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Indonesia agrees to attempt Sumatran rhino IVF with eggs from Malaysia

by Basten Gokkon on 6 August 2019

- *Conservationists have welcomed a long-awaited agreement by Indonesia and Malaysia to move ahead with assisted reproductive technology for the captive breeding of the nearly extinct Sumatran rhino.*
- *Indonesia has long balked at sending rhino sperm to Malaysia for use in artificial insemination, but has now agreed to accept eggs from Malaysia to carry out in vitro fertilization.*
- *If successful, the program would give the species a much-needed boost in genetic diversity.*
- *Scientists in Germany last year used IVF to successfully produced embryos — though not a baby — of white rhinos, an African species.*

JAKARTA — The governments of Indonesia and Malaysia have agreed to carry out in vitro fertilization of Sumatran rhinos, heralding a breakthrough in a decades-long effort to breed the nearly extinct species in captivity.

The procedure will take place in Indonesia, which has long balked at requests to send sperm to Malaysia for artificial insemination efforts there.

Conservationists in both countries and abroad had been pushing for some kind of assisted reproductive technology for the species, whether through artificial insemination (introducing sperm taken from a male rhino into a female) or IVF, in which an egg extracted from a female is fertilized in a lab and implanted in a surrogate female.

Indonesia is home to an estimated 30 to 80 Sumatran rhinos (*Dicerorhinus sumatrensis*), [at most](#), while Malaysia now has just one — a female — after [its last male died](#) in May. Under the newly announced plan, researchers hope to use sperm from one of Indonesia's captive male rhinos to fertilize eggs sent from the lone female of the species in Malaysia.

“Originally the plan was to bring sperm [of the rhinos in Indonesia] there [to Malaysia], but after discussions and negotiations, it’s eventually decided to bring the

eggs here [to Indonesia],” Indra Exploitasia, the director of biodiversity conservation at Indonesia’s environment ministry, told reporters in Jakarta on July 31.

“We have actually agreed on this at lower levels,” she said, adding that both Indonesian and Malaysian governments were completing the administrative process. These include requirements under the Nagoya Protocol, which governs the international sharing of genetic material.



Zulfi Arsan, head veterinarian at the Sumatran Rhino Sanctuary, hand feeds Andalas, the first Sumatran rhino bred and born in captivity in over a century. Image by Jeremy Hance/Mongabay.

Indra said the IVF procedure would be performed by Indonesian experts, with funding from the Indonesian government.

“We would pick the best sperm from all of the male rhinos we have here,” she said, referring to the Sumatran Rhino Sanctuary in Way Kambas National Park.

Should the procedure prove successful, resulting in a viable embryo, Indra said it would be implanted in the uterus of a surrogate mother from one of the captive female rhinos in Indonesia. Indra said Indonesia and Malaysia had not yet agreed on ownership of any offspring resulting from the IVF program.

Despite this last sticking point, conservationists from both countries have welcomed the advance in this long-awaited collaboration, noting that producing a viable Sumatran rhino embryo through IVF would add much-needed diversity to the captive population.

Four of the seven rhinos at the Indonesian SRS, including all of the males, are closely related. Iman, the Malaysian female, comes from a population in Borneo that was once considered a separate subspecies, and which has been genetically separated from the Sumatran populations for thousands of years.

The journey toward collaboration between the two countries has been a fraught one, with Indonesia for years [reluctant to heed Malaysian requests](#) for a transfer of sperm to attempt artificial insemination in Malaysia. Last October, Indonesia's conservation chief, Wiratno, said the IVF program had been [postponed](#) because Iman, who was being treated for a uterine tumor, had ceased to produce viable eggs.

Officials from the Sabah Wildlife Department, in Malaysian Borneo, reported last December that Iman had [suffered a ruptured tumor in her uterus](#), leading to massive bleeding. Since then, however, an intensive regimen of medical treatment and feeding has raised hopes about her [prospects for recovery](#).

The team caring for Iman, believed to [still be fertile](#), says the rhino is recovering and produces viable oocytes with assistance.

John Payne, the head of the Borne Rhino Alliance, said that collecting eggs from Iman would be very challenging and would require a highly skilled and coordinated team of veterinarians and anesthetists.

"This is not a time for training or capacity building. It is a time to get on the best experts," he told Mongabay in an email.



Iman is the last Sumatran rhino left in Malaysia. A tumor in her uterus ruptured in 2017, and while scientists don't believe she can carry a baby to term, they're confident her eggs can still be used for in vitro fertilization. Image courtesy of the Sabah Wildlife Department.

He said the rhino would be put under general anesthesia, which entailed some degree of risk, particularly inadvertent puncturing of a blood vessel if the animal moved slightly but suddenly during the egg extraction process.

"This is even more dangerous in a rhino with large fibroids in the uterus, like Iman," he said. "Great skill and rapid performance are both of the essence."

After the successful collection, Payne said the eggs had to be taken in a buffer solution, kept at the rhino's body temperature, to where the IVF would be conducted.

“Essentially, the quicker this is done the better, within a 24 hour time frame,” he said. “However, if the eggs are found to be still immature, they will need to be kept in a specialist laboratory for maturation, which could take up to a few days.”

Payne suggested the collection be carried out by Thomas Hildebrandt, a professor from the Leibniz Institute for Zoo and Wildlife Research in Berlin, who has successfully extracted eggs from Iman since 2014. He added that Zainal Zahari Zainuddin, Iman’s Malaysian veterinarian, should also be involved in the process.

For the IVF, Payne suggested Arief Boediono, an Indonesian professor who is an expert in the practice.

Widodo Ramono, the executive director of the Indonesian Rhino Foundation (YABI), said his team was ready to help with getting the sperm needed to fertilize the collected eggs. “This would be an opportunity for our experts to perform IVF,” he said.

Payne said his pick for the best sperm donor would be Andalas, a male at the SRS who was born in a captive-breeding program at Cincinnati Zoo in 2001 and has since sired two calves.

“[H]e is a proven father, and the spontaneous method should ideally be used” to collect the specimen, Payne said.

Widodo said the experts needed to ensure the availability of a healthy surrogate rhino mother before performing the IVF. “Right now, there’s only one: Ratu, who is currently going under a natural breeding program,” he said noting that experts hoped she would achieve more natural pregnancies. (Ratu is the mother of the two calves conceived naturally with Andalas.)

“If there is an embryo [resulting from the IVF], it should be kept until a surrogate mother is available,” Widodo said, suggesting that Ratu, a proven natural breeder, should be kept in that role.

There’s a growing urgency to step up the captive-breeding program for the critically endangered species. With such a small population to draw from in Indonesia, the risk of genetic defects being passed on through captive breeding are high — which makes the need for the Indonesia-Malaysia collaboration all the more important.

Scientists in Germany reported success in [producing embryos](#) — but not yet a baby — of an African species, the white rhino (*Ceratotherium simum*), through IVF. Before this, this form of assisted reproductive technology remained unproven in rhinos, and some experts were skeptical it could be perfected in time to stall the extinction of a species.

Earlier this year, a 7-year-old greater one-horned rhino (*Rhinoceros unicornis*) [gave birth](#) following a combination of induced ovulation and artificial insemination.

“This is the very first attempt at IVF using eggs from an aging and sick female with the sperm of an aging and fit male,” Payne said. “The chances of getting offspring at the first attempt is close to zero. What we are seeing here is the beginning of a process of refining techniques and protocols with a goal of success after several attempts.”



Ratu, right, with her daughter, Delilah. Ratu and Andalas are parents to Andatu, a male born in 2012, and Delilah, a female born in 2016. Image by Jeremy Hance/Mongabay.

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