ECO-METHANE – Rewarding dairy farmers for low GHG emissions in France

With the ECO-METHANE program, farmers commit to provide a monthly analysis of the fatty acid profile of their milk and to feed their cattle with rich-omega 3 feed intake (mainly through grass feed) and by doing so to decrease the methane emissions of their cattle. In 2019, 617 farmers were engaged in this result-based method.

Summary

The Eco-Methane program is a private-private result-based contractual solution. Methane emissions of dairy cows are estimated by frequent and regular infra-red analysis of their milk. Indeed, there is a correlation between an equilibrated feed ration, the composition of milk fatty acid and the emission of enteric gas (methane) by dairy cows. Farmers' payments depend on the difference in their methane emissions to a regional reference. They also depend on the donations by private companies to support their effort. Funds are collected by the Bleu-Blanc-Coeur fund for health-oriented agriculture and payments granted by the private association "Bleu-Blanc-Coeur" that also governs a food brand based on better animal nutrition for heathier human food. The Eco-Methane method has been recognized by the French Ministry of Ecology in 2011 and by the United Nations in 2012, as a specific methodology for projects of methane emissions reductions of digestive origin trough the feed of dairy ruminants.

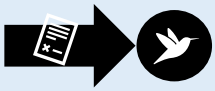
Objectives

1. Reduce GHG emissions
2. Increase zootechnical performances of the dairy cattle

Problem description

Animal breeding contributes for 14,5% of global GHG emissions (FAO) and on a dairy farm, the methane emitted by cows represents more than 50% of the total GHG emissions of the farm. This contract solution was implemented in France with the initiative of a feed company and the association Bleu-Blanc-Coeur. Bleu-Blanc-Coeur is a label that focuses on the nutritional benefits of consuming products from animals fed with omega-3 rich feed ration. Furthermore, there is a correlation between an equilibrated feed ration, the composition of milk fatty acid and the emission of enteric gas (methane) by dairy cows. They have used the program Eco-Methane to encourage dairy farmers that could not be involved in their label (due to a lack of local adapted structures) to adopt practices that would reduce their methane emissions. The Eco-Methane method has been recognized by the French Ministry of Ecology in 2011 and by the United Nations in 2012, as a specific methodology for projects of methane emissions reductions of digestive origin trough the feed of dairy ruminants.

RESULT-BASED



Each farmer commits individually to provide each month its milk analysis to the association Bleu-Blanc-Coeur. The milk analysis provides the composition in fatty acid that can be directly linked to methane emissions.

The commitment to the Eco-Methane program forbids the use of synthetic chemical adjuvants such as synthetic fatty acids, formalin, caustic soda and of all sources of palm (oil and meal) or copra in the cows feed. It also encourages farmers to include in the dairy cows' feed ration a fraction of omega-3 throughout the year, mainly given from grass.

PUBLIC GOODS

Climate regulation - greenhouse gas emissions

CONTRACT

Private – private contract between farmer and private association (Bleu-Blanc-Coeur)

Contract conclusion: Written agreement

Payment mechanism: incentive payments (vouchers)

Length of contract: Annual contract with tacit renewal for the farmers

Length of participation: 4.5 years in average (increasing)

Start of the program: 2011

End: still running

Note: At first, farmers were not payed. The first partnership between the association and a private company has begun in 2015 with the catering service of the Group Orange.

LOCATION

FRANCE

https://www.bleu-blanc-coeur.org

Data and Facts - Contract

Participation: In 2019, 617 farmers were engaged in the Eco-Methane program. It represents 16 203 milk analysis and an average mean decreasing rate in GHG emissions of 11,1% per farm, that is 21,5 T CO2eq. The area involved is the metropolitan France. The Bleu-Blanc-Coeur association that initiated and coordinates the Eco-Methane program is based in the region Brittany. There are also several donators involved (a telephone operator, a national bank, a feed company, …).

Involved parties: The farmers targeted by the Eco-Methane approach are dairy farmers. The farmers participate in the Eco-Methane program through the association Bleu-Blanc-Coeur (BBC), founded in 2000. They have to provide their milk analysis and commit not to use synthetic chemical adjuvants such as synthetic fatty acids, formalin, caustic soda and all sources of palm (oil and meal) or copra in the cows feed.

The association Bleu-Blanc-Coeur is the coordinator of the Eco-Methane program. The association gathers various actors of the food chain around a common objective of quality, in terms of animal, environmental and food quality. In order to provide incentive payments to the farmers involved in the Eco-Methane program, the association Bleu-Blanc-Coeur has created another association habilitated to receive donations (partly tax-free) from companies, local authorities or private individuals. Among the donators there are the telephone network operator Orange (through its catering service), the Crédit Mutuel Arkea (bank company), the Groupe Up, Valorex (animal feed company).

The benefits for the farmers/ for the association: The benefits for farmers is to be involved in a program that rewards their decrease in GHG emissions while not imposing given practices, other than the interdiction of using some components in their animal feed.

One of the benefits for the Bleu-Blanc-Coeur association is to give farmers incentives to change their farming practices towards what is required otherwise in their animal products brand. Actually some of the farmers engaged in the Eco-Methane approach value their milk within the Bleu-Blanc-Coeur marketed products.

Management requirements for farmers: Each farmer participating to the Eco-Methane approach commits individually to provide each month his milk analysis to the association Bleu-Blanc-Coeur. It is also forbidden to use synthetic chemical adjuvants such as synthetic fatty acids, formalin, caustic soda and all sources of palm (oil and meal) or copra in the cows feed. Farmers are encouraged to include in the dairy cows feed ration a fraction of omega-3 throughout the year, mainly provided from grass (grazed or preserved).

Controls/monitoring: The farmers get controlled and certified through the association Bleu-Blanc-Coeur. Each month, farmers individually provide their milk analysis. Three dimensions are observed :

- The quantities of the different components of the feed ration used in the dairy farms involved in the project
- The profile of fatty acids of the milk collected by the dairies and farmers groups
- The milk yield of dairy cows

The emissions of GHG are estimated from the profile of fatty acids and the milk yield, such that:

$$CH4\ produced = (FA \leq C16\ /\ total\ FA) * (a * Milk\ yield^{b})$$

Where *CH4* are the methane emissions, *FA≤C16 / total FA*, the fatty acids ratio expressed in % of fatty acids with 16 or less carbon atoms over the total amount of fatty acids, *milk yield* the milk production in kg per cow and per year and *a* and *b* numeric coefficients.

To be involved in the program, farmers have either to be adherents of the association Bleu-Blanc-Coeur, who monitors the controls, or to have a guarantee of their approach, in this case, a technician from a company member of the association Bleu-Blanc-Coeur.

Legal status of the contracting parties: Here, the AECPGs suppliers are single farmers and the buyer is the Bleu-Blanc-Coeur association that receives donations for this purpose from private companies (such as the telephone network operator Orange (through its catering service), the Crédit Mutuel Arkea (bank company), the Groupe Up, Valorex (animal feed company)) and particulars. The association has a particular convention with each partner. Some partnerships involve local municipalities.

Product requirements: Here, the production of the public goods (reduction of methane emissions) is directly correlated with the milk production and its composition in fatty acids, rebalanced by an omega-3 intake in the ration. The ratio of milk fatty acids and the methane emissions deduced from it are compared to a regional reference. However there are no ratio targeted in particular.

Conditions of participation: There are no limitation of participants. The requirements are defined precisely and comprehensibly in terms of feed requirements and dairy milk analysis use. The consequences of non-compliance with the contractual conditions are a non-payment and the termination of the contract, but there is no particular penalty.

Funding/Payments: To provide incentive payments to the farmers involved in the Eco-Methane program, the association Bleu-Blanc-Coeur has created another association habilitated to receive donations (partly tax-free) from companies, collectivities or private individuals. Among the donators there are the telephone network operator Orange (through its catering service), the Crédit Mutel Arkea (bank company), the Groupe Up, Valorex (animal feed company). Each partner has his own convention with the association Bleu-Blanc-Coeur.

To receive the payments, farmers have to commit to several management requirements and they are payed for GHG emissions saved, based on a regional reference (the price is not fixed).

Single farmers receive the payment in the form of vouchers or communication tools. Indeed, the amounts involved are low and more symbolic than representing a proper payment.

Renewal / termination:

- Renewal of the contract : tacit annual renewal,
- Termination: if the farmers do not respect their commitments, they exit the Eco-methane program.

Risk/uncertainties of participants: The main source of risk for participants is to not reach the objective of a reduction of methane emissions based on the historical regional reference. The reference takes into account the characteristics of the production system. However the financial risk is low : there are no penalty in case of non compliance and the payments are quite low as well and do not represent a necessary revenue for farmers.

Links to other contractual relationships: Some farmers engaged in the Eco-Methane program have another contractual relationship with the association Bleu-Blanc-Coeur through their marketed brand that has higher requirements than those of the Eco-Methane program. However this does not condition the participation to the program.

Context features

Landscape and climate: France has a variety of landscape and climatic conditions that are nevertheless suitable to extensive dairy farming (whether in mountainous regions or plains and bocages). This is not a requirement in the Eco-Methane program but grass is a source of omega-3 for animals. Omega-3 can also be added in the animal feed using compound feed rich in omega-3, for instance with extruded linseed. This kind of compound feed is sold by the Valorex feed company which is part of the association Bleu-Blanc-Coeur.

Farm structure: The farming system targeted is dairy cows farming, since the estimation of methane emission is based on the correlation between the composition of dairy milk and methane emissions. Other animal milk production systems are not targeted by this program. There are no other pre-requirements to be part of the Eco-Methane program.

SUCCESS OR FAILURE?

The Eco-Methane is a successful contract solution both in terms of participation and results per farm. Since the beginning, the number of participants has increased : in 2015, 429 farmers were involved in the Eco-Methane program and in 2017, it increased to 745 farmers. In 2019, 617 farmers were involved in the program, and the reduction of methane emissions was estimated to an average of 11.1 % per farms (21.5 t CO2 eq). Since August 2021, the Eco-methane approach has also been recognized by the Low Carbon Label (created by the French Ministry of Environment) and offers new development prospects. They are currently building the first labeled project.

Reasons for success:

- Results-based program, based on a recognized method that is easy to implement (based on milk analysis)
- Few mandatory requirements, most of them already adopted by farmers (easy access to the program) and no pre-requirements (other than dairy milk farming)
- Few risks in case of non-compliance to the requirements
- Important potential of participants within the farmers involved with Association Bleu-Blanc-Coeur

SWOT analysis

Main Strengths

1. Method used to estimate methane emissions
2. Attractive and simple program : few requirements and no penalties
3. Quality of animal products due to better feed (rich in omega-3)

Main Weaknesses

1. Reductive in terms of environmental benefits (onlymethane emissions)
2. Payments to farmers are dependent on the amount of money collected through the association, it is quite low and can vary
3. The individual additionnality is not insured, since most farmers already have practices allowing them to have lower methane emissions compared to the regional dairy farm reference

Main Opportunities

1. The program could become more inclusive with other environmental benefits assessments (AECPGs from grasslands, such as biodiversity, animal health, water regulation)
2. Eco-Methane could attract more donators in order to make their payments more inciting and their program even larger
3. The regional references and numeric parameters used could be updated to be even more accurate and extended to other animals (For now regional reference are taken from 2007 scientific references and the numeric parameters of the formula used to compute methane emissions are taken from 2009 scientific works)

Main Threats

1. Within the Eco-Methane program, farmers produce a better milk quality while not having enough local processing or commercial outlets to market it as such
2. Could be replaced by public programs (with fixed and more inciting payments), since the scientific method Eco-Methane it is based on is patent-free

"The INRAE Team in CONSOLE bears the entire responsibility of this factors of success and failure appraisal"

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Main external factors influencing success

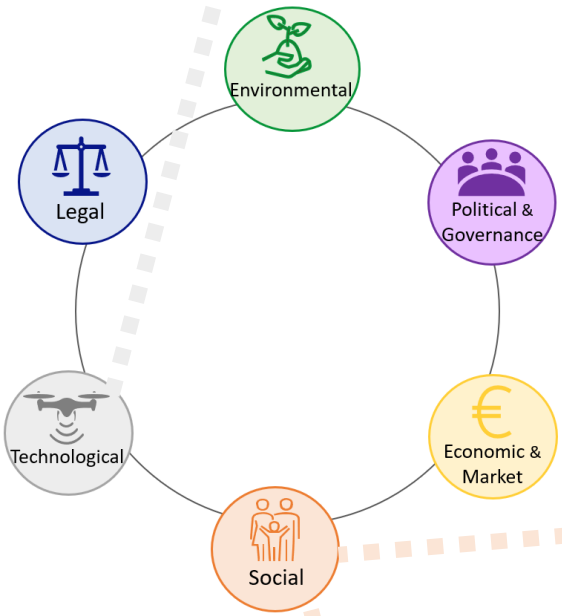
Political/governance, economic/market, social, technological, legal and environmental factors can all have a strong impact on the success of contract solutions. In this case study an in-depth analysis found that the following, selected factors were of specific importance.

Technology for indicator monitoring and measuring:

In EcoMethane, the basis for indicator assessment is automatized milk analysis and a calculation model of estimating methane emissions from the pattern of milk lipids, with a degree of reliability deemed credible enough to be certified to enter voluntary carbon mechanisms.

The monitoring tool is implemented as a **smartphone tool**, giving direct access to the analysis, with the grams of methane emitted/litre of milk. Also, the tool enables further analyses, e.g. on the efficiency of the ration, reproduction, etc.

Consequently, for the farmer the tool enables controlling the ration in terms of animal health as well as environmental impact. For each dairy farm there is an EcoMethane-meter that shows the number of methane emissions and its level according to the feeding system. The tool is used both in external communication but also as a more technical monitoring tool by breeders, as methane emissions can be correlated to zootechnical aspects.



Communication of environmental success:

EcoMethane allows farmers to raise awareness of their own public: Thanks to the meter and the numbers obtained, the awareness of the society can be increased, and agricultural practices, different systems and efforts to reduce GHGs by farmers, can be communicated to the public, even if methane is not as easily noticeable as environmental goods, such as landscapes, animal welfare, clear water etc.

The possibility to enhance public awareness is fostered by the provision of performance signs to breeders. These disclose the savings produced (translated in terms of car miles to be more telling). which can change people's perception of breeders and their practices.

A program that "make sense":

In EcoMethane the approach of lowering methane emissions via adaptations in the dairy cows' feed ration itself is clear, based on scientific elements, recognized at the state and United Nations level and therefore **understandable** and **credible to the farmers**. Moreover, a shared environmental awareness of the partaking pioneer farmers leads to a high moral understanding that the objectives of the contract "**make sense**". One of the interviewed farmers stated:

>> EcoMethane finally brings […] a methodology to have a better future and transmit a planet where we have limited the damage, and it makes us want to talk about it and that society recognizes it. <<

CONSOLE scientific analysis – results and recommendations

INRAE researchers have conducted an analysis based on the idea of the "Ecomethane" case study to gain further insights about the payment design and its possible implications.

Background

- Methane (CH_4) is a short-lived climate pollutant → a significant reduction of emission rates would have a rapid positive impact on climate.
- 81% of EU agricultural CH_4 emissions result from enteric fermentation (e.g. digestive process in cows)
- For a given productivity, enteric CH_4 emissions decline as dairy cows' feed is enriched with unsaturated omega-3 fatty acids → the main natural sources are grass fodders and linseed.
- Since 2011, the Payment for Environmental Services programme Eco-Methane rewards French dairy farmers for reducing CH_4 emissions, calculated from cows' productivity and fatty acid composition of milk.

Research aim

To effectively support CH_4 mitigation in dairy farms, the payment design:

1. Should be based on an emission indicator that captures both the effect of productivity and feeding.

→ We examine how diet affects CH_4 estimates.

2. Should compensate farmers for the extra-costs of milk production induced by a change of their practices.

→ We quantify the additional production cost of a change in cows' diet.

Method

We used a balanced panel of 735 French dairy farms for the years 2016 to 2018 and conducted:

→ a comparison of two estimates of CH_4 enteric emissions per litre of milk

→ An estimation of additional milk production variable costs

Main results

- Our results confirm the relevance of using CH_4 indicators (= ways of measuring and display CH_4) taking **both productivity** and **diet** into account in the design of **payment schemes** targeting the reduction of GHG emissions.
- The financial support needed to incorporate more grass in their fodder crop rotation system differs from one dairy system to another.
  - → Our results suggest that low productivity French dairy systems with already large shares of grassland areas might need higher payments to enter a scheme such as Eco-Methane, or find less costly ways to decrease their emissions (increasing productivity).
- Increasing grassland areas in dairy farms is likely to have other direct effects on farm costs that are not considered in this study → additional barriers to participation in payment schemes.

Recommendations

- For an efficient result-based scheme :
  - Having an indicator and a monitoring feature that allow farmers to adjust their practices and to predict the environmental results to be reached.
  - Having payment schemes where farmers can anticipate the payments they will obtain.

Additional page added June 2022