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Emission of Methane from Enteric Fermentation of Cattle and Buffaloes in Romania between 1989-2014

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Abstract

The paper aimed to present the evolution of methane emissions from enteric fermentation at cattle and buffaloes, during the period 1989 -2014 in Romania. It is based on the statistical data provided by National Institute of Statistics. The data have been processed into the following indicators: cattle and buffaloes livestock, number of dairy cows and buffaloes, milk yield, and milk production. All categories included in this study were in accordance with IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories, 2006, chapter 11, Agriculture and used parameters in equations have national values (gross energy intake, digestible energy, methane conversion factor). After all the calculations to see that the methane emission trend from enteric fermentation is descending due, on the one hand, to the decrease in the number of animals, and on the other hand, due to the technological improvements at farms level and genetic improvements, at animal level.

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Keywords: emission, methane, greenhouse gas, cattle, buffaloes.

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1. Introduction

Methane from enteric fermentation is the product of microbial activity from the animal rumen. The amount of methane produced in the enteric fermentation is positively correlated with the animal live weight, production and thus the quantity and quality of food intake in order to achieve the production concerned.

Methane is produced in herbivores as a by-product of enteric fermentation, a digestive process by which carbohydrates are broken down by micro-organisms into simple molecules for absorption into the bloodstream.

The amount of methane that is released depends on the type of digestive tract, age, and weight of the animal, and the quality and quantity of the feed consumed. Ruminant livestock (e.g., cattle, buffaloes) are major sources of methane with moderate amounts produced from non-ruminant livestock.

In conditions of normal feed, methane is 15-30% of the total ruminal gas (a mixture of carbon dioxide, methane, hydrogen, nitrogen, etc.). The proportion of these gases varies according to feed nature and the fermentation intensity. The production of ruminal methane is not directly proportional to the consumed feed digestibility. Feed with high digestibility form less methane per unit of consumed caloric energy, than those with lower digestibility (Crista, 1985). In other words, the higher the energy intake, the amount of methane from enteric fermentation will be higher.

2. Materials and Methods

The primary data used in this report were provided by the National Institute of Statistics, by the statistical yearbooks on "Agriculture and Forestry", time series 1990 ÷ 2009, and by the National Environmental Protection Agency, from correspondences with the National Institute of Statistics (NIS). Data afferent to 1989 were taken from the Statistical Yearbook published in 1990.

Data from NIS until 2003, show livestock units grouped on larger categories (the grouping criteria is the production operation), so it was necessary to extrapolate the past animal subcategories which appear in this study and for which there are official data available for 2004-2014. In this respect, it was considered the reference year for extrapolation, 2004.

At this year level, based on the total cattle livestock, were calculated the percentages of the other categories and subcategories, the percentages of cattle, with all subcategories, and the percentages of buffaloes, with their subcategories. Thus, buffaloes occupy 1.2% of the total cattle livestock, and, in this category, dairy female buffaloes represent 0.89% of the total cattle, and the "other buffaloes" subcategory is 0.31% of the total cattle. In cattle subcategory, calves for veal represents 10.03% of the total cattle, young calves for breeding less than 1 year old is 15.3% of the total cattle, young breeding calves 1-2 years old is 7.97% of the total cattle, breeding bulls are 0.34% of the total cattle, heifers – 5.83% of the total cattle, dairy cows – 55.79% of the total cattle, males and females for beef – 1% of the total cattle, and draft cattles are 1.94% of the total cattle.

There were kept the same percentages for whole 1989-2003 period because they are sensitive similar, given that certain subcategories move pretty quickly from one subcategory to another. The long service categories, such as dairy cows, breeding bulls, draft cattle, dairy female buffaloes, have similar percentages for the entire time series, and the livestock structure is not changing, even if the numeric livestock registers sudden drops. Most buffaloes livestock is found in households that do not slaughter youth for beef, but keep it in order to exploit their milk production. Draft cattle are also private property only at the household level.

The methane emission was calculated based on equations 10.19, 10.20, 10.21 of the *IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories,2006:*