RUMPRINT - Beef and dairy environmental footprint

Summary

Including environmental criteria in cattle farming and primary sector activities in general is on the rise. Climate change, European environmental policy and social pressure, which increasingly demands greener products, are the main reasons why the livestock sector is becoming increasingly aware of environmental issues and the need to measure the environmental footprint of its products.
The RUMPRINT operational group has channelled this need by quantifying the environmental footprint of the complete farm-to-retail production cycle of milk from El Baix Empordà Cattle Breeders' Cooperative and meat from the Viñas Group.
To do this, it applied a science-based methodology harmonised in all EU countries called the Environmental Footprint (EF), which was developed by the European Commission and is currently in the testing phase, after the implementation of European environmental policies aimed at giving competitive advantages to more environmentally friendly products (e.g. through eco-labelling).
The results identified several processes as priorities when working with farms with ruminant livestock; in particular, processes related to producing animal feed, and more particularly commercial feed, are of paramount importance. Other significant processes are slurry management and the use of water, electricity and diesel fuel for farm operations. Efforts to reduce/replace plastics in packaging provide comparatively minor improvements because they contribute little to the environmental impact of the end products available to the consumer.
The EF methodology is generally well adapted to the study of the beef sector environmental footprint in Catalonia, but it also has certain limitations that could be improved.
Thanks to this project, beneficiaries now have a better understanding of their production processes and can identify the most important environmental aspects (stages and processes), which helps them decide where to direct their efforts to improve the environmental performance of their products.

Objectives

1. Drawing up an inventory of resource consumption and emissions produced throughout the value chains for beef and milk produced in Catalonia.
2. Conducting an environmental diagnosis of the inventories using Environmental Footprint (EF) guidelines.
3. Adding relevant and complementary environmental indicators to the EF for the environmental diagnosis of beef and milk.
4. Detecting environmental improvement points and proposing viable alternatives.
5. Disseminating the EF methodology, the results of applying it to the beef sector and the benefits of using a life-cycle approach to reduce the environmental footprint of food in general and of the beef sector in particular.

Description of the actions carried out in the project

In line with the objectives detailed above:
Objective 1:
For milk, the value chain includes the farm, transport to the dairy plant, processing at the plant, packaging and the distribution of the milk to market centres and supermarkets.
For meat, the value chain includes the farm, transport to the slaughterhouse, slaughter, cutting and packaging, and distribution to central markets and retail outlets.
First of all, representative farms from both production systems were selected for study and the relevant data were collected from them (primary data). This was done using an Excel questionnaire. Once the

primary data were collected from each farm, the corresponding emissions were calculated using mathematical models specified in the EF method. These included emissions from animal enteric fermentation, from manure storage and management and emissions from applying manure exclusively by farms that grow their own crops. Next, the primary data were collected from the following links (processing and distribution industry) in each value chain studied (meat and milk): Amount of relevant inaccessible primary data, whether secondary data was used, and the associated substitution emissions provided by the EF method.

Objective 2:

Once the inventories for objective 1 had been obtained, the environmental characterisation analysis was carried out using life-cycle analysis software (Simapro), applying the European Commission recommended models to the EF. Thus, impact results were obtained for 16 different environmental categories: climate change, ozone depletion, ionising radiation, photo-oxidant formation, micro-particles formation, carcinogenic and non-carcinogenic pollutants, acidification, eutrophication (marine, freshwater, soils), ecotoxicity, land use, water consumption, depletion of fossil fuels, minerals and metals. The results were then converted into a single aggregate final impact measure.

Objective 3:

As a result of the study of individual farms, internal discussions and meetings with experts, indicators were identified that are lacking in the EF but which are important to improving understanding of the impacts of livestock farming and bovine products; in particular, biodiversity indicators and nutritional indicators. EF-compatible options for accounting animal welfare, social impacts and soil carbon storage were also analysed.

Objective 4:

Based on the results of objectives 2 and 3, a series of improvement proposals were made, which the beneficiaries considered feasible for the evaluated cattle farms. Experts from the IRTA sector, other universities and private companies were consulted regarding the proposals.

Objective 5:

The project and the results obtained were disseminated, taking into account the different audiences of interest both within (GO members) and outside (companies in the sector, consumers, society in general) the study. Videos for dissemination to the general public and a brochure summarising the project for the general public and the sector were produced, a transfer conference for the sector was organised and scientific communications at international conferences were prepared.

Final results and practical recommendations

The results identified several processes as priorities when working with farms with ruminant livestock; in particular, processes related to producing animal feed, and more particularly commercial feed, are of paramount importance. Other significant processes are slurry management and the use of water, electricity and diesel fuel for farm operations. Efforts to reduce/replace plastics in packaging provide comparatively minor improvements because they contribute little to the environmental impact of the end products available to the consumer.

Practical recommendations:

In general, improved automation in data generation, subsequent storage and facilitating access to data at all stages of the production chain would allow for more complete and accurate footprint results.

In particular, we highlight the following points to improve environmental performance:

- In relation to feed and its digestibility, a review of the nutritional strategy is recommended to reduce excreted nitrogen and total phosphorus, which contribute to eutrophication impacts, without compromising the nutritional needs of the animals. Therefore, options such as the addition

of additives or amino acids, reducing crude protein and optimising multi-phase feeding (as feed is adapted to the different growth stages) could be reviewed. Considering changing feed ingredients for others that use less water, or assessing feed alternatives directly are also options.
- In relation to manure management, recommendations include reducing the contact ratio between the emission surface and the volume of the manure heap and storing the manure in a shed with impermeable floor or concrete silo.
- In relation to energy consumption, installing meters and timers is recommended for certain specific appliances and machinery, as it is important to know which processes increase consumption and, in turn, it can help to detect breakdowns and equipment that needs to be renewed.

Conclusions

For the first time, this operational group made it possible to obtain preliminary results on the environmental footprint of bovine products produced in Catalonia following the recommended European Commission methodology known as Environmental Footprint (EF); this provides us with an initial control measure to improve the environmental performance of milk and beef produced in Catalonia (without measurement there can be no improvement).
More case studies like the one in this sector and others would give us a representative picture on a regional scale and foreknowledge of the effect of potential European or local policies and, vice versa, how to affect potential future policies.

Leader of the Operational Group

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Coordinator of the Operational Group

ORGANISATION: M2 AMBIENT SOLUTIONS, SL

Other members of the Operational Group (grant recipients)

ORGANISATION: RAMADERS DEL BAIX EMPORDÀ, SCCL

Other members of the Operational Group (not recipients of the grant)

ORGANISATION: IRTA - Institute of Agrifood Research and Technology

Geographical area(s) of application

PROVINCE(S)	REGION(S)
Barcelona and Girona	Osona and Baix Empordà

Dissemination of the project (publications, conferences, multimedia, etc.)

- Presentation at the PATT conference “Innovations in the dairy sector” on 15 September 2021 with the presentation “GO Rumprint: Calculation of the Environmental Footprint in the beef sector. Adaptation to the European Commission calculation rules”: https://transferencia.irta.cat/activitats/innovacions-en-el-sector-lacti/
- Presentation at the international conference on the application of the LCA tool in the food sector 13 LCA Foods (12-14 October 2022 in Lima, Peru), presenting the results obtained with the paper “The impact of farm-inherent variability in environmental assessment of dairy products”: http://perulca.com/lcafoods-lima2022/index-pc.html,
  Co-authors: Marta Ruiz-Colmenero, Ariadna Bàllega, Miquel Andon, Marta Terré, Assumpció Antón, Anna Targa, Ralph Rosenbaum, Maria Devant, Montserrat Núñez

- Presentation at the 31st international conference on the dairy and beef cattle sector, World Buiatrics Congress, WBC (4-8 September 2022 in Madrid), presenting the results obtained with the paper "Measuring the sustainability of dairy production at the farm gate: the PEF initiative" https://www.wbc-madrid2022.com/index.php/en/
  Co-authors: Anna Targa, Ariadna Bàllega, Miquel Andon, Marta Ruiz-Colmenero, Marta Terré, Assumpció Antón, Ralph Rosenbaum, Maria Devant, Montserrat Núñez
- Project dissemination conference as part of the PATT in 2022 (3 November 2022) to present the results of GO RUMPRINT:
  http://agricultura.gencat.cat/ca/ambits/formacio-innovacio/dar_transferencia_tecnologica/dar_jornades_tecniques/
- Video "Què s'amaga darrere un got de llet – l'empremta ambiental de la llet de vaca" ("What's hidden behind a glass of milk – the environmental footprint of cow's milk", in Catalan and Spanish and English subtitles)
- Video "Què s'amaga darrere un bistec de carn de vedella – l'empremta ambiental de la carn de vedella" ("What's behind a beef steak – the environmental footprint of beef", in Catalan and Spanish and English subtitles)
- GO RUMPRINT summary leaflet (in Catalan and Spanish)
  The videos and leaflet will be available through the group leader's website and the beneficiaries' usual social media.

Project website

https://www.grupvinas.com/en/news/?i=27

More information on the project

PROJECT DATES	TOTAL BUDGET
Start date (month-year): July 2020	Total budget: €151,987.92
Completion date (month-year): September 2022	DACC funding: €62,114.31
Current status: Completed	EU funding: €46,858.16
	Own funding: €43,015.45

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