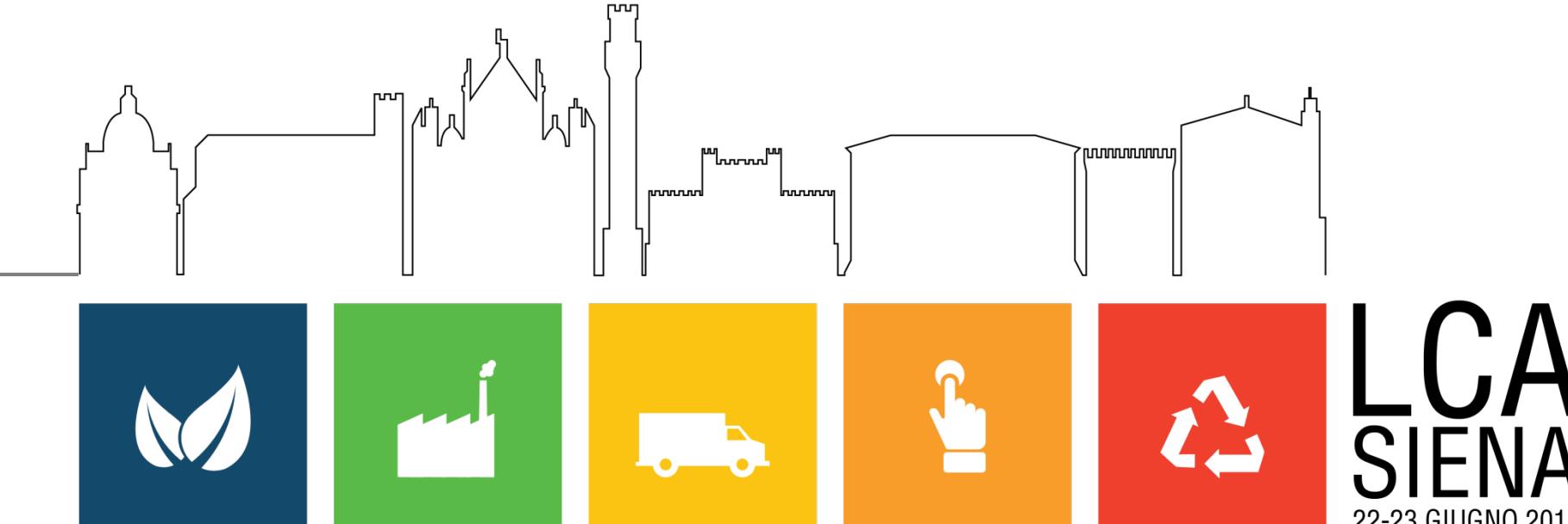


The environmental profile of Pecorino Romano PDO



A case study

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Case study

Pecorino Romano PDO (PR): hard cheese, cooked, made with fresh whole sheep's milk, derived exclusively from farms located in Sardinia and Lazio regions and in province of Grosseto (Tuscany).



Data were collected during 2013 in "Allevatori di Mores Società Cooperativa" (later as Coop. Mores), a dairy plant representative of industrial PR production system. Coop. Mores is a medium-large dairy sheep industry located in Mores (Sardinia). In this study, we considered the PR export type, called "Duca di Mores", weighting 27 kg and with an average fat and protein content of 32% and 22% per 100 g, respectively.

LCA methodology

- System boundaries: "from cradle to retailer".
- Functional unit = 1 kg of PR.
- Economic allocation of co-products.
- Enteric CH₄ emission estimated with a detailed approach (Vermorel et al., 2008).
- Manure considered only for N₂O emissions (IPCC, 2006).
- Evaluation methods: Carbon Footprint (IPCC, 2013); CML-IA (Guinée et al., 2002).
- LCA calculation made with Simapro Analyst v 8.1

Results

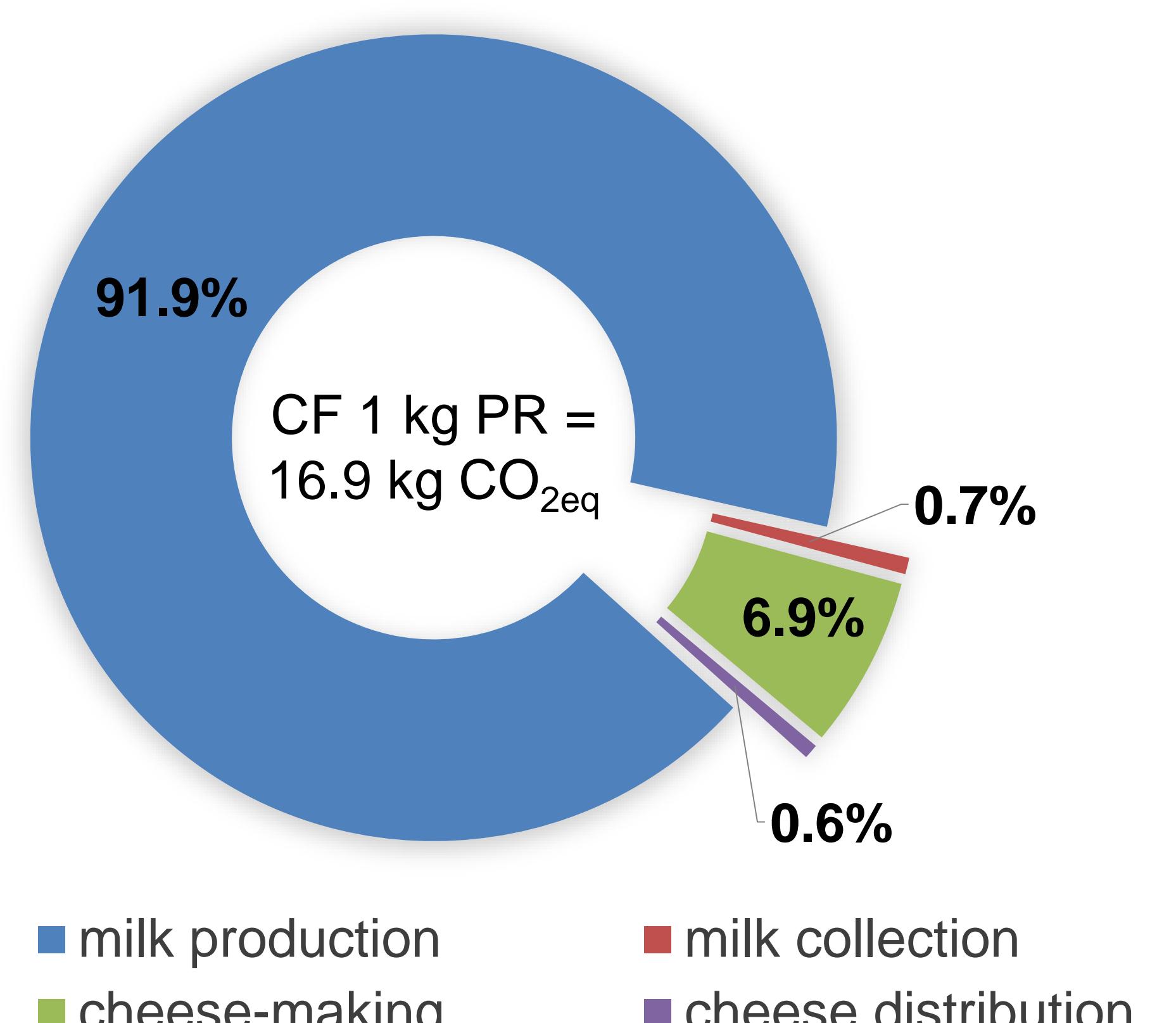


Fig. 1. Carbon Footprint (CF) for 1 kg of Pecorino Romano PDO (PR).

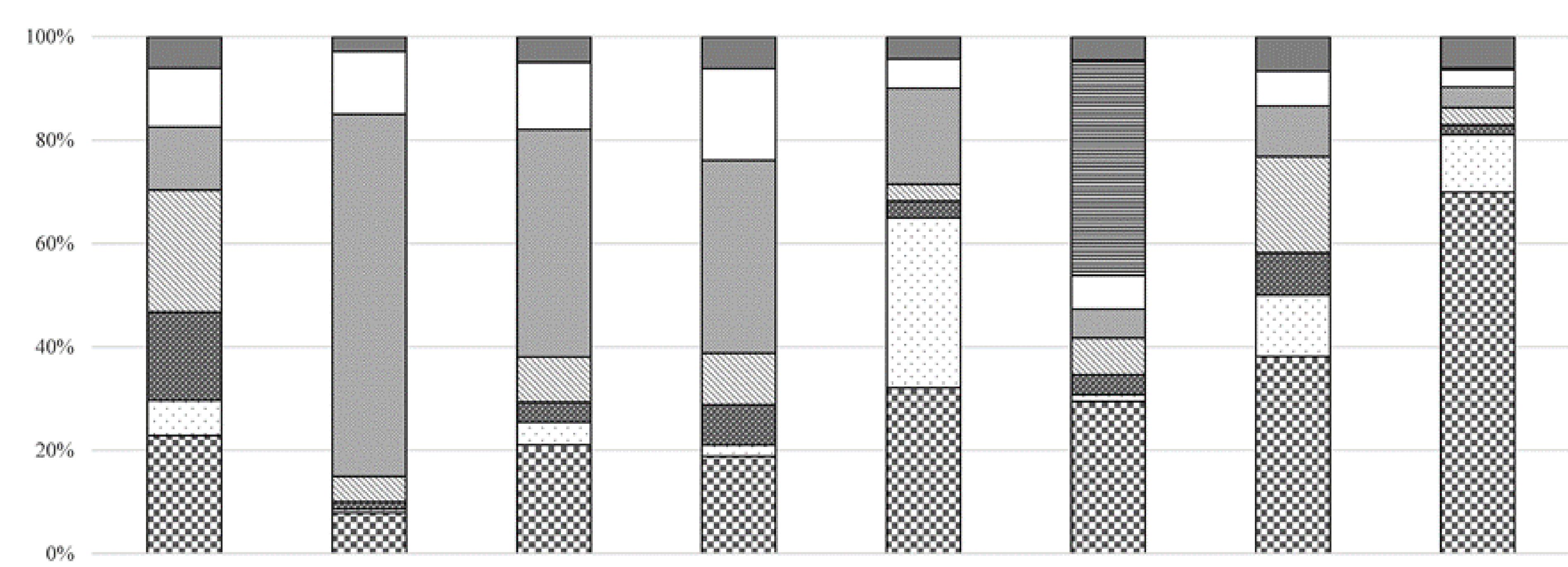
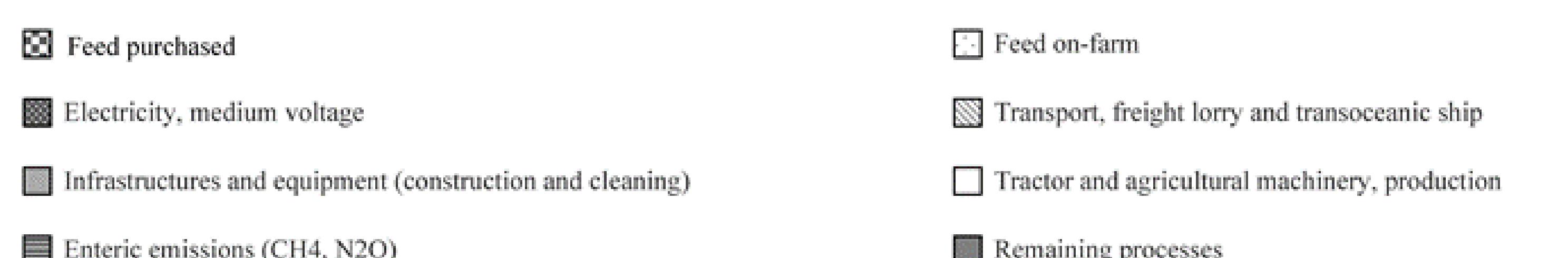


Fig. 2. CML-IA evaluation method results (in %) for each impact category and process involved in the Pecorino Romano PDO life cycle. Impact categories: AD-ff = Abiotic Depletion fossil fuel, HT = Human Toxicity; FWAE = Fresh Water Aquatic Eco-toxicity, MAE = Marine Aquatic Ecotoxicity, TE = Terrestrial Ecotoxicity, PCOP = PhotoChemical Oxidation Potential, AP = Acidification Potential, EP = Eutrophication potential.

Process	%
Methane enteric emissions	53.4
Soybean meal, feed purchased	12.0
Cereal grain, feed purchased	7.5
Electricity, medium voltage	5.5
Transport, lorry	4.5
Transport, transoceanic freight ship	1.7
Dairy plant equipment	3.5
Tractor and agricultural machinery	3.5
Field crop operations (mowing, baling, etc.)	1.1
Dinitrogen oxide enteric emissions	0.8
Milking parlour, construction	0.4
Hay, from natural grassland	0.2
Remaining processes	5.8

Table 1: percentage contribution of processes to the total GHG emissions of 1 kg of Pecorino Romano PDO life cycle. "Remaining processes" includes all the processes with a percentage contribution lower than 0.25%.

Conclusions

Looking for the environmental profile improvement of the Pecorino Romano PDO supply chain, enteric fermentation reduction and feed system optimization seem to be clear priorities. Moreover, a high efficient and/or more green-energy based power supply and a proper sizing of the equipment stock are key improvements at the dairy plant and represent further important steps towards a more eco-sustainable dairy system. Future research studies are needed to better assess the environmental implications related to i) the relationship between sheep breed, diet composition and enteric methane emissions, and ii) the ecosystem services produced by the pasture-based farming systems.

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