



Velvyslanectví České republiky v Nairobi
Embassy of the Czech Republic in Nairobi

NORTHERN WHITE RHINOS

FREQUENTLY ASKED QUESTIONS (FAQs)

Northern white rhino

Scientific name: *Ceratotherium simum cottoni*

Conservation status: Critically Endangered; probably now extinct in the wild

Lifespan: up to 40 years (in the wild)

Size: weighing from 1,700 to 2,400 kg or 1.7-2.4tonnes. It is the third largest African animal (after the elephant and hippo)

How many rhino species are there in the world? Is the northern white a separate species?

There are five rhino species left on earth: the white, black, Sumatran, Indian and Javan. Black and white rhinos are found in Africa, while the others are found in Asia. The northern white rhino is generally considered a subspecies of white rhino (along with the southern white rhino) although some scientists believe it to be a sixth species.

How can you tell a northern white rhino apart from a southern white rhino?

The northern and the southern white rhino look rather similar at first glance and they both belong to megafauna, but the two subspecies have rather distinct features. The northern subspecies has hairy ears, a slightly different skull (concave formation), a different shape of the neck and a different texture of the skin between the neck and the forelegs. Another important difference is the shape of the feet: the northern subspecies feet has a wider circumference as it is adapted to swamp habitat, while the southern is a typical savannah grazer – the shape of the feet reflects this adaptation. The two subspecies are also slightly different in weight and size.

How many northern white rhinos are left?

Northern white rhinos are now widely believed to be extinct in the wild. The last four wild individuals were seen in Garamba National Park, Democratic Republic of Congo (DRC), in August 2005 and signs of their existence were still seen in 2007. There was an isolated and unconfirmed report of three white rhinos in southern Sudan in 2008, although surveys in June of that year failed to locate them. There are now just two rhinos left in

captivity – Najin and Fatu – who live under close protection in a semi-wild environment on OI Pejeta Conservancy in Kenya.

How did the northern white rhino become extinct in the wild?

The main threat to their survival in the wild was (and still is for all rhinos around the world) poaching — in particular for their horns, which are believed to have medicinal properties in some countries. Coupled with the heavy poaching pressure was the outbreak of war in many parts of the northern white rhino's home range, which quashed any protection and conservation initiatives.

What was the northern white rhino's historic range?

The northern white rhino used to range over parts of north-western Uganda, southern Chad, South Sudan, the eastern part of Central African Republic and the north-eastern Democratic Republic of the Congo. There is fossil evidence that the northern white rhino ranged into the Rift Valley in Kenya 3,000 years ago.

Are white and black rhinos so-called because of their colour?

White and black rhinos are actually both grey! The name 'white' comes from a misinterpretation of the Dutch word "wijde" ('wide' in English), which was actually used to describe the flat shape of the white rhino's mouth. This is an adaptation that helps them graze on grass, as opposed to the black rhino's pointed mouth adapted for browsing on leaves, shoots and branches.

Where did the northern white rhinos at OI Pejeta come from?

Four northern white rhinos – two males and two females – were transported to OI Pejeta Conservancy from Dvůr Králové Zoo in the Czech Republic in December 2009. Scientists and conservationists hoped that a more natural habitat would encourage the animals to breed, as it became increasingly obvious that the numbers of captive northern white rhinos were dropping fast.

One of the males, Suni, died in October 2014 of natural causes. The other male, Sudan died on March 19th, 2018 of old age related causes. Females Najin and Fatu, who were born in Dvůr Králové Zoo, are now the only survivors of their kind.

How old are the Fatu and Najin, and what was their relationship to the other rhinos they moved to Kenya with?

Fatu was born on 29th June 2000, and her mother Najin was born on 11th July 1989. Sudan was Najin's father (so Fatu's grandfather). Suni and Fatu share the same father, a male named Saut.

Why didn't the northern white rhinos manage to breed successfully on OI Pejeta?

The OI Pejeta keepers witnessed various mating between the northern white rhinos from 2010 to 2013 but none of them resulted in a pregnancy. In 2014, examinations of the two females showed that the younger rhino Fatu has degenerative lesions in her uterus. Simultaneously it was found out that her mother Najin has

weak hind legs which make it difficult for her to support a mounting male, and could also cause complications during the added weight of pregnancy. These pathologies were supposedly present for some time which is why either of the two did not become pregnant even though mating had been seen. Despite uterine dysfunctions Fatu and Najin's ovaries still could carry viable oocytes.

So what options are left if this megavertebrate is to be saved?

Natural reproduction was no longer an option after the death of Suni in 2014. However, sperm was collected and cryogenically frozen from four individuals. This now can be utilized for in-vitro fertilization (IVF). For that purpose, the harvesting of egg cells from the remaining two female individuals is a necessity. Due to their inability to carry out a pregnancy (as referred above) – and owing to the value of these two individuals for the species – transferring an embryo to Najin and Fatu is not an option. A surrogate mother from within the southern white rhino population needs to be found.

This approach may – if it is successful – yield several births of northern white rhino calves, but it has its limits. First, the egg collection is a complicated procedure and can only be conducted three times a year, so the number of natural gametes (and therefore possible attempts) is limited. And second, the genetic variability is very limited because the number of individuals from which sperm and egg cells can be utilized is down to just six. For this reason, the BioRescue consortium of international scientists and experts follows a second approach: the creation of artificial gametes via stem cell transformation. There is frozen tissue from a few more northern white rhinos available at the Cryobanks of Leibniz-IZW and San Diego Zoo bringing the gene pool up to 12 cell lines from 8 presumably unrelated founders adding to the semen of four bulls and eggs from the two living females. Cells from skin tissue will be transformed into stem cells, which then can be developed into primordial germ cells and further into oocytes and sperm. This state-of-the-art approach is currently being developed by partners of the BioRescue consortium.

If IVF is successful, what is the long-term plan?

The long-term objective is to reintroduce northern white rhinos and future offspring into secure habitats within their former range. This objective may only be realised in 50-70 years.

After foundation of a viable breeding nucleus at Ol Pejeta, new populations can be translocated to create or reinforce existing white rhino populations with northern white rhino genes. By increasing the number of populations, the overall risk to the northern white rhino will be spread and reduced.

Southern white and black rhino numbers seem to be responding well to conservation efforts, why is it so important to save the northern white?

These northern white rhinos represent the last known individuals of important megafauna of central Africa and so contain valuable and unique genes that must be preserved. Equally, rhinos provide unique bioservice to other species communities such as small antelopes, birds, insects and bats. Their genes evolved in the wild and give the northern white rhinos vital traits for survival in their swampy natural habitat. Ultimately, the value of these animals can only be realised if they are reintroduced to the wild.

OVUUM PICK UP

FREQUENTLY ASKED QUESTIONS (FAQs)

What happened yesterday on OI Pejeta and what was the purpose of this procedure?

Yesterday, a procedure of harvesting eggs from the last northern white rhino females took place. The next steps will be to mature eggs, fertilize them with northern white rhino semen, generate embryos in substantial number and cryo-preserve them or transfer them directly into a surrogate mother of a southern white rhino origin.

Who are the main partners in this project?

Dvůr Králové Zoo, OI Pejeta Conservancy, IZW Berlin, Kenya Wildlife Service and Avantea are the institutions involved in the procedures on the northern white rhinos in Kenya. Their efforts are linked to a large research project funded by the German Federal Ministry of Education and Research (BMBF) – “BioRescue” – which is led by IZW Berlin and coordinated together with Dvůr Králové Zoo (Czech Republic). The BioRescue consortium includes the institutions mentioned above as well as several research partners in the field of stem cell technology: Max Delbrück Center for Molecular Medicine (Germany), Helmholtz Zentrum München (Germany), Kyushu University (Japan), and Northwestern University (USA).

The publication about the first rhino embryo achieved in vitro can be found here.

<https://www.nature.com/articles/s41467-018-04959-2>

What happens if this fails and you don't produce any viable embryos?

Failure is a normal process when new ground is broken in science. In this case, the techniques and procedures will be evaluated and refined for another attempt. The failure of one attempt is, in this case, crucial to the learning process and will help finding the successful way of conducting the state of the art procedures. Additionally, a second approach using stem cell technology is currently being developed to complement the efforts in the field of IVF using natural gametes. For further information see the question “So what options are left if the subspecies is to be saved?”

Why can't you do Artificial Insemination (AI) like they did at the San Diego Zoo?

Artificial insemination is not an option for the northern white rhinos because neither Najin nor Fatu can carry a pregnancy. We therefore have to extract their eggs and fertilize them outside the womb. Additionally, the northern white rhino semen stored over the last two decades in liquid nitrogen is of poor quality and can be only used in the ICSI (intro cytoplasmic sperm injection system) like it is commonly used in sub-fertile men.

Are there any issues with starting up a population from just a few individuals?

There are inbreeding issues with small number of founders, particularly if any of the animals are related. For this reason, the conservation strategy for the northern white rhinos in OI Pejeta will include even utilization of genetic samples that are cryopreserved in special cryo-banks. For example, semen from four already dead northern white rhino males can be used for assisted techniques of reproduction. Also, the strategy may include

inter-crossing northern white rhinos with southern white rhinos in order to maximise breeding opportunities and propagation of the northern gene pool.

With careful conservation management, small rhino populations are able to reproduce at over 10% per annum, and recover from very small to large healthy populations. This was achieved with the southern white rhino in South Africa, where numbers recovered from less than 50 animals to the current total of approximately 20,000 animals.

What is the quality of the semen?

The quality of semen from the northern white rhino males is poor but good enough to produce a transferable embryo by ICSI, the crucial part of IVF.

What success rate have you had with collecting ova from female rhinos? How many ova/collection?

Are there any challenges associated with removing viable ova from rhinos of this age?

The team in Europe has collected eggs from southern white rhino females approximately 50 times with no health consequences for the females that underwent procedure, including females with up to five individual procedures. After such an egg retrieval, the candidates could get pregnant naturally if they were showing no reproductive pathology. The success rate depends on quality of a donor (mainly related to age). There were post-reproductive females that showed no sign of follicles developed on their ovaries while with other females we were able to collect up to 11 oocytes during one collection. The protocol was tested on females of similar age like those on OI Pejeta and the procedure went well.

Will this procedure be repeated?

Yes, the mentioned team in Europe has done repeated collections of eggs. The plan is for the northern white rhinos to undergo repeated collections three times a year. By the way, one of the multiple donors in Europe naturally conceived after the collection procedure.

How many rhinos have been born using IVF techniques?

None.

How many attempts have been made?

None so far. The science has gone as far as creating a viable embryo and attempting the embryo transfer procedure.

Who do the animals belong to?

The animals belong to the Dvůr Králové Zoo that even coordinates efforts to save the northern white rhinos. While in Kenya, their wellbeing is overseen by a committee that comprises of representatives of Kenya Wildlife Service, OI Pejeta Conservancy, Dvůr Králové Zoo, Back to Africa, AfRSG and FFI.

Who will the offspring belong to and where will they be housed?

The offspring born in Kenya will be housed on OI Pejeta Conservancy in a 700-acre secure enclosure. They will belong to Dvůr Králové Zoo (every first calf) and to Kenya Wildlife Service (every second calf). It is planned that embryo transfer will be performed even in European zoos.

How will the surrogates be protected from poachers? And the offspring should they be born?

There has not been a poaching on Ol Pejeta since 2017. There are 42 armed rangers that patrol the conservancy and 120 rhino patrol rangers. The northern white rhinos, surrogates and their offsprings will be under 24/7 armed surveillance. The enclosure they are housed in is right next to the armed rangers HQ.

What animals will be used as surrogates? Will they be trained for the procedure, or will it be necessary to anesthetize them for embryo transplant? Where will they come from?

There are five southern white rhinos in the protected enclosure, which have been kept empty for the purpose of this project. They will need to be anesthetised, as they are wild animals. They belong to the Kenya Wildlife Service who is the custodian of wildlife in Kenya. For the embryo transfer, the animal has to be in full anaesthesia and it has to be trained for hormonal preparation.