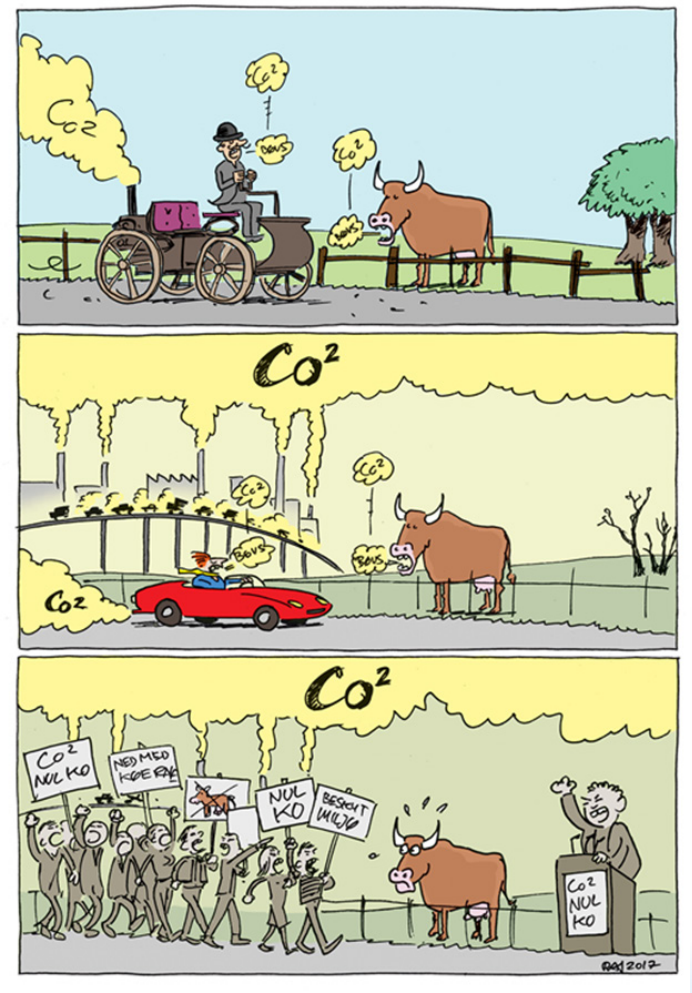
Cows belch methane, grasslands store carbon - and it all adds up

In Denmark, there is currently an intense political debate on how high a tax should be imposed on agricultural greenhouse gas emissions. Proposals range from 100 – 150 – 200 EUR per ton CO2 equivalents.

LDM argues that the digestive processes of cows should not be taxed because they are part of the natural CO2 cycle.



Cows belch methane, but it's not a climate problem

* Climate impact from the cow's digestive processes is outweighed by the high carbon storage of the grassland.
* Reducing the Danish cattle population will benefit the Danish climate accounts, but not the climate

The carbon cycle

The infinitely old biological carbon cycle of a cow and its environment is intact – nothing comes from nothing.

Along the cycle, carbon enters into various compounds. It starts with the CO2 content of the atmosphere, is taken up by grasses and other vegetative forage plants during photosynthesis and plant growth. In grasses and other plants, the carbon is stored as organic carbon compounds.

Grass and forage plants are eaten by the cow and in the digestive process some of the carbon is used in the cow's production of meat and milk and some is exhaled as respiration CO2. Some leaves the cow as methane via manure and finally the cow burps some as methane produced in the rumen by otherwise useless methanogenic organisms (archaea).

These methane burps are the cows' problem in the IPCC's measurement method, which only looks at emissions. It is carbon from the feed that the cows have "refined" into methane.

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The climate impact of the eternal cow can be calculated as:

200 kg of methane per year x 12 years x 27 times the CO2 effect = approximately 65 tons of CO2 equivalents.

One could say that the 65 tons of CO2e is the climate debt of the eternal cow, but the cow also has assets, i.e. climate benefits because it eats grass, and grasslands are known to be good at storing carbon in the soil. Available estimates of the carbon content of soils vary widely and must therefore be estimated conservatively from literature estimates. It is assumed that dairy production on average uses 0.25 ha of permanent grass and 0.5 ha of rotational grass per cow for grazing and grass harvest, about half of the Danish grassland area.

Based on these figures, it can be calculated that the grassland used per cow, stores about 20 tons more carbon than the same area would store as cereal fields or similar annual crops. The 20 tons of carbon corresponds to about 73 tons of CO2e. One ton of carbon (C) weighs 3.67 tons as CO2.

When milk production ceases, the only realistic alternative today is to continue farming with cereals or other annual crops, which means that over time the area in question will release the calculated additional storage of 73 tons of CO2e. Each cow's share of CO2e in the atmosphere will also disappear over time.

The climate impact of the cow's digestive processes can be added up:

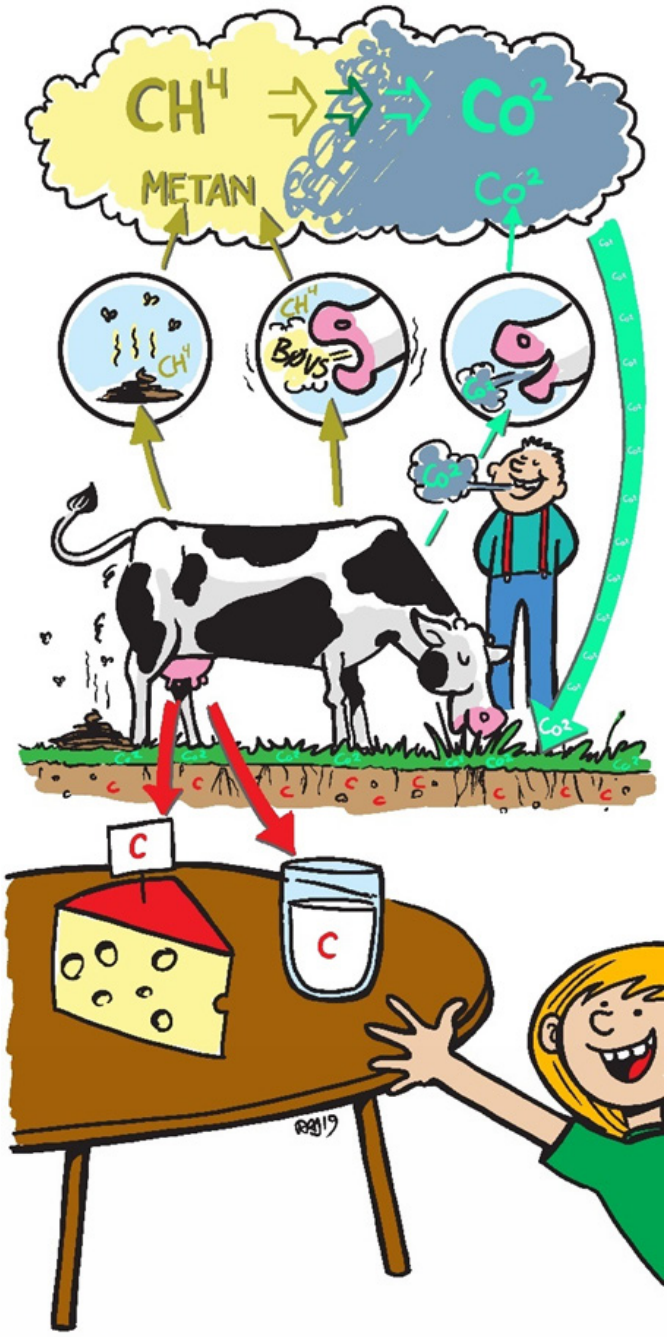
The climate benefit of a perpetual cow consists of soil carbon equivalent to 73 tons of CO2e

The climate disadvantage of a perpetual cow consists of methane in the atmosphere, equivalent to 65 tons of CO2e

A proportion of the area with permanent grass will presumably be unsuitable for cereal cultivation and will remain as permanent grass for leasing or care, so in round numbers, the climate impact of the cows' digestive processes is equal to the climate benefit of dairy farming operating large grasslands. A reduction in Danish milk production or the number of cows will therefore not benefit the climate.

Tax without climate effect

Based on the above calculations, it can be concluded that a uniform tax on agricultural CO2 emissions will to a greater or lesser extent cause a reduction in Danish milk production, and this will benefit the national climate accounts, but not the climate neither nationally, nor globally.



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