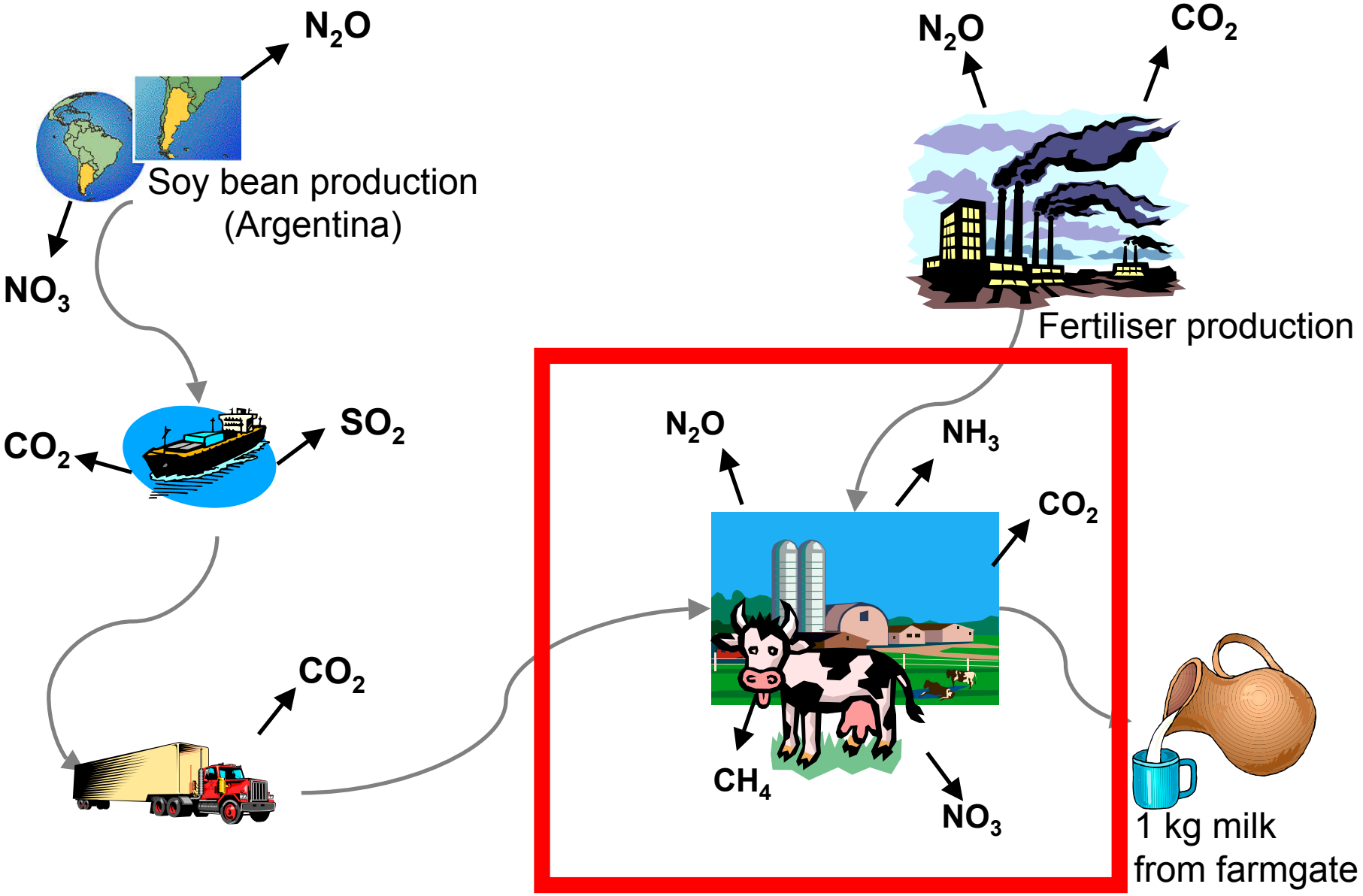
An LC inventory based on representative and coherent farm types

Randi Dalgaard, Niels Halberg

Ib Sillebak Kristensen

Inger Larsen

Ministry of Food, Agriculture and Fisheries
Danish Institute of Agricultural Sciences
Department of Agroecology


N_2O
Soy bean production
(Argentina)
NO_3
N_2O
CO_2
Fertiliser production
CO_2
SO_2
N_2O
NH_3
CO_2
CO_2
CH_4
NO_3
1 kg milk
from farmgate

Objectives

- To present a method for establishing a typology of 28 farm models based on representative data for the Danish agricultural sector.
- To discuss problems and advantages in using the representative data.

Ministry of Food, Agriculture and Fisheries
Danish Institute of Agricultural Sciences
Department of Agroecology

Method for establishing LCI for farm types

- Step 1: Modelling farm types
- Step 2: Modelling emissions

Ministry of Food, Agriculture and Fisheries
Danish Institute of Agricultural Sciences
Department of Agroecology

Step 1: Modelling farm types

- Starting point: Representative data (e.g. land use, crop yields, live stock) from farm accounts.
- Soy meal and feed
- Nitrogen fertiliser
- Sold products (milk, grain, rape seed, sugar beet etc)
- Coherent farm types!

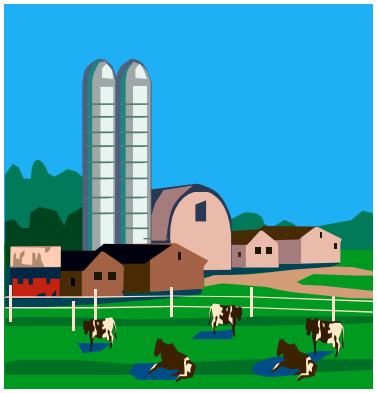
Ministry of Food, Agriculture and Fisheries
Danish Institute of Agricultural Sciences
Department of Agroecology

Step 1: Modelling farm types

An example: Farm type 18, Dairy farm, high stocking rate, 48 hectares, 75 milking cows

Inputs per year

Feed grain: 224 tons
Soy meal: 256 tons
Fertiliser: 2821 kg N
Mineral feed: 1565 kg
Electricity: 37 MWh
Etc.



Products per year

Milk: 538 tons
Wheat: 8,4 tons
Sugar beet: 44,9 tons
Beef meat: 23,9 tons
Manure: 1,9 tons N

Farm type 18 represent 330 Danish dairy farms

Upscaling…….

330 * 48 hectares = 15.840 hectares

330 * 75 milking cows = 24.750 milking cows

Ministry of Food, Agriculture and Fisheries
Danish Institute of Agricultural Sciences
Department of Agroecology

Comparing typology of farm models with national statistics

Agricultural area	0%
Milking cows	-4%
Slaughtering pigs produced	-1%
Soy meal	-7%
Fertiliser, Nitrogen	-11%

Ministry of Food, Agriculture and Fisheries
Danish Institute of Agricultural Sciences
Department of Agroecology

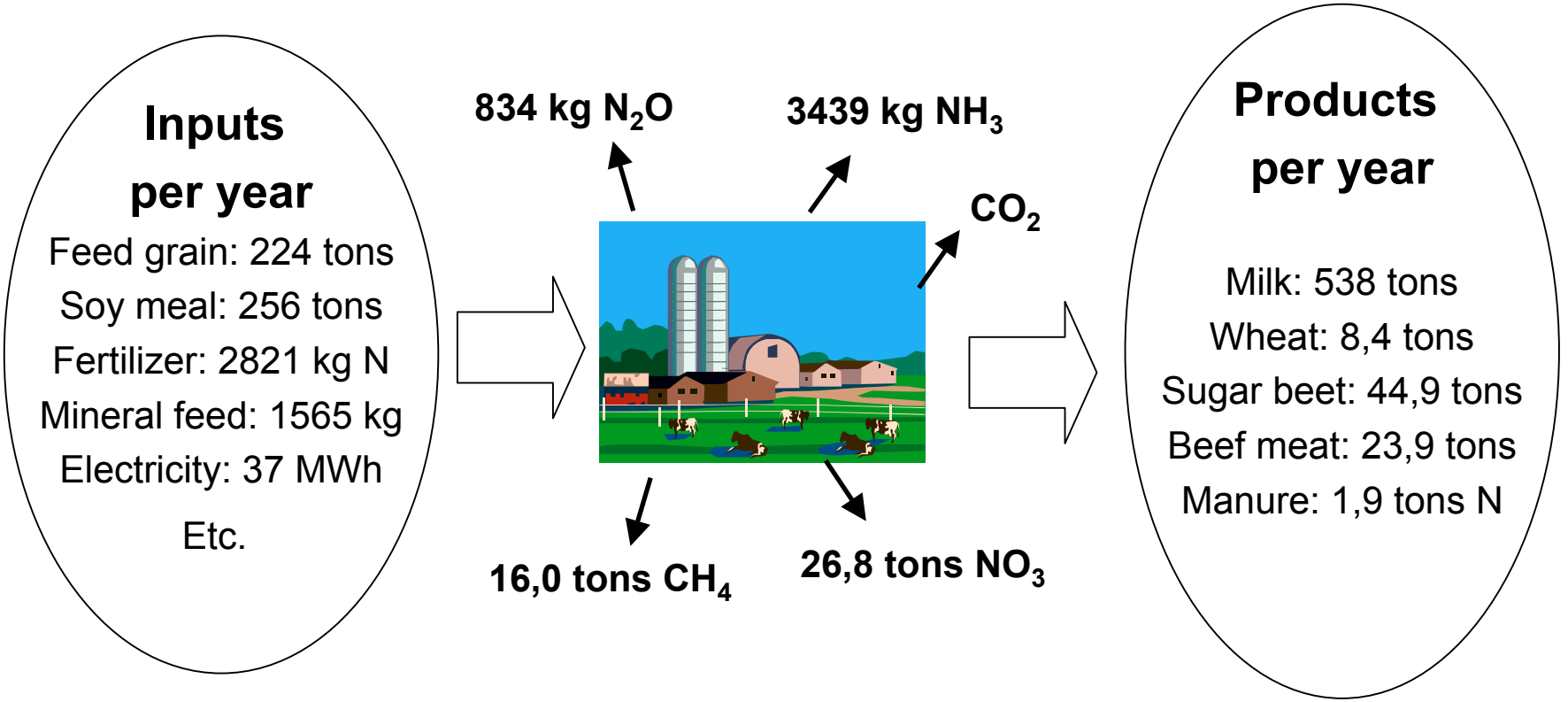
Step 2: Modelling emissions

- Methane and nitrous oxides (Standards from IPCC)
- CO_2 (estimated from use of fossil fuel)
- Ammonia (Standards from NERI)
- Nitrate = N_{input} - N_{output}-$N_{NH3\text{-}loss}$-$N_{denitrifikation}$
- Phosphate = P_{input} - P_{output}

Ministry of Food, Agriculture and Fisheries
Danish Institute of Agricultural Sciences
Department of Agroecology

Step 2: Modelling emissions

An example: Farm type 18, Dairy farm, high stocking rate, 48 hectares, 75 milking cows



Comparing typology of farm models with national statistics

CO_2 equivalents	-11%
Nitrous oxides	-11%
Methane	6%
Ammonia	-14%

Ministry of Food, Agriculture and Fisheries
Danish Institute of Agricultural Sciences
Department of Agroecology

Method for establishing LCI for farm types

- Step 1: Modelling farm types
- Step 2: Modelling emissions

Ministry of Food, Agriculture and Fisheries
Danish Institute of Agricultural Sciences
Department of Agroecology

Problems

- Differences within farm types due to farmers' management is not reflected
- Use of correction factor

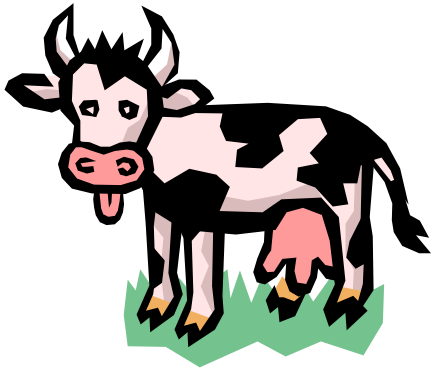
Advantages

- The typology accounts for most input and output of the Danish agricultural production
- The farm types are representative and coherent
- The farm types allow for LCA of agricultural products, by use of system expansion
- Relatively easily updated with data for the subsequent years

Ministry of Food, Agriculture and Fisheries
Danish Institute of Agricultural Sciences
Department of Agroecology

Conclusion

- Possible to establish typology of 28 farm models
- Farm types are,
  - Representative
  - Coherent



Ministry of Food, Agriculture and Fisheries
Danish Institute of Agricultural Sciences
Department of Agroecology