

# Comparing the effects of single or trickle experimental infections with *Haemonchus contortus* on digestibility and host response in naïve Creole kids reared indoors

Jean-Christophe Bambou<sup>1†</sup>, Willy Cei<sup>1</sup>, Claude Barbier<sup>2</sup>, Nathalie Mandonnet<sup>1</sup> and Eiel Gonzalez-Garcia<sup>3</sup>

<sup>1</sup>INRA, UR143 Unité de Recherches Zootechniques, 97170 Petit Bourg (France); <sup>2</sup>INRA UE 1294 PTEA, site de Gardel, 97160 Le Moule (France);

<sup>3</sup>UMR 868-INRA-ERRC, Campus SupAgro-INRA 34060 Montpellier (France)

## Introduction

Gastrointestinal nematodes are a major cause of economic loss in most small ruminant production systems. Chemotherapy is no longer efficient in gastrointestinal nematode control because of dearth of veterinary services in the rural community and high cost of drugs when available has limited this strategy as an effective option for rural producers. It has been shown that improved nutrition is one of the most promising and feasible alternatives to chemotherapy (Coop and Kyriazakis, 1999). However, most of our understanding about the effects of gastrointestinal parasites on ruminant nutrition derives from studies in sheep. In goats, little is known about the mechanisms underlying the relationship between nutrition and gastrointestinal parasitism. In a previous study (see Bambou *et al.*, 2009) we demonstrated the negative effects of an experimental infection with *Haemonchus contortus* on feed intake (DMI) and digestibility of nutrients in Creole kids. Here we compare the differences between two infection types (single, SI; and trickle, TI) with *H. contortus*, based on the fact that TI better mimics natural infection and the hypothesis that animals may respond differently. Effects on DMI, digestibility, fecal egg count (FEC), circulating eosinophils (EOS) and packed cell volume (PCV) were evaluated in naïve male Creole kids maintained on a similar level of nutrition.

## Materials and Methods

The kids were infected over 2 periods of 6 weeks each, differing in immunity stage (PI, 'acquisition of immunity'; PII, 'expression of immunity'). In PI, 24 kids ( $19.3 \pm 0.15$  kg BW) were housed in individual boxes, fed a hay-based diet, and a primary experimental infection was induced with a dose of 10,000 L<sub>3</sub> (SI,  $n = 12$ ) or 1,000 L<sub>3</sub>/day during ten days (TI,  $n = 12$ ). In PII, 23 of the initial 24 kids ( $22.0 \pm 0$  kg BW) were submitted to a secondary infection (SI,  $n = 11$ ; TI,  $n = 12$ ). Animals were reared indoors with the same management throughout the experiment. For each period, measurements of intake and digestibility were made at 0, 3, and 5 week post-infection (WPI). The DMI and total-tract DM, OM, CP, NDF, and ADF digestibilities were determined using the total feces collection and ad libitum forage supply method. Fecal and blood samples were collected weekly to measure FEC, EOS, and PCV.

## Results and Discussion

Infection with *H. contortus* affected DMI, basically during PI, decreasing between WPI 0 and 3 then increasing in WPI 5 ( $P = 0.05$ ). The infection type affected FEC and PCV ( $P < 0.001$ ) but not DMI. In PI, results in digestibility show an interaction ( $P < 0.0001$ ) between the WPI and infection type, with lower values in SI and at the third WPI; however, such interaction disappeared in PII where animals continued to linearly decrease digestibilities. The FEC were higher ( $P < 0.001$ ) in SI than TI in both periods, and in PI than PII. The results suggest that infection type influenced the intensity through the worm establishment rate and/or female prolificacy stages. However, the effects of these parasites on feed intake and digestibility could not be strictly linked to the infection intensity but more to the immunological stage.

## Conclusion

The results are valuable and the reflection around factors determining the performance in nutrition-parasitism interaction in Creole kids must be continued. This approach must also be evaluated under grazing conditions.

## References

- Bambou JC, Arquet R, Archimède H, Alexandre G, Mandonnet N and González-García E 2009. Intake and digestibility of naïve kids differing in genetic resistance and experimentally parasitized (indoor) with *Haemonchus contortus* in two successive challenges. *Journal of Animal Science* 87, 2367–2375.
- Coop RL and Kyriazakis I 1999. Nutrition-parasite interaction. *Veterinary Parasitology* 84, 187–204.

† E-mail: Jean-Christophe.Bambou@antilles.inra.fr