Climate mitigating tools for the Danish pig production

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Danish Agriculture & Food Council
Pig Research Centre

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Danish Agriculture and Food Council has presented a plan for how Danish farmers can and will reduce the climate impact of the agri-food sector and thus contribute to achieving the Danish Climate Act's 70% reduction target (baseline 1990). Additionally, the Danish government has in collaboration with Danish Agriculture and The Danish Nature Conservation Society agreed on a plan, The Green Triparty Agreement, for implementing the climate mitigating tools.

This document contains information on climate control measures for the Danish pig production.

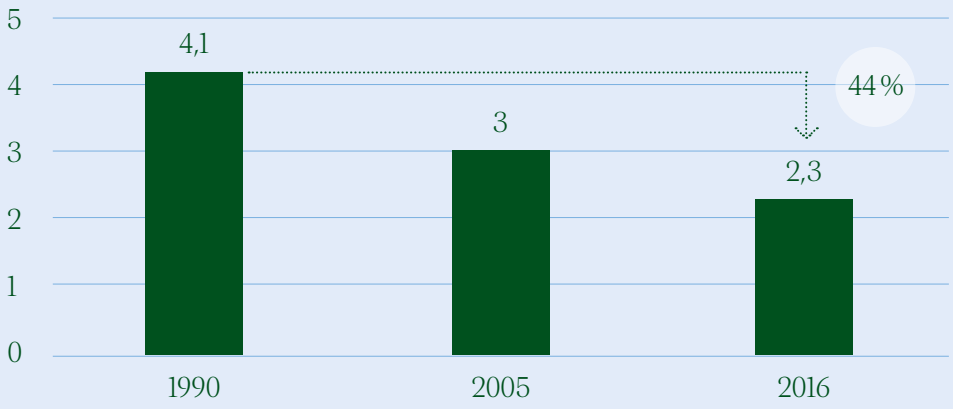
The path towards becoming climate neutral

In the period 1990 to 2016, the climate footprint of Danish pigs has been reduced by 44% from 4.1 kg CO2e/kg live weight to 2.3 kg CO2e/live weight. The current implementation of further climate measures will contribute to further reductions.

The reduction in the period 1990 – 2016 is primarily due to breakthroughs in breeding in relation to feed efficiency and meat gain. To further reduce the climate footprint of the pig, there is a need for investments in new climate technologies in the barn, as a significant proportion of the CO2e emissions from pig production originate from methane emissions during manure handling in barns and manure storages. The Green Triparty Agreement includes measures towards this goal.

By using the latest technologies for handling manure, in newly built barns – which could include frequent slurry flushing every/daily removal from the barn, bio gasification and combustion, acidification in the slurry tank etc. – significant reduction of GHG-emissions in the manure handling, and thereby also in the pig production, could be achieved (potentially up to 79%, see figure next page).

Kg CO_2e/kg live weight, pig (born to ready to deliverance to slaughterhouse)



Source: Andersen H M-L, Mogensen L, Kristensen T. 2021. Klima- og miljøpåvirkning ved produktion af grisekød – år 1990, 2005 og 2016. Page 28.

Furthermore, such technologies will also lead to improved climate performance for natural fertilizers, which is based on manure. Another area that is gaining growing attention is how to reduce feed's climate footprint. This includes topics such as introduction of nitrification inhibitors in manure related to crop production, alternative proteins and genetics improvements.

The below table is extracted on the basis of SEGES Innovation's overview of climate control agents with possible reduction effects from the publication "Climate control measures for Danish agriculture 2024" The table below only includes measures for pig production.

Reduction of CH_4 and N_2O in barn manure storage

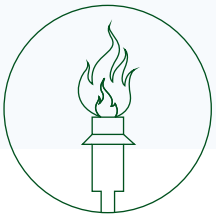
Manure handling in barns and manure stores[1]	Barn + manure stores reduction, %
Slurry flushing every 7 days	17
Slurry flushing every 7 days + Biogasification[2]	58
Slurry flushing every 7 days + Acidification in manure storage[2]	51
Slurry flushing every 7 days + Combustion[2]	53
Acidification of manure in barn and manure stores	56
Daily removal of manure by scraper [3]	30
Daily removal of manure + Biogasification[3]	79
Daily removal of manure + Acidification in manure storage[3]	69
Daily removal of manure + Combustion [3]	72

[1] *Reduction effect of climate technologies estimated by Aarhus University*
[2] *Theoretically calculated estimate*
[3] *SEGES Innovation calculation based on AU draft catalog, 2024*

References: Aarhus University, draft "Virkemidler til reduktion af klimagasser i landbruget", 2024

Biogasification

Acidification



Combustion

Disclaimer: *The assessed climate effects are based of theoretical models. Presently, many experiments and tests are carried out to document the real emission levels. The preliminary experience of these tests is that there is a very large variation in the performance when it comes to methane emission levels (both stables and manure storage) among individual farms. The emission levels must be expected to be adjusted, when new documentation is available.*