Introduction

Suaka Rhino Sumatera (SRS) is a semi wild breeding program for the endangered Sumatran rhinoceros (Dicerorhinus sumatrensis, CITES, APPENDIX I) located within the rainforests of Way Kambas National Park (TNWK). Lampong. Since 1998, the SRS mission has been to repatriate Sumatran rhinos remaining in ex situ zoological settings back to a more natural environment to promote breeding. Health is a critical component of any captive-based program and warrants intensive investigation. In 2003, the last captive rhino in peninsular Malaysia died suddenly of paramphistomid trematodes in the gastrointestinal tract of an emaciated elephant. Recognizing the "one health" principle the people, domestic and wild animals all share a common health (WCS, 2004).

More recently, the SRS team identified chronic trematode parasitism (Paramphistomidae) in one of 15 rhinos and abundant trematode organisms in the gastrointestinal tract of an emaciated elephant that died at the nearby TNWK elephant sanctuary. These health issues invariably are linked to the wildlife and domestic animal contact in the national park area. Increasingly, conservationists are considering the "one health" principle in which the people, domestic and wild animals all share a common health (WCS, 2004).

Mapping of potential disease agents around TNWK was first implemented prior to the translocation of the male Sumatran rhino from the Los Angeles Zoo. This animal, Anadalis, is the first captive-born Sumatran rhino ever to be returned to its species homeland in Indonesia. Coming from a zoo environment in North America, Anadalis was never exposed to the disease agents he would encounter in TNWK. Therefore, the SRS conducted a survey and mapped the disease risk in the national park area.

Materials and Methods

Samples were collected during July-August 2006 and July 2007 from five Sumatran rhinoceroses at the Sumatran Rhino Sanctuary. 49 Sumatran elephants at the Way Kambas Elephant Conservation Center, and 191 livestock (152 cattle, 26 water buffalo, 12 goats and 1 sheep) in six villages bordering Way Kambas National Park. Samples collected for this study were blood, serum, feces and ectoparasites from the animals and environment. Blood and serum samples were analyzed for hemoparasites using Giemsa and Diff quick stains and molecular analysis with Reverse Line Blot Hybridization (RLB) and PCR for species sequencing. Both qualitative methods (native and sedimentation) and quantitative methods (Mc Master and hemocytometer) were used to identify and measure endoparasite infections.

Results and Discussion

Hemoparasites identified using microscopy include Anaplasma marginale, Anaplasma centrale, Theilenia bicornis, and Babesia species. Molecular analysis using Reverse Line Blot Hybridization (RLB) and nested PCR revealed three species of hemoparasite: Theilenia bicornis was discovered in one Sumatran rhino, while Theilenia buffelli, Theilenia orientalis and Plasmodium sp. were identified in water buffalo. Theilenia bicornis has been reported to cause mortality in black rhino in Africa (Nijhof, 2003). In our study m and around TNWK, PCR analysis of the DNA extracted from blood samples of domestic ungulates revealed a significant number of trypanosome-infected animals in the villages sampled. The primary animals attacked were cattle and water buffalo. The incidence of trypanosome infection in water buffalo (n=28) was 19% and cattle (n=147) was 17%. The Sumatran Rhinocerotes and the Sumatran Elephants in comparison bath had low rates of trypanosome infection, with only two of the 53 captive wildlife species (1 rhino and 1 elephant) testing positive for trypanosomes. The species of trypanosomes remains unidentified, although efforts to identify the species of organisms are ongoing.

Endoparasites identified from Sumatran rhino include fasciolidae, paramphistomidae and oxyuridae. A land snail of the genus Planorbis, also known as the intermediate host for the parasitic Paramphistomidae. A number of parasitic protozoa have also been identified from 3 families and 9 genera; almost all protozoan parasites found in domestic animals have been found in wildlife (Sumatran rhino and elephant). From these results we conclude that the rhino and elephant of TNWK are at high risk for acquiring parasitic infection from cohabiting with domestic animals. Protozoan parasites from the genera Entamoeba, Cryptosporidium, Balantidium and the family Cystoisosporidae are present in rhino, elephant, cattle and buffalo. Cryptosporidium and Entamoeba are zoonotic parasites commonly transmitted through contamination of water and grazing areas.

Ectoparasites were identified from 24 species in 9 families from the insect class and one family from the Arachnida class. Two species of tick (family Ixodidae) were identified in the SRS. Haemaphysalis hystricis and Amblyomma latudinarium. Both of these ticks are known reservoirs and vectors for trypanosomiasis (Thekisoe et al., 2007).

Many species of parasite play an important role in disease transmission as mechanical/zoic/vertebrate vectors; these roles are connected with a life cycle that requires a mammalian host. Given the significant risks to wildlife, TNWK park policy should consider restricting domestic animal traffic in and around the park area.
URVILLIENNE AROUND WAY KAMBAS NATIONAL ORT SUMATRA RHINO CONSERVATION AND HEALTH

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fs: Sumatran rhino, Parasite, Surveillance, Trypanosome

At the Sumatran Rhino Sanctuary, 49 Sumatran elephant conservation center, and 171 livestock (152 cattle, 25 water buffalo, 7 goats and 1 sheep) in 6 villages surrounding the Way Kambas National Park. Samples collected for this study were blood, serum, feces and ectoparasites from the animals and environment. Blood and serum samples were analyzed for antibodies using gamma and direct immunofluorescence and molecular analysis with Reverse Line Blot Hybridization (RLB) and PCR for species sequencing (both qualitative methods (targets and restriction) and quantitative methods (PCR-Master and hemocytometer) were used to identify and study endoparasite infections.

Results and Discussion

Ectoparasites identified by microscopy included Anaplasma marginale, Anaplasma centrale, Theileria sp. and Boophilus sp. Molecular analysis using Reverse Line blot Hybridization (RLB) and nested PCR revealed three species of haemoparasites: Theileria bimca was discovered in one Sumatran rhino, while Theileria buffelli, Theileria orientalis and Plasmodium sp. were identified in water buffalo. Theileria bimca has been reported to cause mortality in black rhino in Africa (Nijhof 2003). In our study in and around TNWK, PCR analysis of the DNA extracted from domestic ungulates revealed a significant number of trypanosome-infected animals in the villages sampled. The incidence of trypanosome infection in water buffalo (n=26) was 19% (n=147) was 17%. The Sumatran Rhinoceros and the Sumatran Elephants in comparison had low rates of trypanosome infection, with only two of the 53 captive wildlife species (1 rhino and 1 elephant) testing positive for trypanosomes. The species of trypanosome remains unidentified, although efforts to identify the species of organisms are ongoing.

Endoparasites identified from Sumatran rhino include fasciolopsiasis, paramphistomiasis and oxyuriasis. A small snail of the genus semisulcanthus was also identified in the sedimentary area of the Sumatran Rhino Sanctuary. Sediment analysis from 37 Sumatran rhinos revealed that 31 were infected with nematodes of the genus Paramphistomum with high worm burdens estimated at up to 32,73 eggs per gram of feces. The elephant conservation center houses snails of the genus Paramphistomum that is suspected to be the intermediate host for the genius Paramphistomoides. A number of parasitic protozoa have also been identified from 3 families and 9 genera; almost all protozoan parasites found in domestic animals have also been found in wildlife (Sumatran rhino and elephant). From these results we conclude that the rhino and elephant of TNWK are at high risk for acquiring parasitic infections from contamination with domestic/effectuates. Protozoan parasites from the genera haemogregarina, cryptosporidium, balantidium and the family Cystoisospora are present in rhino, cattle, and buffalo. Cryptosporidium and Entamoeba are zoonotic parasites commonly transmitted through contamination of water and grazing areas.

Ectoparasites were identified from 24 species in 9 families from the Insecta class and one family from the Arachnida class. Two species of tick (family Ixodidae) were identified in the black Haemaphysalis yaldwyni and Amblyomma striatulus. Both of these ticks are known reservoirs and vectors for trypanosomes (Theobald et al., 2007). Many species of parasite play an important role in disease transmission as mechanical and/or biologic vectors; these roles are connected with a life cycle that requires a mammal host. Given the significant risks to wildlife, TNWK park policy should consider restricting domestic animal traffic in and around the park.