

## Imke de Boer - Trends in Environmental Impact of Dutch Dairy Production

### Trends in environmental impact of Dutch dairy production

Imke J.M. de Boer

*Professor of Animal Production Systems*



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### Aim

Insight into trends in environmental impact of  
Dutch milk production

Future challenges & opportunities

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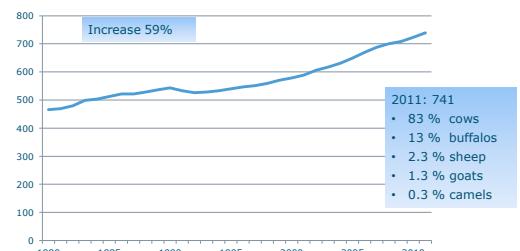
### Today

- Trends
  - Global milk production
  - Technical performance Dutch production
  - Environmental impact
- Future challenges & opportunities

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### World milk production 1980-2011

million tons



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FAOstat, 2013

### Top 10 milk producing countries/regions

Million tons ECM 2010

Country	Production	Global share (%)	Processed
EU-27	157.2	21.2	91.7
India	135.9	18.3	12.3
USA	82.1	11.1	99.5
Pakistan	41.7	5.6	11.9
China	36.2	4.9	86.1
Brazil	30.9	4.2	68.3
Russia	30.5	4.1	53.0
New Zealand	19.2	2.6	100
Turkey	13.6	1.8	53.8
Mexico	11.4	1.5	68.0
Iran	11.2	1.5	74.3
World	740.9	61.7	

### Top 10 milk processors

Company	Country	Market (%)	Turnover bill US\$
1 Fonterra Co-operative Group	NZ	3	16.4
2 Dairy Farmers of America	USA	2.4	13.0
3 Group Lactalis (Parmalat)	FR	2.1	16.9
4 Nestlé	CH	2.1	19.1
5 Dean Foods	USA	1.7	13.1
6 Arla Foods/Milch Union Hocheifel/ Milk Link	DK/SE	1.7	12.0
7 FrieslandCampina	NL	1.4	13.4
8 Danone	FR	1.1	15.6
9 Kraft Foods	USA	1.1	7.5
10 DMK – Deutsches Milch Kontor	DE	1	6.4
			17.7

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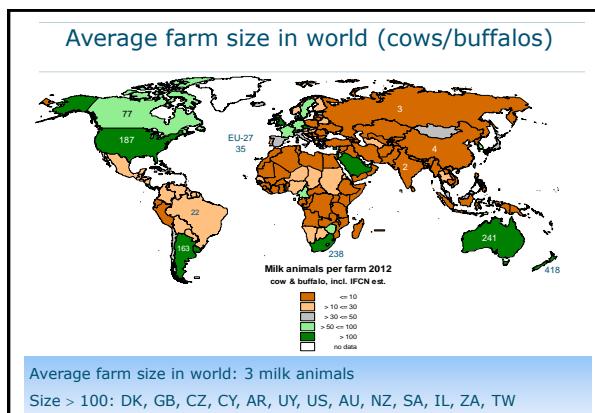
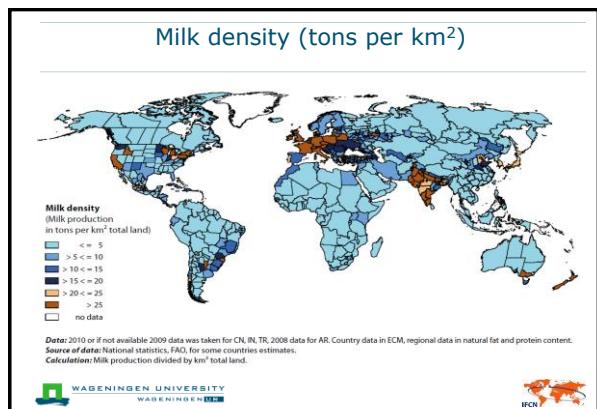
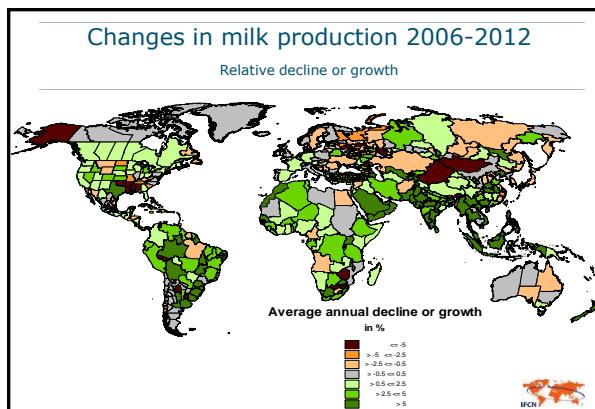


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### Environmental challenges

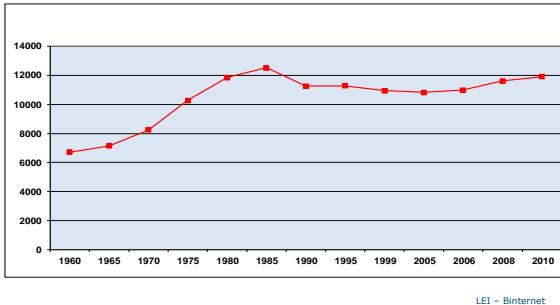
- Emission of greenhouse gases (GHGs)
  - Global contribution is 4.4% (Gerber et al. 2013)
  - NL: 30%↓ in GHGs in 2020 compared to 1990
- Local eutrophication and acidification
  - Regulation: < 50 mg NO<sub>3</sub><sup>-</sup>/l groundwater
  - < 0,22 mg P/l surface water
  - < 2,4 mg N/l surface water
  - < 129 kton NH<sub>3</sub> in NL (NEC)
- Use of resources: land, water, fossil energy & P

### Trends in technical performance



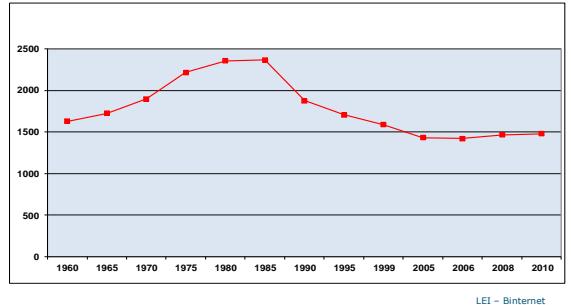
### Milk production in NL

National production (x 1000 tons) doubled in 50 years



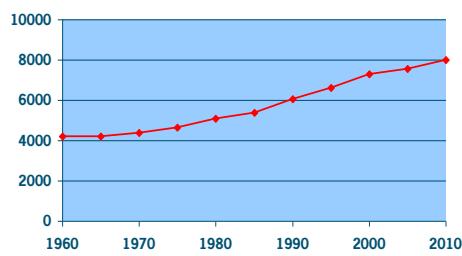
### Milk production in NL

Number of cows (x 1000) almost equal to 50 years ago



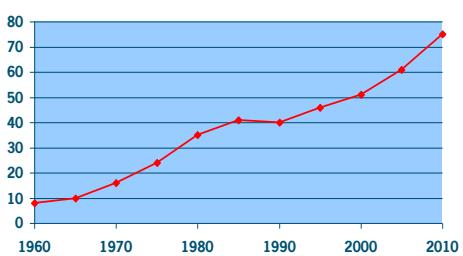
### Milk production in NL

Milk production per cow (kg/year) doubled in 50 years

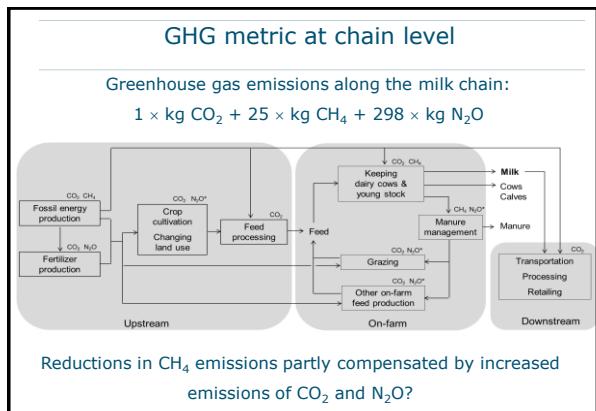
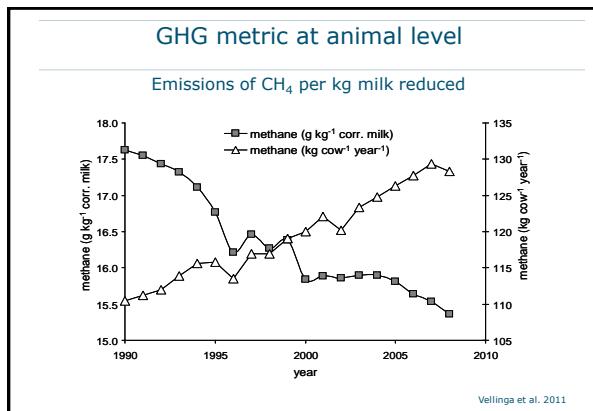
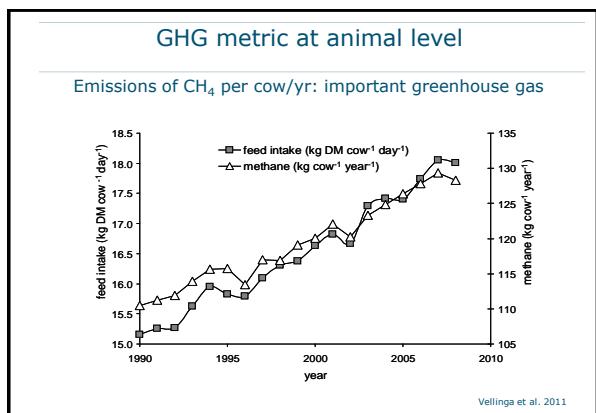
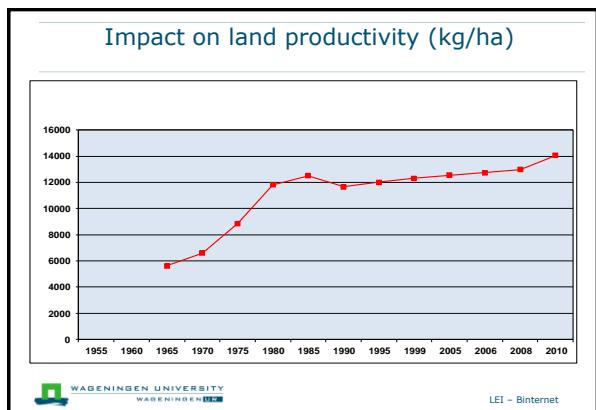
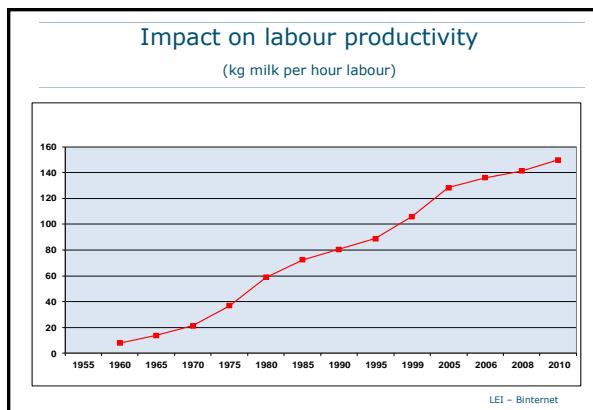


### Milk production in NL

Number cows per farm 10 times higher in 50 years



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### GHG metric at chain level

National GHG emissions cradle-to-farm gate dairy sector  
 (million tons CO<sub>2</sub>-e)

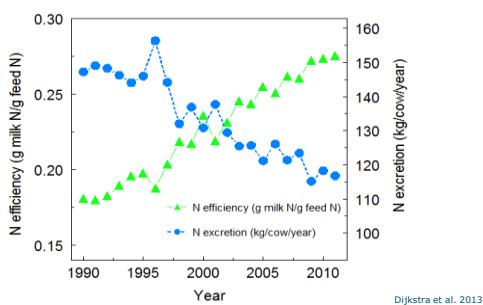


### Conclusions GHG emissions

- Past trends in milk production per cow reduced CH<sub>4</sub> emissions per kg of milk (global issue)
- Manure policy further reduced GHGs per kg of milk
- Growth milk production requires >10% reduction in GHG emissions

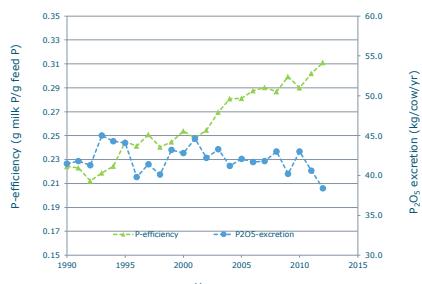
### Nutrient metric at animal level

Trends in efficiency of N use



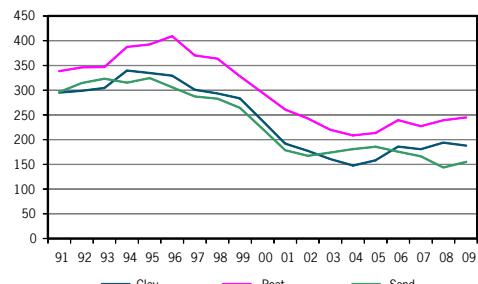
### Nutrient metric at animal level

Trends in efficiency of P use



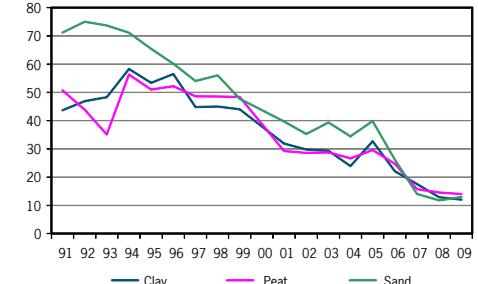
### Nutrient metric at farm level

Kg N/ha Trends in N surplus/ha

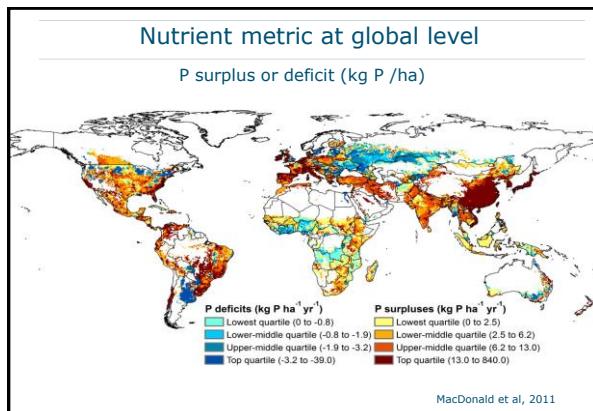
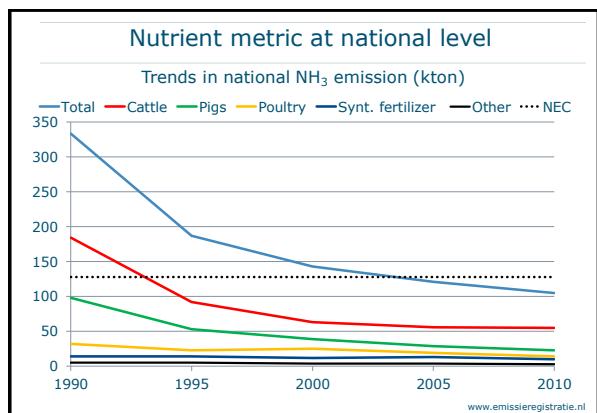
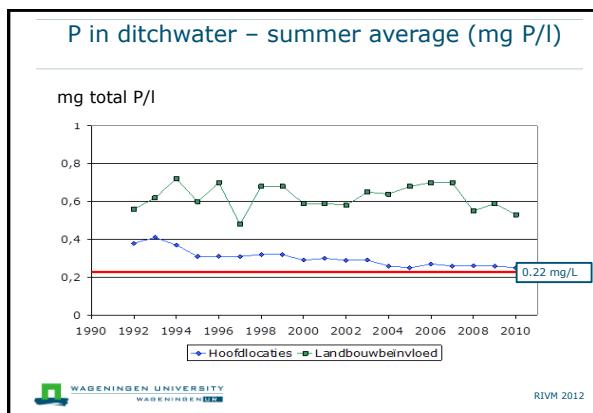
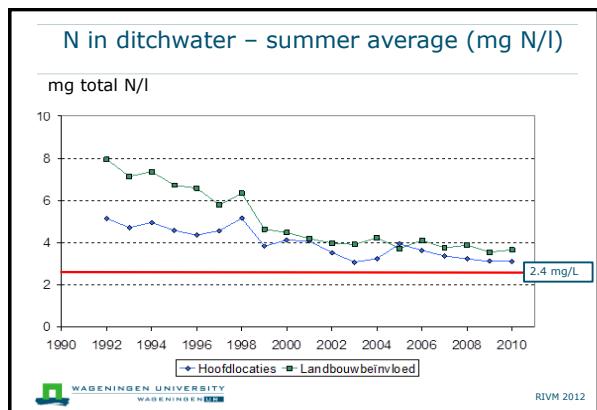
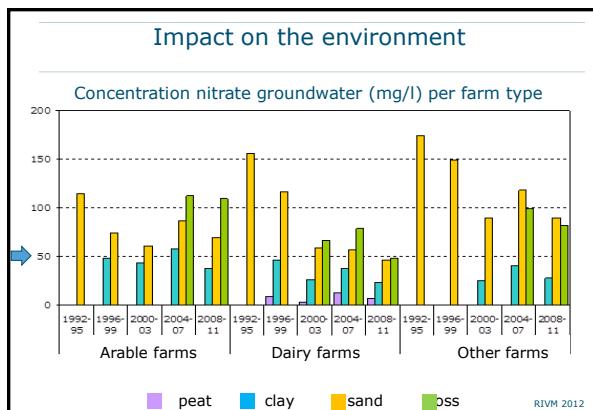


### Nutrient metric at farm level

Kg P/ha Trends in P surplus/ha



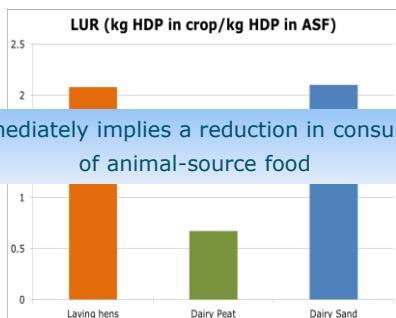
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- ### Conclusions NP emissions
- Nitrate levels <50 mg/l for dairy farms, not for arable or other livestock farms
  - NEC NH<sub>3</sub> accomplished: future target ..... ?
  - Emissions N and P to surface water still too high
  - Growth of the milk sector requires further reductions in NP surplus per ha
  - Restore nutrient cycle regionally

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### Global metric for land use efficiency



.... immediately implies a reduction in consumption of animal-source food

### Future environmental challenges

- Maintain current nitrate levels ground water
- Maintain ammonia ceiling
- Further reduce GHG emissions
- Further reduce NP emissions to surface water
- Restore nutrient recycling at farm and regional level
- Avoid competition between feed and food

### Opportunities

- Use "Kringloopwijzer" to improve nutrient recycling and identify farm-specific improvement strategies, e.g.
  - precision feeding & fertilization;
  - improving longevity & life-time milk yield;
  - mono-digestion manure (no additional maize etc.);
  - separate faeces & urine
- Avoid off-farm trade offs via, e.g., imported feed
- Use wind & solar energy instead of fossil fuels
- Avoid competition feed and food: maximize animal productivity on grassland unsuitable for crop cultivation

### "No-single-solution"



Future development of milk production requires a farm-specific approach!

Thank you for your attention



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