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Greenhouse Gases Of Animal Agriculture In Brazil - Current Status And Perspectives

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Brazil has currently the biggest commercial bovine herd in the World with 195.5 Mi of animals, being mainly used for beef production, around 90%, and the rest 10% for milk.

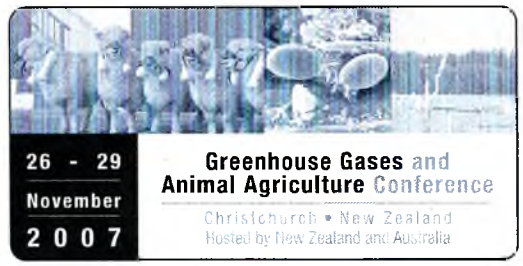
Regarding the greenhouse gas (GHG) emission our current main concern are burning activities and land use changes of Amazonian rainforest and other areas, corresponding to the main contribution of Brazil to global GHG. There is a great effort of authorities and a consensus in the country about the need to stop the Amazonian deforestation, being an illegal and criminal activity that must be strongly combated, mainly in the huge 500 M ha of Amazonian rainforest area.

In Table 1 are data of relative CO_2, CH_4 and N_2O emissions in the World and in Brazil. While worldwide 78% of total anthropogenic CHG emissions came from fossil fuel use in Brazil only 25% came from this fossil sources due to the energy matrix of about 45% being of renewable origin, including hydroelectricity and ethanol, as car fuel, compared to a World mean of only 14% of renewable energy.

The total anthropogenic GHG emission of Brazil, regarding the year 1994, occurred as 1,030 Tg CO_2, 13,2 Tg CH_4 and 550 Gg N_2O, with a total of 1,500 Tg CO_2-equivalent, with around 75% of the total GHG coming from agriculture and land use changes, including deforestation and biomass burning.

From this total GHG emission in Brazil the methane emitted from agriculture was estimated in around 10.2 Tg/year, with 96% (or 9.8 Tg/year) associated with livestock production (92% from enteric fermentation and 4% from animal manure) (Primavesi et al., 2004). This methane from livestock production represents around 16% of total GHG emission (in CO_2- equivalent) of Brazil and 12% of total world livestock methane emission, or only around 2% of the global anthropogenic sources. The main source of methane in Brazil were Zebu bovine breed and crossbreeds fed on Brachiaria grass pastureland, with 80% of total of Brazil methane emission. In Figure 1 is shown the device, developed at the Washington State University, used to collect ruminal methane from bovines under field conditions, based on the use of SF_6 gas tracer with further gaseous chromatography analysis in laboratory (Lima & Demarchi, 2007; Primavesi et al., 2004).

The main strategies to mitigate methane emission from ruminal fermentation in Brazil are: to improve the livestock productivity, through feed supplementation (for example, chopped sugar cane with urea or concentrate in the dry season), improved feed quality (lesser fiber, more crude protein, greater digestibility; by rotational cattle management and adequate stocking rate), use of complementary more digestive forages like oat and alfalfa under irrigation conditions, and other leguminous forages, disease control, artificial insemination, genetic improvement, with efforts to improve feed conversion, that is a strategy to reduce methane emission by meat or milk unity produced. Secondary also, with the use of unsaturated oil (like that of palms), immunization tentatively using CSIRO vaccine to reduce livestock methane production and tentative uses of ionospheres and antibiotics to improve feed conversion and consequent methane reduction. From the total balance of CHG emission in livestock production the use of Brachiaria grassland has a important potential to increase total soil organic matter with soil carbon sequestration and GHG mitigation. Recent data did show, at the Southeast Cattle Research Center from Embrapa, in São Carlos, São Paulo State, a relevant amount of carbon sequestration with around 2 Mg ha^{-1} $year^{-1}$ in Brachiaria decumbes areas stimulated to allow greater stocking rate by use of fertilizer. This strategy of intensifying stocking rate by exploring the great yielding potential of tropical grasses through the use of N-fertilizer, may allow the reduction of pastureland released for cropland besides of reducing the pressure to slash new forests and they burnings. Nowadays Brazil has 80 million of hectares with Brachiaria decumbes, basically feeding beef



cattle. The strategy to intensify the stocking rate, by better management practices, will also reduce the burnings and therefore improve the main methane sink in atmosphere, the OH^- radicals, currently neutralized by NO-ozone produced during burnings.

Regarding N_2O emission from agriculture, in Brazil, the estimation for 1994, was a total of 503 Gg, with 219 Gg (43%) due to livestock on pastureland, 125,7 Gg (25%) due to cultivated soils and other 131.77 Gg (26%) to indirect emissions (Lima et al., 2001). Based on these data the N_2O emission from animal agriculture in Brazil represents around 4% of total GHG (in CO_2-equivalent) of the country and could represent around 13% of total N_2O emission from worldwide animal agriculture. Recent studies did show that the N_2O emissions from Brazilian soils (Oxisols) are much lower than predicted, due to their great permeability.

To date the Brazilian Agricultural Research Corporation- Embrapa, in partnership with several other Brazilian institutions as well as with international cooperation, has developed a wide agenda on GHG in agricultural activities with several researches conducted in different regions of the country and many activities with resulting data on: inventory of general GHG emissions of Brazil; more specific data on methane, from bovine ruminal emissions and rice fields; mitigation activities as reforestation, biofuel use (MacDiarmid & Venancio, 2006), soil carbon sequestration (Bayer et al., 2006), and others; researches and stimulus to increase adoption of biodigestor tank mainly with effluent of swines to use methane as fuel source, and participation in Clean Development Mechanism (MDL) projects; vulnerability evaluations of different crops in the very large country using climate risk zoning tools (Zuffo Júnior et al., 2006) with IPCC scenarios of temperature increase; as well as biological adaptation of crops to more dry seasons and others climate interferences.

Table 1- Proportion of carbon dioxide, methane and nitrous oxide regarding CHG emissions from agriculture and land use changes in the World and in the Brazil.

WORLD			BRAZIL		
CO_2	CH_4	N_2O	CO_2	CH_4	N_2O
22%	55%	80%	75%	91%	94%

Figure 1- Details of device utilized to collect methane in bovines in Brazil (Lima & Demarchi, 2007; Primavesi et al, 2004).

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