Country case study from Italy

Workshop

Abating ammonia emissions in the UNECE and EECCA region in the context of the nitrogen cycle

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Outline

- **General country information**
  - farm structure, farm size, animal population distribution

- **The ammonia emissions from Agriculture**
  - share, trends, hot spots

- **Successful activities: diffusion of the reducing techniques**
  - housing, storage, landspreading, N-fertilizers

- **Future obligations to Gothenburg Protocol**
  - scenarios with different ambition levels

- **Problems, research and practical needs**
  - integrated nitrogen approach

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ABATING AMMONIA EMISSIONS IN THE UNECE AND EECCA REGION IN THE CONTEXT OF THE NITROGEN CYCLE
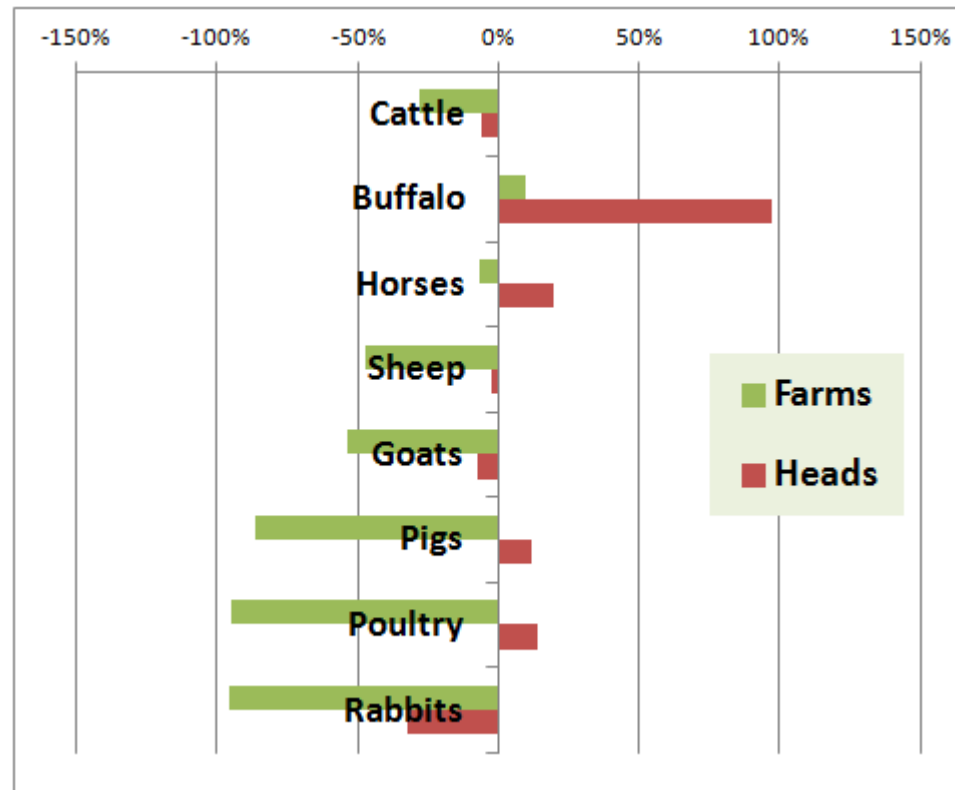
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General country information

- in Italy there are 1.6 millions of agricultural holdings (of which 210,000 with livestock) with a Utilized Agricultural Area (UAA) of 12.9 million hectares,

- between 2000 and 2010, agricultural holdings have decreased by 32% and their average size increased from 5.5 ha to 7.9 ha,

- holdings with less than 1 ha of UAA decrease of 50% in 2010, but still represent 31% of total Italian farms,

- holdings with cattle are 124 000 and, although lower than in 2000 (-27.7%), represent 59% of total farms. The number of cattle amount to 5.7 million (-6.1% compared to 2000),

- the livestock population is mostly concentrated in the North of the country.

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General decrease in the number of farms

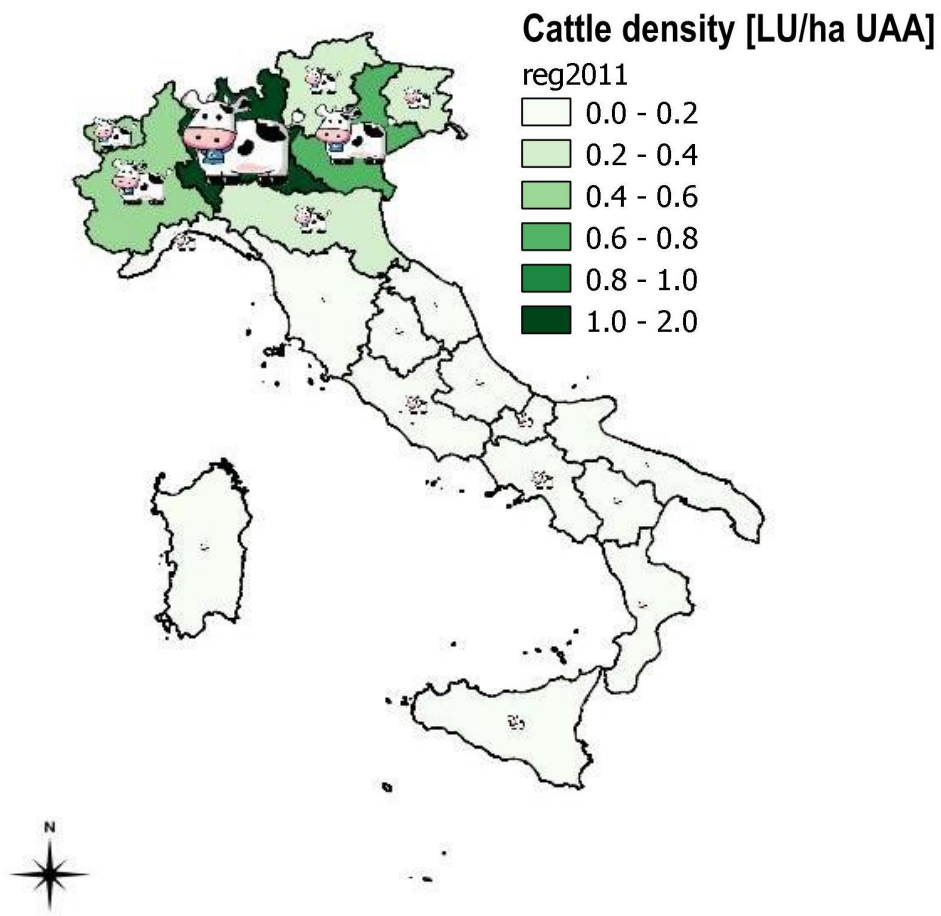Trend towards concentration of farms in fewer but larger holdings

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Regional distribution of cattle
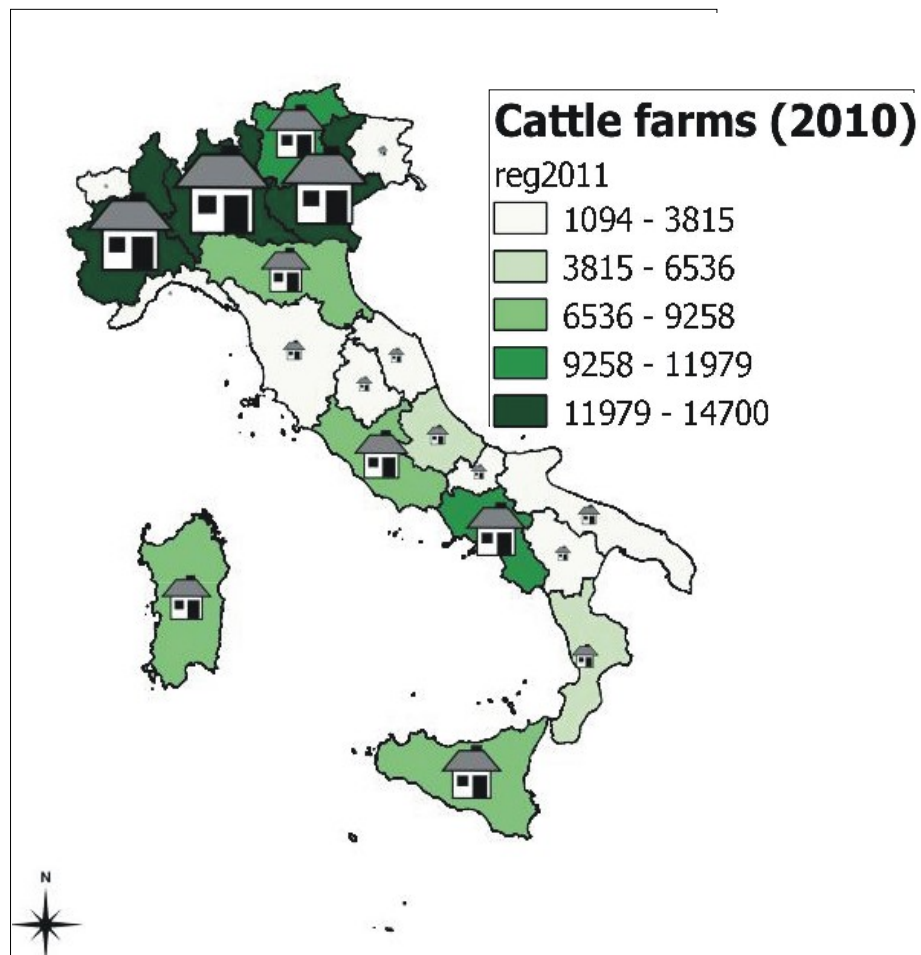
Farms

Heads

Cattle farms (2010)
reg2011
- 1094 - 3815
- 3815 - 6536
- 6536 - 9258
- 9258 - 11979
- 11979 - 14700
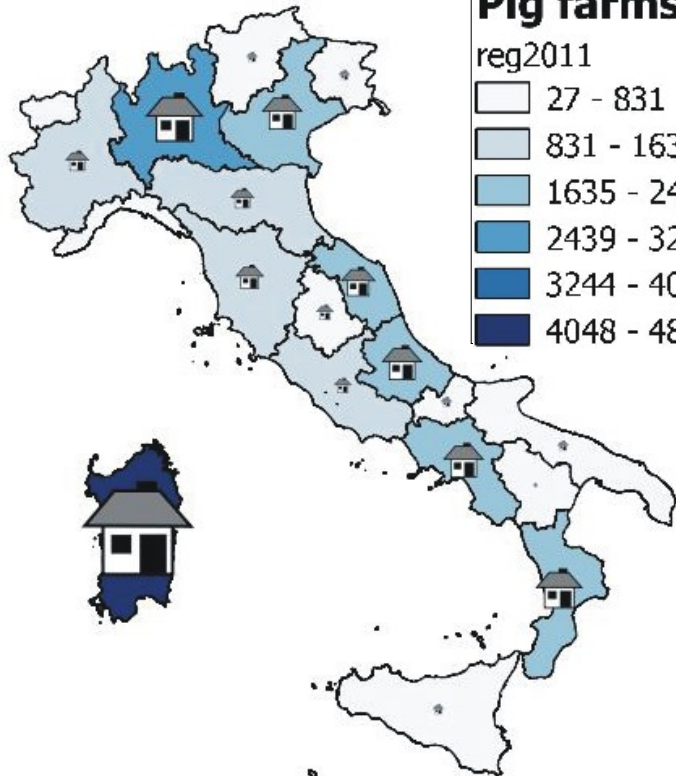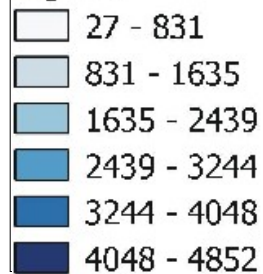
Cattle density [LU/ha UAA]
reg2011
- 0.0 - 0.2
- 0.2 - 0.4
- 0.4 - 0.6
- 0.6 - 0.8
- 0.8 - 1.0
- 1.0 - 2.0

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Regional distribution of pigs
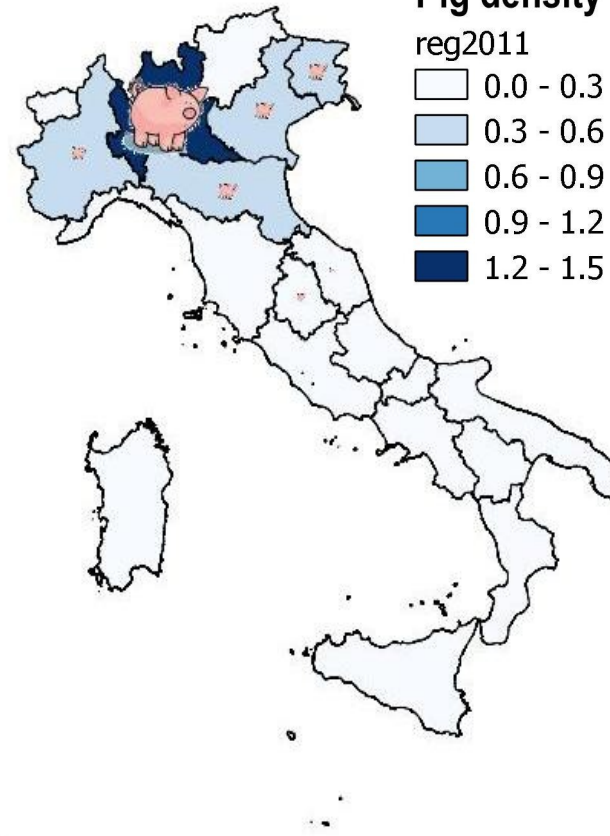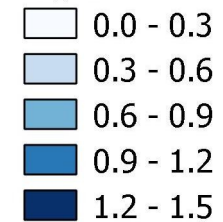
Farms

Heads

Regional distribution of poultry

Farms
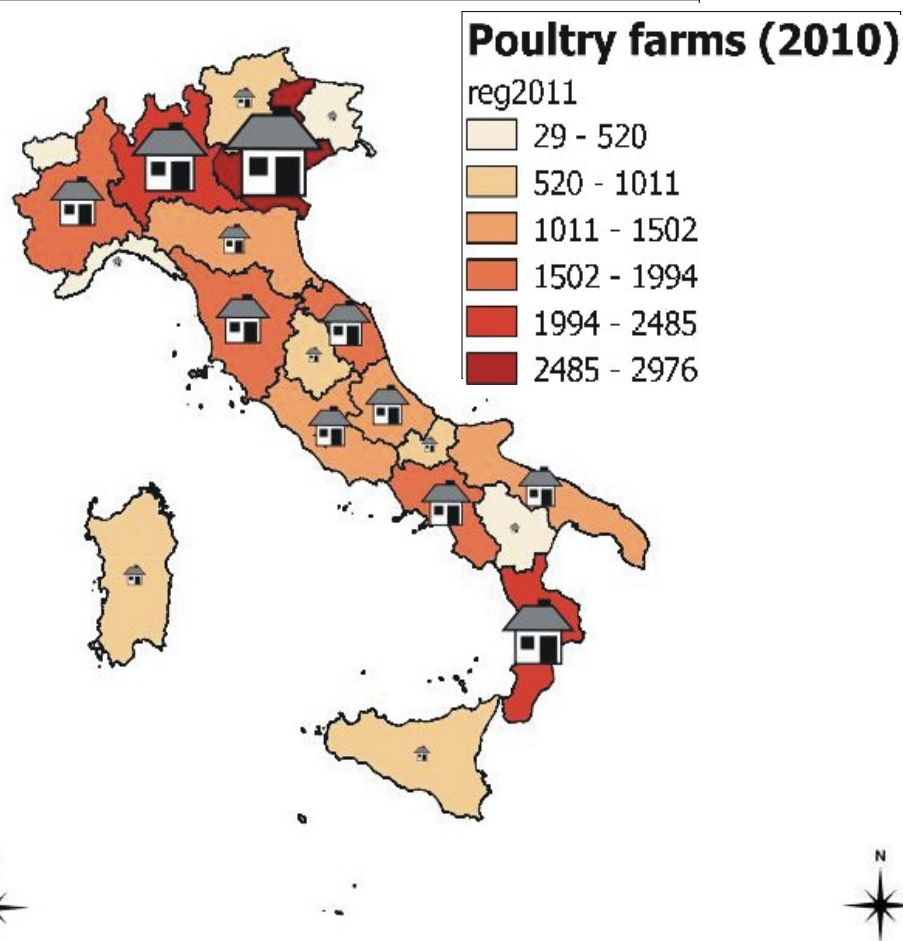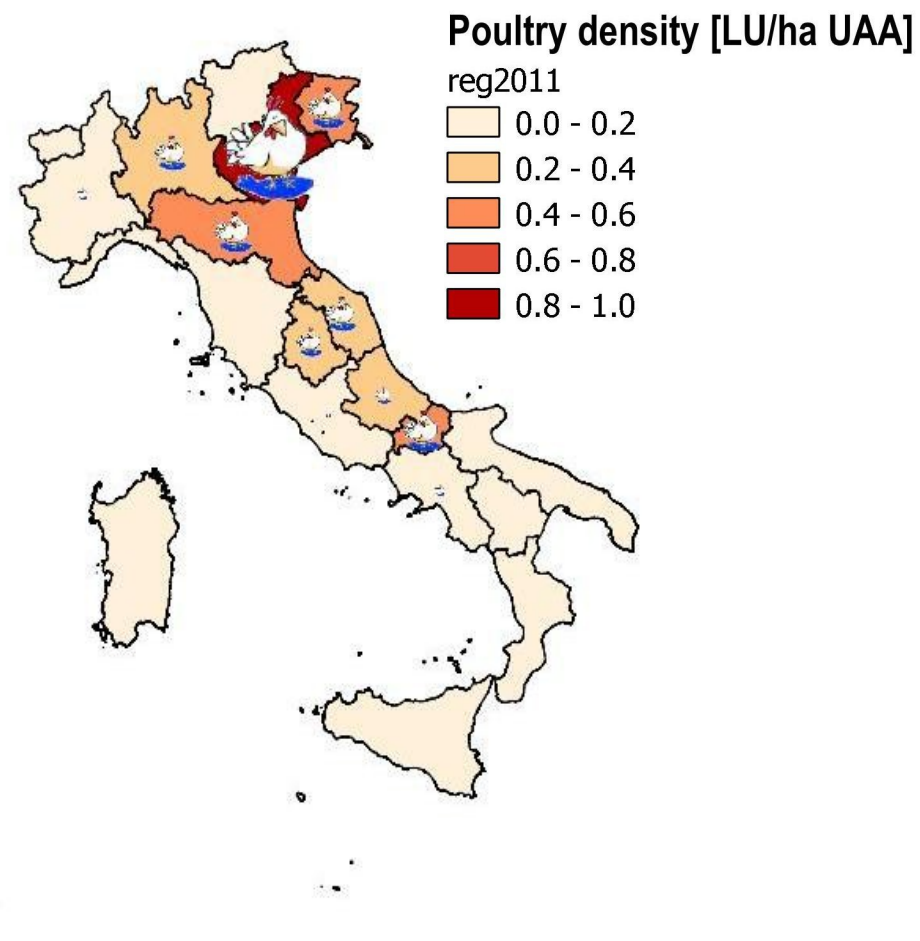
Heads

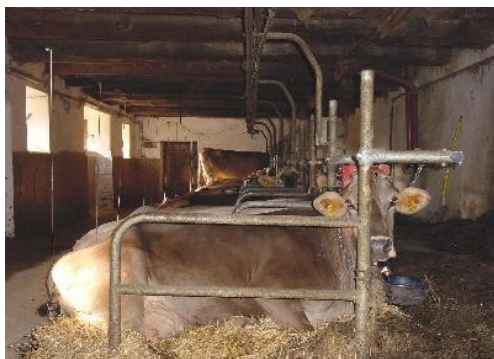# Class size distribution
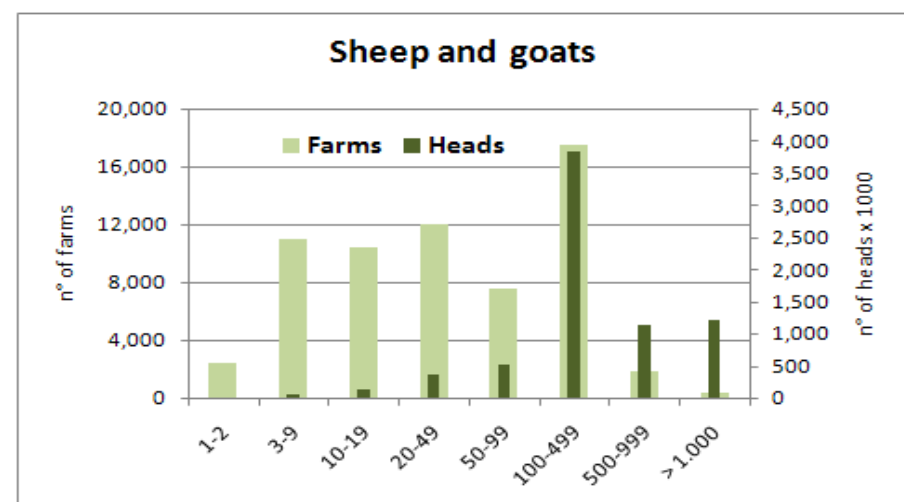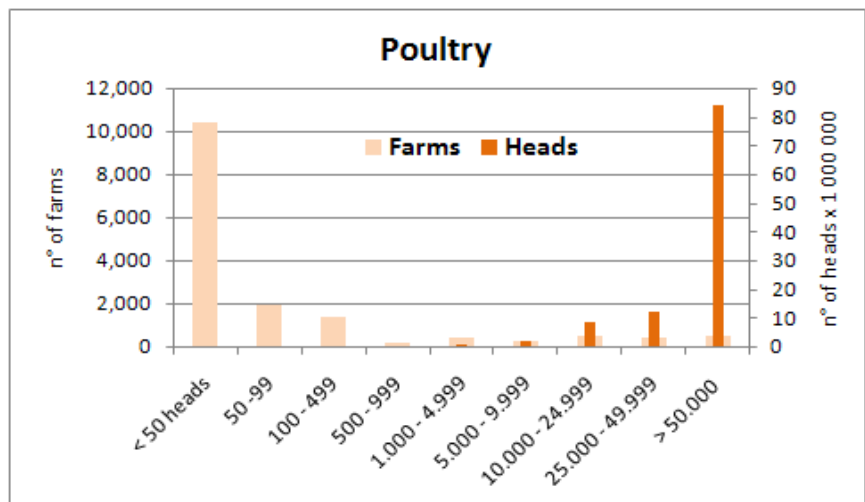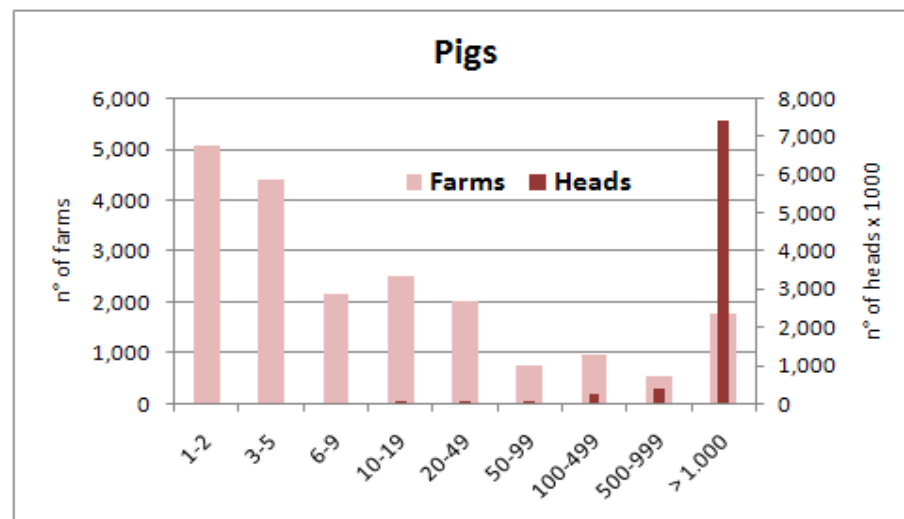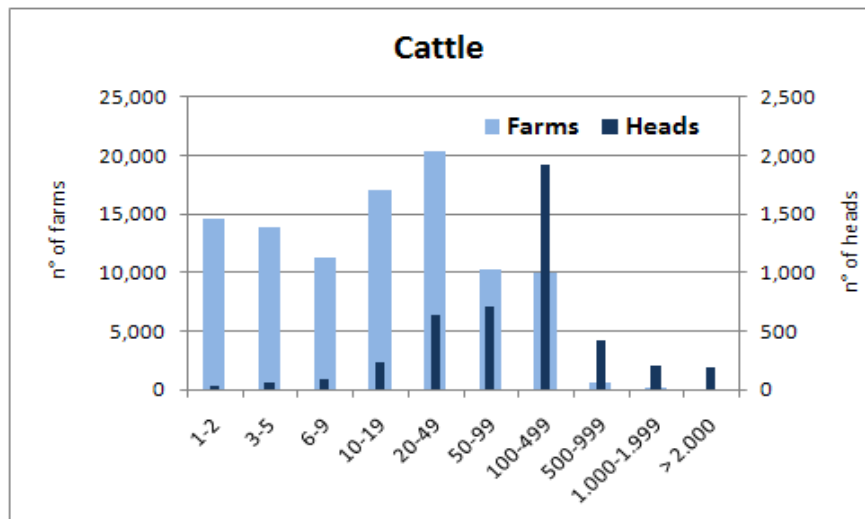
Housing type: dairy cows

Housing type	Grana Padano cheese	Parmeasan cheese	National inventory
	(% of total heads)		
Tied stalls with bedding	5	58	76
Cubicle housing	53	25	15
Loose housing on bedding	42	17	9

Ammonia emissions

Share of ammonia emissions
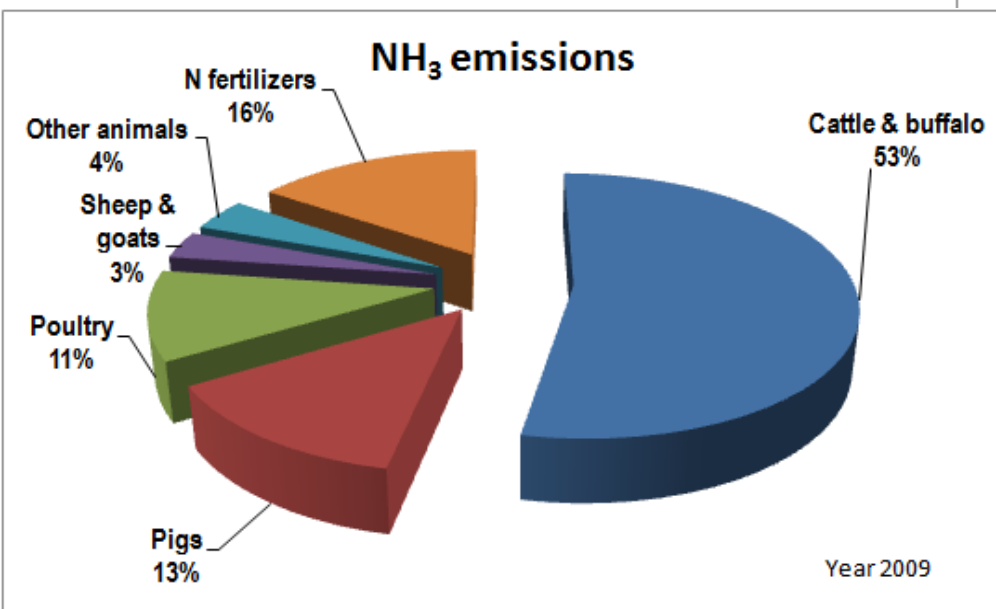
Source: ISPRA, 2011

Nitrous oxide emissions

N₂O emissions trend

-18%

Share of nitrous oxide emissions
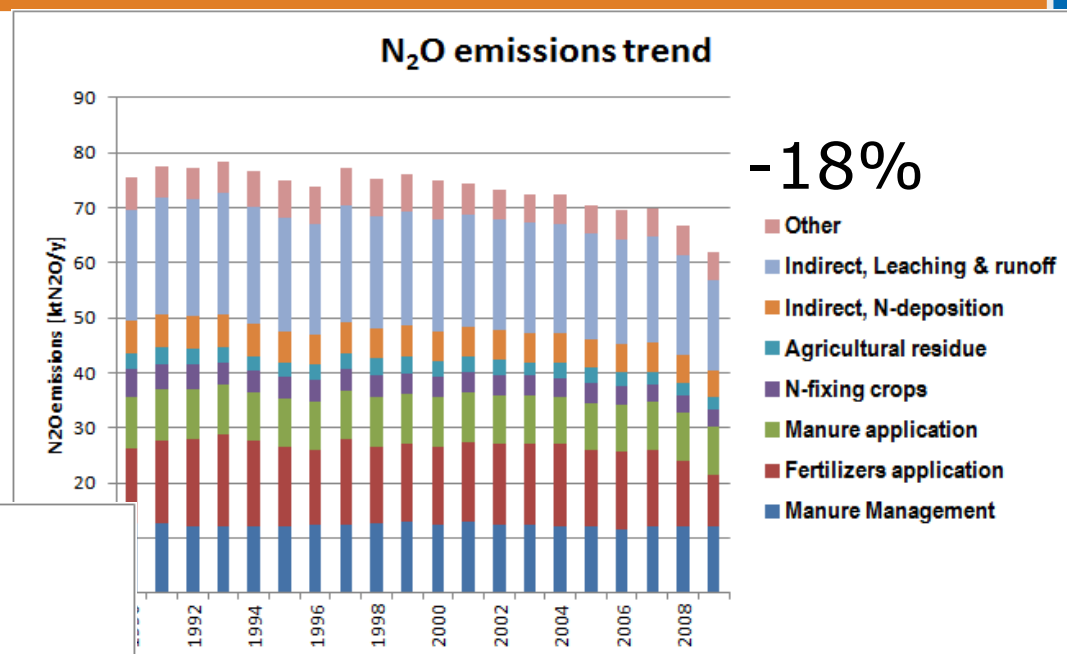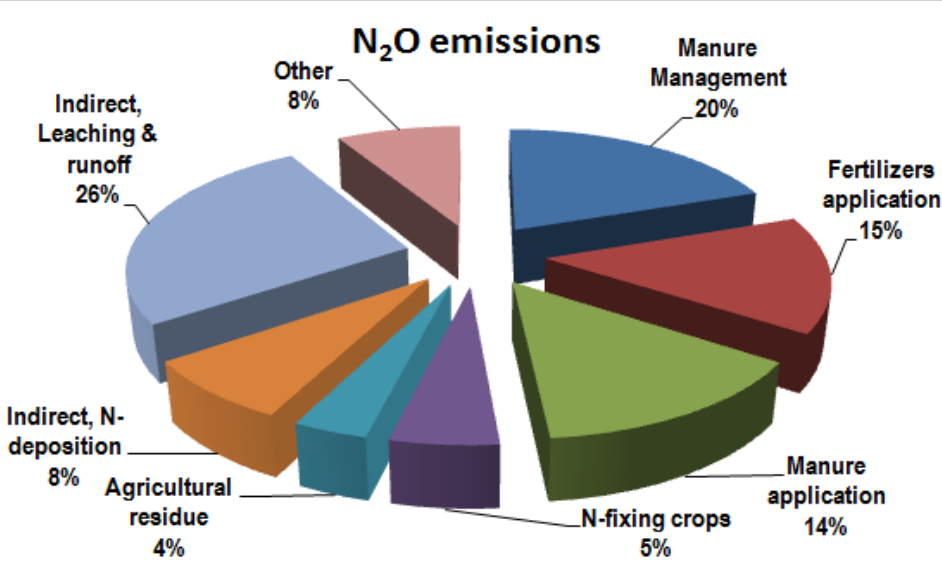
N₂O emissions

Source: ISPRA, 2011

Nitrogen fertilizers
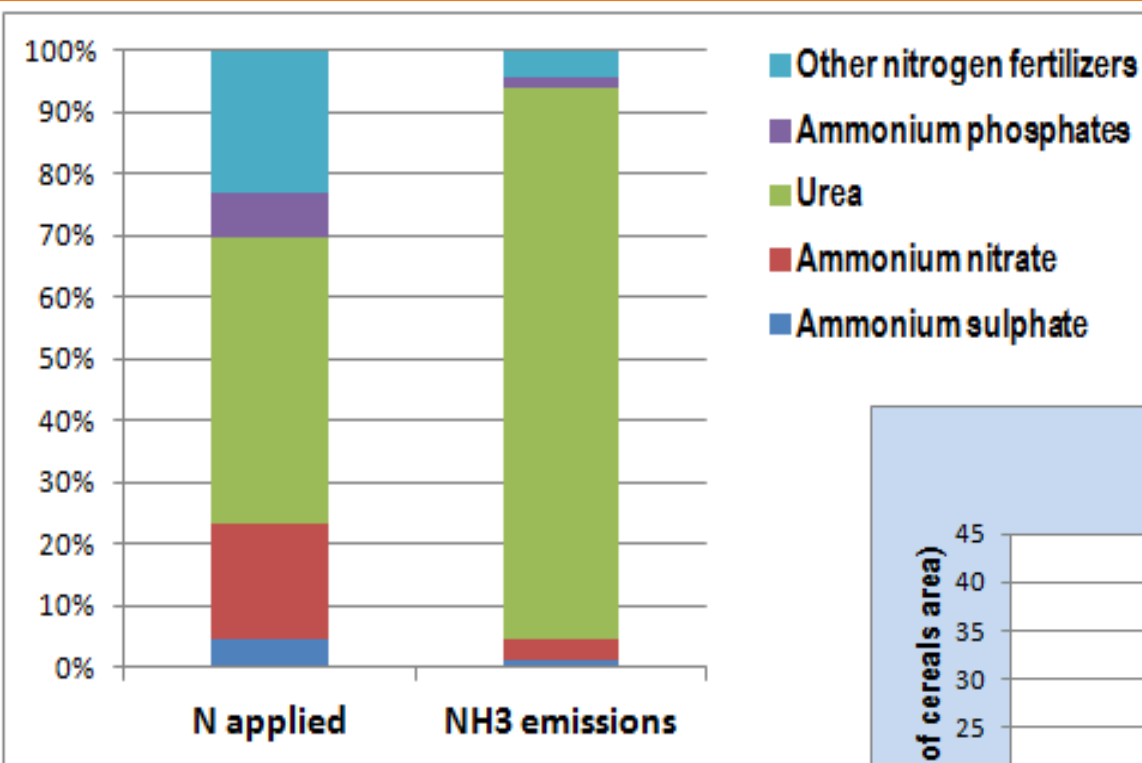
N applied and NH₃ emissions
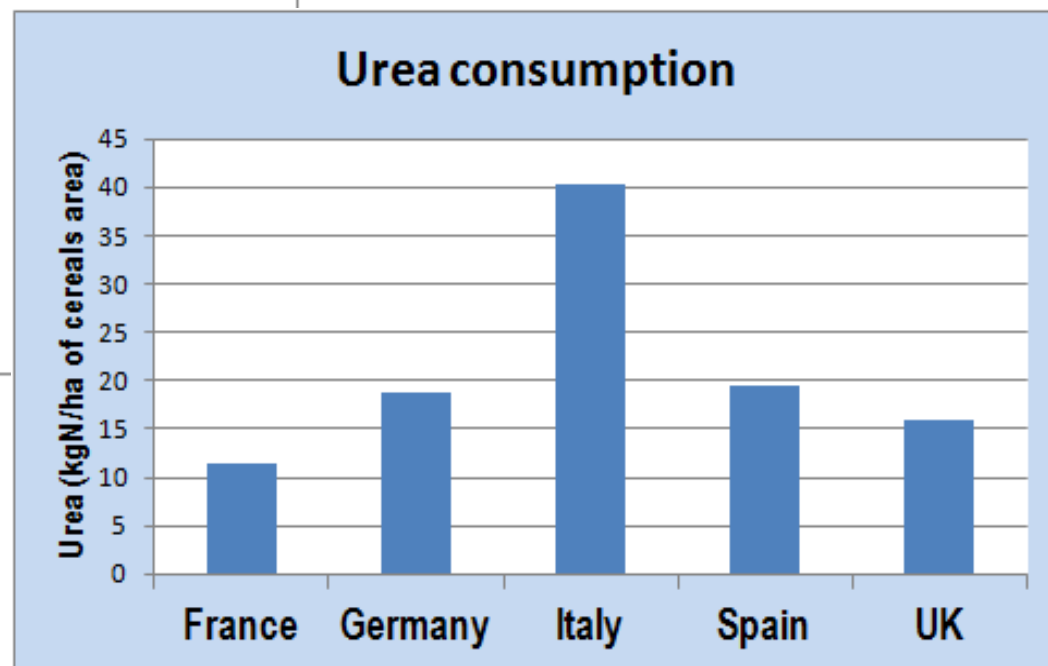
NH$_3$ emissions on a provincial basis

NH3 emissions (t)
Agricolture 2005

- 14 –2008
- 2009 – 4951
- 4952 – 12236
- 12237 – 28611
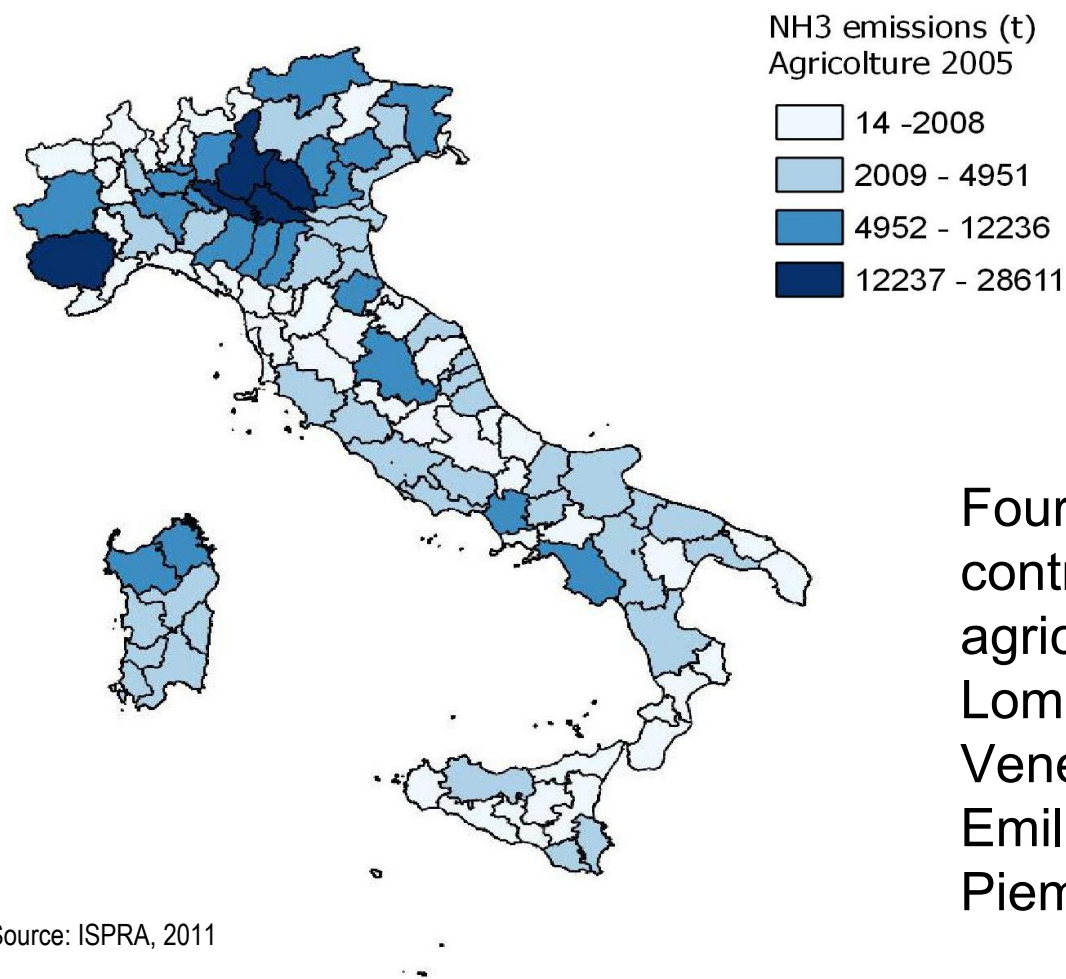
Source: ISPRA, 2011

Four regions from Italy contributed with 63% of agricultural NH3 emissions:
Lombardia (25%),
Veneto (15%),
Emilia Romagna (13%),
Piemonte (10%)

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Level of penetration of reducing techniques in pig houses
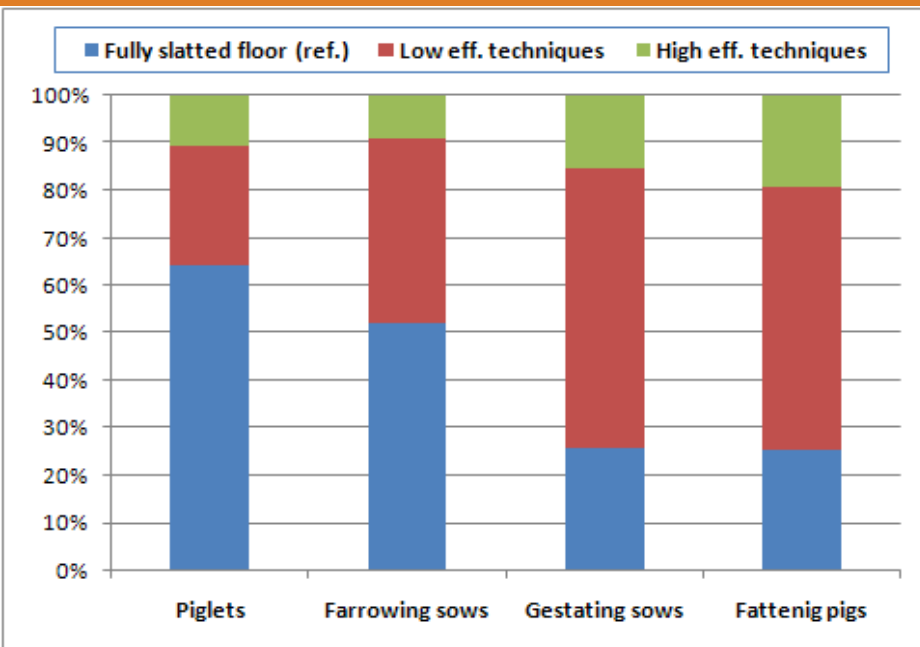
Referred to the total live weight more than 70% of national pig live weight have introduced BATs in pig houses
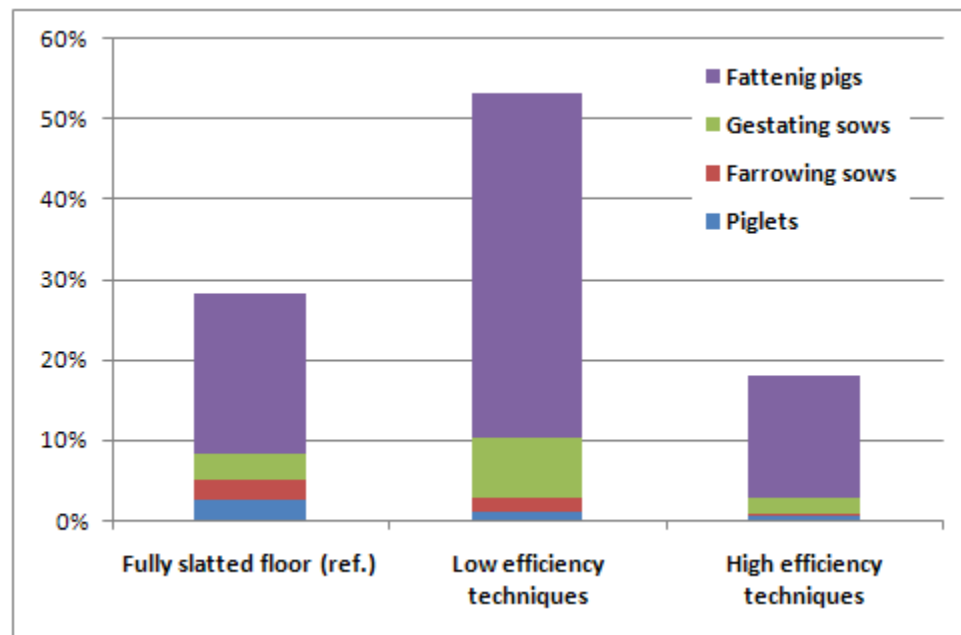
Source: ISPRA, 2011

Level of penetration of reducing techniques in storage of manure

Dairy cows
- solid manure 64%
- Slurry 36%
- uncovered tanks 28%
- covered tanks 4%
- lagoons 4%

Pigs
- covered tanks 4%
- lagoons 42%
- uncovered tanks 54%

Other cattle
- solid manure 48%
- Slurry 52%
- uncovered tanks 38%
- covered tanks 9%
- lagoons 5%

Poultry
- to fertilizer plants 32%
- in-field heap 43%
- concrete platform 8%
- shed 17%

Source: ISPRA, 2011

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Level of penetration of reducing techniques in field application of manure
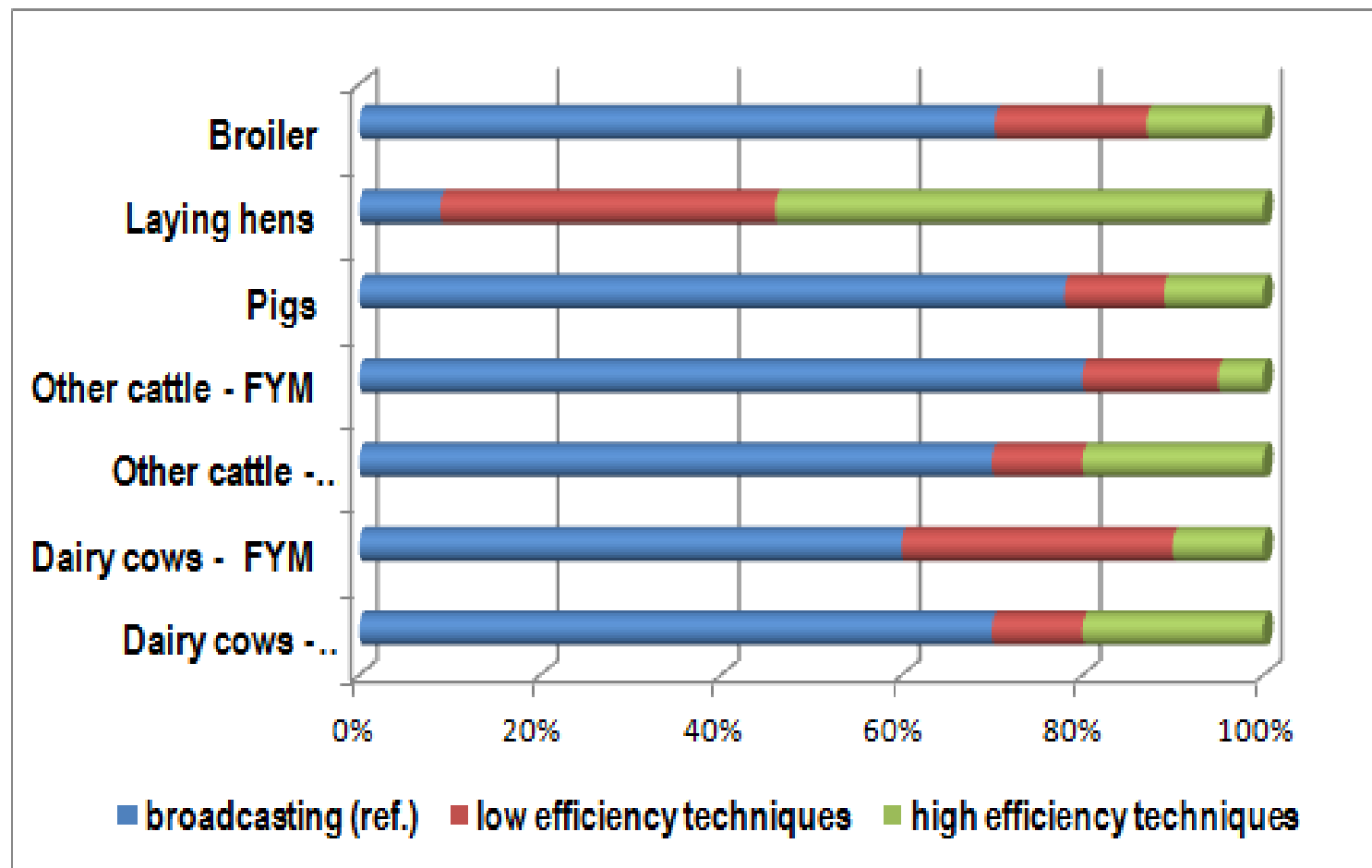
Source: ISPRA, 2011

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Driving forces for the diffusion of the emissions reducing techniques

- legislation, in particular:
  - the IPCC Direcive (pigs and poultry),
  - the Nitrate Directive (regional Action Programmes, national provisions with compulsory fertilization plans),
  - the directives on animal welfare (that, however, in some cases, lead to an increase of the emissions)
- advisory services, extension programs,
- voluntary measures aimed for good farming practices supported by government funds, e.g. the rural development programmes (RDPs) funds,

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Driving forces for the diffusion of the emissions reducing techniques

- motivation of the farmer:

  - to improve the environmental conditions of the farm (e.g. with frequent slurry removal techniques, improved ventilation, etc.),

  - to facilitate manure management operations (e.g. with fast drying of the poultry droppings),

  - to save the fertilizers consumption and costs, optimizing the use of the manure,

  - to mantain good neighborly relations and reduce litigation (e.g. with fast incorporation of slurry and manure after spreading)

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A model to assess the impact of future obligations of the Gothenburg Protocol

Assessment with a tool based on Miterra-Europe model, developed within a project funded by the Ministry of Environment and ENEA

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Scenarios for single measures
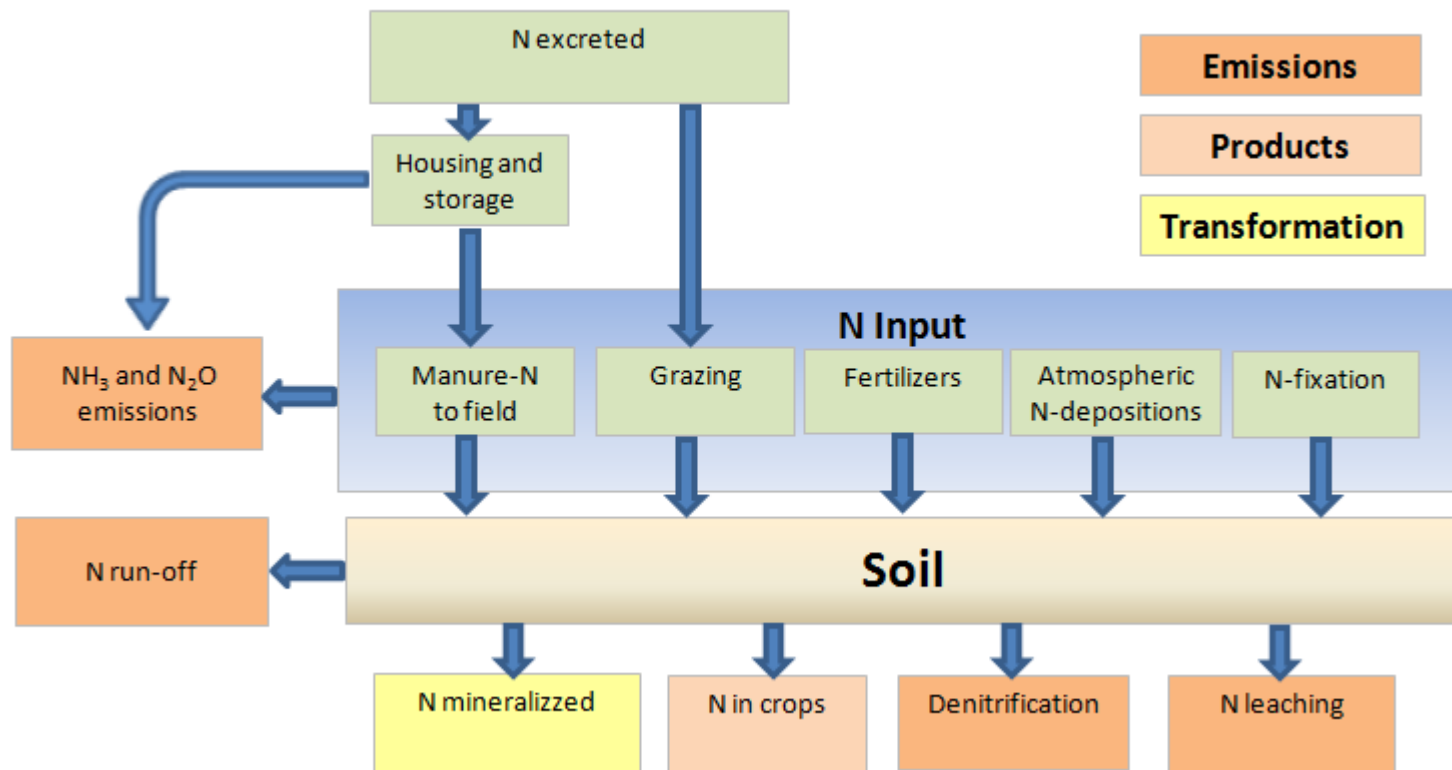
maximum applicability of single measures
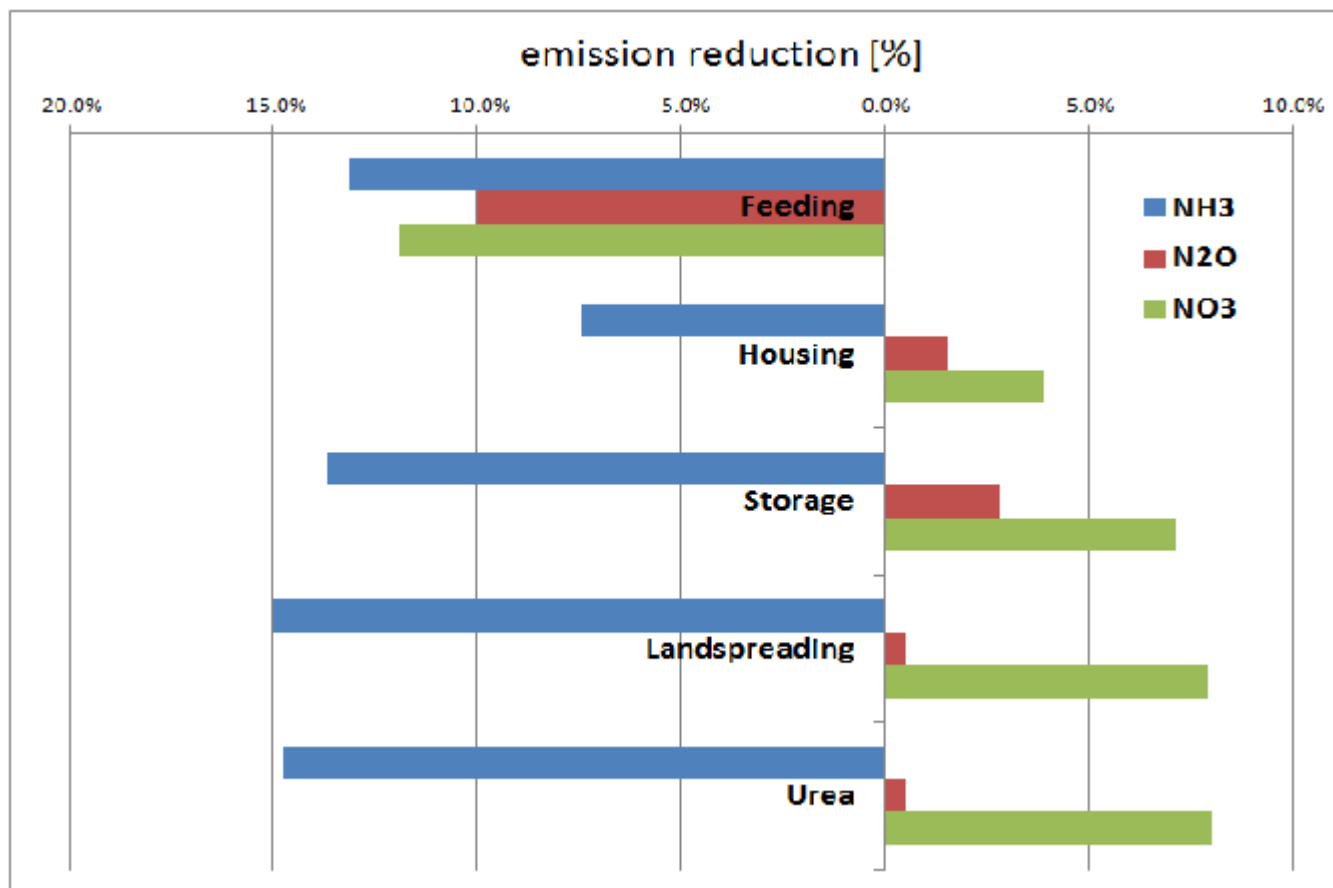
Scenarios for the future obligations of the Gothenburg Protocol

NH$_3$ emissions reduction [ktNH$_3$/y]

Legend:
- Feeding
- Housing
- Storage
- Landspreading
- N-fertilizers

GOT_A: -40%
GOT_B: -21%
GOT_C: -11%

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Manure N efficiency
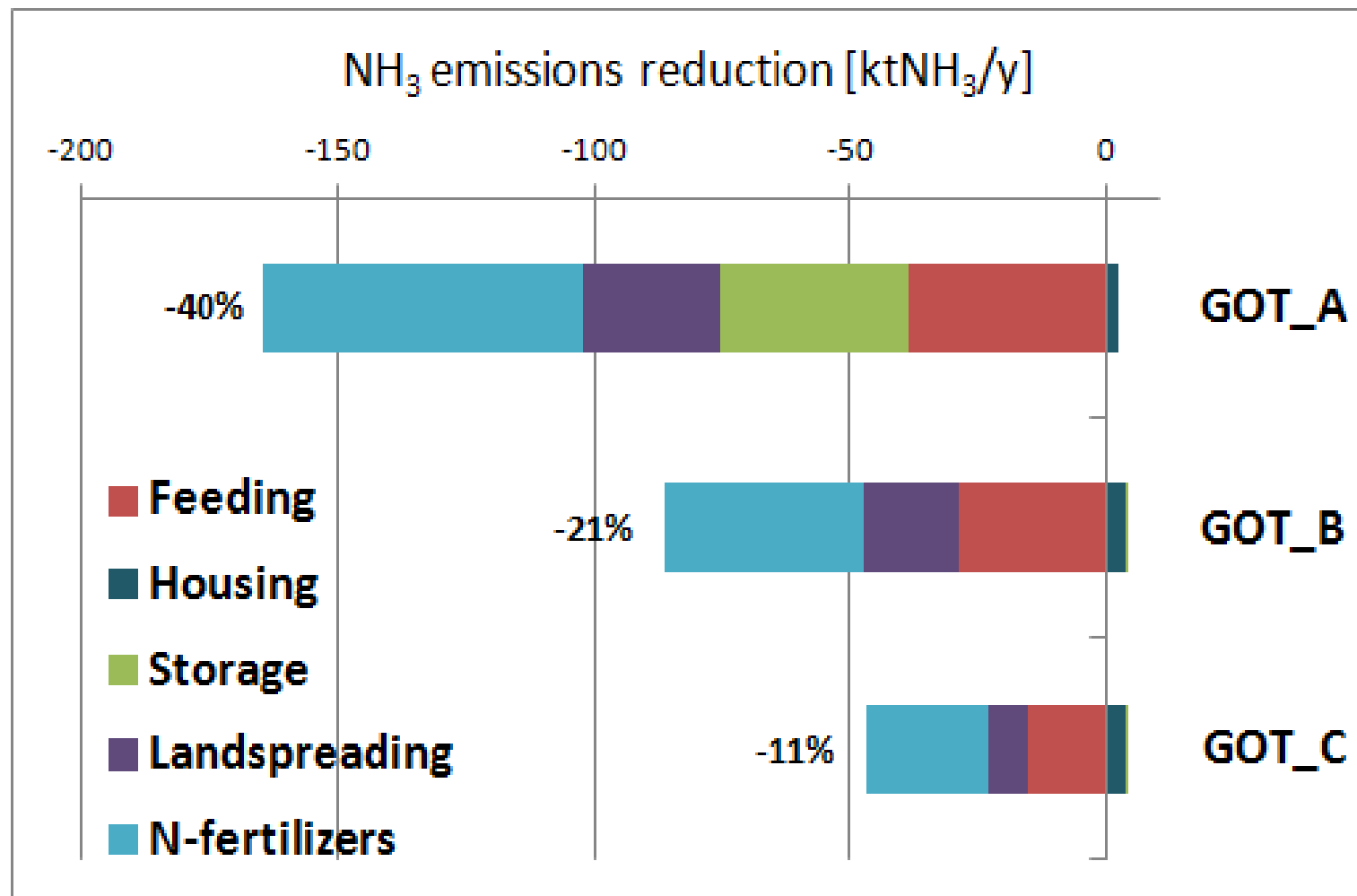
Livestock category	Manure N efficiency		
	(mandatory in Fertilization Plans*) Soil texture: fine / medium / coarse	(target at 2011*)	(derogation to ND)
Cattle - slurry	36 / 41 / 45%	50%	65%
Cattle - FYM	36 / 41 / 45%	40%	50%
Pigs	42 / 48 / 53%	60%	65%
Poultry	48 / 55 / 61%	60%	

(*) Ministerial decree of 7 April 2006 on agricultural utilisation of livestock manure

The increase in the manure N efficiency to the levels required should reduce the synthetic-N fertilizer need by 10-20%

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The increase in Nitrogen Use Efficiency (NUE) can reduce the input of synthetic N-fertilizers

Conclusions
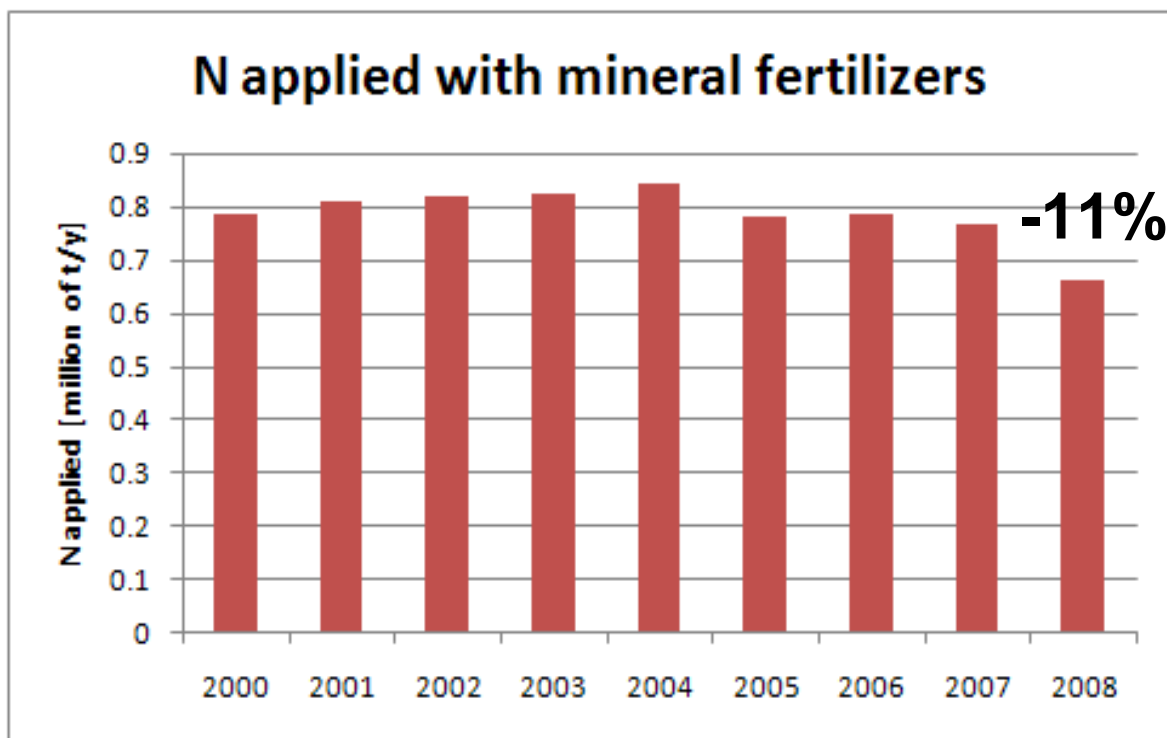
- Agriculture contributes for 95% and for 69% to the national emissions of NH_3 and N_2O, respectively,

- The main responsability in NH_3 emissions in agriculture is due to cattle (53%), followed by nitrogen fertilizer application (16%)

- The emissions of reactive nitrogen compounds can be reduced by the application of BATs

- It is necessary to take account of the full nitrogen cycle in order to avoid pollution swapping

- The most efficient measures are in low-N animal feeding, manure application, synthetic N-fertilizer application, balanced fertilization and NUE

- To assess the improvement the regular collection of ad-hoc statistical data is needed

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Thanks for your attention

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