

LIFE CYCLE ASSESSMENT OF GRANA PADANO CHEESE PRODUCTION

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AIM

Evaluation of the environmental impact of Grana Padano PDO cheese through a “cradle to cheese factory gate” LCA

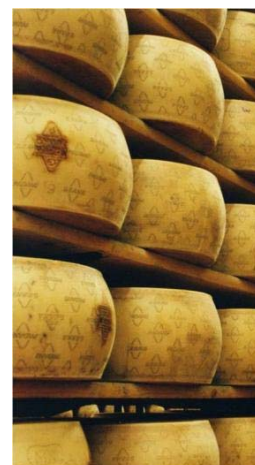


METHODS

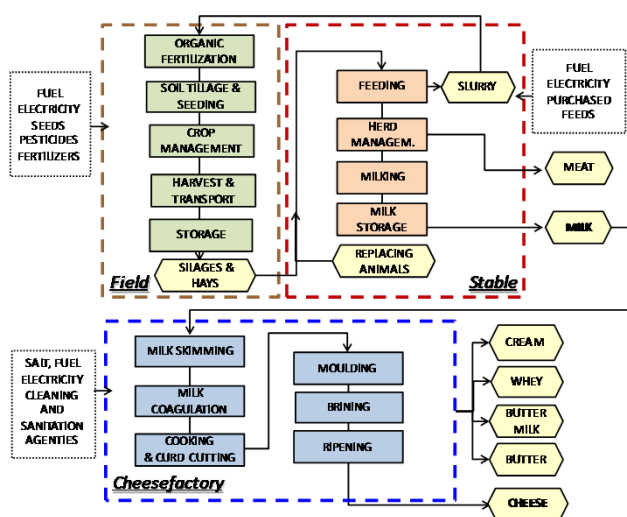
Cradle to- factory gate perspective : the system boundaries include all the upstream processes (e.g., feed production, purchasing of concentrate feed, barn management, slurry storage and spreading, etc.), as well as the downstream ones (e.g., cheese making process and ripening); packaging, distribution and end-of-life of the product were excluded.

Functional Unit: 1 kg cheese. **Primary data:** collected by means of questionnaires in representative dairy farms and in a cheese factory (producing about 3.6% of total Grana Padano PDO production).

The **impact categories** evaluated (using ILCD) are: climate change (**CC**); terrestrial acidification (**TA**); terrestrial (**TE**), freshwater (**FE**) and marine eutrophication (**ME**); mineral, fossil and renewable res. depletion (**MFRD**).



SYSTEM BOUNDARY & LCI



Grana Padano has a low cheese yield (7-8 kg cheese/100 kg milk) due to the low water content achieved by the production process that requires curd cutting and cooking (until 56°C) and long ripening (>9 months).

MAIN INVENTORY DATA AT CHEESE FACTORY

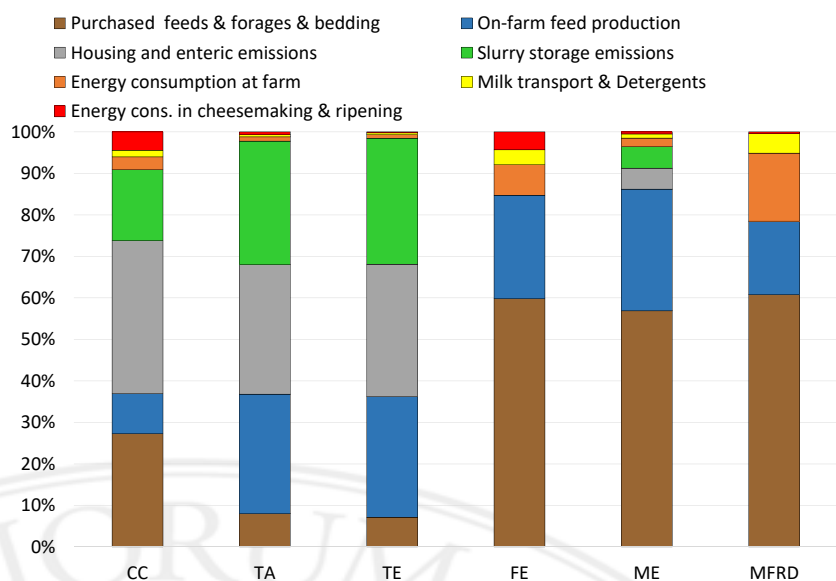
		Unit	Value
Input	Milk	t/year	95882
	Rennet*	g/wheel	17.5
	Lysozyme*	g/wheel	10
	Salt	t/year	120
	Natural gas [§]	MWh	8655
	Electricity [§]	MWh	4747
	Cleaning detergents [§]	t/year	31.5
Output	Cheese wheels	Numb.	183443
	Average wheel weight	kg/wheel	35.9
	Cheese	t	6592
	Butter	t	206
	Whey	t	61806
	Buttermilk	t	1104

*not included in LCA; [§] for cheesemaking and ripening

Economic allocation was applied at cheese factory level among cheese, whey, butter, buttermilk

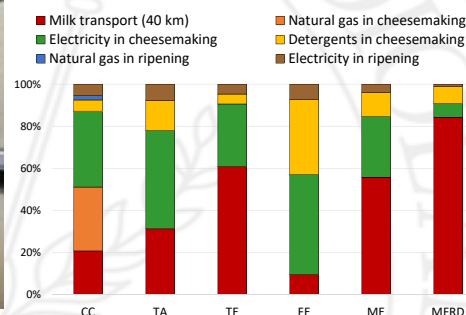
RESULTS

	CC	TA	TE	FE	ME	MFRD
kg CO ₂ eq	15.7	0.35	1.54	2.13	66.2	0.12



Milk production and upstream processes contributed for over 90% to all the impact categories. In particular, 66.7% of CC came from stable (enteric emission and slurry storage) whereas 36% derived from feed (produced on-farm and purchased). Cheesemaking & ripening loaded for <10% on all impact categories.

Hotspots for cheesemaking & ripening



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