

## **Dynamics of parasitic helminth infections: Improved control practices through comparative studies in chickens**

### **Executive summary**

This PhD project from Nicaragua was one of the first research project dealing with parasitic infections in poultry in Latin America. The project was a combination of experimental studies in Denmark and field studies in Nicaragua. The project gave insight in host-parasite biology and gave knowledge, which is important for the development of control programmes. On the more general level, the project created capacity in an economically important area relevant also in connection with other livestock species.

### **Summary**

- Introduction

The present project was a continuation of previous collaboration project with universities in Nicaragua. The present project focused on a single topic: parasitic diseases in smallholder chicken. The project consisted of a grant given for the PhD study of Luz Adilia Luna Olivares. The project was a combination of experimental studies in Denmark and field studies in Nicaragua. The combination of experimental and field studies gave insight in the host-parasite biology from different perspectives, and was also an excellent tool for capacity building.

- Background,

Poultry production is an important economic and social activity of smallholder farmers in Nicaragua, mainly for the women. One of the limiting factors for productivity of the chickens may be parasitic infections, but the exact impact was not known on beforehand. The present project was therefore formulated to study the biology and epidemiology of selected parasites. The intention was to study the diseases as such and to create a much needed capacity within veterinary parasitology in Nicaragua.

- Results:

The experimental studies gave new insight in the dynamics and turn-over of infections with the common roundworm *Ascaridia galli*. We showed that newly incoming larvae were localized in between the villi and in the crypts of the intestinal mucosa. We could demonstrate that the number of larvae declined with time, a process which was associated with at moderate immune response in the mucosa. With the help of molecular markers and a PCR method we could demonstrate the fate of the already established larval population versus the fate of a secondary infection with the same number of eggs, which only differed by a molecular marker. This method permitted identification at necropsy. It was seen that the early infection to a large extent reduced the establishment of the later infection.

The field studies in Nicaragua showed that smallholder chickens in Nicaragua has a high burden of helminth infections consisting of several different parasite species. It was shown that the infection intensity generally

declined with age which is supporting the evidence of immunity described above. It was also shown that high parasite burdens could lead to a reduction in body weight gain in chickens.

As an outcome of the project Luz Adilia Luna was awarded her PhD degree from the University of Copenhagen on 3 December 2014. The results were published in peer-reviewed journals. Throughout the project Luz was very active in teaching of veterinary students, in supervision of students for their graduation projects and in supervision of MSc students. The experience was therefore disseminated to a much wider group.

- Conclusions:

This is the first project to create capacity at this level within veterinary parasitology in Nicaragua. As parasitic infections are important to several livestock species in the tropics, the project has made an important and needed contribution to the research capacity in the country.

These results and capacity is used actively in teaching, as the project has provided data from Nicaragua itself. The diagnostic capacity is being used and contacts have been made for future research collaborations.

It would have been ideal to continue with a broader research capacity collaboration in Nicaragua. The country is vastly depending on agriculture and livestock production, and research capacity is therefore needed within this field. Presently most of the livestock research is directed to the large-scale intensive production, but investment in the livestock species and production systems, which are relevant to smallholders, is likely to have both a productive and social impact. A direct continuation of the present project has however not been possible as the development collaboration with Nicaragua was phased out.