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ENTERIC METHANE EMISSION BY GRAZING CATTLE IN THE BRAZILIAN TROPICS USING THE SF₆ TRACER METHOD

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To verify the real emission rate of methane by the Brazilian cattle herd, initially estimated to be around 6.2 g/h on tropical grasses for beef cattle and between 9.2 to 13.5 g/h for dairy cattle, field measurements began to be done with dairy cattle, in the 2002 summer and fall season, in São Carlos, São Paulo state. The summer CH₄ emission rate was of about 8.3 g/h or 0.43 g/day/kg life weight (71 kg/year/animal) for 459 Holstein heifers grazing a non fertilized 7.5% CP *Brachiaria decumbens* pasture (aprox. 70% of the Brazilian pastures), and 16.8 g/h or 0.71 g/day/kg life weight (147 kg/year/animal) for 572 kg lactating Holstein cows, grazing a fertilized 13.8% CP *Panicum maximum* cv Tanzania pasture plus 1 kg 20% CP concentrate each 3 kg milk (intensively in rotation managed animals on pasture). The methane emission by 1/2 Zebu crossbreed was a little higher, although not significant, perhaps because of their better cellulose digestion capacity. The methane emission per kg milk was of about 18.4 and 25.4 g/kg, respectively, for pure Holstein and Zebu crossbreed.

The fall emission was a little lower for heifers, perhaps due to the lower quality of the grasses. But in intensively managed dairy production systems the feed quality will be improved or more stable in the drier season because of the use of silage or chopped sugar cane plus 1% urea or/and concentrate. Also for Zebu crossbreed heifers on unfertilized pastures the stocking rate will be adjusted to the feed offer, to avoid hunger regime. Further trials to measure the methane emission by ingestion of chopped sugar cane plus 40% DM as 18% CP concentrate or 1% urea, currently used in the winter season, with very low grass forage availability, did bring as first data, respectively, 0.42 and 0.29 g/day/kg life weight or 6.3 and 4.1 g/h of methane, due reduced DM intake only with urea. Former studies showed that two sugar cane varieties tested with 17% DM from a 20% CP concentrate, one with lower NDF and higher sucrose content, with a NDF/sucrose ratio of about 3 against the currently 4, which allowed an up to 30% increase in weight gain by Zebu beef cattle heifers, with the same ingestion rate of dry matter. The

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same methane emission rate for ... indicate that the 3 NDF/sucrose canes could be a very important tool to reduce methane emission, besides the intensification of the production system, with fertilized pastures, and the rotation of animals.

Field measurements done with Zebu beef cattle (aprox. 80% of the Brazilian herd) heifers, in Nova Odessa, São Paulo state, grazing fertilized *Brachiaria brizantha* pasture, in the dry winter season, resulted in methane emissions around 0.32 g/day/kg live weight for 314 kg animals (37.5 kg/year/animal). This lower emission rate is perhaps due to the lower availability of good quality forage in the dry winter season. An other interesting observation was that there is a big variability among animals with a similar life weight. And also that the younger animals seem to ingest more dry matter per life weight than older ones: 217 kg heifers produced a CH₄ emission rate of 0.41 g/day/kg life weight (32.7 kg/year/animal) against 0.21 g/day/kg life weight (40 kg/year/animal) by 516 kg heifers.

In the praxis, the extensively managed beef cattle herd, in Brazil, on degraded (aprox. 70%) *Brachiaria* pastures suffers mainly of three hunger months, with weight losses, increasing the slaughter age from 2 to 4 or 6 years. So the emission rate could be lower with animals under hunger regime, and the total yearly methane emission by the Brazilian herd will be not so high than initially estimated.

The measurements in Nova Odessa will continue under pasture conditions. Also measurements with controlled intake will be done in Nova Odessa and in Jaboticabal, São Paulo state, at the UNESP University, with tropical forage, pure and complemented with concentrate levels, using Zebu and Zebu crossbreed cattle. The greatest challenge found is to have better ingestion data by grazing animals, mainly when grazing a mix of grass and bush or little tree leaves like in the Cerrado (Savannah) or Pantanal or Amazon conditions, where measurements will be done in the near future. The main goals will be, besides to determine the real methane emission by the Brazilian herd, the practices which could reduce methane emission per animal and per unit of produced meat or milk, and to get better coefficients for prediction equations for tropical conditions.

