OPINION

AfRSG northern white rhino strategy—an alternative view

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The reporting of the situation regarding the northern white rhino (NWR) in *Pachyderm* 45 and 46 leaves a lot to be desired as it seeks to justify the stance of the AfRSG and its selected experts. For the sake of balance, at least some of the data put forward by experts who disagree with the strategy should also be presented.

AfRSG seeks to justify intercrossing the NWR with Southern White Rhino (SWR) by maintaining that they are closely related subspecies. A recent, peer-reviewed paper published by Groves et al. (2010) re-assessed the taxonomy of the two species using new material and analytical techniques. They concluded that the two forms were morphologically and genetically distinct, warranting the recognition of the taxa formerly designated as subspecies as two distinct species. Given this, intercrossing would not be considered appropriate by many geneticists and inferred from Harley et al. in *Molecular Ecology* (2005).

Two of the recognised methods of describing whether two forms of a similar animal are a species or subspecies are based on whether they look different and whether they inhabit different, usually widely separated, areas (Groves pers. comm.). For those experienced in viewing both NWR and SWR, the differences, such as body shape and ear margins, are clear. Historically, populations of both NWR and SWR have inhabited geographically distinct and widely separated regions.

Moving the remaining four potential breeding animals from Dvůr Králové Zoo to the wild was justified by the AfRSG based on long-term data regarding the poor reproductive performance of NWRs in captivity. As in most areas of science, new knowledge can overcome problems and recent research has made marked improvements to captive rhinoceros breeding success. Long-term infertility has been found to be due to an asymmetric aging process, the onset of which can be prevented by early pregnancy (Hermes et al. 2006). If it is not possible to obtain pregnancy by natural sexual reproduction, artificial insemination can be used. Natural sexual reproduction among captive rhinos has been greatly improved by utilizing more open spaces and controlled introduction of males to females to avoid sibling type relations that occur when keeping males and females permanently together; i.e. the lack of brother–sister relationships can lead to males not breeding with females (Versteege pers. comm.).

In the *Pachyderm* 46 African Rhino Specialist Group Report, Brooks states that moving the four animals to, (hopefully reproduce in), the wild is 'probably the "last chance saloon" for northern white rhino genes'. This is not wholly the case as the use of assisted reproduction technologies (ARTs) offers an equal, if not greater, prospect of conserving NWR genes now and in the future when further advances in such technologies are likely. ARTs for rhinos such as AI (artificial insemination), in vitro fertilization and embryo transfer (ET) could include, in the future, the use of developing stem cell technology enabling even dead NWR animals to provide genetic resources. Together this could provide the genetic equivalent of what Brooks refers to as the 'four unrelated founders indicated by previous vortex modelling to be the minimum number with a reasonable chance of long-term genetic and demographic viability over a 50 year period'.

Probably the best chance of maintaining NWR genetics, developing pure NWR individuals and rapidly breeding up a new NWR population is from

ET and the use of SWR as surrogate mothers. The basic technology of ET is well understood and applied in practice in many species including humans, cattle and horses. Initial laboratory work has resulted in the successful production of in vitro white rhino embryos. With further attention to species-specific protocols, success rates could be improved. Specialists do not consider implantation of embryos a problem.

However, the application of ARTs requires sources of NWR sperm, eggs or embryos from as wide a number of sources as possible. Moving four out of the eight available NWR individuals to the wild and releasing them in large open areas has put them all but out of reach for this and of the expertise required to apply ARTs. For AI and ET, standing sedation as opposed to complete knockdown of ART recipient animals has been found to produce significant benefits over full anaesthesia but this is only practical in a captive environment. A more appropriate and far less costly and risky relocation of the four animals would have been to improve their existing facility or move them to a better captive facility in Europe, as was the recommendation at the time by the European Association of Zoos and Aquariums (EAZA 2009).

The four animals moved were acknowledged to be of the greatest conservation value, yet they were moved to the Laikipia area of Kenya where all rhino reserves were on high alert for poachers who had successfully increased their activity in many parts of Africa. The safest option may have been to have kept the rhinos in Europe where zoos have a better record of rhino security than African reserves, thus also making them readily available for ART development.

The reproductive status of the potential females for movement was only tested in 2006 by specialists using ultrasound technology uniquely developed for use in rhinos. The two that were eventually moved were found to be reproductively healthy although neither had an oestrus cycle at that time. Any time lag in obtaining a pregnancy, given the ages of the females, could be sufficient for the female to develop the reproductive problems that cause infertility. However, as could have been expected, it was not until late December 2009 that the relocation took place due to the time needed to procure the export/import permissions, obtain the high level of funding needed for the project and prepare the animals for shipment. Even then a further time lag could be expected in getting the animals to settle and then getting either of the males to breed with them. There was no updated test of reproductive performance prior to movement and it could now be several years before a pregnancy. All this time the risk of reproductive problems was and is increasing. Was this an acceptable risk with such valuable animals when a far safer alternative was available? The older male developed an intestinal tumour that would lead to a reduced lifespan. This made it essential to obtain as much of its sperm as possible before its death but moving it away from Europe made this expensive and technically more challenging.

The single donor who provided the funding for the translocation to Africa did so in order to save the NWR species. It could be considered that, for this end, the funding may have been better spent on an intra-European translocation and proposed developments in ARTs—with a potentially better chance of reaching the objective of the AfRSG members and their experts.

References/further reading

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