Methane production by crossbred cows in silvo-pastoral systems from Michoacán, México

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INTRODUCTION
Livestock production is considered the main user of natural resources and one of the main emitters of greenhouse gases (GHG) such as carbon dioxide (CO₂), methane (CH₄) and nitrous oxide (N₂O), contributing to global warming and climate change. Methane originating primarily from enteric fermentation in ruminants represents 18-23% of annual methane emissions. Silvo-pastoral systems with Leucaena leucocephala, a tropical tree native to southern Mexico and northern Central America, are evaluated for their GHG emission mitigation potential.

The aim of the study was to estimate methane production in traditional grazing (TG) vs silvo-pastoral systems (SPS).

MATERIAL AND METHODS
The study was carried out in the ranch “Los Huarinches”, located in Tepalcatepec, Michoacán, México.

Heifers were Bos taurus x Bos indicus, Pardo Suizo-Americano breed. They were managed under the 2 grazing systems over 43 days, fed Panicum maximum only (TG) and P. maximum plus L. leucocephala (SPS).

No concentrate or other nutritional supplement was included in the ration. Activities, feeding patterns and ruminal content were monitored daily. Analyses included dry matter intake (DMI), feed quality and methane production.

RESULTS
Significant differences (P<0.05) were found in the grazing hours for TG (5.5±0.62) and SPS (7.8±1.3). Intake was 109.7±33.6 g DM/kg0.75day⁻¹ for TG and 118.7± g DM/kg0.75day⁻¹ for SPS.

Methane production was 316.6±68.1 L day⁻¹ (TG) and 386.9±60.9 L day⁻¹ (SPS). Using CH₄/100 MJ gross energy (GE) conversion rates, methane productions were 11.75±0.03 (TG) and 12.10±0.02 (SPS), whereby differences were not significant (P>0.05).

DISCUSSION
Based on DMI, methane emissions should be higher in SPS, as livestock in SPS tended to consume more forage. Based on feed quality, methane emissions should be lower in SPS due to feed characteristics such as CT and low fibre content. P. maximum alone (TG) has higher structural carbohydrates and lower digestibility in combination with L. leucocephala (SPS).

Feed characteristics in SPS included: higher condensed tannins (CT), which inhibit certain rumen methanogens, and lower fibre content, which influences the ruminal volatile fatty acids (VFAs) ratio acetate:propionate, reducing methane production (Wanapat et al. 2015).

CONCLUSIONS
In this study, these two factors seem to counterbalance one another, as no significant differences were found in methane emissions from TG and SPS. Further research on methane emissions prediction models for SPS should be carried out taking into account parameters such as live weight gain, environment temperature and feed intake.

REFERENCES