economic S	GFLI EU	721,32	721,32	2952,66
Barley grain, dried, at farm/FI Economic S	GFLI EU	485,74	485,74	2330,41
Barley grain, dried, at farm/FR Economic S	GFLI EU	361,34	361,34	1240,94
Barley grain, dried, at farm/GR Economic S	GFLI EU	623,70	623,70	2978,82
Barley grain, dried, at farm/HU Economic S	GFLI EU	440,21	440,21	2138,12
Barley grain, dried, at farm/IE Economic S	GFLI EU	371,59	370,41	1062,35
Barley grain, dried, at farm/IT Economic S	GFLI EU	525,40	525,40	2271,51
Barley grain, dried, at farm/LT Economic S	GFLI EU	517,76	517,76	2558,17
Barley grain, dried, at farm/LV Economic S	GFLI EU	551,44	551,44	3008,94
Barley grain, dried, at farm/NL Economic S	GFLI EU	469,87	469,87	1178,48
Barley grain, dried, at farm/PL Economic S	GFLI EU	464,04	464,04	2322,72
Barley grain, dried, at farm/PT Economic S	GFLI EU	1255,73	1255,73	5581,99
Barley grain, dried, at farm/RO Economic S	GFLI EU	470,73	470,73	2847,87
Barley grain, dried, at farm/SE Economic S	GFLI EU	361,32	361,32	1757,50
Barley grain, dried, at farm/SK Economic S	GFLI EU	491,71	491,71	2263,76
Barley grain, dried, at farm/UK Economic S	GFLI EU	402,52	402,52	1355,66
Barley grain, production mix, at farm/CA Economic S	GFLI Canada	285,01	285,01	2172,68