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S4-P3: Spatial Distribution of Enteric Methane Emissions from Ruminant Livestock in Andhra Pradesh

D.B.V. Ramana, A. Vijaya Kumar, D. Sudheer and B.M.K. Raju

Central Research Institute for Dryland Agriculture, Santoshnagar, Hyderabad-500 059

ABSTRACT

Ruminant livestock (cattle, buffalo, sheep and goat) is the major anthropogenic source of methane emission from agriculture. Methane represents a loss of energy to the animal and also an important green house gas that significantly contributes to global warming. District wise methane emission from enteric fermentation of different ruminant livestock categories in Andhra Pradesh was estimated using dry matter intake approach. The estimated total enteric methane emission was 0.81Tg. Buffaloes alone contributing 57.4% of total enteric methane emission followed by indigenous cattle (27.0%), sheep (8.7%), crossbred cattle (3.9%) and goat (3.0%). Total enteric methane emission was highest in Prakasham (0.054 Tg) district and lowest in Hyderabad (0.002Tg). However, emission density (kg/km^2) was highest in Hyderabad (9.82) and lowest in Cuddapah (1.83) district compared to average of the state (2.96). The ruminant livestock in five rainfed districts (Adilabad, Anantapur, Kurnool, Mahaboobnagar and Ranga Reddy) of the state contribute a quarter of the total emissions. Studies in developing the inventory in methane emissions at block/village level and mitigating the same through research, institutional and policy support are explored.

INTRODUCTION

Ruminants depend on microorganisms to digest plant cell wall polysaccharides present in coarse crop residues into energy sources. However, microbial digestion in the rumen also results in waste products, such as carbon dioxide (CO_2) and methane (CH_4) and approximately 6% of dietary gross intake energy is lost to the atmosphere as CH_4 (Holter and Young, 1992; DeRamus *et al., 2003*) Methane contributes to climate change and global worming (Johnson and Johnson, 1995) by trapping outgoing terrestrial infrared radiation 20 times more effectively than CO_2, which leads to increased surface temperatures and it indirectly affects atmospheric oxidation reactions that produce CO_2. Livestock contributes about 18% of the GHC emissions, and as much as 37% of anthropogenic methane, mostly from enteric fermentation (Chhabra *et al.* 2009). In India, the major (59%) GHG emissions from the agriculture sector are from enteric fermentation (Singhal *et al.* 2005). Various attempts have been made earlier to estimate the enteric methane emissions from Indian livestock. The current study is an attempt to estimate the total methane emission from different categories of animals in 23 districts of Andhra Pradesh using data from published reports on actual measurement of methane emission from feed intake.

MATERIALS AND METHODS

Data on livestock census, 2003 (DAHD) was used in this study. Only 70% of the total population of young animals of cattle and buffaloes (in the age group of 0–1 year) has been considered for methane emission. The livestock are grouped in different categories depending upon their sex, age, type and productivity. Cattle and buffalo have been categorized into dairy and non-dairy. Cattle are further categorized into crossbred and indigenous. Body weights have been taken from published reports. Total DMI by each subcategory is worked out as percentage of body weight based on literature survey. Feed intake in terms of kg DMI/100 kg livestock body weight/day is estimated. Methane emission has been calculated taking into account methane conversion factor in g CH4/kg DMI from published reports and dry matter intake of animals (Singhal *et al.* 2005; Swamy and Bhattacharya, 2006).