

SPECIES IN DANGER

# FROM STEPPE TO STORE:

THE TRADE IN  
SAIGA ANTELOPE HORN

SIMBA CHAN, ANATOLY V. MAKSIMUK  
and LIR V. ZHIRNOV  
compiled by STEPHEN V. NASH

A TRAFFIC NETWORK REPORT

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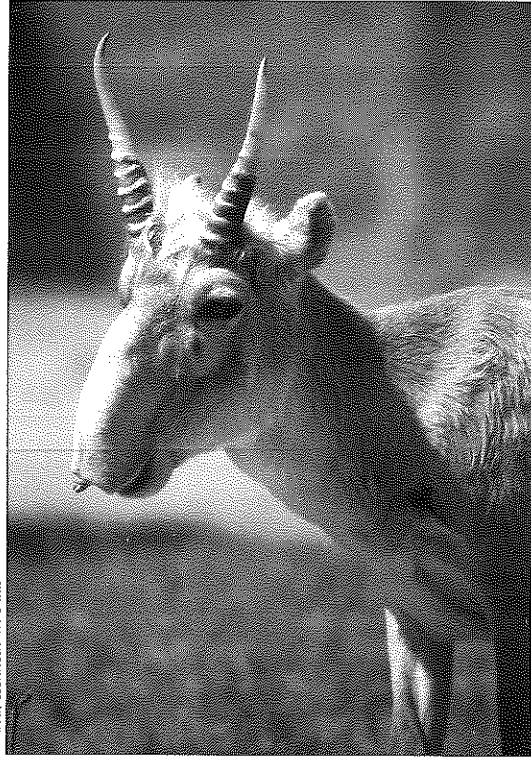


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**Simba Chan, Anatoly V. Maksimuk  
and Lir V. Zhirnov<sup>1</sup>**

*Compiled by*  
**Stephen V. Nash**



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Saiga Antelope.

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## INTRODUCTION

Saiga Antelopes are remarkable animals, adapted in behaviour and physiology to the harsh and unpredictable climactic conditions of the semiarid steppes of Central Asia. Nomadic and forming huge herds, the Saiga Antelope is a species with a short life span and an extremely high reproductive rate, whose populations are capable of quickly recovering from periodic high mortality rates induced by particularly harsh weather. However, the greatest threat currently facing the Saiga is not the extremes of nature, but excessive and unsustainable harvesting. Brought back from the brink of extinction in the early 1900s, the Saiga Antelope has recovered only to find itself under serious threat once again. The political situation and habitat within the Saiga's range have changed substantially and demand for its horn in traditional Chinese medicine has led to uncontrolled poaching, leaving the long-term survival of the Saiga Antelope far from certain.

Politics appear to have saved the Saiga Antelope from extinction in the early part of this century, as following the Russian Revolution of 1917 in the Soviet Union, a ban on hunting the antelope was imposed. Policies controlled hunting and changed human settlement patterns, thereby protecting the Saiga's steppe habitat from encroachment and change. As a result, the number of Saiga Antelope was able to return to the high levels of the nineteenth century by the end of the 1950s, growing from probably fewer than a thousand animals scattered in isolated areas at the turn of the century to two million animals living in 2.5 million square kilometres of habitat in Russia and Kazakhstan (Bannikov *et al.*, 1961; Sludsky, 1955).

Then, however, changes began that proved problematic for the species. Changes in state policies brought in livestock production and irrigation canals, introducing competition for the limited grazing resources of the steppes, loss of habitat through desertification and changes in age-old Saiga migration routes. Harvesting on a commercial scale resumed under a controlled hunt, although Saiga harvesting was managed and subjected to research aimed at ensuring an optimal and sustainable off-take.

In the 1980s came attempts at changing the Soviet economy towards an open-market system, which were overtaken by historical events in the early 1990s with the collapse of the central government (and its centrally planned economy) and the dissolution of the USSR into a loose confederation of independent States. State protection and management regimes for the Saiga Antelope have since suffered from inadequate funding and any long-term potential for managing the Saiga Antelope as a renewable resource has been overshadowed by the more immediate need for meat, leather and most importantly, foreign currency. Poaching has greatly increased, largely for the exportable horns. As only the male Saiga Antelopes carry horns, the selective hunting of this sex has resulted in considerable bias in the gender ratio of individual populations, possibly reducing the Saiga's reproductive success (Milner-Gulland, 1994), and consequently its ability to "bounce back".

The demand for Saiga horn has been driven by the relatively recent appearance late last century of the horn as an ingredient in Oriental medicines, the use of which is dictated by Chinese philosophy and an approach to medical treatment going back thousands of years. Saiga horn, now popularly interpreted to be the *lingyang-jiao* referred to in ancient Chinese medical texts, is used to reduce "heat" (which may appear as a fever), and to treat "internal wind", a condition often associated with liver problems. In combination with other medicines, it is also used to treat convulsions, headache, vertigo and other problems.

The use of Saiga horn is common in China, and indeed wherever Chinese communities are found in Asia. Destinations of Saiga horn include Japan, Korea, Hong Kong, Malaysia, Thailand, Viet Nam and other Asian countries (S. Broad *in litt.*, 1994). In August 1994 alone, there may have been at least 30 000 Saiga

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horns for sale in the traditional medicine shops of Hong Kong, the world's largest importer of Saiga horns. Most horn in trade originates in the Russian Republic of Kalmykia and the Independent Republic of Kazakhstan, although there is the possibility that some Saiga horn enters trade from Mongolia. The two isolated populations of Saiga Antelope in Mongolia may now be as low as 300 and 36 animals (Mix, 1994; Bold and Dulamtseren, 1992).

Politics, economics, and medical practices are determining the fate of Saiga Antelopes. It is clear that the species is fast becoming a victim of human tradition, social evolution and medical application, and that the next decades will be critical for its survival. In response to this and the 1994 proposal by the United States of America to list Saiga Antelope in the Appendices of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), the TRAFFIC Network undertook an examination that same year of Saiga commercial harvesting and the demand for and use of its horn in Chinese medicine.

The findings of this initial research into the production and demand elements of the trade are presented in this report in four parts and aim to bring together useful information on, and attention to, a largely overlooked species. This report also aims to assist in implementation of the CITES Appendix II listing, which was adopted at the ninth meeting of the Conference of the Parties to CITES in November 1994. The listing requires all international trade in Saiga Antelope and its derivatives to now be accompanied by an export permit, which shall only be granted if a properly designated Scientific Authority of the state deems that the export will not be detrimental to the survival of the species. The listing also requires that Parties to the Convention collate and present trade data in annual reports to the CITES Secretariat. Russia, which issues CITES export permits on behalf of several newly independent republics, is a Party to the Convention as are the main consuming countries of Saiga Antelope horn, such as China and Hong Kong (UK).

Part one of this report examines the appearance and use of Saiga horn in Chinese medicine; part two focuses on the history and present state of commercial harvests in the Central Asian Republics of Kalmykia and Kazakhstan as well as Mongolia; part three presents the results of a survey on the availability of Saiga horn in Southeast and East Asia; and finally, part four provides recommendations on conservation steps to be taken to improve the odds that the Saiga Antelope will survive this critical period into the next century.

## THE USE OF SAIGA ANTELOPE HORN IN CHINESE MEDICINE

Simba Chan

### MENTION OF SAIGA ANTELOPES IN ORIENTAL LITERATURE

Although *lingyang-jiao* is taken nowadays to mean horns of the Saiga Antelope (and it probably has had this meaning for the past 200 years), the descriptions of *lingyang* in ancient Chinese historical and medical texts cannot confirm that the animal referred to as *lingyang-jiao* was indeed the Saiga Antelope.

*Lingyang* is the Chinese name given to antelopes and goat-antelopes. "Ling" means clever and "yang" is the name given to both goats and sheep. The reason why ancient Chinese thought *lingyang* were clever is because these were supposed to hang themselves by their horns on trees at the edge of cliffs at nighttime, so no terrestrial predators could prey on them (Luo, 1174). Some Chinese medicine textbooks still state that the presence of the "hang-mark" on a horn is a good way to tell genuine *lingyang* horn, or *lingyang-jiao*, from counterfeit ones.

The oldest records of using *lingyang-jiao* in Chinese medicine are probably those written on bamboo slips excavated in Anhui Province in 1977. The slips were made in the Han Dynasty (206 BC-219 AD), but the text, named "Wanwu" (Ten Thousand Things), is believed to have been written during the Eastern Zhou Dynasty (770-222 BC). *Lingyang* was among the animals mentioned in connection with medicine, together with rhinoceroses, pigs, oxen, oysters, silkworms, turtles and swallows (Fu, 1993).

The use of *lingyang-jiao* was also recorded in the earliest Chinese medical text, "Shennong Bencao Jing" (The Herbal Classic by the Divine Agriculturist), which was probably written in the second century AD.

The following varied, often contradictory descriptions are taken from Li Shizhen's sixteenth century text *Bencao Gangmu* (Compendium of Materia Medica) dated 1593. Conversion of measurements is according to the Dictionary on Chinese Medicine (Anon, 1986). Translations, modern locations and additions to clarify text are within brackets.

- Tao Hengjing (456-536 AD), a great pharmacist of the South Dynasties (420-580 AD), commented that "... many *lingyang* have two horns, but animals with a single horn are of superior quality. The horn has many narrow rings. There is another animal called *shanyang*, but its horn is very long with rings only on one side and with wide gaps between the rings, and it is not used in medicine. This is the *yuanyang* named in *Er Ya* [an ancient dictionary more than 2 000 years old] but the Qiang people regarded it as *lingyang*. It can climb very steep slopes".
- Su Jing, the editor of *Xin-xiu Bencao* (Su, 659) in the Tang Dynasty (618-906 AD), described *lingyang-jiao* as "slender as a human finger, about 4-5 *cun* [12.4-15.6 cm] in length, with fine and narrow rings. *Shanyang* [mountain *yang* - Goral] is also known as *yeyang*, and can be big as an ox. Another animal is the *shanlyu* [mountain donkey - Mainland Serow *Capricornis sumatrensis*]. It is as big as a deer and has two horns, which are as big as *shanyang* horns. Ordinary people also use it [in medicine]".
- Chen Cangqi, the author of *Bencao Shiyi* (Additions to *Bencao*, 741) in the Tang Dynasty, wrote "*shanyang*, *shanlyu* and *lingyang* look similar, but *lingyang* is a spiritual animal. It hangs itself by its horns and stays above ground at night to protect itself from predators. If the horn is narrowly ringed especially at the bend and has a hang-mark, it is a genuine *lingyang* horn. Those loosely ringed and without hang-marks are counterfeits. Place a genuine horn by your ear, and if you hear it call then its quality is good. Tao Hengjing mentioned a single-horned animal. This is absurd".



- Kou Zongshi, the author of *Bencao Yanyi* (Derivatives of *Bencao*, 1116) noted “all horns make sound when you put them close to your ear, so the hang-mark should be a better characteristic for identification. However, there are counterfeits, so we must be careful”.
- Su Song of the Northern Song Dynasty (960-1127 A.D.) edited the *Tu Jing Bencao* (A Pictorial Classic of *Bencao*, 1061), in which it is mentioned that “minority tribes catch *lingyang* to trade in the markets. It looks like a goat/sheep but is greenish and bigger. Its horn is about 1-2 *chi* [about 31-61 cm] in length. On the horn there are rings which look as if compressed by human fingers. It is very hard. Guo Pu once explained in the dictionary *Er Ya* that “*lingyang* is similar to goat/sheep but is bigger. Its horn is slender, round and sharp and it lives on the cliffs. *Yuanyang* horn is big and curved. It is found in the west”. What we can find now in the markets is very similar to what was described as *yuanyang* in *Er Ya*, or *shanyang* by Tao Hengjing, or *shanlyu* by Su Jing. Now people are using them as *lingyang-jiao*. These are small horns like human fingers and about 4-5 *cun* [12-15cm] in length, with many narrow rings. Worn traces can be seen where the horn bends. After reading through various descriptions, this is genuine *lingyang-jiao*. I wonder why it is not used [in medicine]. There is also a kind of wild *yang* in the mountains of Min and Guang and people there called it *lingyang*”.
- Li Shizhen, the editor of *Bencao Gangmu* (1593), remarked that “*lingyang* is similar to *yang*, but it is greenish in colour and its hair is coarse. Its two horns are short and small. *Shanlyu* [serow] has a donkey’s body and a pair of *lingyang-jiao*-like horns. The horns are only slightly bigger and the rings are not so dense. In *Huanyu Zhi* [Book of the Universe] it is said that a *lingyang* was found in the high rocky mountains in Annam [Vietnam] that has one very hard horn, so hard that it can break diamonds”.

In the *San Cai Tu Hui* (A Collection of Pictures on the Heaven, the Earth and the Human Being, a pictorial encyclopedia published in 1607), *lingyang* was still a mountain-dwelling animal with curved horns, which hung itself on trees at night (although the Ming Dynasty picture, drawn 500 years earlier, represents a more antelope-like animal). In the explanatory notes with the picture it is mentioned that people of northern China often consumed *lingyang-jiao*, and people of southern China also consumed the horn in order to protect themselves from snakes and other venomous beasts because it was believed to have magical power. In one version of the *Tu Jing Bencao*, *lingyang* was drawn to be like a bearded goat with two long, curved horns, looking somewhat like an Ibex *Capra ibex* but not like the distinctive Saiga Antelope.

From these conflicting accounts we may conclude that as late as in Li Shizhen’s time (the late sixteenth century), the real Saiga Antelope and its horn was largely unknown to the Chinese, let alone utilized in any way. These many different descriptions conclude that *lingyang* was a greenish-grey animal living in the mountains in western or even central and southern China and was a good mountain climber, with short, narrowly-ringed and curved horns. None of these descriptions fit the appearance or habits of the Saiga Antelope, and these descriptions are closer to that of the Goral *Nemorhaedus goral*, or other goat-antelopes found in China. Serow was probably not the real *lingyang* because Serow (or *shanlyu*) was so well-known to pharmacists at the time, although laymen used its horn as *lingyang-jiao* anyway. Namba (1980) proposed the descriptions refer to the Goral or a species of gazelle. However, the distribution given for *lingyang* in the ancient texts does not correspond to that of any gazelle.

The Saiga Antelope is a species adapted to semi-desert open habitats and it is very unlikely that it ever occurred in the mountains of China. It is even more unlikely that the Chinese pharmacists who wrote the

texts of *Shennong Bencao Jing* about 2 000 years ago were familiar with the Saiga. The earliest animal-based medicines were made from animals the pharmacists knew well, such as geese, domestic chickens, bats, flying squirrels, domestic dogs, goats and/or sheep, horses, Asiatic Black Bear *Selenarctos thibetanus*, domestic pigs, domestic ox, Père David's Deer *Elaphrus davidianus*, Sika Deer *Cervus nippon*, musk deer *Moschus* spp., hedgehogs and rhinoceroses. Most of these species could be found in historical central or eastern China 2 000 years ago, and several can still be found there today.

The main range of the Saiga Antelope is Central Asia, and so it is logical that *lingyang-jiao* might have been brought to China from this region. However, there is no historical record of any Saiga horn trade between China and Central Asia along the Silk Road. This is the trade route by which alfalfa, grapes, walnuts, garlic and so on were introduced into China, and which would have been the most likely route for trade in Saiga horn.

The most detailed text on foreign countries during the Ming Dynasty (1368-1643) was the *Xian Bin Lu* (A Record of All Foreign Guests, edited by Luo Yuegeng and published in 1591), and it contains no mention of *lingyang-jiao* in Central Asian countries. *Lingyang* (but not the horns) was only mentioned as a product of Tian-fang (Mecca), together with animals such as Lion *Panthera leo*, Leopard *Panthera pardus*, Ostrich *Struthio camelus* (*tuo-ji*, "camel-chicken") and Cheetah *Acionyx jubatus* (*cao-shang-fei*, flying on the grasses). The *lingyang* referred to is most likely the Arabian gazelle *Gazella dorcas*, but the use of horn is not specifically mentioned.

Perhaps the first real mention of *lingyang-jiao* from Central Asia is in the *Si-yi Guangji* (Shen, 1368-1643), also published during the Ming Dynasty. This text mentions *lingyang-jiao* as one of the contributions (to the Chinese emperor) from *Huozhou* ("land of fire") in the Turpan Basin in Xinjiang. The Turpan Basin is about 200km south of the Jungar Basin, the only known site with wild Saiga Antelopes in China. However, the text does not provide any descriptions of the *lingyang-jiao*, so it can not be verified if the reference is to Saiga horns.

In 1727, the Manchu Government established the trade port Dongker, near Xining (now the capital of Qinghai Province). It was recorded that in 1741, a big caravan of about 300 people from Jungaria, a Mongolian khanate in the Jungar Basin (now northern Xinjiang), traded livestock, fur and antelope horns for about 100 000 taels (about 3 750kg) of silver (Yuan, 1991). This is one of the earliest records of antelope horn trade, which may quite possibly have been Saiga horn.

Cui (1989) quoted Cao Bingzhang who lived during the Qing Dynasty (1644-1911), stating "there are two types of *lingyang* [horns], black and white. The black horn reduces heat of the kidney and liver. The white horn reduces heat of the lungs and calms the 'wind'. In recent years the white horns are highly valued so these are commonly found in the market, and it is very difficult to find the black horns". Cui believes Saiga horns (white horns) were not the only horns used in the past, and the reason why Saiga Antelopes are used now is probably owing to the promotion of the use of Saiga horn by medicine traders, and the belief by the upper class that imported medicine must be better than local medicines.

The appearance of "white horns" in markets during the Qing Dynasty also coincided with the gradual annexation of Mongolia by the Manchus in the seventeenth century and the conquest of eastern Turkestan in 1759 (in 1884 Turkestan became the new Chinese province Xinjiang, which means "new territories"). These areas mark the easternmost range of Saiga.

At about the same time, Saiga horn was introduced to Japan. Genri Endo, a pharmacist of this period,



Saiga Antelope horn, incorrectly labelled.

noticed the differences between the Chinese horns and Japanese horns and questioned how the “straight white horns” could be hung on trees. The text *Honzo Komoku Keimo* (Introduction to *Bencao Gangmu*, dated 1803), compiled by the disciples of the great Japanese pharmacist Ranzan Ono, describes the importation of Saiga horns (Namba, 1980)

It is known that there was trade in Saiga horn between the Central Asian khanates and China in the nineteenth century. By 1845, trade between Chinese and Kazakhs was made legal by the Manchu government. While St. Petersburg banned export of opium, gold, silver, cash, firearms and vodka to China in 1841, it still exported livestock, textiles, metalware, jewellery, leather and furs, mainly in exchange for homespun cloth and tea (Fairbank, 1978). It is very likely that Saiga horns also became an important item of export to China at this time, as

there are records that merchants in Buchara and Chibinsk alone sold at least 344 747 pairs of Saiga horns between 1840 and 1850 (Grzimek, 1972).

Song (1907) mentioned that *lingyang-jiao* was also collected for medicine in northern Xinjiang; these horns were very probably from Saiga. The Xinjiang-Suiyuan Trading Company had imported about 450 *catty* [approximately 270kg; a *catty* is a measure of weight roughly equivalent to 0.6kg] of *lingyang-jiao* from Xinjiang annually between 1930 and 1932. The horns were carried by vehicle from Xinjiang through Suiyuan (now central Inner Mongolia) to Tianjin (Zeng, 1936).

Traders of Saiga horns mainly gathered in the cities of Zhangjiakou (in Hebei Province) and Niuzhuang (in Liaoning Province) in the early twentieth century (Chen, 1930). Zhangjiakou is on the route from Suiyuan to Tianjin, and is also connected with Ulaan Baator by rail. Niuzhuang is connected with Harbin by the South Manchurian Railway, and Harbin is connected with Chita (a Russian city on the Trans-Siberian Railway) by the China Eastern Railway. Saiga horns in Zhangjiakou could have been imported from Xinjiang, Mongolia and Russia, while those in Niuzhuang were likely to be from Russian stocks.

There are also reports that horns similar to those of Saiga but smaller (with a length of 10-20cm and a diameter of 2-3cm) used to be imported from Mongolia prior to 1949. Such horns are known as *qing-tiao lingyang-jiao* (green-striped antelope horn) or *xiao-zhi lingyang-jiao* (small antelope horn) and they were mainly exported to Jiangxi Province. These horns are very rarely found in the market now (Cui, 1989; Han, 1993)

Most literature suggests that Chinese-origin Saiga horn is likely of the Mongolian subspecies *mongolica* (Liang, 1986; Zheng, 1994), but Tan (1992) places Saiga Antelopes formerly living in China under the nominate subspecies *tatarica*. Formerly, there were two populations of Saiga Antelopes in China, one on the Sino-Mongolian border (at Beita Shan) and the other a migratory population on the Sino-Soviet border (at Ala Shankou [Ala pass]) (Liang, 1986). It is recorded that 50 000 pairs of Saiga horns were collected in Xinjiang in one year in the 1930s (Zheng, 1994), and Chinese Saiga horns were still available until the

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1940s (Tan, 1985). It is rather surprising to learn that Saiga Antelopes seem to have been rather plentiful in China until the 1930s, at a time when the Kalmyk and Kazakh populations were almost extinct and only just starting to recover. One of the possible reasons for the survival of Chinese Saiga Antelopes into the 1930s was the lack at the time of a good transportation system between Xinjiang and the rest of China. Xie (1925) noted that it took about three months to travel on land from Beijing to Urumqi, the capital of Xinjiang, via Shaanxi and Gansu or the Mongolian steppes. Travelling time was shorter from the Russian side, but it still took about at least one month.

The Beita Shan population was last seen in the 1960s. There were reports of horns from Ala Shankou in 1984 and a few animals were seen by local herdsman, but these animals were probably migrants from Kazakhstan (Gao, 1991). Saiga Antelopes are generally believed to be extinct, or nearly so, in China. In 1988, Chinese authorities reintroduced 10 animals to a breeding centre in Gansu Province, to be captive-bred in the hope of reintroducing them back to the wild (Gao, 1991).

### USE OF SAIGA HORN IN CHINESE MEDICINES

The ancient medical text *Shanghan Lun* (On Febrile Diseases, written by Zheng Zhongjing in the first to second century AD) listed the prescription *ling-jiao gouteng tang* using a decoction of *lingyang-jiao* along with herbal ingredients (including *Uncaria rhynchophylla*, a vine called *Gouteng*) to reduce fever (Ling, 1984).

According to the text *Shennong Bencao Jing*, the characteristics of *lingyang-jiao* are salty in flavour, cooling in its properties, and acting on the liver and heart channels. It is used to pacify the liver and to check "endogenous wind", clearing away "heat" from the liver to improve acuity of vision, and clearing away toxins (Zhang, 1990).



Saiga Antelope horn medicines.

Saiga horn is classified along with rhinoceros horn as a product salty-cold in character and which can detoxify the body and reduce "heat". However, rhinoceros and Saiga horn are regarded differently as Saiga horn cures liver ailments while rhinoceros horn detoxifies the heart and cools the blood, but cannot calm the liver (Anon., 1973). It is believed that the *lingyang-jiao* is not as effective as rhinoceros horn in clearing "heat" and relieving toxicity but is more effective in relieving spasms and extinguishing "wind". In severe cases of coma and convulsions owing to high fever, both horns are often used together (Bensky and Gamble, 1993). It is also believed when the *qi* or *chi* [vital energy] of a man is

"heated" Saiga horn should be taken, but when his blood is "heated", rhinoceros horn should be taken (Cheung, 1943). However, Cheung (1943) did not consider Saiga horn as effective as rhinoceros horn, based on his clinical experience.

Each dose of Saiga horn is 1-3g, taken as a fine powder either boiled or ground with water (Zhang, 1990). Zhou (1981) suggested 3-6g should be used if boiled in water, but only 0.6-1.5g are needed if taken as powder or ground with water. The bony core of the Saiga horn can also be used in Chinese medicine. It has similar effects as the horn but a larger amount (11.25 - 18.75g) should be taken in each dose (Anon.,

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1973). A listing of commercial medicines and local prescriptions containing Saiga horn is included in Table 1.

A chemical analysis of Saiga horn has revealed that the main constituents are keratin, calcium phosphate and vitamin A. Zinc is the most important trace element found in Saiga horn, with other trace elements including aluminium, selenium, chromium, manganese, iron and copper. As Saiga horn has a high zinc content, it is believed that consumption of Saiga horn would help to delay ageing (Chen, 1989).

Experiments have demonstrated that an alcoholic extract of Saiga horn inhibits the central nervous system. It has been found to reduce convulsions in toads and mice caused by caffeine, and enhance the rate of recovery in these animals. This extract can also enhance the tolerance of animals to anaerobic conditions and soothe pain. Boiled extract of Saiga horn has been found to reduce fevers in rabbits suffering from typhoid (Dai, 1981).

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**Table 1**

**The Saiga and/or antelope horn content of 32 manufactured medicines and locally produced prescriptions (Chinese Medicine Research Institute, 1962; Zhang, 1990)**

Name and locality	Horn content, % by weight
<b>1. Niu Huang Qingxin Wan</b>	
Beijing and Chengde	1.87%
Tianjin	1.69%
Shanghai	0%
Nanjing (1)	0%
Nanjing (2)	0%
Wuhan	0%
Guangzhou	0%
Fuzhou (1)	0%
Fuzhou (2)	0%
Hangzhou (1)	0%
Hangzhou (2)	<2.28%
Nanchang (1)	0%
Nanchang (2)	<2.06%
Shashi	0%
Chongqing (1)	0%
Chongqing (2)	<2.06%
Kunming	0%
Xi'an	0%
Lanzhou	2.30%
Datong	<0.38%
Yuxian	<2.02%
Jinan (1)	<2.14%
Jinan (2)	0%
Qingdao	<0.89%
Shenyang (1)	<7.75%
Shenyang (2)	0%
Shenyang (3)	0%
Shenyang (4)	0%
Fushun	0%
Harbin and Jilin	10.45%
Kaohsiung County (Niou Hwang Ching Shin Pill)	2.18%
Taichung City (Niou Hwang Jiow Shin Pill - Niou Hwang Ching Shin Pill)	1.85%
Kaohsiung County (Pao T'ai Lung Fuan Chih Niu Huang Ch'ing Hsin Wan)	1.75%
Tainan County (Niou Hwang Ching Shin Wan "Bae Shian")	1.92%



FROM STEPPE TO STORE: THE TRADE IN SAIGA ANTELOPE HORN

Table 1 continued

Name and locality	Horn content, % by weight
2. <b>Qing-shen Ding-zhi Wan</b>	
Harbin	<8.30%
3. <b>Ling-qiao Jiedu Wan</b>	
Beijing, Jinan and Chengde	0.40%
Tianjin	0.42%
Lanzhou	0.42%
Datong	0.54%
Qingdao	1.44%
Shenyang	0.90%
Hohhot	3.30%
4. <b>Shi-yi Qing-wen Wan</b>	
Beijing and Chengde	0%
Qingdao	0.59%
Datong	0.70%
Shenyang	0%
Hohhot	2.94%
5. <b>Xi Ling Jiedu Wan</b>	
Datong	0.22%
Jinan	0.11%
6. <b>Zi Xue Dan</b>	
Beijing	0.76%
Tianjin	1.45%
Shanghai	cannot be calculated
Nanjing	<1.13%
Wuhan	cannot be calculated
Fuzhou and Guangzhou	cannot be calculated
Hangzhou	cannot be calculated
Nanchang	cannot be calculated
Shashi	cannot be calculated
Chongqing	cannot be calculated
Xi'an	cannot be calculated
Lanzhou	cannot be calculated
Yuxian	cannot be calculated
Jinan	cannot be calculated
Shenyang (1)	cannot be calculated
Shenyang (2)	cannot be calculated
Shenyang (3)	cannot be calculated
Jilin and Harbin	cannot be calculated
Hohhot	cannot be calculated

FROM STEPPE TO STORE: THE TRADE IN SAIGA ANTELOPE HORN

Table 1 continued

Name and locality	Horn content, % by weight
<b>7. Xi Ling Dan</b>	
Tianjin and Lanzhou	0.36%
Chengde	0.39%
<b>8. Zicao Wan</b>	
Shenyang	2.40%
Fushun	0%
Jilin	5.59%
<b>9. Yu-ying Jin Dan</b>	
Tianjin	0.62%
Lanzhou	0%
Shenyang	7.14%
<b>10. Ji-man Jingfeng Wan</b>	
Fuzhou	3.93%
Hohhot	3.28%
<b>11. Xiao'er Jin Dan</b>	
Tianjin	0.05%
Lanzhou	0.69%
<b>12. Bao-you Zaisheng Dan</b>	
Beijing	<0.65%
<b>13. Xiao'er Hui-chun Dan</b>	
Beijing, Chengde	0%
Tianjin	2.50%
Shanghai	0%
Nanjing	0%
Wuhan	0%
Fuzhou	0%
Hangzhou	0%
Nanchang	0%
Shashi	0%
Chongqing	0%
Xi'an	0%
Lanzhou	0%
Datong	0%
Yuxian	0%
Jinan	0%
Fushun (1)	0%
Fushun (2)	0%
Hohhot	3.94%

FROM STEPPE TO STORE: THE TRADE IN SAIGA ANTELOPE HORN

Table 1 continued

Name and locality	Horn content, % by weight
<b>14. Niuhuang Ba-bao Dan</b>	
Tianjin	cannot be calculated
Jinan	5.35%
Shenyang	cannot be calculated
Jilin and Harbin	5.55%
<b>15. Zhi-sheng Bao-yuan Dan</b>	
Beijing	0%
Tianjin	0%
Lanzhou	3.14%
Datong	0%
Jinan	0%
Shenyang	0%
Fushun	0%
Harbin	0%
Chengde	0%
Hohhot	0%
<b>16. Zhu-huang Bao Sheng Dan</b>	
Beijing	1.78%
<b>17. Xiao'er bai-shou Dan</b>	
Beijing and Chengde	0%
Tianjin	0.39%
Jinan	0%
<b>18. Xiao'er Jijing Fen</b>	
Beijing and Chengde	1.61%
<b>19. Miao Ling Dan</b>	
Beijing and Chengde	0%
Tianjin, Lanzhou and Jinan	0.48%
Hohhot	0%
<b>20. Xi-jiao Hua-du Wan</b>	
Shenyang	6.29%
Tainan City (Chieh Tu Wan - Hsi Chiau Hua Tu Wan [Xi-jiao Hua-du Wan])	3.64%
<b>21. Lingyang Ming-mu Wan</b>	
Shenyang	10.10%

FROM STEPPE TO STORE: THE TRADE IN SAIGA ANTELOPE HORN

Table 1 continued

Name and locality	Horn content, % by weight
22. <b>Dan-liao Ling Po Ming-mu Wan</b> Harbin	1.58%
23. <b>Jia-liao Liao Po Ming-mu Wan</b> Hohhot	3.94%
24. <b>Kai-guang Fu-ming Wan</b> Datong	0.37%
25. <b>Shihu Yeguang Wan</b> Jinan	unknown
26. <b>Linyang Ganmao Pian</b> Ningbo	unknown
27. <b>Naoxueshuan pian</b> Tianjin	unknown
28. <b>Linyang Qingfei San</b> Harbin	unknown
29. <b>Bei Ling San</b> Shanghai	unknown
30. <b>Linyang-jiao San</b> Chaozhou	unknown
31. <b>Loong Tan Hsieh Kan Wan [Longdan Xie-gan Wan]</b> Tainan County	1.52%
32. <b>Huan Ching Wan (Huan-jing Wan)</b> Pingtung County	2.56%
33. <b>Linyang Fen</b> Beijing	unknown

**SPECIES USED AS SUBSTITUTES FOR SAIGA HORN IN CHINESE MEDICINE**

The following species and derivatives have been reported in literature, or recommended to the author by medical practitioners, as substitutes for Saiga horn. Where possible the Chinese names and the status of the species in China are given. As to the status, Chinese law divides rare and endangered species into two categories for protection. The State Council (the Central Government) is responsible for protecting those in Category One while those in Category Two are under the protection of provinces, autonomous regions and municipalities.

*Chiru* *Pantholops hodgsoni*

The Chiru (*Zangling*, or “Tibetan antelope”) is the closest relative of the Saiga Antelope. Surprisingly few medical texts state that it can be used as a substitute, although there are suspicions that the single-horned animal mentioned by Tao Hengjing (456-536 AD) was actually a Chiru because seen from the side it looks like an antelope with only one horn

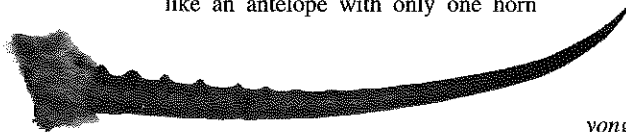
(Namba, 1980). Gao (1991) mentioned that Chiru horn has the effect of “clearing heat and detoxifying”.

In a Korean text (Ryuk, 1981) it is listed as one of the *yongyang-kak* (antelope horns), and is supposed to have the

same medical effects as other antelope horns. Chiru horn is also used

in traditional Tibetan medicine, although not in the same way as Saiga horn. It is usually burnt to charcoal and used for curing goitre, gastritis and prolonged diarrhoea. It is also used to hasten parturition (Anon., 1975). The Chiru is protected (Category One) in China. In 1989 an estimated 50 000 Chiru occurred on the Changtang Plateau, Tibet (Yin and Liu, 1993).

S. Y. Chan / TRAFFIC



Chiru horn.

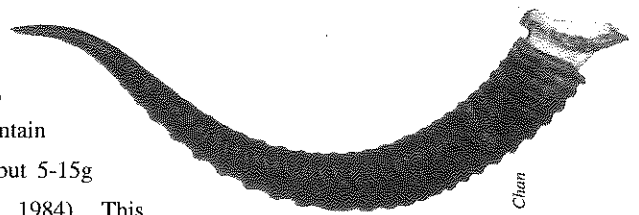
Mongolian Gazelle *Procapra gutturosa*

The horn from the Mongolian Gazelle (*huangyang*, “yellow goat” or *huangling*, “yellow antelope”) can reduce “heat” and is lower in toxicity. It can reduce convulsions caused by caffeine in laboratory animals and enhance the rate of recovery. It can calm the liver and check the “endogenous wind”. Horn from the Mongolian Gazelle can cure epilepsy, apoplexy and infantile convulsions; 3.75 - 11.25g should be taken in each dose. For infant fever resulting from influenza, about 7.5g of horn should be boiled for three hours, then filtered, condensed, and sucrose added to make a syrup; about 0.37 - 1.12g should be taken three times a day (Anon., 1972).

Nakayama (1939) mentions trade in Mongolian Gazelle horns from Japanese-occupied Manchuria to China, but the horns were used in making knife handles and the tips were used for making awls and pins. No mention is made of medical use. The Mongolian Gazelle is protected (Category Two) in China. Some 6 000-9 000 pelts were collected annually from the Hulun Bei'er League (now a district in Inner Mongolia) in the mid-1980s (Ma, 1986).

Tibetan Gazelle *Procapra picticaudata*

The horn from the Tibetan Gazelle (*zang-yuanling*, “Tibetan steppe antelope” or *shan-huangyang*, “mountain yellow goat”) has the same effect as Saiga horn but 5-15g should be taken in each dose (Anon., 1979; Ling, 1984). This species is protected (Category Two) in China. About 8 000 pelts were



Tibetan Gazelle horn.

S. Y. Chan

collected in Sichuan alone every year before and during the mid-1980s (Hu and Wang, 1984). In 1989, the

## FROM STEPPE TO STORE: THE TRADE IN SAIGA ANTELOPE HORN

population in Tibet was estimated to be approximately 186 000 (Yin and Liu, 1993). Another survey in 1987-1988 estimated that about 182 000 Tibetan Gazelles were living in Tibet (Piao and Liu, 1993).

### Przewalski's Gazelle *Procapra przewalskii*

The effect and dosage of horn from Przewalski's Gazelle (*pushi-yuanling*, "Przewalski's steppe antelope"; *meng-yuanling*, "Mongolian steppe antelope", or *tan-huangyang*, "open-area yellow goat") is the same as that of the Tibetan Gazelle (Anon., 1979; Ling, 1984). This species is protected (Category One) in China. Its status is insufficiently known (Groombridge, 1994).

### Goitred Gazelle *Gazella subgutturosa*

The effect and dosage of horn from the Goitred Gazelle (*ehouling*, "goose-throated antelope" or *changwei-huangyang*, "long-tailed yellow goat") is the same as that for the Tibetan Gazelle (Chinese Medicine Fauna Editorial Board, 1979; Ling, 1984). The Chinese Government has approved the use of Goitred Gazelle horn as a substitute for Saiga horn (Gao, 1991). This species is protected (Category Two) in China.

### Serow *Capricornis sumatraensis*

The effect and dosage of horn from the Serow (*lieling*, "maned antelope" or *sumenling*, "Sumatran antelope") is the same as for the Tibetan Gazelle (Chinese Medicine Fauna Editorial Board, 1979; Ling, 1984). The horn can be used as a substitute for Saiga horn (Lin, 1991). Li Shizhen (1593) mentioned ordinary people taking Serow (called *shanlyu*, or mountain-donkey, at that time) horns as *lingyang-jiao*. The Serow is protected (Category Two) in China.

### Japanese Serow *Capricornis crispus*

Horns from the Japanese Serow have long been used as *reiyo-kaku* (antelope horn) in Japan, and these have been used in medicine since the Heian Era (794-1185 AD) (Namba, 1980). It is said to have a similar effect to rhinoceros horn (Obara, 1972), and it is also used in curing convulsions. The horn is ground into powder and taken with milk or Japanese wine. When boiled to produce an extract, 2-3g of horn is needed. A dose of 0.3-0.5g of powder should be taken for apoplexy, and this is said to be very effective (Kawanaka and Shimana, 1937). However, it appears that modern-day Japanese pharmacists have forgotten the use of this medicine. The Chinese name is *riben-lieling* (Japanese-maned antelope) or *taiwan-lieling* (Taiwanese-maned antelope) for the Taiwanese subspecies *C. c. swinhoei*; the latter is sometimes regarded as a full species, the Taiwanese Serow *C. swinhoei*. The Japanese name for this animal is *kamosika* which, when expressed in *kanji* (Chinese) characters, uses the same character as *ling* (pronounced as *rei*, which means antelope). The Taiwanese subspecies is protected (Category One) in China.

### Domestic Goat *Capra hircus*

The horn from the Domestic Goat (*shanyang* or "mountain goat") has a similar medical effect as Saiga horn, but more should be taken. Thirty grams should be used when boiling (Lin, 1991).



Goral *Naemorhedus goral*

The horn of the Goral (*banling*, "spotted antelope" or *qingyang*, "green goat") is "salty and cold" and has a similar effect as that of Saiga horn, but a larger quantity (about 3-6g) is needed in each dose. Goral horn should be taken as ground powder (Zhou, 1981; Ling, 1984). Nakayama (1939) mentioned that the Goral was hunted in Japanese-occupied Manchuria for its blood and fat, which were valued as medicine. Although the horns were also sold with the meat and pelts, there is no mention of the medicinal value of the horns. The Goral in traditional medicine literature is often confusingly named as *shanyang* ("mountain goat"), which is the same name given to the domestic goat. The Goral is protected (Category Two) in China.

The similar Red Goral *Naemorhedus cranbrooki* is in Category One of the protected list in China. It is estimated that there are fewer than 1 500 Red Gorals left in Tibet and more than 200 are being killed by hunters every year (Yin and Liu, 1993). The subspecies found in Russia, Korea and much of China, *N. g. caudatus*, is sometimes regarded as a full species, the Long-tailed Goral *N. caudatus*.

Argali Sheep *Ovis ammon*

In traditional Tibetan medicine, the horns of the Argali Sheep (*Panyang*, "coiling sheep") are believed to cure fever (Anon., 1975). This species is protected (Category Two) in China. An estimated 5 000 Argali Sheep occur in Tibet (Yin and Liu, 1993).

Blue Sheep *Pseudois nayaur*

Like those of the Argali Sheep, horns from the Blue Sheep (*yanyang*, "rock sheep") are also regarded in Tibetan medicine to be effective for reducing fever; however, the horn must be burnt to charcoal before use (Anon., 1975). This species is protected (Category Two) in China. The estimated population in 1989 was approximately 78 800 (Yin and Liu, 1993). The subspecies *P. n. schaeferi* is sometimes regarded as a full species, the Dwarf Blue Sheep *P. schaeferi*, and is considered to be endangered (Groombridge, 1994).

Water Buffalo *Bubalus bubalis*

One medicine trader at Hehuachi market in Chengdu City informed the author that domesticated Water Buffalo (*shuiniu*, "water ox") horns can be used as a substitute for Saiga horn, but 10 times more should be taken.

Shavings of elephant ivory

Shavings of ivory can be used as a substitute for Saiga horn, but a larger quantity is needed to obtain the same effect as that of Saiga horn (Anon., 1973).

African antelopes

From comments made to the author, it appears that several Taiwanese pharmacists and patients believe horns from African antelopes (species unknown) are an effective substitute for Saiga horn.

**STATUS AND COMMERCIAL HARVESTING OF SAIGA ANTELOPE IN CENTRAL ASIA**

**Anatoly V. Maksimuk and Lir V. Zhirnov**

**SOURCES OF INFORMATION**

The information presented in this section is based on studies of the Saiga Antelope by the authors in the Autonomous Republic of Kalmykia of the Russian Federation (1972-1993), and in the Republic of Kazakhstan (1987-1992). The authors visited Kalmykia in September 1994 and the Republic of Kazakhstan in October 1994 on behalf of TRAFFIC Europe, to obtain further information for this report. Information concerning the trade in Saiga products in Kalmykia was also provided by G.B. Pavlov, Head of the Kalmyk Department of the Protection and Rational Use of Hunting Resources; S.N. Salikov, State Hunting Inspector of the same department; V.M. Tsyganov, Chief of the Saiga Preservation Division; V.S. Badmaev, the Director of Montane Reserves; and the Director of the Kalmytskyi State Game Management Area. Information on the trade in Saiga products in the Republic of Kazakhstan was provided by Yu. A. Grachev, Senior Researcher and Head of the Saiga Study Division of the Zoological Institute of the Kazakh Academy of Sciences as well as the following people from the commercial enterprise P.O. Okhotzooptom: V.V. Ukrainskii, General Director; A. Lebachhev, Main Game Manager; and I.B. Adilbayev, Chief of the Division for International Trade in Saiga Products. Finally, information was also received from V. Ilyashenko, the Head of the Main Division of Biological Resources, Russian Ministry of Environmental Protection and Natural Resources.

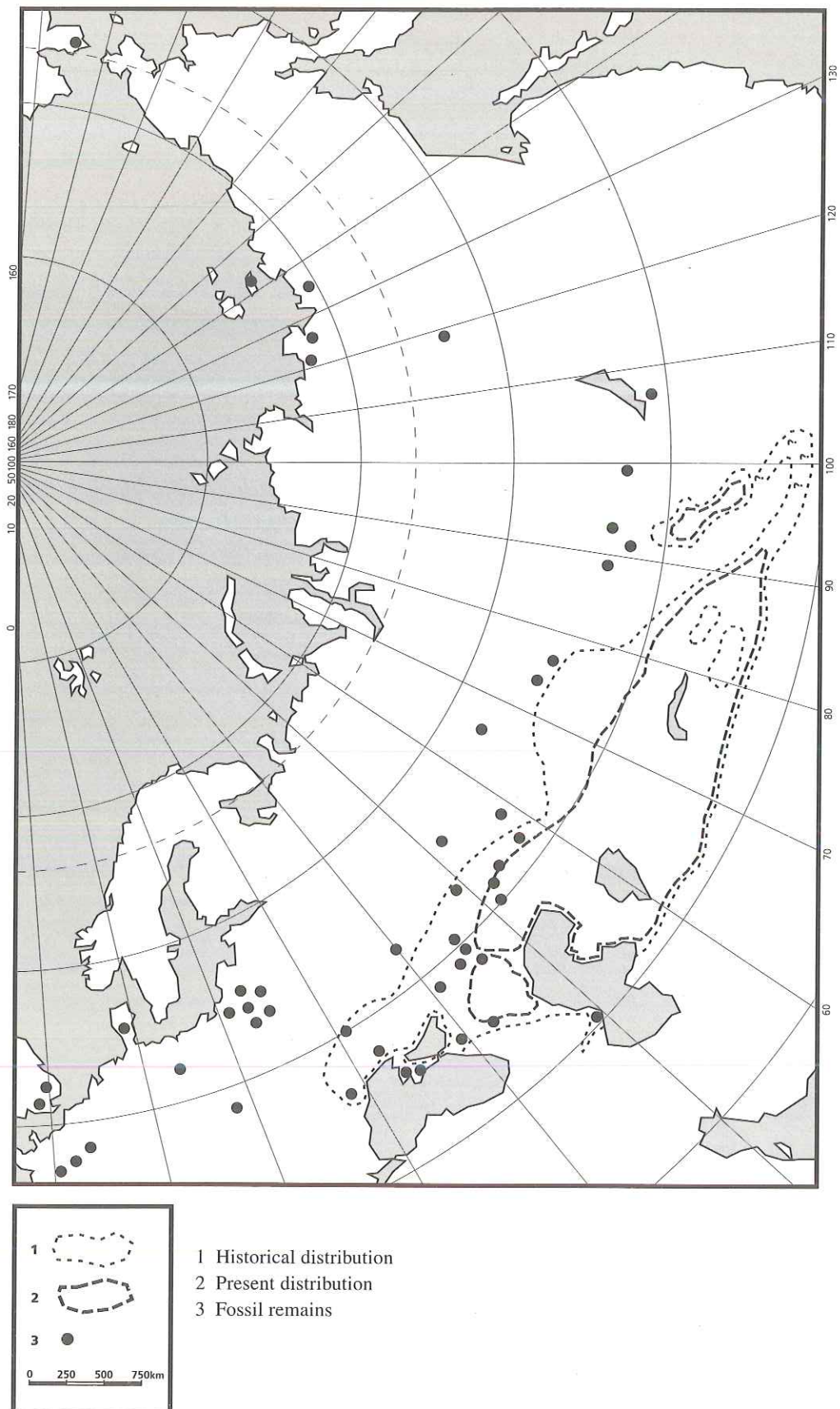
**DESCRIPTION AND DISTRIBUTION OF SAIGA ANTELOPES**

The Saiga Antelope belongs to the order Artiodactyla and the family Bovidae (Nowak, 1991). The genus *Saiga* includes the single species *tatarica*, which is further subdivided into two subspecies. The nominate subspecies *S. tatarica tatarica* inhabits the semiarid steppes in the north-west Caspian region in Kalmykia and throughout much of the Republic of Kazakhstan, while the Mongolian subspecies *S. tatarica mongolica* inhabits two isolated areas in northwest Mongolia.

The Kalmyk population west of the Volga River can be considered as an isolated European group, while to the east of the Volga in Kazakhstan is an isolated Aral population of *S. tatarica tatarica* beyond which another separate population exists adjacent to northern regions of Kazakhstan on the Ust-Urt plateau. To the east of the Aral region is another isolated population, occupying the Betpak.Dala desert and adjacent regions of central and eastern Kazakhstan. This latter group is the largest of the populations, with the greatest geographical range. Contact between these Kazakh populations is not extensive, occurring only occasionally in some summer seasons.

The Mongolian subspecies of Saiga Antelope exists as a distinct population in the Mongolian Great Western Lakes Depression. In the 1940s and 1950s, Saiga Antelopes were spread in the Great Western Lakes Depression in the area around lakes Khirhis Nuur and Har Nuur, and to the southeast in Khoisiin-Gobi and Shargiin-Gobi (Bannikov, 1954). In the following years, this range and the number of animals began decreasing, so by the beginning of the 1980s this subspecies was restricted to the lower parts of the northeastern foothills of the Mongolian Altai mountain range, the territories around the Sulai-Ula and Darwiin-Nuru ranges, and the region south of Lake Har Us Nuur (Sapozhnikov and Dulamtseren, 1982).

Present and historical distribution of the Saiga Antelope, from *Bannikov et al (1961)*





R. Scire / WWF / Russia

Saiga Antelope female.

The Saiga Antelope exhibits several morphological features and ecological adaptations well suited to the harsh, open arid landscapes of Eurasia. The obvious feature of the Saiga is the enlarged proboscis, which contains large nasal chambers that filter out sand and dust and humidify the air inhaled (Teer, 1991). Saiga Antelopes are powerful runners, similar in size to a goat. The males have short, ribbed horns the colour of amber. The animals' feeding is adapted to the semiarid conditions of the steppes, their diet being based on drought-resistant wild grass crops in the spring to mid-summer, and on desert shrub vegetation the rest of the year.

Saiga are nomadic, seasonally migratory, and well-organized socially, adaptations brought about by the naturally low productivity of the semiarid ecosystem of the steppes. In the spring months many Saiga herds move from wintering areas in the southern portion of their range to dry steppes in the northern part of their range, often travelling several hundred kilometres. In autumn, at the beginning of the snowy season, herds of Saiga migrate south toward drier areas with less snow. The extent of seasonal migrations may reach 250-300km in Kalmykia and 600-1 000km in Kazakhstan (Bannikov *et al.*, 1961; Zhirnov, 1982a; Fadeev and Sludsky, 1982). Saiga Antelopes can move quickly in a coordinated way, and throughout the year they form herds ranging in size from a few dozen animals to several thousand. Even when calving in the spring, females may gather into large groups, in so-called "maternity hospitals".

One of the ecological peculiarities of Saiga Antelopes is their high rate of reproduction and recruitment. In years with a favourable climate the population size can increase rapidly, by up to 60% in a single year. Usually up to 95% of females produce young in their first year, with twin calves being common, resulting in an average litter size of 1.6 young per breeding female. The high recruitment rate is also encouraged by the high percentage of breeding females in a population, usually not less than 65%. This high reproductive rate and obligate polygamy within herds provides for a certain resistance to natural and man-made effects. However, years of droughts in spring and summer or especially snowy winters can cause a 40-60% overall decrease of female fertility, owing to an increase in barrenness and a decrease in twin births (Bannikov *et al.*, 1961; Rashek, 1963; Zhirnov, 1982a; Fadeev and Sludsky, 1982). Mortality of young Saiga Antelopes increases drastically in drought years, with a loss of 70-80% of the year's offspring during one summer

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(Zhirnov, 1982a). During the winter months, snow cover in excess of 20cm depth leads to starvation and mass death (Sludsky, 1963).

Overall, Saiga Antelopes are capable of remarkably fast population renewal, and a complete generation change within three to four years (with an average life span of four to five years, slightly less for males). Saiga Antelopes have early maturation, high generative potential, obligate polygamy, simple age structure within a population, and short longevity of separate generations. All these peculiarities have been formed in a process of natural selection directed towards reaching high productivity in ecologically favourable years, as a compensation for high losses in years with abnormal weather. In the unstable environment of the northern arid and semiarid zones, this strategy has ensured survival and even prosperity of the species (Zhirnov, 1982a).

## **EXPLOITATION OF SAIGA ANTELOPES**

### **A short history**

Saiga Antelope populations have long been affected by human activities such as hunting and agriculture. Primitive hunters used the Saiga (and other animals such as bison and horses) from the end of middle Pleistocene. The hunting pressure on many hoofed mammals continued to increase in the Stone Age, and later in the Bronze Age (Vereshchagin and Baryshnikov, 1980).

While many hunters have focused on both sexes of Saiga Antelopes for meat and hides, horns from the males have been a valuable item in trade for at least the last few hundred years. As a result, hundreds of thousands were exported from Russia to China in the middle of the nineteenth century (Silant'ev, 1898; Sludsky, 1955). While hunting through the ages has certainly caused fluctuations in Saiga numbers, of concern is the drastic decline in the population at the end of the nineteenth century and beginning of the twentieth century caused by excessive harvesting. Selective killing of males for their horns led, significantly, to changes in the reproductive rate, moreover. As a result, many populations were reduced to critical levels at the turn of the last century. By the 1920s, the species numbered about 1 000 individuals or less, surviving within the territory of the former USSR only in parts of the north-west Caspian region (Kalmykia) and Kazakhstan (Bannikov *et al.*, 1961).

Following the Russian Revolution in 1917, the Saiga Antelope was classed as a rare species and received strong protection. Hunting of the animals was prohibited in all seasons, state export of horns was banned and borders were guarded against illegal exports. In addition, favourable climactic conditions contributed to the recovery of the Saiga Antelope as did new land-use policies. Grazing areas became free of cattle as a result of the forced transition of nomadic peoples to a settled way of life under collectivization, enabling Saiga Antelopes to fill the vacant ecological niche. Their numbers increased through the 1930s, and by the 1940s they had again become quite common in many regions of Kalmykia and Kazakhstan. By the end of the 1950s, the restored range of the species covered 2.5 million square kilometres and the population was estimated to be about two million individuals (Bannikov *et al.*, 1961; Sludsky, 1955), believed to be equivalent to population levels for the species of the mid-nineteenth century. Commercial hunting was again allowed from the 1950s and the Saiga Antelope may have become the most important commercially hunted species in the USSR (Zhimov, 1982a; Fadeev and Sludsky, 1982).

Despite the general trend during the twentieth century towards the restoration of historical ranges and numbers, the populations of Saiga Antelopes have remained largely isolated from each other.

### **Modern-day population status of Saiga Antelopes**

#### **The Kalmyk population**

The highest recorded number for this population dates back to the end of the 1950s, when assessments of the overall stock were made of about 800 000 individuals, occupying an area of 100 000 - 120 000km<sup>2</sup>. During this period, Saiga Antelopes occupied all suitable territory in the north-west Caspian region, which may be interpreted as the upper ecological limit (in numbers) of the species in Kalmykia.

In the following decade (1960-70), however, intensive harvesting reduced the Kalmyk population by more than half. The 1964-66 harvest of the antelopes was equivalent to 40% of the total number of the Kalmyk population in those years. In addition, heavy snow and ice conditions during the winter of 1966-67 contributed to the decline (in the 1950s it had been empirically established that Saiga populations could tolerate harvesting rates of up to 20%) in numbers, leaving a population of only 85 000 individuals. As a





B. I. Petrishev

Saiga on steppe.

result, hunting was suspended in the 1968-69 season, and protection was reinforced in the following five years. The population grew and by the spring of 1975 increased to 340 000 individuals, with an additional 160 000 young produced later that year.

From 1976-85, the population decreased slightly, ranging between 350 000-730 000 individuals. Intensive harvesting had resumed by this time, resulting in as many as 200 000 animals taken in some hunting seasons. The negative impacts of other human activities increased, including those of widespread construction of irrigation canals and fenced pastures while the number of livestock in Kalmykia reached its peak of about 360 000 cattle and 3.3 million sheep.

Growth of the Kalmyk population of Saiga Antelopes ceased in the second half of the 1980s, and harvesting decreased to 15 000 - 20 000 head per season. From 1987, the population stabilized at between 120 000 and 150 000 individuals. A special decision of the Supreme Soviet of Kalmykia prohibited any harvest in the years 1987 to 1989. However, political changes within the USSR during this period, resulting in the attempted transformation of a centralized to a market-oriented economy and the collapse of the State foreign trade monopoly, meant that Saiga horn became much more widely available. This increased their value as an export commodity, and offered a means of earning foreign currency. In 1990, commercial harvesting of Saiga Antelopes took place along with mass poaching of the male antelopes for their horns. The Supreme Soviet of Kalmykia again cancelled hunting, beginning in 1991. Unlike those in previous years, however, this ban has not led to a restoration of numbers because poaching has continued as have detrimental changes to the Saiga Antelope's habitat.

Development efforts in Kalmykia have both harmed the environment irreparably and failed to produce good economic results as well. Livestock breeders rejected seasonal use of natural pastures, and turned to settled grazing on the same territories throughout the whole year. As livestock numbers have increased the productivity of pasture land has decreased dramatically. Furthermore, pasture land has been ploughed for growing fodder, and set aside for irrigation canals. Kalmykia has been deprived of most of its pastures, wells have dried up, numerous salty marshlands and masses of shifting sand have appeared, under which

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settlements have started to disappear. The southern regions of Kalmykia, where good winter pastures for the Saiga used to occur (the so-called Black Lands), have turned into a virtual desert and have fallen into disuse by the species. Sand dunes constituted 3.5% of this region in 1956-57, 18.2% in 1971-72 and 38.6% in 1984-86. Today, the total area of sand occupies approximately 600km<sup>2</sup>, and is increasing every year by 40-50km<sup>2</sup>.

In Kalmykia, the suitable habitat for Saiga has decreased almost five-fold since the late 1950s to less than 20 000 - 25 000 square kilometres. The widespread increase in irrigation canals, roads and industrial development has allowed increased access to Saiga habitats and also created barriers for Saiga in their migrations and their search for seasonal pastures. Prevented from moving, herds of Saiga Antelopes now occur at high density levels around water basins and are over-exhausting grazing areas. The Saiga have apparently reached the point where their rate of reproduction has decreased. Female fertility (i.e. the number of embryos found in pregnant adults) decreased by 30-50% in 1983-86 in comparison with rates between 1958 and 1970, and an increase in the mortality rate in all age groups was simultaneous (Zhirnov *et al.*, 1988). Changes in the genetic structure of the Kalmyk population occurred as well (Maksimuk and Zhirnov, 1994).

### **The Kazakhstan populations**

The highest numbers of Saiga Antelopes noted in Kazakhstan, as with the Kalmyk population, were observed during the periods 1958-60 and 1971-74. The total number of all three Kazakh populations (Volga-Ural, Ust-Urt and Betpak.Dala) reached 1-1.2 million in the spring months of these years (Fadeev and Sludsky, 1982). During the interval between these two peaks, the population numbers decreased by more than half as a result of snowy winters, summer droughts, and intensive harvesting in some seasons. Generally, however, the Kazakh populations have recovered more rapidly than the Kalmyk populations from periods of depletion and suffered less serious population decreases.

The most drastic reduction took place in 1976, when numbers dropped from 1.2 million to 600 000 mainly because of excessive harvesting in 1975 when 500 000 animals were killed during the hunting season. Snowy winters in 1975-76 and 1976-77 led to further decreases in the population size, especially in the Betpak.Dala population, which fell from 956 000 individuals in 1974 to a low of 280 000 in 1978.

The overall reduction of harvesting in recent years (and a complete prohibition of hunting in 1979) has resulted in the Betpak.Dala population increasing to 540 000 by 1987 and up to 700 000 by 1990. Recent estimates of the total number of Saiga Antelopes in Kazakhstan were of 825 000 in 1991; 927 000 in 1992; and, most recently, 976 000 in the spring of 1993 (before the harvest season). According to an aerial census taken in April 1993, the numbers of Saiga Antelopes in the individual Kazakhstan populations were 510 000 (Belpakdala), 216 000 (Ust-Urt), and 250 000 (Volga-Ural) (Y.A. Grachev *in litt.*, 1994; author's data).

Recent census data indicate a more satisfactory state in the Kazakh populations compared with the Kalmyk population because of better-preserved natural landscapes in Kazakhstan, and a reflection of the more moderate burden that livestock exerts on pastures in this region. Significant disturbances to natural landscapes in Kazakhstan are limited to particular areas which, owing to their mobility, the antelopes manage to avoid. The relatively unchanged steppes, semi-deserts and deserts of much of Kazakhstan are all used by the herds in different seasons and provide them with the opportunity to regenerate after unfavourable years. The existence in Kazakhstan of militarized zones with forbidden access has also created areas where any hunting is impossible. However, large areas of virgin lands were ploughed in

northern Kazakhstan, destroying habitats especially valuable to Saiga Antelopes in drought years. Conditions in eastern Kazakhstan also changed as a result of increased development. As a result, the species was eliminated from the Alaakul basin and became rare in the region between the Ili and Karatal Rivers in the 1970s. (Fadeev and Sludsky, 1982).



Anatoly Maksimuk

Saiga Antelope.

### **The Mongolian populations**

In the 1940s and 1950s, Saiga were common in their Mongolian range, numbering several thousand (Bannikov, 1954). According to census data derived from counts taken on the ground (from motorized vehicle) in the summer of 1981, the total number in Shargiin-Gobi was estimated at between 600 and 750 individuals (Sapozhnikov and Dulamtseren, 1982). Aerial counts in the summer of 1988 found 1 700 individuals in Shargiin-Gobi, but as few as 30-40 around Lake Har Us Nuur (Zhirnov *et al.*, 1989; Munghtogtokh, 1993). More recent (1993) indications suggest that the Shargiin-Gobi population may now be reduced to 300 animals (M. Mix, *in litt.*, 1994).

Thus, the Mongolian subspecies is represented by residual populations with limited ranges and, at best, very low numbers. They occur in isolated desert depressions under high pressure from intensive cattle farming and other disturbances (such as motorized vehicles). The lower reproductive potential characteristic of stressed populations, coupled with these human interferences and periodic harsh winters, underscores the very high vulnerability of this subspecies and the real possibility of its extinction in the near future.

## **COMMERCIAL HARVESTING OF SAIGA**

### **History and techniques of commercial hunting**

In the 1950s, the first commercial harvests of Saiga Antelopes in Kalmykia and Kazakhstan were carried out by local groups of hunters, who both shot and processed the animals. Early Saiga hunts involved daytime shooting, often from vehicles, which did not work well for large-scale harvesting and resulted in poor quality products and many wounded animals left behind.

The first specialized Saiga hunting enterprise was established in Kalmykia in 1956, the Astrakhanskii State Game Management Area. In 1977, a second hunting enterprise was established, the Kalmytskii State Game Management Area (this enterprise, active on the west bank of the Volga, is still in operation today). In Kazakhstan, similar Saiga harvesting enterprises were established: the Betpakdalinskii State Game Management Area in 1963, in central Kazakhstan, and Akt'ubinskii and Uralskii Game Management Areas, and others in following years.

With the formation of these state game management areas, a certain degree of supervision over the harvest and marketing of the resource became possible. Scientific recommendations for seasons and quotas, including the composition of quotas, were instituted and allowed a more rational use of Saiga. In the 1970s and 1980s, these management enterprises appeared to work well. In Kazakhstan, where commercially viable numbers of Saiga Antelopes still occur, the legal harvest is still organized by these bodies.

As harvesting methods improved in efficiency and product quality, two methods emerged that are considered effective:

### ***Night hunting with powerful lights***

At night, trucks move towards the herd at a speed of 15-20km/hour, with the hunters locating the animals aided by a searchlight. At a distance of 100-150m from the herd the vehicle is stopped and the powerful light dazzles the animals. Once this happens, several hunters shoot buckshot at the animals from a distance of 30-35 meters. While shooting from this distance reduces the number of wounded animals, the number of hurt and unrecovered antelopes still reaches 15-20% of the total collected.

This hunting method is the most effective on dark windy nights, and an experienced team of four or five hunters can harvest 100-150 animals during a five- or six-hour hunt.

This method of hunting Saiga Antelopes has been forbidden in Russia since 1981.

### ***Portable net traps***

The Central Laboratory of Hunting and Natural Preservation in Kalmykia developed a more efficient way to harvest saiga at the end of the 1970s, using a portable net trap into which whole herds can be driven with the aid of motorcycles. Trapped animals are killed on the spot or are taken alive to be slaughtered and processed elsewhere. This way of harvesting is more efficient than the other current method, and provides a greater quantity and higher quality of product. This method also enables hunters to select animals according to gender and age, and allows authorities to monitor the off-take more closely. This method, essentially an adaptation of ancient Saiga hunting techniques used by nomadic tribes, was introduced recently in Kazakhstan as well.

### Products of the hunt

The main product (by volume) of the Saiga harvest is meat, which is very lean (less than 5% fat), and surpasses mutton in protein, trace elements and vitamin contents (Zhitenko, 1974). Live weights of Saiga Antelopes vary between 32 and 51kg for adult males and between 21 and 41kg for adult females; the average yield of meat with bones is 50-55% of the live weight.

In addition to meat, leather, fat and horns are used. The skin of an adult male is about 0.80m<sup>2</sup> in size while the skin of the smaller females and young are 0.45-0.6m<sup>2</sup> in size. Meat and skins are sold in domestic markets, horns are exported, and any leftovers from the butchering process are used as feed in breeding farms for fur-bearing animals. Prisjzhnjuk and Pronjaev (1982) documented that per 100 000 harvested animals of mixed sex and age, 1217.7t of meat, 8.3t of raw horn (4.3t of horn sheaths), 7.8t of tongues, 80.5t of first category by-products (such as hearts, livers and kidneys) and 161t of second category by-products (heads, intestines, stomachs, etc.) could be obtained.

Horns are the most valuable part of Saiga Antelopes as they are in demand in East Asia for medicinal use. The most valuable horns are those of males of about one year. In preparation for exportation, horns are cut off with part of the skull and shelved for two to three weeks to dry out in well-ventilated premises. The horns are then sawn off at their base and packed in stiff paper. The weight of one pair of horns, processed for exportation, is usually about 190-345g, 240g on average (Fadeev and Sludsky, 1982).

### Harvest levels in Kalmykia

Regular commercial harvesting of Saiga Antelopes started in Kalmykia in 1951, in which local hunting societies took 10 000. During the next five years, 208 000 animals were commercially harvested. The Astrakhanskii State Game Management Area was founded in 1956 to improve rates of harvest, and during the next 12 years some 850 000 Saiga were shot, with harvests in some seasons as high as 150 000 - 180 000. The 1968-69 hunting season was cancelled as a management measure, and protection of the Saiga was reinforced in the following five years. In the middle of the 1970s, the Kalmytskii State Game Management Area was re-established to increase harvests again. Between 1951 and 1990, 2.2 million Saiga were harvested, producing more than 31 000t of meat.

Exploitation of Saiga resources in Kalmykia has been a profitable business. In the 1970s, the Astrakhanskii and Kalmytskii State Game Management Areas marketed Saiga products on average for 1 200 000 - 1 300 000 rubles annually (approximately US\$1 800 000 - 2 000 000). Economic data show that Saiga harvesting was more profitable in Kalmykia than traditional cattle breeding. An assessment in the 1970s of the Saiga harvest yield recorded production of 500kg per thousand hectares, an output four times higher than that obtained from cattle in the Baltic region and other territories.

According to official data, the harvesting level peaked in the years 1956-1960 and 1976-1980, when the average yearly harvest exceeded 100 000 head. At the beginning of the 1980s, the Kalmykia Saiga stock began to decrease significantly, and commercial harvests have not exceeded 15 000 - 20 000 per year since



Mounted Saiga head.

S. Y. Chen / TRAFFIC

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1984 (with the exception of 1990, when the commercial enterprise Kalmytskii State Game Management Area was allowed to shoot 11 000 Saiga Antelopes). The 1987 decree of the Supreme Soviet of Kalmykia prohibited hunting from that year to 1989, inclusive, moreover. In 1991, the hunt was again closed and is scheduled to be so until 1996 although sport hunting was allowed in 1993, with a quota of 500 animals. Only 98 Saiga Antelope were actually taken.

However, illegal harvesting continued, despite the hunting bans. Once the State monopoly on Saiga horn exports was abolished, following *perestroika*, an estimated 200 000 male Saiga Antelopes were hunted illegally from 1988-89 in Kalmykia and Kazakhstan. As a result, the proportion of adult males in the Kalmyk population dropped from a normal 20% to less than 6%. In 1993 alone, local experts estimate that the illegal harvest (again, mainly of males) could have been as high as 10 000 - 15 000 animals.

**Table 1**  
**Official figures of Saiga harvest and meat production in Kalmykia, 1951-1993**

Years	Gross harvest	Meat production (t)
1951-1955	103 000	1 400
1956-1960	612 000	8 500
1961-1965	347 000	4 800
1966-1970	52 000	700
1971-1975	195 700	2 700
1976-1980	653 100	9 100
1981-1985	253 000	3 500
1986-1990	26 300	360
1991-1993	98	-
<b>Total</b>	<b>2 242 198</b>	<b>31 060</b>

### Harvest levels in Kazakhstan

In Kazakhstan, commercial harvesting started in 1955 but hunting was not carried out on a large scale until 1959 and the annual take fluctuated between 30 000 - 80 000 head. Harvests increased in the following years and peaked in 1971-1975, a period in which 1.8 million Saiga Antelopes were killed and the annual off-take ranged between 194 000 - 501 000 animals. In the following 10 years, the harvest rate dipped, but still reached 350 000 animals in some years.

Since 1986, the legal hunting quota has been reduced to 86 000 - 130 000 antelopes per season. However, hunting in excess of this quota level is known to have taken place between 1988-89 and caused the proportion of males in the population to drop from a normal 20% to a low of between 8% and 12%.

These statistics demonstrate the high value of the Saiga Antelopes to the region, where in 40 years of exploitation 7.5 million have been harvested, providing among other products some 117 000t of meat. During the period between 1955 and 1981 alone, some 4 137 000 Saiga Antelopes were harvested in Kazakhstan providing meat, skin, horns and other products at a value of 85 693 000 rubles, with an estimated net profit of 25 162 000 rubles (Fadeev and Sludsky, 1982).



**Table 2****Official figures of Saiga harvest and meat production in Kazakhstan, 1955-1993**

Years	Gross Harvest	Meat Production (t)
1955-1960	257 000	4 600
1961-1965	723 000	12 700
1966-1970	411 000	7 400
1971-1975	1 595 000	27 200
1976-1980	957 000	15 400
1981-1985	887 000	13 000
1986-1990	457 000	6 200
1991-1993	282 000	3 400
<b>Total</b>	<b>5 569 000</b>	<b>89 900</b>

**Hunting in Mongolia**

Hunting the Mongolian subspecies has been prohibited for many years, although illegal hunting is believed to be a problem (D. Mallon, *in litt.*, 1994 to the IUCN Species Survival Commission, Cambridge).

**Population management**

Experience in the management of Saiga Antelopes and research into the species' status and ecology in Kalmykia and Kazakhstan have led to the establishment of management strategies for harvesting in each State. Assessments of Saiga numbers in Kalmykia take place twice a year, (in March and April and from the third week of August to the first week of September), which provide the basis for establishing harvest quotas.

Saiga populations normally consist of 18-22% adult males and 33-47% adult females, with the remainder being the year's young (Zhirnov, 1982b; Fadeev and Sludsky, 1982). According to this ratio, the composition of harvested animals should ideally comprise no more than 15% adult males<sup>2</sup> (older than one-and-a-half years), the remainder being equally split between adult females and young of both sexes. Owing to the low ratio of males to females in Saiga populations, and to a higher death rate among males (especially after mating time), the share of adult males to be harvested should be strictly controlled, as too low a drop in the number of males may seriously affect population recruitment rates.

The optimum Saiga harvesting period, from a commercial point of view, in Kalmykia is from 10 October to 1 December. In Kazakhstan, the Saiga have a later mating season, and the harvesting can be prolonged to 10 or 15 December (Fadeev and Sludsky, 1982). During these winter months Saiga Antelopes form large herds and the young have grown large enough to be commercially valuable. Sport-hunting, mainly in pursuit of males for trophy heads, is best carried out earlier, from 15 August.

Regulation and monitoring of commercial harvesting requires strict State control, which unfortunately has been lost with the dissolution of the USSR and the formation of new independent States.

**Legislation**

The Saiga horn export trade in the USSR was under centralized State control until 1989. The legal basis for regulating the Saiga harvest in Kalmykia is provided by the *Law on the Protection and Usage of Animals*, adopted by the Russian Federation in 1980. As noted, bans on hunting of the antelopes have been

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exercised as considered necessary, namely for the 1968-1969 and 1987-1989 seasons and from 1991 to the present, in Kalmykia and in 1979 in Kazakhstan. Quota levels, such as that in Kazakhstan of 86 000 - 130 000 animals per season, are set based on Saiga population censuses, and hunting methods are in theory under State control.

The Republic of Kazakhstan adopted the *Law on the Protection and Usage of Animals* in 1992. In addition, the *Standard Rules of Hunting* used by both the Russian Federation and the Republic of Kazakhstan provide important by-laws regulating the use of Saiga resources.

In 1990, the Government of Kazakhstan and The Supreme Soviet of the Republic of Kalmykia issued decrees providing a monopoly on the Saiga resource to P.O. Okhotzoprom on Kazakh territory and to the Kalmytskii State Game Management Area on Kalmyk territory. However, the export trade in Saiga horn in recent years has also been promoted by numerous smaller co-operatives and individual businessmen, often from horn obtained illegally.

The Mongolian subspecies has been exempt from hunting for many years and the subspecies is under official State protection. However it is unclear whether there are any protected areas in Mongolia suitable for its Saiga populations.

### **Enforcement**

Saiga protection in Russia is carried out by the Department of Environmental Protection and Rational Use of Hunting Resources of Kalmykia, with the help of 60 hunting inspectors and game keepers. About 500 cases of poaching were discovered each year until the early 1990s. Now the number discovered is lower because there is less control capacity. In 1992 and 1993 some 700kg of horns were confiscated from poachers and purchasers. Also in 1992, inspectors found 400 male Saiga carcasses with their horns sawn off.

Saiga protection in Kazakhstan is carried out by the Main Division on Protection and Rational Use of Animals and by a section of P.O. Okhotzoprom devoted to Saiga protection. Each year, about 1 500 cases of Saiga poaching are investigated in Kazakhstan and 1 000-1 500kg of Saiga horn are confiscated by militia and Customs officers.

These figures confirm an increase in Saiga poaching, despite tough sanctions introduced in Russia and Kazakhstan. Saiga poachers generally use motorcycles, with which they escape authorities. In some districts of Kalmykia, but especially in Kazakhstan, illegal hunters are organized in well-equipped groups.

Illegally killing a male Saiga in Russia carries the penalty of a fine equal to 10 times the minimum monthly salary of 22 500 rubles (approximately US\$5), and in Kazakhstan the fine is equal to 15 times the minimum monthly salary of 200 tenge (approximately US\$4). For killing three or more male Saiga Antelopes, a poacher can be sentenced to five years' imprisonment. However, such penalties appear insufficient as a deterrent to poaching.

Poaching is also occurring in Dagestan, Karakalpakia (Uzbekistan), Kirgizia and Turkmenia, where Saiga wintering areas are located. Illegal hunting of Saiga Antelopes is now widespread because of the high price paid for horns and is exacerbated by the high rate of unemployment in territories where the antelopes occur.

### THE EXPORT TRADE IN SAIGA HORN FROM KALMYKIA AND KAZAKHSTAN

Saiga horns were regularly exported to China in the nineteenth century, where between 1840 and 1860 it is recorded that 11 000 to 61 000 pairs of horn were exported annually (Meyer, 1865 in Silant'ev, 1898).

Until 1989, exportation of horns by the State Game Management Areas was conducted through specialized foreign trade bodies such as Medexport and Prodintorg that set quotas and horn prices under State control within the USSR. Kazakhstan exported 26t of Saiga horns from 1975 to 1981 and in 1993, 20t (at a price of US\$40 per kilogramme) from natural mortality and commercial harvests in 1991-1993. By comparison, exports from Kalmykia amounted to 2.8t between 1982 and 1993.

A number of organisations received special permits from employees of the government of Kalmykia to export Saiga horns in 1993. These organisations are Rusintorg, which exported 1 065kg to the Rian company in Japan at the price of US\$21 000; Agropromservice, which exported 4 000kg of horn to China at the price of US\$16 000; and Arschi, which exported 5 000kg of Saiga horn to the Suifenhe trading company of China, in a barter trade arrangement.

During the period of *perestroika* the State monopoly on Saiga horn exports was abolished. Customs control decreased, state boundaries within the former USSR were of little consequence, and uncontrolled exports of Saiga horns began. Besides State-established enterprises, other organisations became involved in Saiga horn collection and exportation after 1989. This multiplied the amount of Saiga horn on the market and, in 1989, the overall quantity exported may have exceeded previous annual totals by five to seven times. It is believed that in 1988-89 some 100t of Saiga horn were collected in Russia and Kazakhstan and exported, whereas the Kazakh State enterprise P. O. Okhotzoprom only supplied 4.7t. Numerous co-operatives and other organisations are believed to have supplied more than 80t of horn, of which approximately one-third were taken from males dead from natural causes, but two-thirds from illegal harvest, causing imbalance in remaining populations, as noted.

In 1995, Official Saiga horn stockpiles totalled 3.5 to 4 tonnes in Kazakhstan and some 1.5 tonnes in Kalmykia. In Kazakhstan, the horns were obtained during the 1994 hunting season, while the Kalmykia stock was collected from dead males during the last four to five years.

According to P.O. Okhotzoprom, some 44t of Saiga horn have been illegally exported in 1994 to Singapore, China, Korea, Japan and some European countries and there are said to be five tonnes of Saiga horn in Turkey at the present time. Illegal, large-scale exports have been made by numerous co-operatives and business people going abroad on shopping trips, and purchasing of poached Saiga horn has been widespread among Chinese citizens visiting Russia and Kazakhstan. In mid-1994, Saiga horns were being purchased from local people at US\$30/kg, a price which further stimulates poaching.

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**Table 3**  
**Export of Saiga horns in 1970-1993**

Year	Russia (t)	Kazakhstan (t)
1970	-	18.0
1971	-	9.1
1972	-	9.2
1973	-	37.9
1974	-	42.7
1975	-	15.0
1976	-	15.0
1977	-	31.0
1978	-	25.0
1979	-	35.0
1980	-	27.0
1981	-	35.0
1982	2.7	10.0
1983	-	29.7
1984	3.5	28.7
1985	1.5	29.9
1986	0.8	15.3
1987	4.5	1.0
1988	7.0	3.8
1989	3.2	4.7
1990	1.8	7.3
1991	2.0	-
1992	1.2	-
1993	-	20.0
<b>Total</b>	<b>28.2</b>	<b>450.8</b>

*Source:* State Game Management Areas of Russia and Kazakhstan

## A SURVEY OF MARKETS FOR SAIGA HORNS IN EAST AND SOUTHEAST ASIA

Simba Chan

### INTRODUCTION

The main purpose of the survey was to establish the availability of Saiga horn in the markets of several Asian countries. The survey aimed to provide data which would help determine the extent of the trade and, by extension, the effect this trade may have on the remaining wild populations in Kalmykia, Kazakhstan and Mongolia. In addition the survey collected data on the origin of horns in trade, prices, varieties of Saiga horn products and the presence of counterfeit horns.

### SURVEY METHODOLOGY

Fourteen cities were chosen for this survey: Hong Kong; Macau; Guangzhou, Harbin, Heihe, and Chengdu in China; Seoul in South Korea; Taipei and Kaohsiung in the territory of Taiwan; Tokyo and Osaka in Japan; and Penang, Ipoh and Kuala Lumpur in Malaysia. These cities were chosen because they were known or thought to have large traditional Chinese medicine markets or several important medicine shops. Heihe was chosen in particular as an important Chinese trading port with Russia.

Whenever possible a complete list of traditional Chinese medicine shops was prepared and a representative sample of shops was chosen with the help of a random numbers table. The shops in Hong Kong, South Korea, Japan and Malaysia were chosen in this way, with the lists derived from the most recent telephone directory listings. The shops were visited during August-September 1994 to determine if Saiga horn was available and, if so, the form in which it was available, the price and origin, how the horns were used and prepared, and whether counterfeit horns were in trade. When applicable, questions were asked about the volume of trade in Saiga horn. Assuming the random sample was representative, an estimate was made of the total amount of Saiga horn available in the city at the time of the survey. However, it should be recognized that lists derived from telephone directory listings may not be complete as some medicine shops may not be listed, are under different headings, or not listed at all.

Where it was not possible to obtain a list of the medicine shops in advance, visits were made to districts of the city where most traditional Chinese medicine shops were located and all shops encountered were examined. This latter method cannot be used to estimate city-wide availability or quantity. All shops or stalls in the open markets in Chinese cities were visited. The number of stalls and the number of horns seen were recorded.

Saiga horns can be identified by their shape, which is slightly bowed with a bent tip and by their colour, which is usually light yellow to creamy white at the tip. These characteristics immediately separate Saiga horn from most other horns found in China. The most distinguishable characteristic of Saiga horn is a long neural canal running through the horn. This canal is visible when examined against a strong light and is therefore called the *tongtianyuan* ("eyes that reach the sky") by traditional Chinese pharmacists. Its visibility is regarded as one of the best ways to tell true Saiga horn from counterfeit (Fang, 1994). A cross-section of the base of the horn also shows the horn layer embedded in a sawtooth-like pattern into the grooves of the central bone core (Wu and Qiu, 1993). Saiga horn is usually sold in one or more of the following forms:

- **Horns with the bone core.** These are unprocessed "raw" horns about 25-40cm in length and 150-200g in weight. The basal end is greyish-brown in colour and sometimes hair and skin can still be found at the base.

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- **Horns without the bone core.** These are usually half to two-thirds the length of unprocessed horns (about 15-20cm in length) and about 50g in weight.
- **Ribbons.** These are shavings cut longitudinally along the horn. These narrow (about 3mm) and white ribbons are called *lingyang-si* (antelope filaments) in the shops.
- **Slices.** These are cross-section slices of the horns, with or without the central bone core.
- **Irregular sections.** These are horns partly shaved for ribbons or partly cut for slices, but still of reasonable size (at least one-tenth of a horn) for identification.
- **Chips.** These are small, irregular-sized bits of horn.
- **Bone cores.** These may be sold separately from the horns, and are called *lingyang-gu* (antelope bone) in the market.

Counts were made of horns with or without the bone core, and of partially processed large pieces. No estimates were based on other horn products seen, apart from horn ribbons.

### SURVEY RESULTS

#### Hong Kong

Hong Kong has long been the major importer of Saiga horns, and it was the major exporter of Saiga horns to China until political changes occurred in the former USSR (Han 1993).

In August 1994, 131 shops were visited, accounting for approximately 6.6% of all traditional Chinese medicine shops in Hong Kong. The equivalent of approximately 2 012 Saiga horns were examined (see

Table 1). Most of the shops (67%) claimed their horns were imported from Russia (which in this context may be taken to include the Autonomous Republic of Kalmykia and the Republic of Kazakhstan), while most of the others (30%) claimed the horns came from China. The remaining shops (3%) either did not know the origin of their horns or claimed they were imported from countries other than the former USSR and China. If these results are extrapolated to the whole of Hong Kong, an estimated 30 720 horns could have been available in the traditional Chinese medicine shops in August 1994. However, because it is based on the number of



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Saiga horns in Traditional Chinese medicine shop, Hong Kong.

horns actually seen, this may be an underestimate of the real figure. While turnover rates are not known, sales must be considerable as each shop had an average of 15 horns in stock, and many shops mentioned that new stock would arrive within a week to a month later.

Saiga horns said to originate from Russia were generally less expensive than those supposedly from China and elsewhere, the average cost of horn with the bone core being US\$0.446/g (compared with US\$0.530/g for Chinese horn) and horn without the bone core being US\$0.764/g (compared with US\$0.855/g for Chinese horn). In contrast, Russian Saiga horn ribbons were more expensive (US\$0.821/g) than ribbons said to be from Chinese horn (US\$0.569/g). Nevertheless, the price of the horns is subject to large

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variations. This is owing to several shops selling horns at an "old" price. Nearly all shopkeepers interviewed claimed the price of Saiga horn had dropped dramatically to about 30% of the original price in the past two to five years. The shopkeepers believed the decline in price resulted from a much larger supply of horns being available with the loosening of export controls in the former USSR. The shopkeepers also claimed the decrease in price had increased the sale of Saiga horns, though they either could not or would not give an idea of how much horn had been sold in recent years. One shopkeeper at Causeway Bay mentioned that a Hong Kong firm had recently bought horns worth 5 million Hong Kong dollars (*circa* US\$645 000), which may represent anywhere between 4 000 and 25 000 horns or more, depending on type and quality.

In the surveys, only one non-Saiga horn (possibly from another Asian antelope species) was observed for sale as Saiga. In the 1950s and 1960s, there was a product imported from Southeast Asia called "southern antelope" that was regarded as inferior to Saiga (Liu 1963). It is uncertain whether these "southern antelope" horns were Southeast Asian in origin, or from another source of antelope-type horns such as India or Africa.

### Macau

On 12 August 1994, 46 shops were surveyed, representing nearly all the traditional Chinese medicine shops in Macau. A total of 757 Saiga horns were observed. Of these 37% were said to originate from China, 31% from the "USSR" and 16% from Africa. The source of the remaining 16% was unknown. The high percentage of so-called "African" Saiga horn was unusual. The shopkeepers said these were different from the Russian horns, though their appearance was near-identical.

### Guangzhou, China

In Guangzhou, 23 traditional medical shops and the Qingping Market were visited on 17 and 18 August 1994. Of the 113 horns seen in the shops, 32% were said to be from China and 20% from Russia; the rest were from unspecified sources. In addition, small 3.75g-packets of Saiga horn chips (*circa* 40 chips to a packet) were on sale in one of the shops for five yuan (about US\$0.55) each. However, it was not possible to confirm the authenticity of these chips.

In the Qingping Market, 1 911 Saiga horns were counted and most (68%) were said to be from Russia, 13% from Xinjiang, 1% from northeastern China, and the rest (18%) from unknown sources. Interestingly, most Saiga horns on sale at the Qingping Market still retained their bone cores. At least two big sacks of bone cores taken from Saiga horns were also seen on sale at the Qingping Market. The price was about five to 10 times cheaper than for the horns, but few people seemed interested. The separately offered bone cores may have been left over from horns processed into ribbons.

The Saiga horns offered for sale at the Qingping Market were the cheapest encountered in the survey (Table 1), which may be owing to that most, if not all, the stall owners are also wholesalers. One stall owner stated he could obtain 5 000 to 6 000 Saiga horns without difficulties in the space of a few days. The stall owner said he went to Heihe frequently and crossed the Amur river to Blagoveshchensk to buy the horn himself. This trader claimed to import tonnes of Saiga horns to Guangzhou every year (one tonne of horns is roughly equivalent to 5 000 horns).

### Heihe, China

Heihe is a new trade port in the northern Heilongjiang Province of China. It is an old town (formerly called Aihun) famous for its wildlife products, lying along the bank of the Amur River across from Blagoveshchensk, the second largest city of the Russian Far East. Heihe was opened up for cross-border trade between China and Russia, and each day hundreds of Russians cross into the city to buy goods to take back to Russia. It appears that most Russians come to buy rather than to sell as they carry little in the way of goods into China. Chinese hawkers easily cross the border as well, and buy Russian products in Blagoveshchensk.



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Heihe Market.

There are about 500 stalls and many more mobile hawkers along Heihe's Zhongyang Street, where the trading is conducted. Some stalls sell cloth, sports shoes and other Chinese products, while others sell Russian products, such as army watches, binoculars, silver plates and spoons -- and Saiga horns. These stalls attract many Chinese traders, some of whom are obviously from southern China (speaking southern dialects). About 15 stalls offered Saiga horns for sale. However, unlike hawkers at Guangzhou's Qingping Market, stall owners in Heihe displayed only several horns in each stall, replacing

them from hidden stock as needed. Approximately 100-130 horns were counted between 8 and 11 September 1994.

From discussions with the stall owners, it may be estimated that between 3 000-6 000 Saiga horns were likely to be present in the market or in nearby storage, and thousands more could be brought over from Blagoveshchensk when needed. According to the traders, business was so good that new horns were being received almost every day. The traders also claimed that many people from other Chinese provinces, especially from the south, come to buy Saiga horns. Several dozen to several hundred horns can be sold in one day; one wandering trader claimed to sell 100 Saiga horns in a day. The Saiga horn on sale in Heihe is entirely from Russian sources. The supply and sale is said to be more or less stable throughout the year, with more horn available in recent years with the loosening of trade restrictions with Russia.

Unlike other markets surveyed, the stall owners were selling Saiga horns by the piece and not by weight. One horn costs roughly between US\$6.60 and US\$13.00 depending on the size of the horn; all horns still had their bone cores. If a large horn weighs 200g and its price is US\$13, then the unit price by weight is approximately US\$0.065/g. However, prices in Heihe were not fixed and changed according to the quantity purchased.

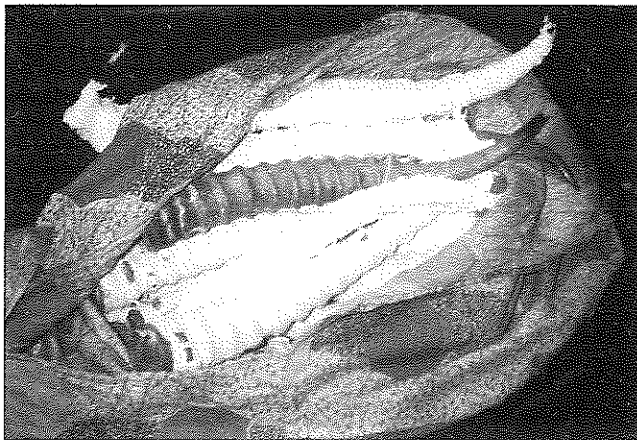
In Heihe itself, there are only a handful of traditional Chinese medicine shops, which mainly sell commercially packaged medicines. No Saiga horns were seen in these shops.

### Harbin, China

Harbin is the capital of Heilongjiang Province where in recent years there has been an increase in trade with Russia. The city is home to a Foreigners' Market, where Russian products are bought and sold. This market and five traditional Chinese medicine shops on Fendou Road were visited on 12 September 1994.



In the market there were between 100 and 200 stalls, but only three offered Saiga horn for sale and only one of these actually displayed a horn. However, discussions with these three stall owners revealed that



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Cotton-wrapped Saiga horn in Heihe Market, China.

the first stall had about 10 horns at a price of about US\$19.70 each; the second stall had about 12 horns at a price of about US\$16.50 each; and the third stall had only four horns at a price of US\$25 each, but the owner claimed about 50 more horns would soon be available. All three stall owners were nervous about showing the horns. According to one, the government had banned trade in this endangered species.

In the five traditional Chinese medicine shops along Fendou Road, no whole horns were available but slices, chips and ribbons were offered. The shopkeepers explained that government officers had

warned them not to sell parts from endangered animals again. Earlier in 1994, the authorities had clamped down on the sale of endangered animals in medicine, presumably the result of international pressure resulting from China's trade in rhinoceros, Tiger *Panthera tigris* and bear products.

### Chengdu, China

The *Hehuachi* (lotus pond) market in Chengdu City is the largest Chinese traditional medicine market in southwestern China. This market and five other shops were visited in Chengdu on 20 and 21 September 1994.

In the Hehuachi Market, there are more than 100 traditional Chinese medicine stalls, about half of which sell herbal medicines only. Thirty of the non-herbal stalls were observed selling Saiga horns, and approximately 650 horns were counted in the survey. Of these, about 180 were horns of young Saiga (<10cm long), and about 470 were horns from adult animals. Young Saiga horns were rarely encountered in other markets surveyed (the only other city where young horns were seen was Hong Kong). It is believed here that horns of young animals are "better" than ones from older animals. Stall owners claimed that 5 000 - 10 000 Saiga horns could be obtained in a few days. All the stall owners claimed their horns were from Russia. Chengdu is in western China, but surprisingly none of the horns were said to be from Xinjiang or Khazakhstan.

Horns of other antelope species were also present in the market. There were 160 Chiru horns, and 130 horns possibly from Tibetan Gazelles. These horns were very inexpensive, at about US\$1.10 per horn. Stall owners said these horns had no medicinal value, and that people bought them out of interest.

Five traditional Chinese medicine shops were visited in Chengdu, where about 127 horns, mostly from young animals, were counted. Two of the shops marked their horns as "imported" while two others claimed their horns were from the "USSR". There was also half a horn in one of the shops labelled "imported from Africa", which was more expensive than Saiga horn (US\$0.660/g).

### Seoul, South Korea

In Seoul, 31 shops were chosen at random from 115 traditional medicine shops and herbal clinics listed in the telephone directory. The total number of traditional medicine shops in Seoul must be much higher, as there are several hundred shops in Cheki-dong, Tongdaemun District alone.

Only four shops had "*yong-yang kak*" (antelope horn), and none of them had Saiga horn. Of these shops only two could give a price for Saiga horn, claiming they could get the horn when needed. One shopkeeper said he believed there were "enough" horns on the market and that demand was very low, and that in any case antelope horns are seldom used in traditional Korean medicine. This was confirmed by another shopkeeper who claimed that no Saiga horns had been imported to Korea in 1994, and that the demand for antelope horn was very low. A practitioner from the Korean Physicists Association noted the use of antelope horn in Korean medicine was very low, the Korean Government had banned the use of many animal medicines as a result of foreign pressure and that antelope horn was among one of the banned items. The practitioner claimed that ox horn is now used as a substitute where antelope horn is called for in medicine.

One trader said he knew Saiga horn is highly valued in Chinese medicine, but would not import any because it is too expensive; ordinary patients are unlikely to be willing to pay more for Saiga horn than the horn of other antelopes.

A Korean medical book (Ryuk 1981) lists six types of horns, (from Chiru, Goral, Mongolian Gazelle, Goitred Gazelle, Saiga Antelope and "*Gazella gutturosa*", which may be another name for Goitred Gazelle). All of these can be used as *yong-yang kak*. Since Korean medicine has developed separately from Chinese medicine for hundreds of years, the definition and application of "antelope horn" is probably closer to the original meaning, and does not necessarily imply Saiga (as it does in China).

The average shop price of antelope horn in the survey was US\$0.577/g (US\$0.24 - 0.91/g), while the wholesale price of antelope horn was about US\$77.42/kg (US\$0.077/g).

### Taipei, Taiwan

In Taipei, 76 shops were chosen at random from a total of 776. Taiwan has been notorious in the trade in wildlife parts for Chinese medicine, but recent actions by the government, in response to foreign pressure (including the imposition of certain economic sanctions by the USA) have led to a "cleaning up" of the trade. *Lingyang-jiao* was banned by the government in September 1994, together with parts from 13 animal species used in traditional Chinese medicine and listed in the Appendices of CITES (Anon. 1994). Species listed in the CITES Appendices before November 1994 did not include the Saiga Antelope.

Hsu (1983) listed *lingyang-jiao* as one of the 25 most commonly used animal medicines in Taiwan, and photographs taken before the ban show dozens of horns in shop displays. The use of *lingyang-jiao* may have been very high. Probably because of the ban, only five shops out of 76 admitted they had *lingyang-jiao* for sale, but it is believed that many more still have horns in their shop but are unwilling to sell or even show them to strangers. Most shop owners were nervous about a stranger's request for banned products.

However, only one of these five shops surely had genuine Saiga horn for sale, having 30 horns obtained from China, at a price of about US\$0.92/g. One other shop had what was claimed to be ground Saiga horn, selling at a price of about US\$3.44/g. One shop was unwilling to show Saiga horn and would not quote a price unless the customer actually intended to buy the horn.

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Two of the shops had horns imported from Africa, selling at a price of about US\$0.92 - 1.72/g. According to import records obtained from the Customs Office, many antelope horns have been imported from Africa in recent years. These African horns look rather similar to Saiga horn, and the waxy-yellow colour and surface cracks on the horn suggest these horns may have been chemically treated to improve the resemblance to Saiga horn. One professor from the China Medical College in Taichung said that purchasers were unaware that the African horns were probably not Saiga horns, because the general appearance of those horns was similar to the textbook descriptions of *lingyang-jiao*. Moreover, the professor added that as the horns seemed to be effective in practice, the pharmacists tended to believe the horns were genuine *lingyang-jiao*. He admitted that the African horns could have been treated chemically to make them look like *lingyang-jiao*, and added that the wholesale price of Saiga horns from Russia was about US\$0.14/g, twice that of the African horns.

The professor said it is very difficult to persuade traditional Chinese pharmacists to use alternatives in medicine, and that most pharmacists continue to sell African antelope horns simply because they do not know these horns are not the *lingyang-jiao* referred to in ancient China.

### **Kaohsiung, Taiwan**

In Kaohsiung, 25 randomly chosen shops were visited on 29 September 1994, and none had *lingyang-jiao*.

### **Osaka, Japan**

Out of approximately 200 traditional medicine shops in Osaka, 41 were chosen for the survey, and only 12 of these had *reiyo-kaku* (antelope horn). One other claimed to have a *reiyo-kaku* on display but it was clearly not Saiga and was probably the horn from an African or Indian antelope species.

All shops said the demand for antelope horn was very low in traditional medicine. Most shops had only one or two antelope horns on display. Traditional medicine shops in Japan now mainly sell packaged medicines and herbal medicines imported from China or manufactured in Japan.

Five of the 12 shops having antelope horns had sliced horns on sale (at prices ranging from US\$1.5/100 g), while the others were using the horns for display purposes only (and even the shop owners did not know the price). All shop owners said the *reiyo-kaku* were very seldom used, and some shops had been in possession of these horns for more than 20 years. Their owners were uncertain of the origin of the horns. Most of the horns shown in the shops looked different from genuine Saiga horn, as the central neural canal was not obvious and the overall colour looked dull. The surface of the bone cores seemed too smooth. As bone cores of true Saiga horns have many small and narrow grooves, a cross-section of the horn should not show a smooth border between the horn and the bone, as these horns appeared to have.

One pharmacist explained Japanese pharmacists studied a school of Chinese medicine that did not believe the use of Saiga horn important, so demand of horn was low. In addition, there are many herbal substitutes in Japanese medicine (though the Chinese do not consider herbs to be a complete substitute).

When asked about *reiyo-kaku*, several pharmacists looked through a colour guide to traditional medicines. The photograph in the guide for *reiyo-kaku* illustrates one saiga-like horn and a black *Procapra*-like horn. When asked whether they had used the black horn, all pharmacists interviewed did not know what it was. One shop had a short and heavily ringed horn on display, probably the horn of a Japanese Serow, called *kamosika*. However, none of the pharmacists interviewed were aware of the use of *kamosika* in medicine.

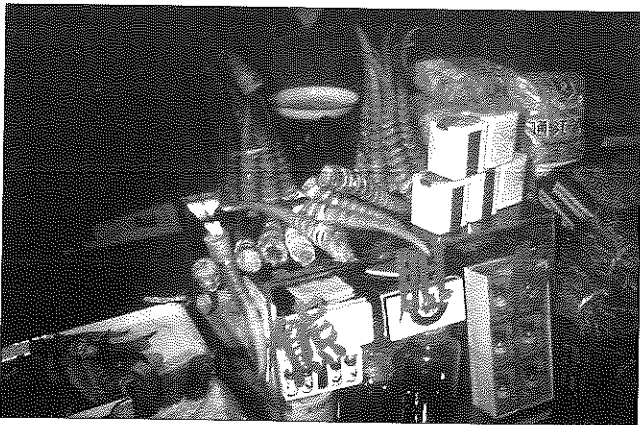
### Tokyo, Japan

There are about 270 traditional medicine shops in Tokyo, and of these 69 shops were chosen in a random sample. Nine shops had Saiga or saiga-like horns. One shop had one horn believed to be from a Serow labelled "reiyo-kaku" on display, but the owner did not know what it was. One shop had two *Procapra*-like black horns but the owner said they were not for sale and he did not know whether they could be used as medicine. Only six Saiga-like horns were seen in Tokyo shops in the survey. Three of these were not for sale. Three shops had sliced Saiga horn; one shop claimed it used more Saiga horn than others because the owner had studied Chinese medicine, but the staff were unable or unwilling to quantify the amount used. Only five shops were willing to sell their horns, at a price of about US\$4/10g. One shop was selling ground Saiga horn powder only.

### Penang, Malaysia

Twenty-three Chinese medicine shops were visited in Penang on 19 October 1994. Fourteen shops had Saiga products on sale and eight shops had Saiga horns on display. The number of horns seen was about 72, but this was probably not a true figure. Unlike in Hong Kong shops, Malaysian shops do not put all of their medicine on display and a customer has to ask for the availability of the product and even then only one specimen is usually shown at a time.

Six shops had only ribbons on sale. Some shops sold the Saiga ribbons in small sealed packets; owners said the sale of Saiga horn was "good".



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Saiga horns and bear bile powder, Chengdu.

Two counterfeit horns were seen in one shop. The big difference in the prices of Saiga horn ribbons (Table 1) also suggested some of these may be counterfeit. One shop quoted the price of "common" horns as about US\$1.03/g while "good" horns (Saiga horns) were about US\$3.10/g. The "common" horns looked like Saiga horns.

In Malaysia, the Saiga horns on display nearly all had their rings shaved off; the horns also looked as if their tips had been sharpened

### Ipoh, Malaysia

Eighteen Chinese medicine shops were visited in Ipoh, 12 of which had a total of 24 Saiga horns on sale. Some shops sold only ribbons.

### Kuala Lumpur, Malaysia

In Kuala Lumpur, 39 Chinese medicine shops were visited and 35 of these had Saiga products for sale; seven of these had Saiga horns on display. All horns seen in Malaysia were claimed to be imported from Russia.

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**Table 1**  
Some results from the TRAFFIC Saiga survey

Locality	Product	Quantity	Average Price (in US\$)
HONG KONG	horns with bone cores	377	0.510/g (0.138 - 1.996/g)
	horns without bone cores	1467	0.777/g (0.344 - 5.161/g)
	ribbons equivalent <sup>1</sup>	168	0.666/g (0.241 - 1.548/g)
MACAU	horns with bone cores	192	0.485/g (0.172 - 0.963/g)
	horns without bone cores	565	0.875/g (0.516 - 1.788/g)
GUANGZHOU	Shops		
	horns with bone core	46	0.437/g (0.189 - 1.004/g)
	horns without bone core	67	0.684/g (0.416 - 1.589/g)
	horn chips		-0.55/3.75 g
Qingping Market	horns with bone cores	1,671	0.096/g (0.058 - 0.289/g)
	horns without bone cores	240	0.192/g (0.138 - 0.230/g)
HARBIN	Foreigners' market		
	horns	@72	20.40/horn (@0.102/g (0.083 - 0.125/g))
Shops	chips	-@0.55/g	
CHENGDU	Hehuachi Market		
	horns (adult)	@470	0.148/g (0.06 - 0.87/g)
	horns (young)	@180	0.130/g (0.10 - 0.18/g)
Shops	horns (adult)	3	0.310/g
	horns (young)	@124	0.477/g (0.43 - 0.50/g)
TAIPEI	horns	30	0.92/g
PENANG	horns with bone cores	@72	0.364/g (0.15 - 0.83/g)
	ribbons	-	1.844/g (0.15 - 3.10/g)
IPOH	horns with bone cores	24	2.684/g (2.06 - 3.10/g)
	ribbons	-	@0.667/g (0.26 - 1.86/g)
KUALA LUMPUR	horns with bone cores	several	0.316/g (0.15 - 0.52/g)
	ribbon	-	1.015/g (0.83 - 1.341/g)

<sup>1</sup> The volume of ribbons equivalent to one horn was estimated to be one cubic decimetre. This is based on the volume of 0.5 tael (about 18.75g) packs seen in one of the shops, and where 10 such packs are roughly one cubic dm in volume.

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### SUMMARY

From the surveys it is evident that China (or Chinese communities in other countries) is the main consumer of Saiga horn. Saiga seemed to be especially popular with southern Chinese (people of, or originating from, the provinces of Fujian, Guangdong and Hainan; Chinese communities in Southeast Asian countries have mostly originated from these provinces).

Although traditional medicine in Korea and Japan has been greatly influenced by that of China, it seems that horns of antelope-type animals are very seldomly used in these two countries. When horns of antelope (*yongyang-kak* in Korea or *reiyo-kaku* in Japan) are indicated, there is some confusion as to which species should be used. It is likely that the use of Saiga horns has never been very popular in Korea and Japan, as none of the pharmacists interviewed knew the product well.

Although the actual number of Saiga horns in trade cannot be estimated, the conclusion can still be drawn that the consumption of Saiga horn is very high in the Chinese communities of Asia.

While most of the Saiga horn identified in the surveys was certainly of Kalmyk or Kazakh origin, there is the possibility that some Mongolian Saiga horn enters trade as well.

## CONCLUSIONS AND RECOMMENDATIONS

**Stephen V. Nash**

The Saiga Antelope presents an example of an emerging conservation challenge for this decade: how to conserve a species whose survival is being threatened by the demand for medicines.

In this "information age" we often know a lot about the problems, but are still at a loss for solutions. We know that, like the Tiger and rhinoceroses, the Saiga Antelope is a species whose unarguable value to millions of people is as a medicinal ingredient. We know the Saiga Antelope is being harvested unsustainably, driven by market demands beyond the control of any of the range States. We know the governments responsible for protecting the species are currently unable to provide the financial and human resources necessary to protect and manage the resource, and a consuming public mainly located far away from the species' range is largely unaware of the threat the species faces. We know the Mongolian subspecies is all but lost, with at best only a few scattered groups remaining. The once abundant nominate subspecies is declining in range and numbers, and perhaps only the Kazakhstan populations may have a chance of long-term survival.

We do not know if the demand for Saiga horn has changed over the last decades, but we do know the demand is strong. In contrast to the case with most other well-known species in the medicinal trade (and tens of thousands of lesser-known ones), we have well-documented historical rates of harvests and fluctuations in population numbers for the species covering the last 40 years. This knowledge, combined with fairly extensive information on the ecology of the species and the state of its habitats, indicates that the Saiga Antelope is in decline as a result of intensive hunting.

We also know the Saiga Antelope has an incredible potential for regeneration of its numbers under favourable conditions. Despite having been practically wiped out early in this century, the Saiga Antelope increased to a high of two million animals in the 1950s. Harvests in Kazakhstan of some 7.5 million animals were made between 1951 and 1990, and the current population there is estimated to be more than one million animals. In Kalmykia some 2.2 million Saiga Antelopes were harvested between 1951 and 1990, when by 1990 declining numbers prompted an official closure of the hunt (some 150 000 Saiga Antelopes remain there). These examples indicate that strict control of harvests and protection of the Saiga's habitat will be required to allow the Saiga Antelope to increase its numbers again. However, in the past 50 years largely irreversible changes have occurred to parts of the Saiga's steppe environment, and within the last five years the governments of Russia and Kazakhstan have all but lost ability to apply and enforce any management regime and harvest controls.

Although poaching in Kalmykia and Kazakhstan continues unabated, there are indications that the smuggling activities in these republics decreased during 1993-94, which may be a direct consequence of an oversupply of Saiga horn on the market and a drop in its cash value. This is illustrated by the recent decline of the price for Saiga horn in Russia from up to US\$600 per kg in 1991 (the sale of 40kg would earn enough money to buy a car) to between US\$30 and US\$45 per kilogramme in mid-1994. The profit margins for middlemen were very high during 1990-1992, with horns being bought directly from hunters at up to US\$50 per kilogramme and retailed at US\$300 to US\$600 per kilogramme, but have since greatly declined while the costs to hunt Saiga, procure horn and transport it abroad have all increased. Although selective poaching for horn still occurs, there are increasing reports in Kazakhstan of hunting parties shooting Saiga principally for collecting game meat. This could indicate that the international Saiga horn

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trade has become economically less attractive while the incentive for hunting Saiga is shifting to the local need for meat (Maksimuk, pers. comm., 1994).

The stabilization of the situation in Russia and Kazakhstan in 1994 was, according to all accounts, entirely the result of a saturation of the market and not to better monitoring or controls in the range states. Special Saiga protection teams in Kazakhstan and Kalmykia stopped operating in 1990 because of lack of support and the Russian State Department in charge of controlling Saiga harvesting is ill-equipped and underpaid. Customs officers at the borders are not motivated and are poorly equipped to deal with wildlife commodities in trade (Ilyashenko, pers. comm., 1994).

The Saiga Antelope is caught in a downward spiral of diminishing supply and strong demand. A plan for conservation of the Saiga Antelope must find some way of halting this downward spiral, and any hope of conserving it must lie in managing and maintaining a supply of horn while controlling or reducing the demand. The following are basic steps and considerations necessary to bring this about:

- First of all, effective protection and population management in Kalmykia and Kazakhstan must be re-established somehow. This will require securing, protecting and managing suitable habitats for all aspects of the Saiga's life history, conducting reliable population censuses, supporting management-oriented research, and providing strong financial and political support to anti-poaching teams and the courts dealing with poaching offenses.
- Under proper management, it would be possible to ensure exports of sufficient quantities of Saiga horn to meet at least the most urgent medicinal demand. Cutting off the supply altogether would alienate the potentially vast consuming public and as history shows, demand will be met by supply, either legally or illegally. However, a controlled supply might still result in raised prices, increasing incentives for poaching. Authorities in Kalmykia and Kazakhstan will have to ensure penalties for illegal hunting and trade are large enough to deter any significant levels of poaching.
- The Saiga Antelope is an ideal candidate for a successful sustainable management scheme: it can sustain high hunting mortality rates, produces a high-value product, and has a well-defined end market. It is notable in having been managed effectively for several decades in the recent past, and thus there is some existing utilization infrastructure, and there is considerable management expertise available (Milner-Gulland, 1994). In addition, the possibility of raising Saiga Antelopes on game ranches or farms needs to be explored. However, there has been little success so far in making the species adjust to captivity, and research is needed to assess the feasibility of different approaches to captive management (Anon., 1993) A possible focus of such research should be to assess the feasibility of integrating management of Saiga and livestock on the same land.
- However, the management and conservation activities for the populations of Kalmykia and Kazakhstan must not be implemented in isolation from the Saiga populations of Mongolia, which at present are the most threatened. Consideration might be given to the establishment of a regional agreement on Saiga management and conservation involving the two republics and Mongolia. The agreement signed by Andean states for the management of Vicuña *Vicugna vicugna* may serve as a useful model.
- CITES clearly provides the appropriate international framework for future exploitation of the species. Kazakhstan, which seems to hold the future of the species in its hand, is not a member of CITES and neither is Mongolia. Both should be encouraged and assisted to become parties to the Convention. In Russia, CITES implementation should be supported and reinforced considerably.



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- Workable substitutes for Saiga horn must be researched and identified, to lessen or displace the demand on the Saiga. Any such substitute(s) would need to be at least as available as Saiga horn and at lower cost, and present no threat whatsoever to wild animal or plant species. For instance, horn from the widely available domestic goat may be found to be a medically acceptable substitute, as some have suggested. The efficacy of domestic goat horn and its suitability as a substitute will need to be carefully researched and clinically tested, if it is to be put forward to the consuming public. Herbal mixes or synthesized compounds may also provide low-cost alternatives. However, comparable therapeutic effect is no guarantee for a solution to this conservation dilemma. It may be that the sales appeal of exotic wild horn, along with the cultural mystique of its high selling price (as well as earning high profit margins for traders and dispensaries), will prove a formidable barrier to any attempts at finding viable substitutes. The desire (and arguable need) of many Chinese to assume a wild animal's strong *qi* to regain or maintain health, and the cultural affinity with that which is rare and valuable are other obstacles to be overcome.
- Over the long term, public awareness activities aimed at dissuading Asian communities from using endangered species must be carefully developed, implemented and monitored worldwide. This will require a multi-disciplinary approach using messages that are both effective and sensitive to Asian culture. While the result of these long-term activities may be too late to impact on the demand for threatened species such as Saiga, the results will nevertheless benefit the thousands of other species listed in Asian pharmacopoeias that will otherwise follow a similar path towards decline.

Ensuring the conservation of the Saiga Antelope while coping with the health care needs of large numbers of Chinese consumers is a daunting task. There are no doubt lessons to be learned, from both good and bad experiences, from recent efforts to protect and conserve species such as Tigers and rhinoceroses. The conservation community must examine, understand and face up to the challenge of reconciling wildlife conservation objectives and the needs of the Asian medicinal trade. To enter philosophical debates about the merits of Western conservation and medical theory versus opposing Asian concepts will not solve the problems, and will only serve to isolate each side from the other. To search for practical solutions requires a recognition from both camps that the objectives and needs of each must somehow be respected, appreciated and met. In the case of a commercially valuable species such as the Saiga, considerations of profit and economic growth will have to be reconciled with competing land development demands, and supply of Saiga products to both domestic and export markets will have to be reconciled with the necessity to bring the resource under strict control. What is clear is that any solution will take time, and the most basic steps outlined above must be implemented soon if the Saiga Antelope is to have that time.

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### NOTES

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<sup>2</sup> Not all specialists concur with this opinion, it being also argued that a more male-biased harvest is the best way to optimise long-term yields and safeguard the population (E.J. Milner-Gulland, *in litt.*, 17 February 1995).

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