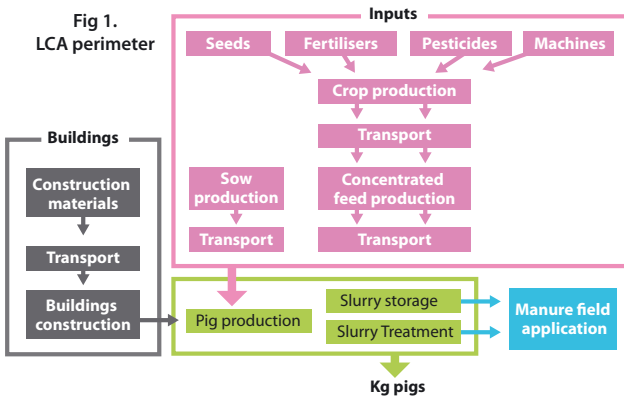


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This study aims to produce multicriteria environmental references (using the Life Cycle Assessment, LCA), associated with socioeconomic indicators, for different types of pig units representative of the dominant French standard production systems.

Materials and methods



Eight pig systems were assessed according to:

- the size (from 84 - 850 sows)
- the degree of specialization (farms specialized in pigs or mixed farms with cereals / pigs)
- the location of the pig unit (Brittany, SW of France, North of France)
- the slurry management (each system produces slurry that is stored below animals in a building). Six of the systems then store slurry in external pits before spreading and two systems (250 - 500 sows) have a biological slurry treatment.
- These systems were characterised for 5 years (2005-2009): the variability of economical context and the evolution of technical performances
- Environmental assessments use LCA and some direct environmental fluxes (NH_3 , CH_4 , N_2O , NO_3^-) from farms which were dynamically modeled using the climat over a period of 30 years

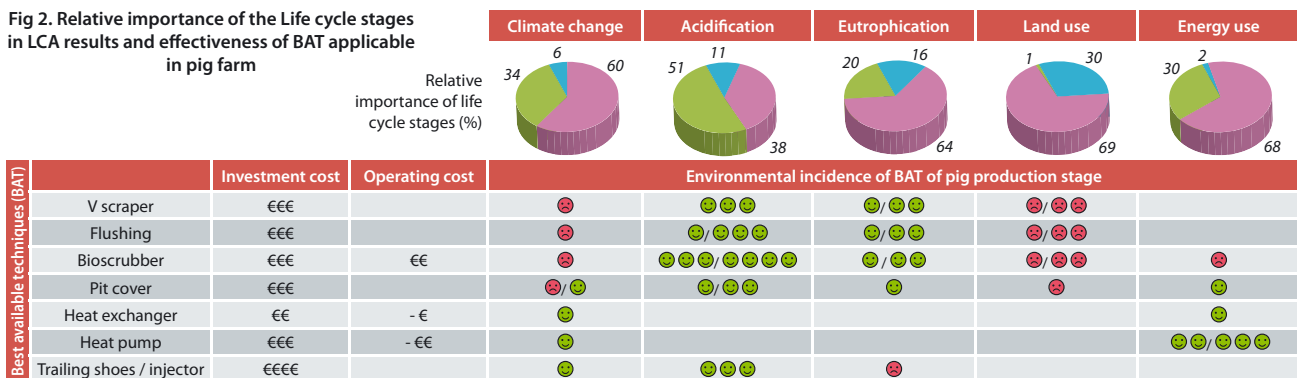
Results and discussion

Tab 1. Environmental impacts and socio-economic indicators (average data and variability)

	Environmental Impacts (/kg pig)					Socio-economic indicators			
	CC : Climat change (kg eq CO ₂)	E : Eutrophication (kg eq PO ₄ ⁻³)	A : Acidification (kg eq SO ₂)	LU : Land use (m ² .an)	Eg : Energy use (MJ/kg)	Margin over feed cost (€/sow)	Production cost (€/kg carc.)	Pig price (€/kg carc.)	Working time (h/sow/year)
Average	2.57	0.028	0.05	6.93	16.6	921	1.21	1.2	17.7
Diff. intersyst	+/- 6%	+/- 14%	+/- 12%	+/- 35%	+/- 15%	+/-33%	+/- 5%	+/-1.5%	+/-23%
Added diff. intrasyst	+/- 17%	+/-23%	+/- 20%	+/-17%	+/-25%	-	-	-	-

- Factors explaining variations between systems:**
 - manure treatment (↘ 16%, 14%, 22% for E, A, LU and ↗ 5-6% for CC and Eg)
 - feed strategy +/-3%, 5%, 4%, 5%, 14% for CC, E, A, LU, Eg
 - technical performance of pigs : 0.1 additional kg of feed per kg of growth ↗ 2-3% for CC, LU, Eg and 3-4% for E and A
- Additional variability due to :**
 - Climate and Economical context : difficult to control by breeders
 - Variability of the Environmental impact of feed input : in most cases difficult to manage by farmers who buy their feed

Fig 2. Relative importance of the Life cycle stages in LCA results and effectiveness of BAT applicable in pig farm



€ : <1ct €/kg pig; €€ : [1-5]; €€€ : [5-15]; €€€€ : [15-30]; €€€€€ >30 ⊙ : impact decrease or increase < 5%; ⊙/⊙/⊙ : ↘ 5-10%; ⊙/⊙/⊙/⊙ : ↘ 10-20%; ⊙/⊙/⊙/⊙/⊙ : ↘ 20-40%

Conclusion

- The most important life cycle stage in LCA is feed: the main way for pig farms to improve on this is through the technical performance of pigs
- The other important stage is the management of animals and manure (in building, in the external pit): pig farmers are responsible for this stage and can apply Best Available Techniques (BAT)
- These BAT's are not accessible for all systems because of their cost : larger farms may further support the additional cost of depreciation and operating.