



## MEDIA INFORMATION

Institute for Farm animal Biology

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# The methane emissions of dairy cows can now be determined very simply

## International patent for livestock biologists from Dummerstorf

Scientists at the Institute of Farm Animal Biology in Dummerstorf developed a new method to predict the methane emissions of a dairy cow. For the first time, it is possible to predict methane emissions using the milk fat analysis and the daily milk quantity to calculate the actual methane emission. A patent for the new method has been granted by the EU, the USA and Canada; this can be utilized to reduce climate-relevant greenhouse gases.

"With our method, we can estimate the methane emissions of dairy cows from the analysis of the milk fatty acids of a milk sample and the knowledge of the daily milk volume of a cow very well. No additional equipment or expense is needed to do this, because these data are obtained in many testing laboratories in Germany for the monthly milk control from infrared spectroscopic measurements," explained the head of the FBN Institute of Nutritional Physiology "Oskar Kellner", Professor Dr. Cornelia C. Metges.

"If these data are available to the dairy farmer, methane emissions could be calculated on an individual basis using the patented equation. Compared to other methane estimation methods, our patent includes the milk yield." This is a correlate of feed intake, which is the most significant quantitative factor for methane emissions.

Prof. Metges developed this patented procedure together with PD Dr. Björn Kuhla, Dr. Gürbüz Daş and Dr. Stefanie W. Engelke. The Dummerstorf Institute is among the leading research institutions for improving feed and energy efficiency and reducing greenhouse gas emissions in livestock farming. The researchers pursue various approaches to reduce methane production and to make cattle farming in general more environmentally friendly.

Cows not only provide milk, but also produce methane via microbial conversions in the digestive tract, which is suspected to accelerate the greenhouse effect. According to current estimates (German Federal Environment Agency, 2020), methane emissions from dairy cows contribute with 14,125 kt CO<sup>2</sup> equivalents for about 20 percent of total greenhouse gas emissions in German agriculture.

## Respiration chambers offer precise measurements

It is very difficult to measure the methane Emission of Cows both in the barn and in the pasture. A variety of scientific equipment and measuring stations worldwide are working to record methane emissions as accurately as possible. In Germany, the only respiration chambers, that allow precise measurement of methane emissions, are located at the FBN. The emission per cow varies between 400 and 700 liters a day.

"In our series of measurements, we were able to clearly determine and scientifically prove that that a realistic estimate of methane emissions can be determined from milk fat composition and milk yield," said Professor Dr. Cornelia C. Metges. "Since feeding plays an important role in methane emissions from cattle, appropriate feeding management can be used to achieve a sustainable reduction. However, there is no economic motivation for

farmers to become active in this case," Metges continued. "If they have to cope with more and more cost-intensive requirements by declining revenues, nothing will change at last." Research on methane emissions will be continued at the FBN and further be included in the current studies.

## Background methane emissions

*The great advantage of ruminant livestock, namely the ability to utilize plant matter (grass, hay, and straw) which is futile for human consumption, has also a disadvantage: The production of valuable dietary protein in form of milk and meat by ruminants (cattle, sheep, goats) goes along with the emission of methane (CH<sub>4</sub>). Methane is generated by the digestion of feed in the forestomach, the rumen, and is emitted mainly by belching, the so-called called ructus, as well as from manure and slurry.*

*Methane is a greenhouse gas that has an about 20 times greater warming potential over the next 100 years than carbon dioxide (CO<sub>2</sub>). A major source of methane is livestock production. Other man-made emissions resulting from surface mining, gas production and Waste deposits. Since 2010, methane emissions accounted for 6.1 to 6.3 percent of total global of total greenhouse gas emissions.*

## Appendix

Certificate and patent EP 3 450 974 B1

Method for predicting methane (CH<sub>4</sub>) emissions from a dairy cow

## Further information

Milk fatty acids estimated by mid-infrared spectroscopy and milk yield can predict methane emissions in dairy cows. *Agronomy for Sustainable Development* (2018) 38: 27; Stefanie W. Engelke, Gürbüz Daş, Michael Derno, Armin Tuchscherer, Werner Berg, Björn Kuhla & Cornelia C. Metges. <https://doi.org/10.1007/s13593-018-0502-x>

German Environment Agency UNFCCC Submission: reporting under the United Nations Framework Convention on Climate Change and the Kyoto Protocol 2020 ([www.umweltbundesamt.de](http://www.umweltbundesamt.de)).

## Photo: FBN/Nordlicht

methane emissions can be measured precisely at the FBN in Germany's only respiration chambers

Institute for Farm Animal Biology (FBN)  
Wilhelm-Stahl-Allee 2, 18196 Dummerstorf, Germany  
Director: Prof. Dr. Klaus Wimmers  
T +49 38208-68 600  
E [wimmers@fbn-dummerstorf.de](mailto:wimmers@fbn-dummerstorf.de)

Institute for Nutritional Physiology "Oskar Kellner"  
Head: Prof. Dr. Cornelia C. Metges  
T +49 38208-68 650  
E [metges@fbn-dummerstorf.de](mailto:metges@fbn-dummerstorf.de)  
[www.fbn-dummerstorf.de](http://www.fbn-dummerstorf.de)