SHEET A: TERMS OF USE, GENERAL COMMENTS, LIST OF CONTENTS, THANKS, NOTES, AND SOURCES

TERMS OF USE:

GENERAL COMMENTS:

This part A contains the list of contents, all the notes for parts B to E, and all the sources referred to in the notes.
The spreadsheet is also available as PDF with the current fixed values.
There may be additions and further amendments, so please check for updates regularly.
Comments and suggestions are welcome.

LIST OF CONTENTS:

THANKS: Many thanks to Arne Kyllingsbæk, DJF, Mette Hjort Mikkelsen, DMU, Hanne Damgaard Poulsen, DJF, Uffe Jørgensen, DJF, and to many other experts at LR and DJF,
none of whom are responsible for any errors resulting from their invaluable help, the nature of which is faintly reflected in the list of sources.

NOTES:

Note 1 Basic crops according to [1] table 1, and additional properties according to [2], separate other crop part only for WRS

Crop	Code	Name	Code(s) according to [2]		Code(s) according to [3]	
SBA	1	Spring barley, fodder/beverage	201	267	001-0008	
SWH	2	Spring wheat, food/fodder	203		001-0013	
OAT	3	Oat, food/fodder	202		001-0010	
MCC	5	Maize/corn cobs, food/fodder	204		001-0113	
WBA	10	Winter barley, fodder/beverage	200		001-0009	
WWH	11	Winter wheat, food/fodder	203		001-0013	
WWBF	13	Winter wheat bread, food	(231) (flour)			
RYE	14	Rye, food/fodder	207		001-0011	
TRI	16	Triticale, fodder	209		001-0015	
WRS	22	Winter rapeseed, oil and fodder cakes/pellets	(347) (fat)	146	(002-0026)	002-0046
MCW	216	Maize/corn whole crop	492		006-0137	
GRP	252	Grass fresh permanent, average of	464 to 466		006-0081 to 006-0083	
GCR	260	Grass fresh <50% clover rotation, average of	421 to 426		006-0059 to 006-0064	
CGR	261	Grass fresh >50% clover rotation, average of	427 to 429		006-0065 to 006-0067	
GRO	263	Grass fresh without clover rotation, average of	464 to 466		006-0081 to 006-0083	

Additional crops, grown or harvested differently, but basically identical to the basic crops

GHP	2521	Grass hay permanent, average of	665		006-0405	
		Same N norm as 252, but lower N yield owing to later harvest and drying				
CGR0	2610	Grass fresh >50% clover rotation, no manure	427 to 429		006-0065 to 006-0067	
		Same N yield as 261, but no N norm owing to its greater amount of N fixation;				
		lower yield of the first harvest, but a greater proportion of clover will be developed, ensuring greater yields of later harvests and the same total N yield				

Additional identical crops with specific biofuel/beverage use and separate other crop part

SBB	19	Spring barley, bioethanol and distillers grain or beer and brewers grain		262		001-0038 or 001-0101
SWB	29	Spring wheat, bioethanol and distillers grain		262		001-0038
OAB	39	Oat, bioethanol and distillers grain		262		001-0038
MCB	59	Maize/corn cobs, bioethanol and distillers grain		263		001-0039 or 001-0040
WBB	109	Winter barley, bioethanol and distillers grain		262		001-0038
WWB	119	Winter wheat, bioethanol and distillers grain		262		001-0038 or 001-0037
RYB	149	Rye, bioethanol and distillers grain		262		001-0038
TRB	169	Triticale, bioethanol and distillers grain		262		001-0038
WRB	229	Winter rapeseed, PPO/biodiesel and fodder cakes/pellets	(347) (fat)	146	(002-0026)	002-0046

Purchased crop part not grown on farm but delivered as fodder, therefore with a nominal <NUE/e> = 1.00

CONC	9999	Concentrate, with an assumed N digestibility of 0.87 corresponding to soy meal according to [2]

Note 2 Precrop values in kg N/ha according to [1], table 1; values for crops 260, 261, and 263, are calculated for 2 consecutive years before ploughing

Note 3 Crude protein content in crop, or other crop parts in connexion with oil/biofuel prouction, in % of dry matter according to [2]
(similar values are found in [3], and some in [4] and [5])

Note 4 Digestibility of crude protein in % of total crude protein according to [2] (especially used for cattle fodder)

Note 5 Water content in % according to [2] and [5], basis values forming the basis of yield norms according to [1], table 1,

Note 6 N content, kg N/t dry matter, directly calculated as 1/6.25 = 16% of protein content according to [6] and [7],

Note 7 N content, kg N/t crop, directly calculated from N content, kg N/t dry matter and water content in %

Note 8 Digestible N content, kg N/t crop, directly calculated from N/t crop and digestibility of protein in %

Note 9 DK average, being a weighed average of the total Danish agricultural area calculated from shares of different soil types

Note 10 Share of total Danish agricultural area in % according to [8]

Note 11 Yield norm, hkg/ha, FU/ha, according to [1], table 1 (hkg = 100 kg, FU = fodder units), except for hay which is according to supplementary information according to [2];
values in brackets pertain to cereals after non cereals (maize/corn being counted as cerels)

Note 12 Yield norm, t/ha, calculated from hkg/ha and FU/ha respectively
Calculation from hkg/ha through division by 10, Calculation from FU through division by 940/927 according to [2]

Note 13 N content, kg N/ha, yield norm in t/ha multiplied by N content in kg/t crop

Note 14 N norm, kg N/ha according to [1], table 1, unless chosen by the user

Note 15 Recalculated N norm, kg N/ha, being N norm minus precrop value according to [1]

Note 16 NUE/e = Uptake efficiency, being N content in kg/ha divided by recalculated N norm in kg/ha, unless chosen by the user

Note 17 NUED/eD = Uptake efficiency, being Digestible N content in kg/ha divided by recalculated N norm in kg/ha

Note 18 Average of the best 2/3 of Danish soils (69%), thus excluding the most inferior 1/3 of soils (31%)
High value crops such as rapeseed, bread wheat, and maize/corn cobs, are mostly grown here.

Note 19 Actual annual average values harvested in Denmark according to [9] for individual years from 1998 to 2007

Note 20 Actual 10 years average values harvested in Denmark according to [9] for the period 1998 to 2007

Note 21 Soil types, JB numbered from 1 to 11, grouped after N norm according to [1], table 1

Note 22 Relative increase in average yield and thus <NUE/e> for cereals, caused by higher yield norm after from non cereals

Note 23 Additional precrop value of non cereals calculated from relative increased yield

Note 24 Numbers of ha grown with the main cereals according to [9]

Note 25 Average additional precrop value of non cereals, calculated as a weighed average of precrop values for the individual cereals

Note 26 Crude protein content in straw, in % of dry matter according to [2]

Note 27 Water content in % according to [2]

Note 28 Straw yield according to [9]

Note 29 Amounts from crop residues and roots according to [11] and [12], for roots based upon method 2 in [12]

Note 30 <NUE/e> = Uptake efficiency of crop residues and roots as an average for all Danish soils, being N content in kg/ha divided by recalculated N norm in kg/ha

Note 31 <NUE/e> = Total uptake efficiency of crop and crop residues as an average for all Danish soils, being N content in kg/ha divided by recalculated N norm in kg/ha

Note 32 <NUE/e> = Surplus of N created by crop, calculated as efficiency in terms of applied N, thus forming part of total N uptake efficiency, as an average for all Danish soils

Note 33 Statement of the emission figures forming the basis for the N2O emissions, see Note 33

Note 34 Addition to basic value of <NUE/e> if applicable

Note 35 Manure kind and handling with #

Manure kind	#	Manure handling	#	Description
None	0		0	No manure; applies to the crops CGR0/2610 and CONC/9999
N	1		1	Synthetic N fertilizer
Cattle	2	Liquid	21	Liquid cattle manure, a mixture of solid manure and urine, sometimes referred to as slurry
		Separated	22	Cattle manure with separate treatment of solid and liquid parts
		Deep litter	23	Cattle manure absorbed in straw bedding
		Grazing	24	Cattle manure left in field during grazing
Pig	3	Liquid	31	Liquid pig manure, a mixture of solid manure and urine, sometimes referred to as slurry
		Separated	32	Pig manure with separate treatment of solid and liquid parts
		Deep litter	33	Pig manure absorbed in straw bedding
		Rooting	34	Pig manure left in field during rooting
Poultry	4	Liquid	41	Liquid poultry manure, a mixture of solid manure and urine, sometimes referred to as slurry
		Separated	42	Poultry manure with separate treatment of solid and liquid parts
		Deep litter	43	Poultry manure absorbed in straw bedding
		Rooting	44	Poultry manure left in field during scraping
Sheep	5	Deep litter	53	Sheep manure absorbed in straw bedding
		Grazing	54	Sheep manure left in field during grazing
Goat	6	Deep litter	63	Goat manure absorbed in straw bedding
		Grazing	64	Goat manure left in field during grazing
Green High N	71	Green High N	71	Green manure with high N uptake efficiency
Green Low N	72	Green Low N	71	Green manure with low N uptake efficiency

Note 36 Relative increase of N amount by addition of straw to manure according to [10]

Note 37 Evaporation of N from stable/store/field, as relative amounts of N compared to N contents in fertilizer/manure, according to [10] and [11], including NH3 emissions

Note 38 Proportion of manure in % stored in the field before application according to [10] and [11]

Note 39 N efficiency of manure relative to N efficiency of synthetic N fertilizer according to [1], Eksempel 10, punkt 4 (page 20)

Note 40 Adapted N efficiency of manure relative to N efficiency of synthetic N fertilizer according to [1], Eksempel 10, punkt 4 (page 20),
incorporating correction of N efficiency for loss of N by NH3 emissions through evaporation in the field according to [10] and [11]

Note 41 Use of crop, or crop part containing the total amount of N in connexion with biofuel prouction, with #,
and with N uptake efficiency as ratio between yield in the form of food and intake in the form of fodder according to [13]

Use, kind	#	Description	Basis for calculation of food to fodder efficiency	
Cattle dairy	21	Fodder crop/crop part	Digestible N content	Recalculated from total N content shown in grey
Cattle beef	22	Fodder crop/crop part	Digestible N content	Recalculated from total N content shown in grey
Pig pork	32	Fodder crop/crop part	Total N content	
Poultry meat	42	Fodder crop/crop part	Total N content	
Poultry eggs	43	Fodder crop/crop part	Total N content	
Sheep mutton/milk	51	Fodder crop/crop part	Total N content	
Goat meat/milk	61	Fodder crop/crop part	Total N content	
N crop High N	71	Green manure with high N uptake efficiency		
N crop Low N	72	Green manure with low N uptake efficiency		
Food/beverage	8	Crop for human consumption		
Fuel	9	Crop/crop part with N content used as biofuel		
Waste moved	-1	Waste with the total N content dumped elsewhere to be disposed of without leaching in field		
Waste in field	0	Waste with the N content dumped in field/on ground and lost to leach without fertilizing effect		

The cattle food to fodder efficiency based upon total N content shown in grey facilitates a comparison with other animal husbandry
The basis of the cattle food to fodder efficiency can be changed from digestible N content to total N content

Note 42 IPCC emission figures expressing the ratio of N in N2O emissions to N in the source,
according to the 1996 IPCC Guidelines [14] and to the 2006 IPCC Guidelines [15], the former of which are applied in the current Danish national inventory [16],
unless changed by the user, possibly in connexion with calculation of non IPCC N2O emissions, see Note 50.

Note 43 Summary of fertilizer, crop, and use of crop/crop part, during the first two years, shown in capitals

Note 44 List of N transformations in the N chain, following the original N fertilizer/manure during each year,
until the total original N amount has been removed as food/beverage/fuel/other use and/or lost by volatilization and leaching, including options for N chain calculations:
The basic information about fertilizer/manure consists of:
and name as chosen by the user, see Note 34,
Store 1/0 as chosen by the user, relevant to animal manure, expressing whether it is stored before use or applied straight from the stable, see Note 37
Amounts store and field state the N amount prior to application and N amount applied to the field, along with the corresponding N amounts lost by volatilization
Organic 1/0 as chosen by the user expresses whether the crop is organically grown or not; if it is, the use of synthetic fertilizer is ruled out
N norm proportion expresses the % of the N norm that is actually being applied, not to exceed 100%, only relevant in connexion with Danish values of <NUE/e>,
Attempted conservative estimate of relative yield based upon various sources including [4]
Crop # and name as chosen by the user, see Note 1
Cereal benefit 1/0 expresses whether the crop contributes precrop value to a following cereal crop, only effective if <NUE/e> before cereal is >0
Straw used 1/0 as chosen by the user expresses whether straw is used or left in the field, if applicable
Crop use & leach states the N amount at the disposal of the crop and the N amount not taken up and thus lost by leaching
Use # and name as chosen by the user, see Note 41
Fodder, uses # 21 to 61, fed and food state the N amounts harvested/fed to the animals and obtained from the animals in the form of food
N crop #71/72 states the N amount harvested as green manure with high/low N uptake efficiency
Food/bev #8 states the N amount harvested as food/beverages and thus removed from the agricultural circulation
Fuel/other #9 states the N amount harvested as fuel or for other purposes and thus removed from the agricultural circulation
Manure handling # and name as chosen by the user, see Note 34
Final N amounts states the final N amounts left in the field and the final N amounts lost by volatilization and leaching, the resulting amount being transferred to the following year
N2O-N emission according to IPCC 1996 and IPCC 2006 which are the two sets of IPCC Guidelines described in Note 41, shown as:
Each: Contribution to total N2O-N emission from each of the three kinds of sources, namely N content, volatilization, and leaching
Total: Total N2O-N emission from all three kinds of sources

Note 45 Outside the insertion:
Total values of N2O emission, expressed as N2O-N, according to IPCC 1996 and IPCC 2006, calculated as the sum of contributions from all years,
until the total original N amount has been removed as food/beverage/fuel/other use and/or lost by volatilization and leaching,
with separate N amounts for each kind of source, namely N content, volatilization, and leaching, and total N amounts from all sources
Inside the insertion, shown in grey:
To the left: Ratios of N2O emission, in the form of N2O-N, to N amount in the first crop whether used or not, according to IPCC 1996 and IPCC 2006:
First Year states the ratio based upon the N2O emissions for the first year, obviously ascribable to the first crop,
thus expressing the N2O emissions caused by growing the first crop
Total states the ratio based upon the N2O emissions for all years, those for later years obviously not ascribable to the first crop
thus expressing the N2O emissions caused by all uses compared to the N amount in the first crop
To the right: Account of total N amounts in kg and % showing how the original N amounts are supplemented/removed/lost from the agricultural circulation,
including final use, in the form of food/beverages/fuel/other, and loss, in the form of volailization and leaching;
supplementation, if any, comes from straw added to animal manure

Note 46 Ratios of N2O emission, in the form of N2O-N, to N amount in the final use, in the form of food/beverages/fuel/other, according to IPCC 1996 and IPCC 2006,
thus expressing the N2O emissions caused by the final use(s)

Note 47 For each year, referring to Note 43:
N amounts in fertilizer/manure, crop, fodder, food, green manure, fuel, and other use, whichever applicable, along with a single auxiliary value shown in grey,
along with user options for N chain calculations in the form of #s, shown on grey background, user option values for year 1 – 5 basically being repeated for year 6 – 10,
user option values in Sheet C basically being repeated in Sheet D,
and followed by the corresponding N2O-N amounts and total N2O-N amounts for the year

Note 48 For each year, referring to Note 43:
N amounts lost by volatilization,
along with information/error warnings,
along with a number of auxiliary values shown in grey,
and followed by the corresponding N2O-N amounts for the year

Note 49 For each year, referring to Note 43:
N amounts lost by leaching,
along with information,
along with a number of auxiliary values shown in grey,
and followed by the corresponding N2O-N amounts for the year

Note 50 Area with crop in ha corresponding to the amount of fertilizer/crop for each year and in total, total/year 1 expressing the degree of fertilizer/manure reuse

Note 51 Possible additional non IPCC N2O-N emissions, based upon values chosen by the user, and stating N2O-N emissions for each year and in total,
reflecting possible anthropogenic and natural contributions to the N2O emissions from agricultural soils not otherwise covered by the IPCC Guidelines/National Inventories
in the form of emissions from agricultural soils which are basically not ascribable to specific N sources:
N residues emissions, based upon a value of the ratio of N2O-N to N left in field, inserted/changed by the user, shown on grey background:
Specific short term emissions from N not taken up by the current crop, before leaching, the amounts depending upon general soil properties and conditions,
in other words anthropogenic emissions that are the effects of an increased N amount in the field caused by specific current use/crops;
Increased soil N emissions, based upon a value in kg N2O-N/ha, inserted/changed by the user, shown on grey background:
General long term background emissions from a general increase in N amount in the field caused by agiculture, depending upon general soil properties and conditions,
in other words emissions that are basically anthropogenic and caused by long term average use, thus not, or at least not only, caused by current use/crops;
Natural background emissions, based upon a value in kg N2O-N/ha, inserted/changed by the user, shown on grey background:
General background emissions from original/natural N amount in the field, independent of agriculture but depending upon general soil properties and conditions,
in other words emissions that are natural/non anthropogenic, basically corresponding to conditions with natural vegetation.
In the IPCC Guidelines, all N2O emissions are ascribed to specific sources, and the values are meant to include long term N2O emissions caused by agriculture,
and therefore, the IPCC Guidelines do not include natural background N2O emissions from agricultural mineral soils, according to [17].
Various sources, including [17], refer to background N2O emissions from agricultural mineral soils, generally stating an average constant value of 1 kg N2O-N/ha,
part of which may be incorporated in the National Inventories along with national values of N2O emissions from specific sources that differ from the IPCC values;
according to [17] and [18], in the Swedish National Inventories, half of the background emission is considered anthropogenic,
so that 0.5 kg N2O-N/ha Increased soil N emissions for mineral soils is used along with a lower value of N2O emissions from synthetic fertilizers,
and so that 0.5 kg N2O-N/ha Natural background emissions for mineral soils are implied as a natural source.

Note 52 Total amounts of N in Danish fodder from different sources according to [9] for two years, namely 2004/2005 and 2005/2006

Note 53 List of presentation of N amounts, values being 1000 tons and % of the total N amounts in the relevant kind of fodder

Note 54 N amounts for individual fodders, groups of fodders, and total N amounts,
in 1000 tons and in % of the total N amounts in the relevant kind of fodder

Note 55 Total amounts of N applied to Danish fields from the two main sources, namely synthetic fertilizer and animal manure, the latter being amounts from the stable
according to [11] for two years, namely 2004 and 2005

Note 56 N amounts from each source, and total N amounts from both sources,

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(The Danish Plant Directorate: Guide to fertilIzation and harmony rules)
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(DJF: DJF report No. 36: Animal husbandry: Nitrogen, phosphorus, and potassium - norm figures 2000, 2001)
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[11] NERI: Emission of ammonia, nitrous oxide and methane from Danish Agriculture 1985-2002, Methodology and Estimates, Research Notes from NERI, no. 231
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(DJF: Brief about dry matter and nitrogen in crop residues left in agricultural soils
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