

## Final grant report form

<b>Project title:</b>	Investigating parasite burdens and immunocompetence of orphaned greater one-horned rhino ( <i>Rhinoceros unicornis</i> ) calves in Kaziranga national park, and Manas national park, Assam, India
<b>Researcher:</b>	Luke O'Connor
<b>Year awarded:</b>	2017

**Provide a lay summary outlining the project, focussing on the project's achievements and potential impact to animal welfare.** You could include outcomes against original objectives; challenges to the project and any statistical analysis completed as part of the project.

Every year, rhino calves orphaned by floods in Kaziranga National Park are rescued by staff from the Centre for Wildlife Rehabilitation & Conservation Centre (CWRC). The rhinos are kept there until they are released into a neighbouring national park two to three years later. This study sought to use parasite infections as a proxy for the orphaned rhinoceroses' health. Three groups were studied: rhino calves at CWRC, juveniles at CWRC and wild rhinos in Kaziranga.

Parasite infection intensity (i.e. number of parasites present in the rhino) was quantified using an 'egg per gram' (epg) method. A sample of faeces is taken, processed and examined under microscope, using a method called FLOTAC, which is very sensitive. The number of parasite eggs are then counted. Using this method, it is possible to directly compare parasite infections between different animals, as well as identify the species of parasites present.

A total of 54 samples were analysed. Only one group of parasites, large roundworms (strongyles) were identified in orphaned rhino samples. The results showed a very low level of parasites in the rhino calves. Strongyles are picked up when they eat, and the calves are still being bottle fed milk, and not yet extensively grazing. Healthy animals can have a low level of parasites with no ill effects, and the levels present in calves probably had no negative effects on their health.

The rhino juveniles had a wide range of parasite burdens, with the highest containing 145 parasite eggs per gram of faeces. They had significantly higher rates of infection than the calves (t-test,  $p < 0.01$ ).

Wild rhino, as well as having roundworm strongyle infections, also had tapeworm *Anoplocephala* and fluke *Paramphistomum* parasites. Infection intensity of *Anoplocephala* was correlated with strongyle infection (Pearson's product-moment correlation,  $p < 0.05$ ).

There was no difference between the parasite burdens of wild rhino and the juvenile orphans (t-test,  $p = 0.21$ ). Captivity can cause stress in some animals, which may cause their immune systems to be weakened. If the juvenile rhinos had suppressed immune systems, they may have increased parasite burdens. Although there are many factors that could play a role, the fact that the orphaned juveniles don't have elevated levels of parasites is a good sign as it means that their immune systems may be healthy enough to fight off parasite infection.

Unfortunately, it was not possible to ascertain parasite burdens of post-release orphaned rhinos. Currently ten rhinos have been released into Manas National Park, and although three samples were collected, once looked at under a microscope, it was found that they were too old to be used. Faecal samples need to be collected soon after they are deposited as the parasite eggs hatch, which leads to spurious results.

Management changes of the captive rhino will improve their welfare. From this study, recommendations were made including implementing targeted selective treatment of animals with high parasite loads. This

will reduce the amount of anthelmintics used in the system, which will reduce anthelmintic resistance in the long run. Another recommendation made is to move the animals to the release site earlier, in order to reduce the density at CWRC, which may reduce density dependent parasite burdens. Overall, however, the orphaned animals were in good health.

### **Provide a short description of your personal experience in undertaking this project**

**This was an extremely formative experience for me, from all aspects of the study design, to implementation, sample processing and collecting. I have learnt a lot about the process of grant writing, completing a scientific project, and working in a developing country.**

One of the most difficult aspects of this project was dealing with the cultural difficulties between India and the UK. India is an extremely bureaucratic place, and there were layers upon layers of paperwork to be completed, people to please, people who wanted to be included, the right hands to shake - all before I could even get close to a faecal sample.

**As well as gaining skills in working with wild animals and identifying parasites, I have gained skills useful in research, such as in statistics and manuscript preparation. These skills are extremely useful to me, especially as I want to pursue a residency in Zoological Medicine. This grant has given me confidence in my ability to perform research, and was a great experience – so thank you!**

### **Use the space below for any other relevant information you wish to report on. This could include details of knowledge transfer activities and any future plans/actions.**

My original grant proposal included knowledge transfer, this has definitely been achieved. While I was there I trained two of the vets in the use of the equipment I was using, and they were inspired by this project. They intend to collect samples and analyse them there so there is a seasonal dataset available. We will be continuing to communicate, so hopefully we can get greater knowledge of the temporal patterns of parasite infections, as well as potentially studying some other species.

The project also sparked a lot of conversations about the welfare of the animals in captivity with the vets there, and they will be taking the role of parasites into consideration more with their future treatments.

I am currently writing the project up which will be submitted to a journal soon – probably Journal of Zoo and Wildlife Medicine as stated in my grant application, which will be forwarded to AWF as soon as it is published.