Climate change, a resultant effect of greenhouse gas emissions, is a worldwide concern because its continuation is having significant impacts on people, natural resources and economic conditions around the world. The root cause of this recent past and projected climate change is now recognised to be the warming potential of a number of greenhouse gases that, by absorbing terrestrial infrared radiation, raise the temperature of the troposphere and with it, global surface temperatures.

The major greenhouse gases are water vapour, carbon dioxide, methane, nitrous oxide and fluorinated gases. While carbon dioxide receives the most attention as a factor which causes global warming, methane also cause significant radiative forcing.

Methane is only second to carbon dioxide in its contribution to global warming and its emissions are caused by both natural and anthropogenic actions. Human activities such as intensive livestock farming are the primary cause of the increased methane concentrations in the atmosphere, being ruminants the animals which create large amounts of methane via fermentation of feeds in the rumen. During this physiological digestive process, hydrogen is released by some microbes during fermentation of forage and is used by methanogenic *Archaea* (methanogens) to convert carbon dioxide to methane, which is released through eructation, normal respiration and small quantities as flatus.

Rumen fermentation of cattle contributes the most towards the greenhouse effect through methane emission followed by sheep, goats and buffalos, respectively.

Several techniques have been developed to quantify methane emissions from ruminants – indirect calorimetry, sulphur hexafluoride tracer technique and in vitro gas production technique – and some strategies for reduction of methane emissions from the rumen have been described – defaunation treatment, vaccine and dietary composition –.

The initial topics of this research were: design the experiments with goats because there are not many reports about methane emissions in these animals; investigate the influence of dietary composition (carbohydrates) as a strategy for reduction methane emissions from the rumen; and use the indirect calorimetry as method to quantify methane production.

Consequently, three experiments were performed. Murciano-Granadina goats during mid or late lactation were used. Diets were mixed rations that differed in the inclusion of cereal or fibrous by-products. The effect of diet was studied on milk yield, digestibility, rumen parameters, energy partitioning, carbon and nitrogen balance, substrate oxidation and methane productions.

In the first experiment, gas exchange was measured using a face mask which was fixed to the head of the goat by a rubber band; a sample of exhaled gas was stored in a gas collection bag which was connected to an analyzer, and it measured the concentration of O_2, CO_2 and CH_4 from the air. This first experiment replaces corn grain with beet pulp and the amount of methane recovered was 19.6 and 29.7 g/day, respectively.

In the other two experiments, gas exchange was measured by a head box designed for small ruminants where the goat introduced the whole head and a specific software automatically recorded concentrations of O_2, CO_2 and CH_4 from the exhaled air continuously throughout the day. The second experiment involved two diets with high and low level of starch and no differences were found on methane emission (28.5 g/day). The experiment number three replaces ingredient by ingredient like in the experiment number one. Here, barley grain was replaced with orange pulp or soybean hulls and no differences were found, with an average methane production value of 41 g/day. The metabolizable energy intake during the three experiments was 1279 kJ/kg of $BW^{0.75}$ and day on average, and the efficiency use of metabolizable energy intake for milk production was 0.6.