

# Beijing - Hand-rearing a Chinese Goral at RZSS Edinburgh Zoo

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Chinese gorals are one of 26 species of the subfamily Caprinae or goat antelope species. They can be found scattered around North India, Burma, South east Siberia and south Thailand. Chinese gorals have very well designed bodies, which allow them to inhabit steep rocky mountainous cliffs, with a range of both evergreen and deciduous forests. As well as the different habitat they can also be found living in various different climates, ranging from dry to moist snowy climates.

Physical description vary a little bit between the males and females in that males are a little heavier weighing in at around 28-42kg and females would be around 22-35kg in bodyweight. The height is also a difference between the sexes in that the males are also a little taller than females. Males are around 69-78cm tall and are around 106-117cm in body length. Females as already mentioned, are a little smaller and are around 50-75cm tall, however they are both around about the same body length with the females being about 106-118cm in body length.

Both sexes are brownish, grey to red in colour, with the distinctive white patch around the throat area. Also on both sexes they have backward curving black sharp horns that can grow until they are around 20-23cm long. Their horns are used when defending themselves from predators or other competing males, but can also be used when carrying out various different courtship or dominance behaviours.

The wild population of Chinese gorals is at a vulnerable status and has had a 30% decrease in the population over recent years. Declines are due to poaching, habitat destruction and even competition from agricultural and domestic livestock in areas they inhabit. Although recognised as a vulnerable or lower risk species in the wild, there are very few of them in captivity. The population in captivity in Europe is as little as 19 males and 21 females.

Beijing is a female Chinese goral and was born on August 2<sup>nd</sup> 2008, to our breeding male and female. However on the 2<sup>nd</sup> day after giving birth to Beijing the mother was found in the paddock, very weak and unwell. Unfortunately the mother could not be saved as she had internal problems from giving birth, so the young calf was removed from the enclosure and as she was an important female for the conservation breeding programme, the decision was taken to hand rear her

Even though the calf had been seen suckling from the mother and therefore may have already received colostrum, immunopriming was given in line with RZSS's



protocol on new born calves. The calf was removed from the existing outdoor enclosure where her father was still present and placed in a heated indoor enclosure.

The indoor enclosure was a pen in Edinburgh Zoo's Pudu House. The pen was enclosed with a wall and mesh on top, with access to an outdoor grass enclosure. The pen was 15.3ft in length, 9.9ft wide and 7.7ft high. Once moved down, access to outside was then closed off and the indoor pen was her new home. The floor was covered with shavings and a wooden sleeping box was filled with straw. The indoor house was heated with overhead heaters and the temperature regularly checked for the young calf. The house temperatures were from a minimum of 15°C to a maximum of 23°C. After around two weeks of age the mesh of the indoor enclosure was covered over with wooden boards, as she was beginning to climb and jump and the risk of catching her hooves in them was possible, so to avoid any injuries these precautions were put in place.

It was decided to limit the number of keepers involved in hand rearing Beijing to keep the process consistent. Hand rearing started with two keepers, Ceri Robertson and Head Keeper Kathleen Standen. Darren McGarry (the Zoo's Animal Collection Manager) was also there for any assistance and advice required. However Kathleen was due to go on holiday, so carried out the hand rearing for around a week and then Sue Gaffing (Senior Keeper) took over in the hand rearing process. On return from a fortnight away from Beijing, Beijing wouldn't

then accept milk from the Head Keeper so the 3 main people hand rearing Beijing were Ceri Robertson, Sue Gaffing and Darren McGarry.

As well as removing Beijing to a new indoor enclosure and given immunoprime, we also weighed her to see how heavy or light she was. Weighing Beijing was carried out in hand held scales, with a bag, that attaches to the hand held scales. We started off by



using 10kg scales and throughout the process moved to walk on scales, which will be described later. On her first weight Beijing weighed as little as 3.75kg and this was recorded and done before her feed to allow a more accurate reading. Beijing would be weighed on a daily basis at the same time every day and before being bottle fed. As mentioned earlier this gave us a more accurate reading and allowed us to monitor any weight loss or gain to try and maintain a healthy bodyweight. Recording voluntary feed intake, faecal consistency and bodyweight on a routine basis will aid in early detection of infection, digestive upsets and poor growth. (Rowe.J, 2002)

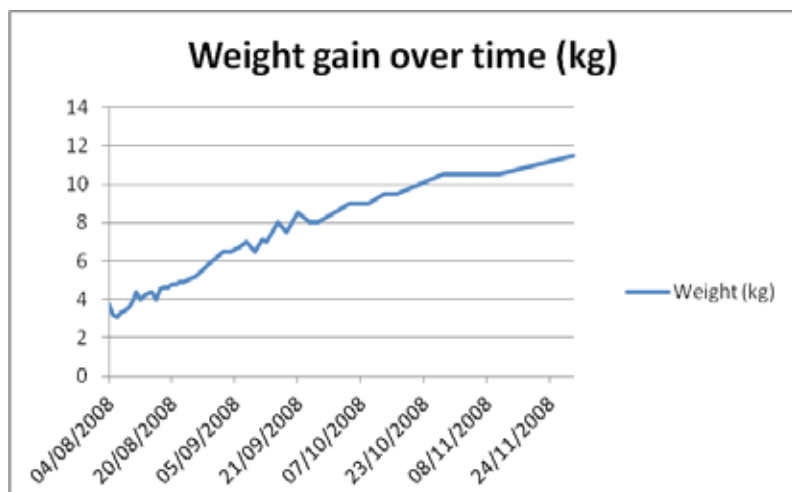
As mentioned earlier we began with placing Beijing in a large bag and attaching it to our hand held scales. This could be done with one person and didn't take up much room in the preparation area. It was also a little bit more relaxing for her as it was dark inside the bag which kept her calm. However as her weight increased and a bond was established with the keepers and calf, she was weighed on walk-on scales, which consisted of two electronic plates spaced out on the floor and a wooden board placed on top of them. The electronic walk-on scales were introduced at around 3 to 4 ½ weeks of the hand rearing process and age of the calf.

Beijing was lifted on to begin with, to allow her to get comfortable with the scales, however when comfortable, she would follow the keeper and walk on. The electronic reading gave a more accurate reading than the hand held, so whilst she was being weighed daily, this was the method used and chosen. After around 4 weeks of age she was weighed every second day, as she was gaining or maintaining her weight well and didn't need done every day. Throughout monitoring her weight and behaviour we were able to determine whether Beijing was healthy or unwell and also having an accurate weight allowed the correct dosage of drugs to be given, when unwell. She was weighed every other day, right up until the move into her new enclosure and we weighed her a few times after the move and end of bottle feeding just to be sure she was still gaining weight and eating correctly.

A graph of her weight progress is shown below. The graph shows that her weight was a little up and down to begin with, however the vet checked every other day and no major concerns were raised. (A table of weights is given as Table 1. at the end of this article).

As quoted earlier it is important to monitor daily feed intakes of animals, so this was carried out with Beijing and all hand reared animals past and present at Edinburgh Zoo.

Beijing was bottle fed throughout the hand rearing process and each bottle was heated before feeding. The bottles were originally heated in a bottle warmer, used for human baby bottles, however we found that for quickness and when hungry, it was easier to heat the bottles in a measuring jug, with boiling water from the kettle. However when doing this, care was taken that it was done outside the enclosure away from Beijing moving around. After every bottle feed carried out, the bottles were sterilised to prevent any diseases or health risks from dirty bottles. The bottles were sterilised with Milton steriliser fluid in a human baby bottle





steriliser. As well as the bottles been cleaned after each use, the steriliser was deep cleaned every second day.



Beijing started off for the first four days, being fed on lamb supplement milk (Powdered shepherdess lambs milk), however she had a little bit of upset stomach, so the decision was made by the vet to change the food to a goat's milk. So on

the fourth day of hand rearing, Beijing milk was changed to organic full fat goat's milk. As she was used to being fed lambs milk and was used to the taste of the milk, we had to gradually wean her off lambs and change it to goats. This process consisted of making every bottle feed  $\frac{1}{2}$  lamb's milk and  $\frac{1}{2}$  goat's milk and after another 5 days in the amounts changed around again to every bottle being  $\frac{3}{4}$  goat's milk to  $\frac{1}{2}$  lamb's milk. As the rest of the days passed the amount of lamb's milk was reduced further until completely weaned of lamb's milk at around 11 days old. The whole milk would be more nutritious for the animal and allowed her to gain weight and become a little stronger every day. The whole goat's milk we used was sourced from our local supermarket, with the brand name of St Helens farm, fresh goat's milk.

The beginning of the hand rearing of the calf consisted on around the clock monitoring and feeds throughout the night as well as the day. On the first five days she was fed every 2 to 3 hours, with visual checks throughout the night. The first week of the calf's life is very important and the youngster needed to be monitored closely, especially after the loss of her mother. The survival of the calf is determined on how well it grows and reacts throughout the first few days of its life. There were no major problems identified from Beijing, when taken from the enclosure, however the around the clock feeding and monitoring was still carried out.

Similar to the weight, the amount of milk consumed and times of feeds were recorded and a graph of data collected can be seen at the end of this article showing the daily amounts of food Beijing consumed and a table of key events (*Editor's note an edited table of key events is at the end of the article*). Also listed is any additional medication she received throughout being bottle fed. As mentioned previously, for the first five days she was fed every 2-3 hours and after that the feed times were changed so the late night feeds would stop and the latest she would be fed was 10pm. This was due to the records showing that on the fourth and fifth day, she

wasn't too happy to feed any later than that time. At around a week old she was on about five feeds per day and these ranged from 7am to 10pm. From 2 weeks old, she was fed no later than 8.30pm, yet again this was through the reluctance shown from her to feed any later and the feeds were reduced to around 4 feeds per day at around 3 weeks of age. The feed times changed from being whenever she was interested and hungry to being a little more of a routine and these times were 7am, 12pm, 4pm and last feed between 7.30pm to 8pm. At just over 5 weeks of age, the feed times were reduced



further and the times were changed to 7.30am, 1pm and 6pm. These feed times worked well with the keepers rota and the times allowed Beijing to have a little more independence for longer hours and eat more solid food, throughout the weaning process. The times of feeding were reduced at around 9 weeks old as this is when we

wanted her to begin eating a lot more solid food and not depend on the bottle feeds. The feeds were therefore reduced down to 2 bottles and the feed times were 8am and 5 pm. The last part of weaning her off the bottle happened around the age of 13 weeks old and she was reduced down to 1 bottle and was fed at around 12pm to 1pm. As the feeding times were reduced the quantity of milk was decreased and we were controlling how much milk she was being fed.

As well as bottle feeds, we were also attempting to wean her of the bottle and to eat more solid food from a young age. As the table shows we introduced a dish of 4mm browser pellets into her enclosure from just over a week old. Also from around 3 weeks old, we handpicked leaves and grass for her and introduced them into her diet. First of all with the leaves, we had to cut them up and make them into smaller pieces, so she was able to digest them; also we introduced fruit and vegetables, such as apple and banana. The banana was a more chosen fruit for her to eat, maybe due to it being a little sweeter and softer for her to eat. The pellets were not a favourite of Beijing and for the first few times feeding them, we placed them in her mouth and she emptied them back out again, so we decided to soak a few of them to make them softer for her to eat. As from the first week of her being placed in the

indoor enclosure, we added hay to the corner of the enclosure and through hand feeding her leaves and grass, she managed to work out that the hay was edible too and started to nibble on this herself from around 3 weeks of age.

The whole weaning process of getting her to eat solid food by herself and be the main part of her diet, took from the age of 3 weeks to around the age of 10 weeks old. This may sound like a long process, but we had a few ups and downs with her being a little dehydrated and a period of adjustment when she was moved into her new enclosure.

As shown in the table, Beijing was given lactade as well as her milk at around 7 weeks old. This was originally mixed in with her milk in the one bottle and then given to her separately as a second bottle after a few days. The lactade was also given with Vetrinex, which was medication prescribed by our zoo vets, due to Beijing being a little under the weather. Even though her appetite was okay, her faecal matter changed and also the differences in her behaviour indicated she was a little dehydrated. A small water dish was added into the enclosure as well as the bottle feeds, but she didn't seem too interested in the dish, so bottle feeds allowed us to ensure she was receiving her medication.

Beijing did not have her mother to teach her a variety of behaviours or even help to stimulate different bodily functions, such as defecating and urinating. So as Beijing's adopted parents it was our role to try and help make this process happen. It was important as mentioned earlier to monitor faecal consistency as this would give a clear indication of any illnesses she may have underlying in her system.

For the first few weeks, after every bottle feed, Beijing's anal area had to be cleaned or moistened, just like the mother would do with her tongue. The mother would lick the anal area to help stimulate the process of defecation and urinating to begin. After the body has learnt to do this, Beijing would start to be able to do this herself, without help.

Cotton wool and warm water was used to rub gently around the area and mimic what the mother would normally do. Beijing was very consistent on this process and defecated and urinated after almost every feed. The colouration and consistency was monitored, and to begin with the colouration was a yellow colour and then started to go a little more orange as time went on. As the diet Beijing had for the first few weeks was a liquid diet with the milk, her faeces was a little runny to begin with, but as more solids were eaten by her the consistency started to change and solidify more.

At the age of 3 weeks, we were still helping her to defecate, however as from this day her behaviour changed a little and she began going away from us

and urinating for herself. Defecating herself wasn't until she was around 4 to 5 weeks old. This is longer than normal for a young calf, but she was without her mother. The faeces at this age were solid and like little pellet balls. The colouration was brown and comparing the consistency and colouration to her father's everything looked correct.

This process was relatively straight forward for the keepers and the only problems we did have was at around the age of 3½ weeks she was a little constipated for 4 days. The vet was consulted and everything was relatively normal, just close observation was to be carried out. She finally defecated on the fourth day she defecated and after that, everything was straight forward on the defecation and urination side.

Beijing's behaviour was monitored closely, whilst being hand reared and this ranged from the first few days of her life, to being placed outside for the first time, feeding on bottle and solids, right up to her being introduced into her new enclosure and being introduced to her new male friend. The first few days of Beijing's life were relatively quiet and not very active. This may be due to her being beside her mother for the first day and half after being born. She was a little quiet and slept most of the day and night, except during feeding times, when she would wake up calling or making a noise. The first few days, she was taken to the head keepers flat during the night time and was kept in the indoor pen during the day. Bottle feeding was relatively straight forward as she took to the bottle without any complications. The hand rearer would kneel down beside her, so quite close to her, just like what the mother would be. The correct position for rearing goats, would to stand over her, with her in-between your legs and feeding from the bottle, similar to where the mother's mammary glands would be on her body. However Beijing didn't really like standing up for too long to begin with and became comfortable lying upright beside you or on your knees on the ground. As the days passed she began to want the bottle more and stand beside you,





rather than lie down and was fed with the keeper standing up and Beijing beside their legs.

At five days old her behaviour changed a little and she was acting a little agitated, grinding her teeth and running away from the keeper. That feed was cancelled as she didn't seem too happy to be fed at this time and was acting a little out of character. She was monitored closely and the next morning was back to her normal self. As she began getting older, she became a little more active every day and at a week old, was attempting to groom herself. Other animals were kept in similar enclosures in the pudu house, so keepers were there to clean them out, so Beijing had regular company and as from around a week and half old, she would come out into the keeper corridor with the keeper she knew whilst they cleaned the beds. Also after every feed she would get time to exercise in the corridor, whilst the paper work was completed for her diary. This gave her company, exercise and helped create a bond between Beijing and her keepers.



As mentioned previously she was kept indoors for the first few weeks, however the enclosure were she was kept had an outdoor enclosure, with grass and trees, so at the age of 2 ½ weeks old and under close supervision from her keepers, she was allowed outside for around a half hour to an hour to allow natural behaviours to be carried out and also become accustomed to the fresh air and weather. The first time she went outside, she bounced around for a little while, sometimes with all four feet off of the ground at once. A few logs were then added to the outdoor and indoor enclosure so she could climb on them and quite often, she would run and jump up on top of them and then jump off the other side. When the weather was nice and not too old and wet, she

was allowed outside after every mid afternoon feed. However she was always observed closely by the keepers as she would quite often come to the fence line and try and get to the public, for attention. Also on several occasions, when in the enclosure with her, she would run up to where you were standing and then run away again and come back, quite often in a full circle in the bottom of the enclosure. Sometimes even she would begin to mimic head butting your legs. This is a natural behaviour shown by her father and goat species in general. After introducing the grass and leaves to her during feeding times, she realised that she could go get them for herself from her outdoor enclosure, so quite often you would find her outside eating the leaves and grass from the ground.

When all the leaves were finished on the ground and as she got bigger and stronger in size, she learnt that if she stood on the logs or high up objects in the enclosure, she could reach the leaves on the trees and eventually would be trying to bring the branches lower down with her hooves to get the leaves.

After the bottle feeds reduced and she began eating more solids for herself, she became a little more independent and had access to the indoor and outdoor enclosure from first thing in the morning to lock up time for the keepers, without close supervision. This allowed her time away from the keepers, so she would learn to feed and be by herself. Also having access outside allowed her to become accustomed to the weather in which she would have all day and night in her new enclosure.

The new enclosure that she would be firstly introduced to was an outdoor enclosure with a non heated house at the top of the paddock. The enclosure

was also beside her father and was next to the enclosure where she was born.

Beijing was introduced to her new enclosure over the space of two weeks. She was taken to the new enclosure for about 2 hours on the first day, where she kept approaching the fence line to be beside the public and look for human attention. Weather permitting over the two weeks, the time period she spent in her new enclosure was increased every visit, until on the 4<sup>th</sup> November 2008, she moved permanently to the first of her new enclosures. The enclosure was not fox proof, so she had to be locked in the house overnight. The house contained a water drinker, food trough with her favourite foods so far and a straw bed with hay in the corner. Beijing was still getting one bottle of



came across and showed a little interest in the new male and no aggression was shown. The two of them are now inseparable and with the bamboo screening, the pairs do not see each other or bother with each other through the fence and are quite happily settled. Next and final step is offspring of her own and so far only a little interest has been shown by Bobby towards her, however they are still young adults.

Additional notes: As mentioned at the start, gorals have black curved horns on their heads. They are however not born with them, but with Beijing, they started to become noticeable at just over

milk per day, but this wasn't done until lunch time so on the first morning after the move, she was let out first thing and her food checked to see if she had eaten or was a little bit unhappy with new home. However on finding she had eaten a little of her food and wasn't too unhappy, just happy to see person letting her out.

After around a week after the move the bottle feed stopped and her behaviour was monitored closely for the next couple of weeks, as she would be moving into the fox proof enclosure with access in and out of the houses that were there permanently. The fox proof enclosure we would be moving her to meant swapping around the male. As he was older and more independent he didn't need the fox proof enclosure. The swap was carried out and Beijing moved into her new enclosure. As she got older the male kept coming down to the fence line and trying to get her through the fence line, so eventually we had to bamboo screen the fence, so he didn't get himself agitated to be with her. This screening was also very helpful towards the next introduction that was about to occur.

Two new Chinese gorals arrived at Edinburgh Zoo in April 2009. The pair that came in was a mother and her young son, so the introductions about to occur meant the mother would go with our adult male and the young male would go in beside Beijing. However the mother and son had never previously been separated. He was fully weaned and old enough, so after arriving at Edinburgh and left to settle down after transport for a couple of days, we separated the mother and son and introduced them to their partners. The adult male and female introduction was relatively successful. The female spent a couple of days indoors and the male didn't show any aggression towards her. Beijing and the new male named Bobby were introduced and wouldn't go near each other for about 5 days. The pair spent their time at the opposite ends of the enclosure. Beijing

11 weeks of age. When hand rearing Beijing we tried to avoid this growth area. With some hand reared antelope, that have had a lot of human contact in this area, their horns have quite often become deformed or one horn ends up slightly smaller than the other.

**Beijing and Bobby became parents** on the 4<sup>th</sup> July 2010 to a female calf. All are doing well and after a slow start, Beijing took well to her young calf and is caring and successfully rearing it by herself. Little intervention has been necessary by the keepers and all seems well.

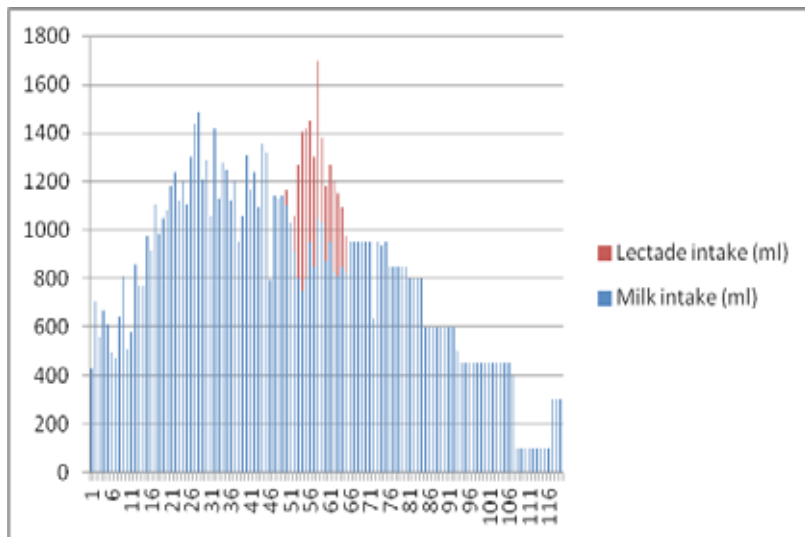
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A graph showing food intake of Beijing over the hand rearing process.



**BELOW: A table of the KEY EVENTS in daily food intake and dietary changes for the hand reared Chinese goral Beijing.**

Day	milk (ml)	other/notes
9	810	Small dish of 4mm browser pellets added to enclosure
21	1180	4 feed times per day, 7am,12pm,4pm and between 7.30pm to 8pm.
22	1240	Ate ½ piece apple today. Hand fed apple.
23	1120	Nibbled on fallen leaves outside and browser pellets Browse added to the indoor enclosure daily
24	1200	Nibbling on hay and leaves Hand fed leaves.
27	1440	Swallowed 4 4mm pellets and another piece of apple
30	1290	Nibbling on hay
34	1280	Leaves sycamore and ash and nibbling grass. Hand fed leaves.
35	1250	Water added to enclosure so drank from dish. Tried banana and ash leaves Hand fed food.
36	1120	Drink from water trough today and ate 5 pieces of banana and ate mixed leaves. Hand fed food.
37	1205	Eating leaves Ate by herself from ground. Feed times reduced to 3 per day, 7.30am,1pm and 6pm.
38	950	Banana Hand fed.
40	1305	Drank from water again and ate hay and leaves.
41	1165	5/6 pellets and 3 slices of banana. Hand fed.
42	1240	Willow leaves today Ate by herself from ground.
45	1320	Tried a little bit Lucerne.
46	795	Mixed leaves and pellets
48	1130	Lost umbilical cord today
50	1100	65mls Lactade. Lactade added to milk as Beijing was a little unwell and soft faeces, so placed on meds. Wouldn't drink from dish, so had to be mixed with milk.
52	910	150mls lactade. Ate a little carrot and pellet today too. Hand fed carrot and pellets.
53	800	470ml lactade
54	750	655ml lactade. Carrot and pellets.
55	800	620ml lactade. Cabbage apple and carrot today. Hand fed food.
56	950	500ml lactade Lactade fed in a separate bottle from milk today and took fine.
57	850	450ml lactade
75	950	Sa 37 supplement added to food trough every day from today.
58	1050	650ml lactade Dish of food left in overnight.
59	1030	350ml lactade. Lots of pellets eaten and a little apple and cabbage eaten to. Ate this food from dish from night before, by herself. Solid food dish added to enclosure every day and night as from today.
60	870	310ml lactade. Small amount of carrot today and pellets. Ate from dish herself.
61	950	320ml lactade. carrot
62	830	370ml lactade
63	810	340ml lactade
64	850	250ml lactade Reduce bottle feeds as from today, down to 2. 8am and 5pm.
65	825	150ml lactade. Pellet and mixed food dish empty this am. Last day of lactade today.
66	950	Milk only.
68	950	Added cucumber to diet, ate that well.
69	950	Empty dish this am again, increase the amount of solid food being fed.
119	300	Last bottle feed being fed today.