New Tools for Wild Research

In Africa, there's no shortage of plans to conserve the continent's wildlife. Park managers, field researchers and government committees are all adept at developing ideas to save African wild dogs or encourage the growth of the black rhinoceros population.

But while coming up with conservation ideas is easy, determining whether these ideas work is much more difficult. Evaluating the outcome of a reintroduction or translocation program can take years. Time is rarely a luxury for endangered species.

New field tests developed by Lincoln Park Zoo Endocrinologist Rachel Santymire, Ph.D., hold the promise of providing real-time feedback on efforts to preserve populations in peril. By enabling easy, field-ready analyses of stress and reproductive hormones, Santymire and her colleagues at the Davee Center for Epidemiology and Endocrinology are providing an effective way to evaluate conservation efforts. By evaluating animals at Lincoln Park Zoo to validate her tests, the scientist is providing an important link between zoo populations and their endangered cousins, one that will help both to thrive.

Field Ready

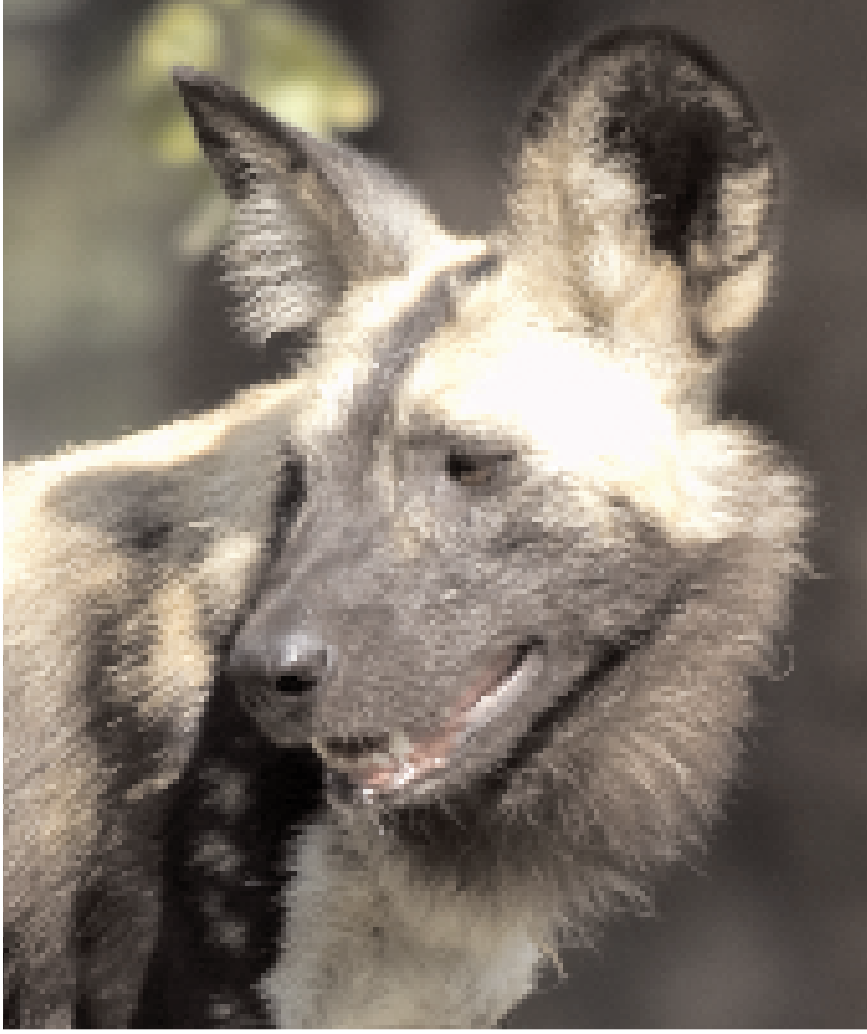
BY JAMES SEIDLER

Science, Hold the Ice

The boundaries of Serengeti National Park are fluid ones, with wild animals, domestic cattle and local villages overlapping. This can lead to conflict, such as when African wild dogs—severely endangered predators—attack cattle that local herders rely on for their livelihood. To reduce the risk of reprisal, conservationists in the area seek to relocate wild dog packs that are harassing cattle to within Serengeti National Park.

It sounds like a win-win situation—the dogs find new prey, and the cattle are safer—but researchers want to ensure that the process of moving the wild dogs into the park doesn't overly stress the dogs. One way to test this is to monitor the carnivores' stress hormones before, during and after the translocation. If they return to their pre-move stress levels with no long-term effects, that's a positive sign for the conservation plan.

There's one issue with the idea, though. You can find many things on the plains of the Serengeti—lions, wildebeest, elephants—but freezers typically aren't one of them.



Right: Endangered species such as African wild dogs (top) and black rhinos (bottom) will receive a boost from the field endocrinology kits developed by Endocrinologist Rachel Santymire, Ph.D. By enabling real-time results in the field, the kits will improve efforts to conserve these species.

Above: Sanytmire's field methods will enable snapshots of animal well-being in locales as remote as South Africa's Addo National Elephant Park (top) and Tanzania's Serengeti National Park.

Why's that a problem? Well, hormones are typically extracted from feces, and feces need to be put on ice within 12 hours to provide usable data. Since field scientists often spend days at a time traveling through the bush, sans icebox, it's easy to see how samples might be lacking.

To make the project work, Santymire knew she had to find a way to take ice out of the equation. And so, using feces collected from the African wild dogs at Regenstein African Journey as a starting point, she did just that.

"We wanted to get rid of the ice, and we also wanted a long shelf life so researchers could mail samples to us from Africa," says the scientist. With some trial and error (and a few contributions from the zoo's wild dogs), Santymire came up with a process suited to life in the wild.

Here's how it works: researchers collect feces, measure out a small amount and mix them in an ethanol solution. The liquid is then poured through filter paper, straining out leftover waste and allowing the hormones to pass into a test tube. After the ethanol evaporates, the tubes are capped and shipped to Santymire's lab, where dried hormones clinging to the test tube walls can be resuspended and analyzed. No liquid, no ice, no problem.

By enabling analyses of samples collected in the wild, Santymire can help quantify the conservation impact of transporting the dogs. At the same time, Santymire's method also gives researchers another tool for studying African wild dogs' famously complex social groups. Wild dogs observe a strict hierarchy. The leaders—an alpha male and alpha female—don't allow other group members to produce pups. Instead, lower-ranking dogs help feed, care for and protect the dominant animals' offspring.

By monitoring reproductive hormones in the field, Santymire and collaborators can learn how breeding cycles might impact group dynamics. They can also study how stress levels relate to an individual's position within the group hierarchy. Do alpha dogs experience more stress? Does anxiety increase as dogs try to work their way up within the structure? Hormonal analysis could shed light on these questions, aiding conservation decisions in the wild and improving zoo efforts to enhance animal well-being.

"These surveys offer an unprecedented look into what's going on in the wild," says Vice President of Conservation & Science Dominic Travis, D.V.M. "Before, there was no way to get this kind of data in a timely manner. By enabling easy analysis of field samples, Rachel is expanding opportunities to study wildlife."

Reviewing the Rhino Recovery

Another site where endocrinology is aiding conservation is South Africa's Addo National Elephant Park, where Santymire and colleagues are collaborating with local researchers to study the black rhinoceros population. Black rhinos are endangered; their population plummeted from 65,000 individuals in 1970 to only 2,000 in 1995. Intensive husbandry efforts have raised that number to approximately 4,000 rhinos today, but the species' status remains precarious.

To boost the recovery, researchers want to learn more about the factors influencing rhino reproduction. Addo National Elephant Park provides an ideal learning laboratory. Rhinos there populate three distinct sections in the park—Addo, Nyathi and Darlington—covering more than 80,000 acres.

Each of the sites varies in factors that might impact breeding: human presence, competition with elephants for resources and the predation of calves by lions and hyenas. The Darlington site, which has the shortest interval between births, also has the fewest tourists and no elephants, lions or hyenas—all potential stressors. By studying stress and reproductive hormones, Santymire hopes to determine how all of these factors are linked. "Rhinos are very shy—zoo studies have shown that breeding can easily be disturbed," says the scientist. "By monitoring hormones, we hope to break down how these environmental factors influence reproduction, thus aiding conservation management."

To look at the link between stress and reproduction, Santymire is developing a field-testing kit that will enable researchers to conduct analyses on the spot. Again a zoo animal—this time the black rhinoceros at Regenstein African Journey—is playing a crucial role in helping his counterparts in the wild. By surveying his hormones, Santymire can validate her procedure before sending it to the field.

Once the test is ready for the wild, Santymire's collaborators will evaluate male rhinos' testosterone levels to see if they vary seasonally—valuable information for breeding. They will also determine basic breeding information for the species, such as the age at which females become reproductively active and the duration of infertility following a pregnancy.

"These answers were made possible by research conducted at zoos," says Santymire. "By using the zoo's animal collection to design tools for the field, we're able to really evaluate the impact of our conservation efforts."