

Organic agriculture as a climate mitigation strategy

The challenge of lack in organic data

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Organic production has been pointed out as a national and international strategy to mitigate climate change. In Denmark, the government is expecting, that doubling the organic production will contribute to a national reduction of 0.5 Mio tons CO₂ equivalents by 2030 (cf. Landbrugsaftalen 2021), corresponding to 7 % of the reductions in the agricultural sector. The reduction potential is assessed based on a lower animal density, a lower supply of fertilisers and changes in crop rotations. These assumptions are, however, dependent on a range of variables; if conversions will be 1:1, e.g., that a conventional pig farmer will convert to organic pig farming; what the assumed fertiliser supply in organic farming is; and are norm data and emission factors representative of organic farming.

Most of the knowledge that is utilized to account for emissions in the agricultural industry in e.g., LCA analyses has been compiled and recorded based on the framework of the conventional agricultural system, which implies that activity data, norm data and emission factors are often based on conventional systems.

Choice of N₂O emission factor greatly affects calculated emissions from fertiliser application

Conventional arable crop rotation*

Crop	Fertiliser, kg total N	CC	Yield, kg dm/ha
Spr. barley		+	4800
Spr. wheat			5500
Lupin/barley		+	3700
Winter rye		+	6700
Total	470		

Fertilised with synthetic fertilisers

Conventional arable crop rotation*

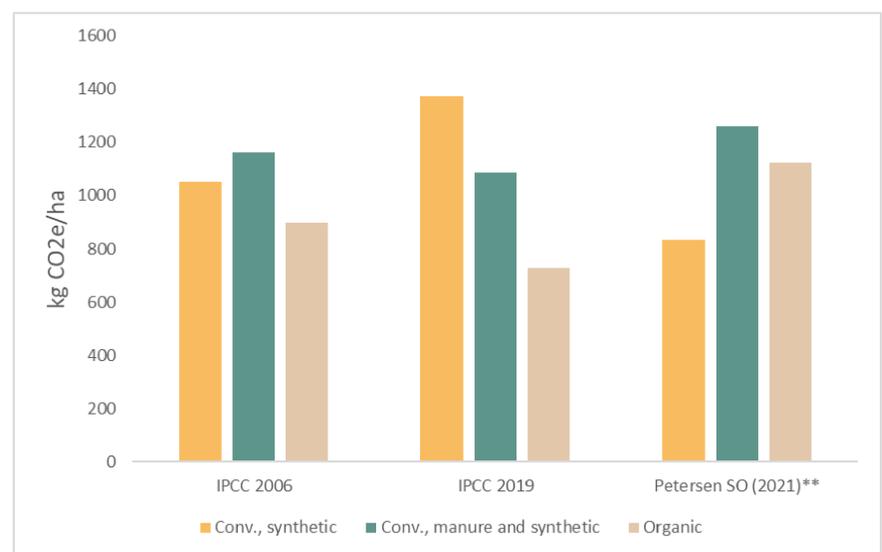
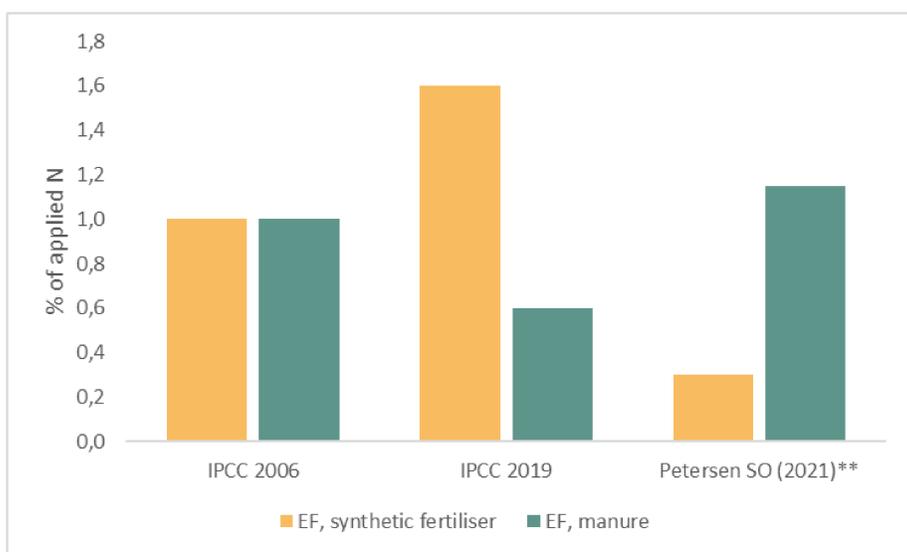
Crop	Fertiliser, kg total N	CC	Yield, kg dm/ha
Spr. barley		+	4800
Spr. wheat			5500
Lupin/barley		+	3700
Winter rye		+	6700
Total	524		

Fertilised with manure and synthetic fertilisers

Organic arable crop rotation*

Crop	Fertiliser, kg total N	CC	Yield, kg dm/ha
Spr. barley		+ (N fix)	5100
Spr. wheat			4200
Lupin/barley		+	3800
Winter rye		+ (N fix)	4800
Total	340		

Fertilised with manure



*Data source: Økologiske sædskifteforsøg, Foulumgaard, Aarhus University. Data from O4 and C4, 2020.

**Tentative average emission factors, based on: Petersen SO. 2021. N₂O fra gødningsudbringning og planterester. 9 sider. Rådgivningsnotat fra DCA – Nationalt Center for Fødevarer og Jordbrug, Aarhus Universitet, leveret: 14.12.2021.

Data matters...

- Choice of N₂O emission factor greatly affects calculated emissions from fertiliser application
- There is a need for more research in organic and free-range livestock systems, to get a better representation of more extensive systems in climate calculations and LCA analyses
- There is a need for more measurements of N₂O emissions from manure and other types of organic fertilisers, to investigate the potential difference in emissions between types of fertilisers

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