Prospecting bioactive compounds from Pampa biome: Antiparasitic effect and mitigate enteric methane - Minho A.P.[1*], Gomes C.C.G.[1], Chagas A.C.S.[2], Juchem S.[1], Mazzocato A.C.[1], Louvandini H.[3]

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The Pampas of South America are a grassland biome being a great source of bioactive compounds (BC) that can be used to parasite control or to mitigate enteric methane (CH4) produced by ruminants. The intensive use of chemical drugs has led to a problem of anthelmintics and acaricides resistance in sheep gastrointestinal nematodes (GIN) and cattle tick *Rhipicephalus (B.) microplus*, respectively. Recent surveys have identified antiparasitic effects of many BC, particularly from condensed tannin (CT). Studies with sheep and cows have shown that the use of forages containing CT can reduce enteric CH4 emissions from 13% to 16%. Some *in vitro* assays will be used to investigate the anthelmintic efficacy of BC: larval migration inhibition (LMI), larval feeding inhibition (LFI) and egg hatching (EH). Adult and larval immersion test will be used to evaluate the effect of plant extracts against the ***R. (B.) microplus* stages**. After screening, the best BC will be evaluated using *in vivo* assays. To quantify the CH4 will be performed *in vitro* screening in bottle assay and Sulfur Hexaflouride tracer (SF_6) *in vivo* technique with the best BC. The objective of this project is to evaluate *in vitro* and *in vivo* potential use of BC from Pampa Biome to: control GIN of sheep, control cattle tick and mitigate CH4 produced by ruminants. The main impact would be the development of new products based on BC that could be used on parasite control reducing selection pressure of chemical drugs and CH4 mitigation in livestock production.

Key-words: control, parasites, greenhouse effect

Embrapa project number: Preapproved, yet unnumbered

PROSPECTING BIOACTIVE COUNPOUNDS FROM PAMPA BIOME: ANTIPARASITIC EFFECT AND MITIGATE ENTERIC METHANE

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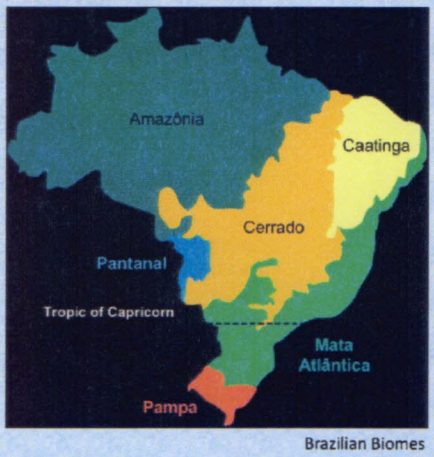
1 Introduction

The Pampas of South America are a grassland biome being a great source of bioactive compounds (BC) that can be used to parasite control or to mitigate enteric methane (CH4) produced by ruminants. The intensive use of chemical drugs has led to a problem of anthelmintic and acaricides resistance in sheep gastrointestinal nematodes (GIN) and cattle tick *Rhipicephalus (B.) microplus*, respectively. Recent surveys have identified antiparasitic effects of many BC, particularly from condensed tannin (CT). Studies with sheep and cows have shown that the use of forages containing CT can reduce enteric CH4 emissions from 13% to 16%.

2 Objective

The objective of this project is to evaluate in vitro and in vivo potential use of BC from Pampa Biome to: control GIN of sheep, control cattle tick and mitigate CH4 produced by ruminants.



Brazilian Biomes

3 Material and Methods

Three *in vitro* assays will be carried out to investigate the anthelmintic efficacy of bioactive compounds: larval migration inhibition (LMI), larval feeding inhibition (LFI) and egg hatching (EH). Adult and larval immersion test will be used to evaluate the effect of plant extracts against the *R. (B.) microplus stages*. After screening, the best vegetal sources will be evaluated using *in vivo* assays (anthelmintics and acaricides). To quantify the CH4 will be performed *in vitro* screening in bottle assay and Sulfur Hexaflouride tracer (SF_6) *in vivo* technique only with the best evaluated plants.

4 Strategies

P.A.1 Project Management: outgoings, purchases, follow-through the activities and equip motivating.

P.A.2 Plants sources: selection, morphological characterization and herbarium storage.

P.A.3 Extracts manufacturing (three polarities) and chemical analyses (vegetable sources and its extracts): nutritional value; bioactive compounds determination and tannins concentration. Creation of an extracts bank.

P.A.4 Anthelmintic effect (*Haemonchus contortus*):
In vitro analysis: (egg hatching, exsheathment inhibition and feed inhibition assay).
Toxicological analysis (extracts): anatomopathological and clinical parameters in lamb.
In vivo analysis: Feacal egg count reduction test and worm burden determination in experimentally infected lambs receiving plant extracts (best sources in screening).
Direct effect analysis: atomic force microscopy of parasites after contact with extracts.

P.A. 5 Acaricide effect (*Rhipicephalus microplus*):
In vitro analysis: (engorgeted female immersion and larvae into impregnated paper test).
Toxicological analysis (extracts): anatomopathological and clinical parameters in calf.
In vivo analysis: Number of engorgeted female determination in experimentally infested calves treated (pulverization) with plant extracts (best sources in screening).
Direct effect analysis: atomic force microscopy of parasites after contact with extracts.

P.A. 6 Enteric methane mitigation:
In vitro analysis: Semi-automated in vitro gas production technique.
In vivo analysis: Sulphur hexafluoride (SF6) tracer technique for CH4 measurement (best source in screening).

P.A. Plan of action

5 Potential Impacts

The main impact would be the development of new products based on bioactive compounds that could be used on parasite control reducing selection pressure of chemical drugs and improving the CH4 mitigation in livestock production. To create a plant extract bank (characterized compounds) to be use in future projects.