Farming at cash crop farms (Planteavlsbedrifter)

Denmark 2000

Process description

The present data refer to production on five typical Cash Crops farms in 2000, which combines dairy and (cash) crop production in a mixed farming system. Nitrogen balances for different cash crop farms can be seen here. The main characteristics of the eight farms are summarized in Table 1.

Table 1: Main characteristics of the considered dairy farms.

Soil type		Loamy (clay)			Sandy	
Farmtype		2	3	11	15	24
Main product		Sugar beets	Grass seed	Cereals	Potatoes	Cereals
Land area, total (ha)		78	105	68	94	76
Percent per total land area	Spring barley	26%	15%	22%	28%	28%
	Wheat	31%	37%	39%	11%	26%
	Other cereals	3%	3%	11%	10%	11%
	Potatoes	0%	0%	1%	26%	1%
	Seed	5%	22%	2%	2%	6%
	Sugar beet	22%	2%	1%	0%	1%
	Others[1)]	14%	20%	24%	23%	29%
ton crop yield per ha	Winter wheat	86.3	80.3	75.1	59.3	64.0
	Spring barley	61.8	59.4	53.6	46.0	45.7
	Potatoes	306.3	296.4	292.2	281.7	340.5
	Grass seed	11.2	10.8	8.9	11.5	8.8
	Sugar beet	559.9	535.6	537.5	460.5	506.2
	Rape seed	30.4	31.7	28.8	19.6	18.2

Data collection and treatment

Data collection:
All Danish farms are obliged to keep detailed records of purchases and sales for tax purposes and the yearly accounts are made with professional help. A representative set of these accounts, 2138, are reported by the advisors to the Danish Research Institute of Food Economics (FØI) and constitute the basic empirical input to the farm types presented here. Besides the economical data, information on the land use, livestock numbers and amounts produced are included in the data set by the advisors.
Data from other sources are used to model the technical processes: Data from the advisory services (feeding and grazing practices), the Directorate for Food, Fisheries and Agri-business, and Statistic Denmark (countrywide use of fertilizer and concentrates, partition of land use on different crops and their total yields). The Danish Institute of Agricultural Sciences (DIAS) together with FØI and Statistic Denmark is responsible for data collection.

Data treatment:
The data processing and details of the different farm types is the responsibility of DIAS and FØI. The FØI checks the account data and has divided the accounts according to the farm typology presented. DIAS to model a typical farm in terms of land use, herd size and

production has used these average data from each farm type. All resource use, inputs, production and emissions is calculated using the farm level as the main unit and all the single enterprises have been described so that they fit coherently into the overall farm balances (e.g. crop production must fit the sum of homegrown feed used and exported). Thus, inputs of fertilizer, feeds and minerals are calculated to mach the livestock and cash crop production after correction for home grown feed (see also under validation).

The nutrient turnover on the farm is calculated by multiplying the physical turnover of inputs and products with N and P contents following standard procedures. Emissions of ammonia, methane and nitrous oxide (N_20) from the livestock, stables, manure storage and handling and from crop residues and soil are calculated using standard coefficients (IPCC, 2000) on the amounts of nutrients and feed dry matter (DM).

Direct energy use is determined by the use of a model that attaches diesel use to field operations following Dalgaard et al. (2000).

Technical scope

The Inventory includes all processes on the farm necessary for the cultivation and preservation of crops and home-produced fodder (e.g. soil preparation, sowing, fertilizing/manuring, plant protection, harvesting, making silage and transport of crops).

Resource use and emissions related to the production of fertilizer, imported feeds, minerals and electricity are handled as external processes described separately.

Pesticide use is not included in the first version. Resource use and emissions related to the construction and maintenance of buildings and machinery used on the farm is not included. Only technical allocations have been made between enterprises within the farm and only when resources used could be clearly divided between the enterprises. To account for the part of resource use and externalities related to e.g. meat on the cash crop farm the method of system enlargement is recommended. This method has been used in the Simapro database developed from this inventory to define the resource use and emissions attached to cash crop production per se.

Representativity

The dataset of 2138 accounts used is statistically representative of the Danish farming sector (50000 farms in total) following a method developed over several decades for yearly economical analysis of Danish farms (FØI) and for reporting to other bodies like the EU Farm Accountancy Data Network. In order to secure representativity within the established typology only farm types that could be described by at least 14 accounts from the sample were allowed for the basic products. Moreover, a given farm could be included in only one type depending on the main enterprise. The data represent only one year (2000), but the large number of farms allows for some generalizations of the input-output relationships.

The present dairy farm types are based on 8 sub samples. Together they represent all Danish dairy farms with a maximum of 10% of Gross Margin from pig production. The total milk production on these types account for 85% of the total milk produced in Denmark. The farms have been divided into groups in order to represent dairy production on sandy and loamy soil types respectively and with different stocking rates (number of standard livestock units per hectare). Two separate types represent organic dairy farms. Farms with low or medium

stocking rates usually produce 1-3 secondary products, which may differ from farm to farm. The resulting farm type thus represents an average of these secondary enterprises, but the number of small enterprises is not typical for a single farm.

Validation

The representativity of the farm accounts has been checked using standard methodology at FØI. The resource use and production on the farms have been validated at two levels: Internal coherence within each farm type and overall coherence between the sum of farm types and national level input use and production.

On the farm level the quantification of each type has been validated primarily by checking the coherence between land use, crop yields and livestock production (e.g. the feed needed for the herd matches the home-produced feed plus imported feeds less sold cash crops and the sum of homegrown feeds and sold crops fits the land use).

At a higher hierarchical level the land use has been validated by comparing the sum of each crop acreage over all types with national statistics for the same year, e.g. checking that the total wheat area and total wheat yield does not differ more than a few % from the national statistics.

Likewise, the total estimated use of inputs like diesel, fertilizer and concentrated feeds across all farm types have been checked against statistical information on national level. In case of differences that could not be ascribed to an error in a specific type, a general correction factor was multiplied into all types for the relevant input item.

Inputs and outputs

Inputs and outputs associated with production processes at eight different types of diary farms. Data are provided per farm per year.

	Soil type	Loamy (clay)			Sandy	
	Stocking rate	2	3	11	15	24
Products						
Spring barley	ton	0	0	78.4	8.1	88.7
Winter barley	ton	9.2	12.9	23.5	12.6	13.8
Bread wheat	ton	133.6	204.3	128.7	39.8	80.3
Wheat	ton	71.9	110.0	69.3	21.4	43.2
Oat	ton	0.410	1.3	8.2	2.6	1.7
Rye	ton	2.1	0	10.1	28.2	23.5
Rape seed	ton	2.5	21.1	16.6	4.1	12.0
Grass seed	ton	3.6	21.1	1.0	2.1	3.5
Clover seed	ton	0	0.7	0	0	0
Peas	ton	3.8	14.8	5.7	7.2	11.6
Potatoes	ton	8.3	13.3	10.5	691.9	14.3
Sugar beet	ton	937.2	111.9	51.6	6.9	31.9
Milk-ECM	ton	45.6	9.0	0	70.4	0
Straw	ton	53.1	78.8	65.9	20.3	27.7
Beef meat	ton	2.0	1.3	0.6	5.6	2.1

Pork meat	ton	44.6	44.8	0.8	37.9	0.6
Materials/fuels						
Spring barley	ton	0	0	0	0	0
Soy meal	ton	37.6	23.0	0.9	29.8	0.2
Rape seed meal	ton	0				
Lubricant Oil	liter	1090	1261	1209	1209	806
Manure	kg N	481	710	1076	1538	1246
Fertilizer , Calcium ammonium nitrate	kg N	8541	12603	9227	10395	8423
Fertilizer P	kg P	798	1268	1010	925	1037
Fertilizer K	kg K	3887	4874	3625	5138	3777
P, Mineral Feed	kg P	341	281	9	293	23
Electricity/heat						
Electricity Denmark	kWh	25438	29880	12036	42028	14273
Heating	MJ	34241	24126	22750	22750	252
Traction	MJ	383634	443872	425428	425428	283652
Emissions to air						
Methane	kg CH4	1614	877	198	2446	248
Ammonia	kg NH3	1855	1865	942	2112	955
N2O	Kg N2O	383	530	388	702	459
Emissions to water						
Nitrate	kg NO3	8044	15904	14370	35200	24578
Phosphate	kg P	23	43	31	77	53
Emissions to soil						
Carbon	kg C	0	0	0	0	0
Non material emissions						
Arable land use	ha a	78	105	68	94	76

Location in database: Processing/agriculture/Farming on...

Administrative information

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References

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Dalgaard, T., Halberg, N. og Fenger, J., 2000. Simulering af fossilt energiforbrug og emissioner af drivhusgasser. Tre scenarier for omlægning til 100% økologisk jordbrug i Danmark.