

Meeting report

International workshop on captive breeding for saiga conservation

Co-hosted by the Saiga Conservation Alliance, San Diego Zoo Global and the Institute of Ecology and Evolution of the Russian Academy of Sciences

28th-29th August 2017

Institute of Ecology and Evolution,
Russian Academy of Sciences,
33, Leninsky Prospekt, Moscow



Executive Summary

A two-day workshop was held at the Institute of Ecology and Evolution of the Russian Academy of Sciences in Moscow, Russia, to discuss the practicalities of captive breeding for the Critically Endangered saiga antelope (*Saiga tatarica*). A total of 30 participants attended representing each of the saiga range states and from across the globe. The workshop was interactive, with plenaries, working groups and knowledge-exchange sessions.

The primary objectives of the workshop were to determine how captive breeding can contribute to saiga conservation and how to improve captive breeding.

Two sessions were held on Day 1. The first session set the scene, the second focussed on the potential conservation contribution of captive breeding. The topics covered were as follows:

What role is saiga captive breeding currently playing?

What are the aims of saiga captive breeding at the current and potential breeding centers?

What are the current strengths and gaps in saiga captive breeding?

How do we increase funding for saiga conservation and captive breeding?

What are the specific characteristics that may affect reintroduction strategies?

What lessons can we learn from other species captive breeding efforts?

What new opportunities are there for saiga conservation through captive breeding?

Day One Summary:

It was decided that captive breeding can assist with the overall conservation of the saiga, through breeding for release, education, scientific study and awareness-raising. All proposals for saiga captive breeding should have a clear rationale and a proper strategy, including articulating the intended overall effect on conservation. For example, public awareness and support for conservation may be raised by centers that allow children to interact with saigas at close quarters, but saigas raised in these centers will not be suitable for release. Any successful captive breeding effort requires financial, institutional, and technical support, locally and internationally.

Therefore, before any further captive breeding efforts proceed, a full feasibility study should be conducted, including ensuring local community buy-in, availability and allocation of funds, the existence of appropriate conditions for good husbandry, and the specific conservation aims which the programme intends to address. The rationale for a captive breeding effort should relate to the specific conservation needs of the relevant country and/or region. There is a need to clearly distinguish between reintroductions (into areas where saigas are currently absent) and reinforcements (into areas where wild saigas are already present) of saiga populations, as the conservation aims and best practice release protocols will differ. In addition consideration should be given to establishing captive populations now while the numbers in the wild are at a point that they can sustain a take for a captive program.

Topics covered on Day 2 were broken down into two parts, firstly focussing on management of captive populations, and secondly considering country-specific priorities:

Part 1:

What kinds of genetic management are needed for captive populations?

Lessons learned from successful captive breeding of saigas within the range states.

Husbandry experiences from other species and institutions.

Part 2:

What is the current status of captive breeding in each country?

What aspects of conservation of the species in the wild might captive breeding support for each country?

Is there a need for more or less focus on captive breeding in the country?

Finally a plenary session wrapped up the meeting, considering the question:

What structures could be put in place for international and national-level cooperation and sharing of best practice?

Day two summary:

It was agreed that the implementation of a studbook at each saiga breeding center, and a feasibility study on exchange of animals between the breeding centers, would help improve the genetic management of existing captive populations. The breeding centers at Askania Nova in Ukraine and the Center for Wild Animals of the Republic of Kalymykia have had very good success with breeding saigas over several years and the best practices in husbandry and management at these facilities could be implemented at the other breeding centers.

Working groups discussed captive breeding and reintroduction by country:

China: In China there is one captive breeding center, which has been going for more than 20 years. It has 170 individuals from 19 founders, with low genetic diversity. The aim is for restoration of the saiga population in China, and so its focus should be reintroduction.

Mongolia: There is no captive breeding program, however there is clear opportunity for captive breeding to support conservation of the Endangered Mongolian saiga sub-species, given the severe threat it is facing from disease and competition for grazing. Nationally, a committee to work on reintroduction and captive breeding, bringing together all stakeholders, is being considered.

Russia: The existing centers support reintroduction, education, public awareness, and scientific research. Some centers can be underfunded and serious attention is needed to solving this problem. A scientific commission (connected to the Ministry) may be useful, for information exchange and scientific support - as exists already for European bison. The focus of cooperation internationally needs to be fund-raising linked to clearly articulated conservation aims, but technical support may also be helpful.

Kazakhstan and Uzbekistan: There are no breeding centers in Uzbekistan, though there is a proposal to start breeding saigas at the Djeiran Ecocenter near Bukhara. In Kazakhstan there are three places with captive saigas (the Ural centre is the main one). Education and research are the main aims for both Uzbekistan and Kazakhstan. Reintroduction is not needed in either country currently; instead the focus should be on wild conservation. A breeding centre in Uzbekistan would have some value for educational purposes, as is already the case for the Ural centre, but it's not a priority. The Ural centre is in need of funding to support its continued operation.

Several recommendations to advance regional cooperation amongst the saiga holders were made:

1. To utilize the forum section of the Saiga Resource Centre website to share ideas on captive breeding and reintroduction.
2. To investigate the language issue; potentially an automatic google translate facility could be effective for online text, such as in www.conservationoptimism.com, but a translation budget would still be needed for important documents, and it's unclear how to automatically translate emails.
3. To develop a section on the SRC, for storage of documents relevant to captive breeding.
4. To ensure the active engagement of the two key breeding centers not represented at the workshop - Wuwei (China) and Askania Nova (Ukraine).
5. To organize a technical workshop on studbooks and genetic management for the collection holders, including training and support for best practice.
6. To set up a captive breeding network, with a central coordination mechanism and potential for exchanges and best practice training.
7. To develop a standardized protocol on collection of genetic samples.
8. To work together to raise the profile of saiga captive breeding and to develop sources of sustainable funding for conservation-relevant captive breeding, particularly through engagement with the wider zoo community in Europe and the USA.

Monday 28th August - How can captive breeding contribute to conservation?

Session 1 - Captive breeding as a conservation tool.

The questions asked in this session were: What role can captive breeding play in conservation in general? What role it is currently playing for saigas? Where are the strengths and the gaps for saigas, and why? Three groups considered these questions and the results are as follows:

Group 1: Leader: E.J. Milner-Gulland.

This group considered what role captive breeding could play for saigas, and what role it is currently playing. Because of the composition of the group, we only considered Yashkul and Wuwei for this second question. We also had a general discussion, raising issues that need further consideration.

Aim	Currently fulfilled?
<i>Awareness and public engagement</i>	
Public awareness among visitors (zoos)	Not currently
Jobs for local people (breeding centres)	Yes, but only a few people (2 or 3)
Tourism for people in range areas (breeding centres)	Not many people come (50-60/yr)
Education for people in range areas (breeding centres)	Children from local schools (few '00/yr)
Dissemination of conservation messages (both)	Yes for CWA - Saiga day, Saiga clubs, leaflets, posters
<i>Direct conservation</i>	
Reintroduction	Only experimental
Insurance population	Yes
Temporary protection (e.g. weather, disease)	No
Demographic manipulation (e.g. releasing males)	Males were put into wild once
Rehabilitation of individuals (e.g. injured, orphans)	No
Genetic fund	Yes
<i>Science for conservation</i>	
Teaching of specialist students	Yes - lots at CWA
Fundamental science	Yes
Disease research	Some
Study of husbandry and behaviour	Yes, some scientific studies
<i>Fundraising for conservation</i>	
Fundraising from donors	No
Making money for conservation (e.g. merchandise)	No
Horn production (£ for conservation, meeting demand)	Chinese TCM industry keen to do this

Discussion points were: We have experienced poor success in saiga captive breeding in zoos, which should give us pause for thought. There is a need for full risk assessment before going ahead with any captive breeding exercise. It's also important to understand the full cost of the project in advance, and know that funding is in place. Decision-makers about saiga conservation need to understand better the importance of saiga conservation, and the role captive breeding can play.

The moment of reintroduction needs to be properly planned - as this is when public opinion can be influenced, either to show how important the species is to conserve, or to give a bad impression. Uzbekistan's population is shared with Kazakhstan so even if it's not possible to get animals from the wild in Uzbekistan, animals from Kazakhstan would be fine.

The thought came that there is no point in starting captive breeding in places like Turkmenistan, where there are no saigas present any more (or scattered individuals only). But there was debate about whether there should be a captive insurance population for Mongolia or not. In general it is worth thinking about whether it's cheaper to conserve saigas in the wild than to bring them into captivity for the sake of future reintroduction. There is also the thought that captive breeding outside the range is less likely to be successful so should be carefully thought about.

It's important that captive breeding does happen in a range of areas, because it provides the opportunity for local people to interact with saigas and value them more. Another potential initiative would be rehabilitation centres in the saiga range in case of disease, to rescue orphan calves.

Group 2: Leader: David Mallon

This group mapped the aims of captive breeding against the current and potential breeding centres, in order to clarify which centres currently or potentially could fulfil which aims. Funding = potential for fundraising to support their work. Number = number of saigas currently held. Djeiran Ecocentre has other species and are considering saigas. Dorgon Steppe is currently just a suggestion (for the nominate subspecies not the Mongolian one), and similarly Barsa-kelmes is a suggested site.

Name	Insurance	Reintroduction	Education	Research	Funding	Number
Askania Nova (Ukr)	Yes	?	Yes	Yes	Low	600
Yashkul (Ru)	Potential	Potential	Potential	Potential	Potential	2
Rostov (Ru)	Yes	No	Yes	Yes	Low	55
Astrakhan (Ru)	Yes	Yes	Yes	Yes	Low	46
Tarkhankhut (Ru)	Yes	No	Yes	Yes	Low	14
Ural (Kz)	Yes	(Yes)	Yes	Yes	Low	16
Biosafety Inst (Kz)	No	No	No	Yes	N/A	4-5
Wuwei (Cn)	Yes	(Yes)	Yes	Yes	Low	170
Djeiran Ecocentre (Uz)	Potential	Potential	Potential	Potential	Potential	0
Dorgon steppe (Mn)	Potential	Potential	Potential	Potential	Potential	0
Barsa-Kelmes (Kz)	Potential	Potential	Potential	Potential	Potential	0

The total number of saigas currently in captivity therefore is **907 individuals**.

Group 3: Leader David O'Connor.

Rather than listing all the potential roles, highlighted nicely already in Jeff's morning presentation, we just coalesced on three broad themes that encompass most of these roles:

- Safety net from extirpation/extinction in the wild
- Research
- Boosting wild populations/Reintroduction/Rewilding

The group then focussed on identifying the current strengths and gaps in saiga captive breeding. The key messages from this group were:

Gaps: There is a lack of a coordinated plan, inadequate funding, facilities are small in area, and have a small number of founders (producing genetic issues).

Strengths: In some places there is political support.

Strengths (in no particular order)	Gaps (in no particular order)
Potential for ecotourism	Small enclosures - need to be bigger
The fact that this workshop was held	Other species which are in the ecosystem are missing from captive facilities
Captive saigas can cope with human contact	Lacks government support
There are relevant lessons to be learnt from other species of the role of reintroduction combined with strict protection	No knowledge about reintroduction and no process in place
Fast breeder	No sharing between captive breeding facilities
Experience is being gained	More funding needed - many sites are close to closing
Gaining more media coverage	Lack of genetic studies of different saiga populations (to inform need for captive breeding)
The saiga has a diverse gene pool	Divergence of opinions
There are a good number of animals left in the wild	Maybe no need for saiga captive breeding
Propagation of males in the wild is good, with no recognised predators	Lack of public interest in saigas - not a charismatic species

Plenary discussion

The key question is how to address the lack of funding for saiga captive breeding. The worst situation is to have poorly funded facilities struggling to keep going, because it's very hard to then have conservation benefit and high husbandry standards. The zoo community is one option, but this requires them to see that captive breeding is part of a clear conservation plan. For example the saola is a species, like saiga, which is not kept in zoos, but because there is a clear plan and coordination mechanism, the zoo community has supported its conservation substantially (including captive breeding). Another option suggested was that if zoos want to keep saigas, they should pay a contribution into a fund for its in situ conservation.

It's also important for the state to fund captive breeding but this requires the state to have an interest in saiga conservation, which is currently limited. Another suggestion was that business sponsors could be found, or there could be private collections set up (these currently are not possible in Russia). These would need to be commercially viable so small businesses can get involved.

Another major problem is the lack of coordination and a mechanism to exchange experience. We had a similar meeting about captive breeding in 2008 in Moscow, which led to an agreement to form such a network, including all captive breeding centres in the range and Askania Nova. However this did not produce the hoped-for results. Someone needs to implement this (suggestion was made that the SCA might have a role here).

The saola has a "saola recovery team" with representatives from each country, and a saola working group which allocates funding, for anti-poaching, community conservation, and captive breeding. However, in the case of the saiga we already have a coordinated plan - the Medium Term International Work Programme under the CMS MOU and Action Plan for saigas. This does include captive breeding, and it is under this MTIWP (which is signed by all relevant governments

and saiga conservation NGOs) that any actions should take place. The saiga is more complicated administratively than the saola, because it has a large range and many more stakeholders, therefore coordinating its conservation is more complex.

Another initiative that would be worth considering as an umbrella is the CMS's Central Asian Mammals Initiative. This is taking an ecosystem-level approach to steppe restoration, which encompasses several species of conservation concern. An example of this type of approach is a new project focussed on kulan in Kazakhstan, but which also includes saigas; this approach can be more attractive to large-scale funders. Captive breeding could then play a part in this wider set of objectives where appropriate.

Session 2: Making better linkages between in situ and ex situ conservation for saigas: experience and future potential.

Theme 1: What are the specific characteristics of saigas that may affect reintroduction strategies?

Leader: Steffen Zuther.

The following characteristics of saiga have been identified as relevant for saiga reintroduction (or reinforcement of existing populations). We also summarise their effect on the reintroduction strategy.

Saiga is a migratory species, covering long distance on its annual migration.

- If saiga is to be introduced or to reinforce an existing population, it is important to release them to an area of sufficient size without any artificial barriers (railways, roads, canals, ...), allowing free movement and dispersal of the animals. If the population, which the animals are to reinforce, has a transboundary character, a potentially existing border fence should be made wildlife-friendly in order to allow for saiga crossing it. If railways or roads are inevitable in the release area, they should also exhibit a sufficient number of appropriate crossing points.
- For reinforcement, saigas should always be released to an area, which is used by wild saiga at the time of release, which will allow them to join wild animals. To achieve this, it is recommended to construct a temporary enclosure, which is located in the area of saiga presence and where the animals can be brought some time prior to release for acclimatisation (with minimal contact with humans). A soft release is then recommended.
- The suitability of a certain habitat (forage quality) for saiga should always be investigated prior to release to that habitat. In the situation of a strong grazing pressure from livestock, it might be useful to keep domestic animals away from a certain area, in order to let the vegetation develop to provide better conditions for saiga.
- As released animals are likely to move a lot after release, tracking their movements through satellite tags, microchips, ear tags is an inevitable part of a release to the wild.

The saiga antelope has an annual biological cycle, with the most important times of calving in May and breeding in December.

- As it is not possible to release the animals during breeding or calving season as well as when they are pregnant or in winter, which all would very negatively affect the success of the release, it is recommended to release them in October (for both males and females). This has the additional advantage that the animals are focusing on feed at this time of the year and show quite a good body condition, which helps them to withstand any stress related to the release.

Saiga are gregarious and live in unstable groups. Harems usually have the size of about 5-30 females per male.

- A release in small groups (harems) is more expensive, as more space is needed for each group's enclosure and each group needs a separate enclosure, but it is regarded as the best release method.
Only for the release of males this is less important.
- If the release is planned to happen in an area without wild saiga for the purpose of reintroduction, a group of saiga should be released, which has an existing social structure, which has to be developed in captivity.

Saigas are prone to contracting diseases.

- It is necessary to treat saiga before release against parasites (anthelmintic treatment) and to vaccinate them against potential diseases (for instance, PPR, pasteurellosis).

Saiga females become sexually mature already in their first year of life, males in their second.

- It is recommended to release young animals to allow for a long reproductive life in the wild. Saiga females can be released in October after their birth, males one year later.

Saiga show higher mortalities in harsh winters (with dzhut) and summers with droughts.

- Despite the low reliability, it is recommended to take into account the long-term weather forecast for the upcoming winter, when deciding on a release in a specific year. If the forecast predicts a harsh winter, it is better to wait one year, instead of losing many animals due to adverse weather conditions.
- It might be advantageous to combine the release of saiga with the release of animals of another species like Asiatic wild ass or Przewalski's horse. If they feed together in winter, the bigger ungulates can make the forage under the snow cover available for saiga and thereby secure their survival.

Since serious efforts are required to reintroduce saiga antelope to a certain territory, the question is whether, taking into account the biological characteristics of the species, a reintroduction is actually necessary, or if the same result can be achieved by striving to provide suitable conditions for wild populations to grow and disperse.

Theme 2: What can lessons from other species, and from the wider international conservation community teach us about saiga conservation through linking in situ and ex situ approaches?

Leaders: Jeff Holland and Andy Blue

This theme involved discussing what has worked in the past on other ungulate captive breeding and reintroduction projects, such as Sonoran Pronghorn, Arabian oryx, Przewalski's horse, kulan and Bukhara deer. The following recommendations were suggested to be incorporated into any future saiga programme:

1. Utilize all experts in understanding the biology and behavior of the saiga before starting a program. It was felt that there is already a lot of knowledge concerning this topic on saiga. However, best practices for husbandry and management still need to be standardised and formulated.
2. Have a veterinary component as part of the program. This should be in place at the start of the program. A lead veterinarian should be identified along with supporting veterinarians. A veterinary health program should be established for both the captive breeding component and the reintroduction component. The lead veterinarian should develop the health program.
3. Utilize the resources of IUCN and its Conservation Planning Specialist Group as the programs are being developed. Also utilize the expertise from the zoo community in AZA and EAZA.
4. Involve all stakeholders from government agencies (local, regional, national), local communities, ranchers/farmers and NGOs working in the area. Must have "buy in" from the stakeholders.
5. Identify multiple release sites. As the captive breeding program grows (exponentially) you will have increasingly more animals available to release per year. A single reintroduction site will only be able to accommodate so many animals, therefore a second and sometimes a third release site will be needed.

Define the goals of the program. How many release sites can be accommodated with security and staff? What kind of acclimation pen will be built? what kind of materials? Will the releases be soft release or hard release? Set up the acclimation pen in known saiga habitat and know the history of the release site.

6. Carefully plan out the composition of the release groups: How many in each group? What are the ages of the group? How many male and female in the group?

7. Have a translocation/transport plan. It is recommended that the first group into the acclimation pen be hand-reared calves. Then the calves produced from that first group or the second set of calves produced are the individuals that are released. Determine how calves will be transported. It is recommended that they be transported in individual boxes.

8. Have a monitoring plan. It does not help if the released animals cannot be monitored in order to determine if the release has been successful or not. Utilize radio collars or some other GPS monitoring device. Consider devices other than collars, such as ear tags with built in monitoring devices or devices that can be embedded into the horns of the male saiga.

It may be helpful to establish a Captive breeding/Reintroduction Task Team that can oversee the various programmes as they are being developed so that the programmes can be guided in the right direction. This would help with making sure all aspects are thought out and nothing is missed.

Theme 3: What new opportunities are there for saiga conservation through captive breeding?

Leader: David Mallon

Reintroduction: applies to saiga range in the year 1500 (conforms with Red List definition).
e.g. China, Mongolia (nominate subspecies)

Rewilding: applies to areas of pre-1500 range (includes Pleistocene rewilding)
e.g. proposals for Spain, Romania, Hungary (no confirmed historical record according to G. Glazer)

Reinforcement: applies to areas of current range e.g. Kazakhstan, Russia, Uzbekistan

Saiga populations may be:

Free-living (all 5 current populations);

Semi-captive (enclosed but in relatively large space and minimal management; e.g. Askania Nova, Crimea)

Captive (confined in relatively small enclosures and intensively managed; e.g. zoos, small breeding centres).

All three situations are considered to be part of the future vision for saiga conservation.

The saiga conservation community will evaluate any proposal to establish a new saiga population under any of the above conditions on an individual basis and make a decision on support accordingly.

Strict veterinary regulations at the current time mean that it is extremely difficult to import any ungulate, including saiga, from any range state into the USA or EU.

Summing up and plenary discussion:

Before captive breeding is carried out, a full feasibility study needs to be conducted - and this includes making sure there is local community buy-in at the release site, as well as funding and appropriate conditions.

We need to distinguish between "reintroduction" - when the animals are introduced to an area where they currently are not present, and "reinforcement", when they are introduced into areas where animals are already present. The best practice for reinforcement (which is likely to be more successful in terms of survival of the animals) is rather different to that for reintroduction. e.g. in reinforcement, it is recommended that animals should be released in areas where existing herds are close by, so the released individuals can take cues from the wild animals.

The recommendation is that in general, captive and semi-wild breeding is part of the potential vision for saiga conservation - then we need to think specifically by country or region about whether it works for a given situation.

There are some areas where it's not possible to have saigas naturally recolonising (e.g. Djungarian Gobi in China and Mongolia). The only way to restore saigas there is through reintroduction. The second question is how much effort and resource is it worth putting into CB given all the other priorities for saiga conservation - and this depends on the conservation benefit that this CB could provide.

Recommendations on specific saiga CB initiatives should start from a neutral position and then evaluate on the basis of a perceived benefit for conservation in the wild.

There is a danger of losing the saiga's ecosystem function due to population declines - but not really of extinction in the wild. The former may not be directly helped by CB in the short term.

It may be precautionary to take some animals from the wild now, while the population is healthy, to widen the captive gene pool, as it will be hard to do this when the population is small. However, CB should not be an option only because of convenient timing - it should be done only if there is a clear rationale and a proper strategy.

Every CB facility needs to make clear the rationale for what they are doing and the effect on conservation. For example, public awareness and support for conservation may be raised by centres that allow children to interact with saigas at close quarters.

Captive breeding requires adequate and sustainable funding as well as strong government support. Support from the business community and private collections should also be explored.

Day 2 - Improving captive breeding for saiga conservation

Session 3: Best practice in husbandry and genetic management. Lessons from saiga experience and from elsewhere.

Theme 1: What kinds of genetic management are needed for captive conservation-focussed populations, why, and how can it be achieved?

Leader: Andy Blue

The main points arising from this discussion were:

- Investigate the possibility of a studbook and animal identification workshop through AZA or SDZG.
- Investigate animal exchanges with Askania Nova and other facilities to enhance genetic diversity.
- Preserve maximum wild genetic diversity within the captive stock.
- Look into developing an online studbook resource via AZA and SDZG.

Theme 2: The key to successful saiga breeding; lessons from experience

Leader: Yuri Arylov

Over the last 20-30 years, techniques for successful ongoing breeding of the saiga antelope have been developed, with animals aged from birth to maturity, with the aim of conserving the gene pool of the species. Some key features to consider are:

1. Substantial experience of feeding young saigas with whole cow's milk with additional ingredients, as well as substitutes for whole cow's milk, has been obtained in different locations (Russia, Kazakhstan, Ukraine, etc.)
2. Construction of special enclosures for keeping the animals, depending on their age, sex, physiological condition (including in enclosure fencing, individual pens, and providing protection against stressors; wolves, foxes, livestock, etc.)

3. Availability of scientific research on saiga (obtaining blood, animal products, and year-round observations: obtaining a semen bank and cryostorage, obtaining data on the growth and development of individuals).
4. Possibility of an exhibition for tourists, video-ing and photographing animals.
5. Using the breeding centre for ecological education of local people about saiga conservation in their wild range.
6. The ability to transfer single specimens of saigas to zoos and wild animal parks, subject to veterinary import constraints.

Theme 3: Husbandry experience from other species and zoos

Leaders: Marc Enderby (Highland Wildlife Park) and Christina Seely (Denver Zoo)

We set out to highlight the problems that are faced with captive husbandry in Saiga and tried to use captive husbandry for other species to find solutions for the highlighted problems. Details for each solution are below.

<u>Problems Highlighted</u>	<u>Possible Solutions</u>
Many different keepers No Consistency	Creating a daily diary 1-2 Keepers in charge of monitoring
Genetics Need new blood	Studbook Record keeping Higher number of animals
Enrichment No stimulation other than natural herds	Placement of raised ground around enclosures. Placing browse in various places. Where possible feed in different areas every day.
Enclosure Poor fencing can cause trauma	Round enclosures even when they are large. No sharp corners Shade cloth in front of fencing to create visual barrier
Identification Individuals not known	Ear Tags Microchips GPS chips (for larger herds)
Hand-rearing Poor diet for calves High aggression from males	Formula has been offered by San Diego zoo. Paddock/assisted rearing of males
Nervousness and high flight distance	Introducing different species in large enclosures 200ha+ Conditioning of animals
Access to Vets Disease	Preventative medicine Vaccines etc. For trauma, improvement of enclosures and reduction of nervousness can help prevent injuries.
Funding Underlines almost all of the above problems	Creation of a wishlist/equipment list Highlight areas of training needed for keepers

<u>Possible Solutions</u>	<u>In Detail</u>
Creating a daily diary 1-2 Keepers in charge of monitoring	<p>A daily diary allows for a consistent note taking system where by keepers can communicate changes in diet, behaviour, enrichment, etc.</p> <p>Even noting down daily weather can help to spot trends in husbandry that might have been missed before.</p>
Studbook	<p>A studbook will allow for a structure approach to breeding and keeping inbreeding down to a minimum. This kind of system is only needed when captive breeding becomes systematic and successes are on the rise.</p>
Record keeping	<p>See as above</p>
Higher number of animals	<p>It was highlighted that most centres did not have enough animals to be able swap males over for breeding. The solution to this would be communication between breeding centres and the swapping of males. A studbook can also facilitate this.</p>
Placement of raised ground around enclosures. Placing browse in various places. Where possible feed in different areas every day.	<p>Complex enrichment can be difficult with Saiga due to their nature of running into everything. So it was decided small changes that can improve their environment which will increase their natural behaviours.</p> <p>Feeding browse and other food items in various places ensures the Saiga are moving around to feed and not just expecting food in one place every day.</p>
Round enclosures even when they are large. No sharp corners	<p>Round enclosures are essential for Saiga due to their flighty nature.</p>
Shade cloth in front of fencing to create visual barrier	<p>Sample of shade cloth supplied by Andy blue from San Diego Zoo. This material has been used with many different species especially species that are naturally flighty like Gerenuk and Pronghorn antelope</p>
Ear Tags Microchips	<p>Ear tags and Microchips are used in almost all hoofed mammals in Western zoos. They allow keepers to identify each individual animal in an enclosure even from far away. This is integral to basic husbandry practices.</p>
GPS chips (for larger herds)	<p>GPS chips may help for larger enclosures in order to find animals but also could be a solution for reintroduced animals</p>
Formula has been offered by San Diego zoo.	<p>Formula for Saiga calves used by San Diego Zoo with much success and all records regarding hand rearing has been offered by Andy Blue.</p>
Paddock/assisted rearing of males	<p>A certain technique of hand-rearing males can be employed to reduce aggression. It has been done with many similar species. Particularly with rutting species</p>

<p>Introducing different species in large enclosures 200ha+</p> <p>Conditioning of animals</p>	<p>It was apparent in Askania Nova and other species kept in captivity that other species (preferably natural range species) can help to reduce the nervousness of Saiga. It has been employed in many different instances.</p> <p>This was highlighted but it is unsure whether it will work with Saiga. It has worked with Gerenuk and Pronghorn antelope which are very similar in behaviour to Saiga. Training would be needed for this.</p>
<p>Preventative medicine Vaccines etc.</p> <p>For trauma, improvement of enclosures and reduction of nervousness can help prevent injuries.</p>	<p>Preventative medicines can pay for themselves and reduce the need for vets. But funding is an issue.</p> <p>As above</p>
<p>Creation of a wishlist/equipment list</p> <p>Highlight areas of training needed for keepers</p>	<p>It was mentioned that a list of needs and wants could be created to allow zoos and other organisations to send the breeding centres equipment or send staff for training opportunities. This has been done for many species like Saola in Vietnam.</p>

Plenary discussion:

There are no saigas currently in European zoos. Askania Nova informed Greg Glazer that a zoo in Poland is planning to keep saigas, and AN are handraising saigas for them.

In Cologne Zoo they used chain-link deer fences. Trees were also present in the enclosures- saiga perhaps don't need trees but in Cologne there were two willow trees and the animals had no problems with them (they ate the leaves). Perhaps with a larger enclosure this would be more problematic, because of the species' flightiness. It may be detrimental to their health to have trees?

There is currently no studbook for saigas, and there was none for European zoos. The Ural centre identified their saigas which were taken from the wild, and give names to them, and passports; this is the first attempt to create a studbook.

Have negative effects of outbreeding ever been observed in any population - Andy says no. It's possible for saigas from different populations to breed together successfully, as shown by Askania Nova. Also it seems like having a mixed exhibit with kulan might be possible - saigas like grass not hay, and kulan can dig through snow and reveal this grass.

The issue of outbreeding being a potential concern for fitness is dependent on the genetic difference between populations. It seems like nominate saiga populations are not that different, and so mixing them may not be problematic.

San Diego stopped breeding saigas mostly because there were no new bloodlines coming in - which gave a risk of inbreeding, also given that there is high mortality from injury. In Europe too, there was a lack of new animals. The only option at the end was to breed males with their daughters to keep the population going, and that was not allowed, and so the programme ended.

Hand-raised saigas were successfully transported as adults by San Diego zoo, in individual crates. Askania Nova also successfully transported them.

Session 4: Developing country-specific priorities for conservation captive breeding.

A session covering the following questions:

What is the current status of captive breeding in the country?

What aspects of conservation of the species in the wild might captive breeding support (e.g. through education and awareness, scientific advances, breeding for reintroduction)?

Is there a need for more or less focus on captive breeding in the country?

What structures could be put in place for national-level cooperation and sharing of best practice?

What needs and opportunities are there for international cooperation and sharing of best practice, and how could these be realised?

Theme 1: Mongolia and China

B. Chimeddorj (leader), Jiang Zhigang (leader), B. Buveibaatar, David Mallon, Jeff Holland, Marc Enderby, Victor Minoransky, Christina Seely

Discussion process: We introduced the aim of the session and decided to raise the given questions one by one for each country. Following is a summary of the discussion and recommendations from the participants.

1. What is the current status of captive breeding in the country?

There was very little information about the breeding center in Gansu region of China. The genetic diversity is low because there were only 19 founders, mostly imported from Kazakhstan. The goal of the breeding centre was unclear but in the end the participants decided that it was to release in wild in order to reformulate saiga in the wild.

In Mongolia, there was one attempt to reintroduce Mongolian saiga into the Trans-Altai Gobi in 1984 (outside its natural range) with unsuccessful results. It was agreed that that the two subspecies should not be mixed and **most importantly Mongolian saiga should be conserved as a single unit.**

2. What aspects of conservation of the species in the wild might captive breeding support (e.g. through education and awareness, scientific advances, breeding for reintroduction)?

The captive breeding of saigas in China is currently just one of the part of a centre where many other species are kept. The section for saiga is small. In order to reach the long- term goal of establishing a wild population in China, the captive breeding programme should be expanded to other areas with adequate enclosure size.

For Mongolia, there is no priority to establish a breeding centre, but participants asked what actions were planned if saiga disease continues or if a harsh winter occurs or frequent natural disasters occur. Mongolia is putting its current resources to supporting the natural recovery of this species because 4 subpopulations have already established in former saiga habitat.

If there is funding, however, they would like to make a breeding centre in Mongolia in order to reintroduce saiga into its historical range. The rationale for a breeding centre in Mongolia would be a) education and awareness b) ecotourism, because western Mongolia is highly attractive to tourists in terms of iconic wildlife species such as Wild camel, Gobi bear, Snow leopard, Wild sheep, Wild ass, Goitered gazelle and Wild horse. But there has been interest in reintroducing the nominate subspecies which become extinct in Mongolia in the 1950s. However this is not currently regarded as a high priority and efforts in Mongolia will be focused on conserving the Mongolian subspecies.

3. Is there a need for more or less focus on captive breeding in the country?

In China there is high interest and a need to establish more breeding centers because there is low genetic diversity of saiga antelope in the current breeding center. In order to reach the long term goal of establishing a wild population, China should develop a strategy to establish several breeding centers in several sites and raise the attention given to this by the government of China.

Aili Kang's PhD on the breeding center in Gansu is available in the Saiga Resource Centre and very useful background.

For Mongolia **there is a need to raise funds to conduct a feasibility study on reintroduction of Mongolia saiga to the western part of their range, an operation which will require captive breeding. However, Mongolia should focus their attention on the Mongolian subspecies because it is a) geographically b) morphologically and c) ecologically different from the nominate subspecies.**

4. What structures could be put in place for national-level cooperation and sharing of best practice?

Currently the Gansu Forest Bureau is responsible for the Wuwei captive breeding center. A national action plan should be developed.

For Mongolia, one of the feasible options is to establish a **National Captive Breeding Programme Committee consisting of protected area administrations, national and international NGOs, universities and institutions under the Ministry of Environment and Nature.**

5. What needs and opportunities are there for international cooperation and sharing of best practice, and how could these be realized?

International cooperation and sharing of best practice around captive breeding would include the following organizations: CMS, CITES, SCA, IUCN, CBSG, Animal husbandry, Animal health, International media and Zoo Associations especially in Asia.

Theme 2: Russia. Leader: Olga Pereladova

Captive breeding needs to be developed in Russia as a base for research, ecological education (very important), and as an insurance population (as the wild population is decreasing), for possible reintroduction –at least for working out methods for reintroduction. Captive breeding methodologies are well developed, but there is need for funding – especially for the Centre for Wild Animals in Kalmykia.

Theme 3: Kazakhstan and Uzbekistan. Leaders: Steffen Zuther and Alexander Esipov

The first question is: Do you need a breeding centre?

There are many advantages of the existing and potential breeding centres:

- New jobs for the local population;
- Ability to photograph saigas;
- Reserve population for insurance;
- Conducting fundamental research on parasitology, genetics etc;
- And others

There are two disadvantages:

- Greater cost (you can spend less money and eradicate poaching);
- To create a breeding centre, you first need to remove a considerable number of animals from the wild population, which may have negative effects.

Being optimistic, the group agreed that it is more important to focus on improving in situ populations in order to enable them to recover, by conducting an anti-poaching campaign. As a result, numbers will increase and it might then be possible to open the trade and sell horns to China and other countries. However, to have a breeding centre, as an expensive conservation tool, is also useful, given the above-mentioned advantages

Plenary discussion

Theme 1: China:

In China there is one captive breeding centre only, which has been going for more than 20 years. It has 170 individuals from 19 founders, with low genetic diversity. The aim is for restoration of the saiga population in China, and so its focus should be reintroduction. China has always been the periphery of the species rather than the core.. The institutional structure in China consists of the State Forestry Administration and provincial Forst Bureaus such as Gansu Forestry Bureau and Xinjiang Forest Bureau (where saiga last occurred in the wild). Several international stakeholders could be engaged to help - including, SCA, IUCN Antelope SG, IUCN Reintroduction SG etc. International guidelines on best practice and reintroduction are available in English and Russian and need to be translated into Chinese..

Mongolia: There is no captive breeding, but in 1983-4 they did attempt it in a temporary centre, 60-70 Mongolian saiga calves were transported to the Trans-Altai Gobi (which is actually previous habitat of the nominate subspecies). This failed. There is currently very high interest among political stakeholders for reintroduction of the nominate subspecies to the Trans-Altai Gobi, where it went extinct in 1960s. There will be a feasibility study in the next couple of years. The purpose for a saiga breeding centre for the Mongolian subspecies could be for local public awareness-raising, but also as a tourism attraction. The area has lots of iconic species in the saiga range, and this centre could raise money for conservation of these species, among them saigas. The Mongolian subspecies is naturally recovering and broadening its range, so the main focus should be on supporting this recovery. However, a feasibility study for reintroduction to the western part of the former range is being prepared. Nationally, a committee to work on reintroduction and captive breeding, bringing together all stakeholders, is being considered.

Theme 2: Russia

The existing centres support reintroduction, education and public awareness; scientific research is also really important. The centres are underfunded and serious attention is needed to solving this problem. Additional institutional structures, are not needed as these cost money. A scientific commission (connected to the Ministry) may be useful, for information exchange and scientific support - as exists already for European bison. There is already a mechanism for best practice sharing, so the focus of cooperation internationally has to be fund-raising.

Theme 3: Kazakhstan and Uzbekistan

There are no breeding centres in Uzbekistan, though there is a proposal to start breeding saiga at the Djeiran Ecocenter near Bukhara. Saigas were in a zoo before, but were not a focus and they died out. In Kazakhstan there are three places with captive saigas (the Ural centre is by far the main one). Education and research are the main aims for both Uzbekistan and Kazakhstan. Reintroduction is not needed or an option which makes sense in either country - it's more expensive and needs more effort than focussing on wild conservation. In Kazakhstan the Ural population is genetically quite similar to the other two populations, and so there already is an insurance population in the Ural centre, so no more breeding centres are needed for this. It might be nice to have a breeding centre for educational purposes, but it's not a priority, and there's no funding even for the Ural centre. In Uzbekistan there are people who say a breeding centre is really needed, but maybe there is no conservation need. A breeding centre would be good to have, but we need to prioritise - in particular there are feasibility issues. Where would these calves come from, when the Ustiurt population is so small (on both sides), and calves are hard to find. And it's expensive. But of course it would be nice to have a centre for education, tourism, research. There are five populations of saiga, and the thought was whether it might be nice to have a viable breeding centre in each of them?

Session V - Plenary: Moving forward. How are we going to build a new network and partnerships to implement our recommendations? A discussion of the way forward for a saiga captive breeding network. What needs to be done, and by whom, and funded how?

What needs to be done next?

Several ideas were advanced about how to bring stakeholders together at a regional level. One suggestion was a saiga listserv under the SCA, where ideas can be shared on captive breeding and reintroduction, or saiga conservation in general. But we already have a forum section programmed into the SRC, but this is not yet used. We need to think about the language issue, potentially an automatic google translate facility could be very effective for online text (such as in www.conservationoptimism.com). We would still need a translation budget for important documents, and it's not that clear how to automatically translate emails. We also can host a captive breeding section on the SRC, for storage of documents. We need to look into whether the forum could function as a listserv.

We have some key breeding centres who are not present today - including the Wuwei breeding centre and Askania Nova. It is vital to include them in the future. This is a key recommendation - to make sure that active engagement with these centres happens.

There is also a recommendation for another workshop about studbooks and genetic management, for the collection holders, including training and support for best practice. This would then lead to a genetic management network being set up, with a central coordination mechanism. A protocol is also needed for how to collect genetic samples, to be given to all the collections so that they can standardise and coordinate their work.

It would be helpful for us as a workshop to send a letter to the responsible people in each range state's government, saying that the workshop has been held, including the recommendations of the workshop. To explain why the workshop was held, in the context of the poor state of the saiga antelope. The plan will be first for the report to be finalised and agreed by all participants, and then a short summary would be written.

Recommended actions	Name of responsible person
Include Wuwei breeding centre in network	Jiang Zhigang
Include Askania Nova in network	Greg Glazer
Communicate outcomes of the meeting to CITES, CMS, IUCN	CITES and CMS via SCA through existing CMS MOU coordination mechanisms, and via David Mallon to CMS CAMI and IUCN.
Hold a workshop for training on studbooks and genetic management	Andy Blue
A report for meeting participants	EJ to circulate the report once the reports from each breakout session are submitted, for comment and editing. Then the final report will be translated and circulated.
A summary of the meeting for external stakeholders, which can be sent to governments, international stakeholders	To be written by EJ once the meeting report is approved
Protocol for sample collection for genetic management	Marina Kholodova
A joint statement for the press	Masha Vorontsova to do first draft and then EJ and then the rest of the group will approve it so that it can be circulated by anyone at the meeting to anyone in national or international
Article in IUCN ASG newsletter and Saiga News	ASG - David Mallon. Saiga News - Marc Enderby
Social media about the workshop, facebook and twitter	Olya Esipova and Carlyn Samuel
All materials presented at this workshop to be made available to participants	Carlyn Samuel - this will be done through google drive in the first instance, until SRC section is ready

Increasing the representation and interest in saigas in EAZA and AZA, as well as private collections and individual zoos	Marc Enderby (EAZA/Europe), Andy Blue (AZA/USA)
A "point person" for saiga captive breeding, who is able to link people together and actively promote the continuation of our network	Jeff Holland
A list of conservation funders which do support captive breeding	Jeff Holland to circulate this - with input from people who have information

Funding - who can we go to?

For the coordination through the SRC and organisation of the network, it would cost about \$20,000.

Opportunities within AZA and private collection holders will be investigated by Andy Blue.

Zoos with small amounts of money for funding could put it all into one pot, which could then be allocated according to need to saiga captive breeding. This could be coordinated by the SCA.

Marc will also chat to the EAZA zoos and try to raise the profile of the saiga within EAZA, maybe through a saiga special interest group.

Sometimes private individuals are interested in funding saiga captive breeding, e.g. in Uzbekistan an individual approached them to start a captive breeding centre. But in this case they investigated, and became suspicious that he wanted to breed them for horn sales, and refused the offer.

Askania Nova are selling saigas in order to raise money. They say they need funding in order to stop doing this, and by funding them it would be possible to stop saigas falling into inappropriate hands and being traded on the open market.

It would be worth developing a list of funders who are prepared to support captive breeding and reintroduction (e.g. Disney do, Segre do - they funded a giant sable enclosure, GEF don't, SOS don't).

Resources are also not just money, but also training and support, some of which will be covered in the recommendations above.

List of resources

IUCN Guidelines for Reintroductions and Other Conservation Translocations:

http://www.iucnsscsrc.org/index.php?option=com_content&view=article&id=197&Itemid=590

IUCN Species Survival Commission Guidelines on the Use of Ex situ Management for Species Conservation: <https://portals.iucn.org/library/sites/library/files/documents/2014-064.pdf>

Link to the Captive Breeding Workshop GoogleDrive for all relevant documents:

<https://drive.google.com/drive/folders/0B489X4gsUfYuanIDcUgyUGhnSk0?usp=sharing>

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