

## **What is “horseback riding for the disabled?”**

### Horseback riding activities for people experiencing physical and/or mental disabilities.

This activity was started in the United Kingdom 100 years ago, for helping the handicapped people to rehabilitate.

### The difficulties in familiarizing the horseback riding for the disabled people (in Japan)

There are not enough gentle ponies (130-140 cm height) suitable for the handicapped people to ride. Very few breeding of Connemara ponies (Country of origin: Ireland) are conducted in Japan, therefore, it is challenging to secure enough ponies for safe riding.



### Preserving Japanese native horses

In Japan, there are eight native horse breeds. National and the local government has been preserving the native horses, however, their numbers are decreasing. (1,800 of native Japanese horses, including 1,200 of Hokkaido native ponies)



## **The aim of this project**

### Critical needs

In Japan, there are 74,000 of horses but only about 3% of them (2,400 horses) are safe riding ponies and native horses. Moreover, the breeding management of gentle and suitable-sized riding ponies (130-140 cm in height) such as Connemara



ponies are not common. Therefore, it is very challenging to secure safe and

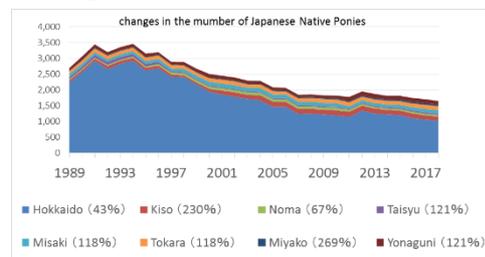
gentle riding ponies in Japan.

In Japan, there are eight Japanese native horse breeds designated as national/regional protected species. They have been supported by the conservation work, however, their numbers are decreasing from 3,400 (in 1994) to 1,817 in 10 years. To preserve the rare Japanese native horses, various communities have



been trying to increase their numbers, but unfortunately, nowadays, the numbers of Japanese native horses are decreasing.

To secure the safe-riding for the disabled rider, three supporters are needed to help the rider. For safe riding, suitable riding ponies such as Connemara ponies are valuable, but there are insufficient



numbers of gentle riding ponies for the handicapped people. On the contrary to the national manifest of improving welfare and biodiversity conservation, the drastic decrease in safe-riding ponies and Japanese native horses are becoming big issues in Japan.

Horses are seasonal breeding animals with gestation period of 11 months. They deliver one foal per foaling, so horses show low productivity compared with other farm animals such as cattle and pigs. To improve their reproductivity, the use of assisted reproduction technologies is the most applicable way. Artificial insemination and embryo transfer techniques will allow surrogate mares to foaling. Considering the three-week estrus cycle, more than one foal could be delivered per year, by conducting several times of embryo transfer. In thoroughbred racehorse breeding, the use of assisted reproduction technologies is prohibited, making the improvement of the assisted reproduction technology challenging.

Taking these backgrounds into consideration, veterinary schools knowledgeable about equine breeding management and reproduction technologies must take actions to conduct research in improving the

reproductivity of small-sized and native horses. This project aimed to establish the efficient breeding methods for developing suitable riding ponies for the disabled, and to preserve Japanese native horses by using assisted reproduction technology.

## **Our issue**

### Why introducing equine embryo transfer technology?

This technology is utilized in breeding the riding horses. After natural mating, the mare needs to retire or stop being as a competition horse to spend about two years being pregnant, giving birth, and lactating. The introduction of equine embryo transfer will allow us to collect the embryo(s) of the competition mare (donor) during several estrus cycles, enabling to produce several foals per year.



### Why conducting this project in Obihiro University of Agriculture and Veterinary Medicine?

Suitable location for equine reproduction.

- Equine breeding management has been routinely conducted, so we will have chance to achieve the goal successfully.
- We have been conducting riding activities for the disabled people.
- The success rate will rise in embryo transfer and the productivity improvement will be achieved by introducing to the common Japanese native horse breed, Hokkaido native ponies (Dosanko).



The use of equine embryo transfer is common in the West (or in Europe and the United States). What about in Japan?

The success in equine embryo transfer was first achieved by Japanese researchers in the world. However, the equine embryo transfer technology had not been done within past 20 years. The safe riding horses for beginners and handicapped people are in need, but unfortunately, the population of safe riding horses cannot meet the increasing demand.

## **Proposal**

By collecting the embryo from the riding mare (donor) for the disabled person, and transferring it to the other mare (recipient), we will develop embryo transfer breeding program to produce several foals per year. This project will contribute to our social welfare. Moreover, this project will be a great prospect for people to receive equine reproductive technology training.



The introduction of Hokkaido native ponies in this project will become a cutting edge of Japanese native horse preservation activity.

## **Research plan**

Since the breeding season of native horses are limited between June and August in most cases, it could be assumed that our research period will also have seasonal limitation. Therefore, to conduct our project, we will introduce the lightening program with blue light mask and hormonal therapy

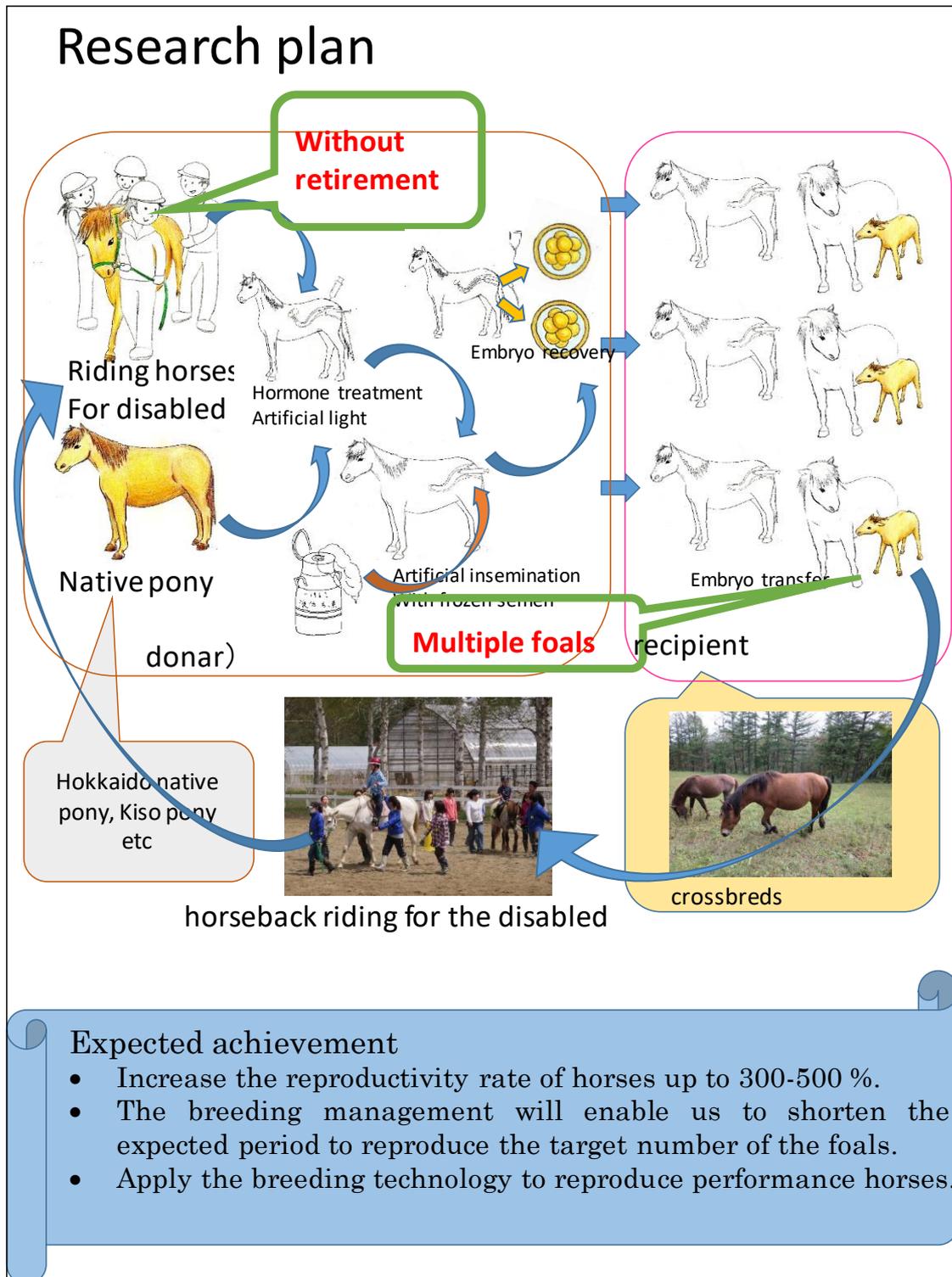


to achieve efficient reproduction system. The breeding control of the mares will be evaluated by measuring ovarian hormone.

## **Agendas of the project**

In the present study, we need to introduce young mares for efficient breeding. It is known that Connemara ponies are suitable for the

handicapped people to ride, but unfortunately, they are rarely raised in Japan. Hence, it is urgent to consider the importation of Connemara ponies. If the importation of the Connemara ponies are difficult, the present project will introduce Hokkaido native ponies as an alternative.



## **Objective of the present study**

### **1. Our objective and expected outcome**

Our final goal is to develop efficient reproduction system including embryo transfer of the riding horses for the handicapped people, and contribute to the riding horse breeding industry. By conducting embryo transfer (donor: safe riding horses and Japanese native horses) to the recipient mare, we will expect to breed more than two foals in one mare, per year. Our project will contribute to enrich the equine breeding management technology and social welfare.

### **2. Contribution to livestock breeding society and future outlook**

If the project was accomplished successfully, this study will induce transformative change in the breeding management of rare Japanese native horses. Moreover, if the present project is able to demonstrate the use of Hokkaido native ponies as recipient mares, Hokkaido native ponies will be expected to support the breeding and preservation of other Japanese native horse breeds. Furthermore, our project will force people to create novel equine breeding management system, leading to improve social welfare and environmental conservation.

## **Research summary**

### **Four foals were born by embryo transfer in Japan for the first time in 24 years**

In Japan, tame and gentle riding horses for the handicapped people are in short supply. Besides, several breeds of the Japanese native horses are in danger of extinction. It is aspired to establish the effective breeding method to reproduce valuable and in-demand horses.

In the present research project, we have focused on using equine embryo transfer technology which had not been common in Japanese equine reproduction industry. We have utilized the frozen semen of Connemara ponies and conducted artificial insemination to the mares of Hokkaido native ponies.

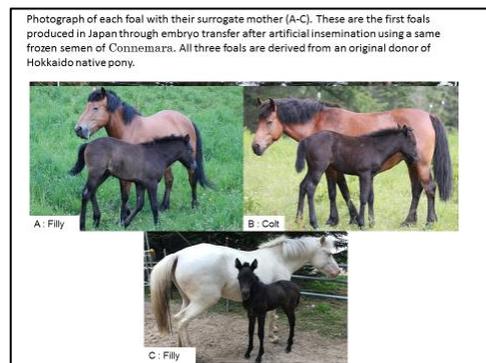


Furthermore, to increase the number of foals, we tried to breed Hokkaido native ponies by natural mating, and attempted to collect and lavage the fertile ovum from the uterus of mares, and transferred it to the recipient mare.

In 2018, to induce the early estrus of Hokkaido native mares (they usually are seasonal breeders), we applied the lightning program (blue light therapy) for them. As a result, the lightning program was also effective in Hokkaido native ponies as well as thoroughbreds.

Thereafter, between April and August of 2018, natural breeding (once), and artificial insemination (13 times) of the donor mares were performed in parallel with rectal palpation and estrus cycle examination. Six to eight days post natural breeding or artificial insemination, we have succeeded in recovering five fertilized eggs. Those fertilized eggs were transplanted to the estrus synchronized-recipient mares, and confirmed the pregnancy of four mares. Three out of the four fertilized eggs were produced from same parents. Their father (frozen semen) was Connemara pony and the mother (donor mare's ovum) was Hokkaido native pony mare. Which means that the three foals were all siblings.

As a consequence, in April 10<sup>th</sup>, 2019, the first foal reproduced by embryo transfer was born in Japan for the first time in 24 years. Shortly afterwards on 26<sup>th</sup> and 27<sup>th</sup> of April, two foals (siblings) were born. Subsequently on July 5<sup>th</sup>, 2019, another sibling was born. Three gentle and valuable foals were born successfully just in a year of 2019.



Our achievement of the present research projects is being published in academic conference and scientific papers. Through webpages, newspapers, and public lectures, they are also announced to the public.

The ovum-providing donor mares can leave their offsprings in parallel with providing safe horseback riding for the disabled people. As the fertilized eggs can be recovered several times, more than one valuable and brilliant foals could be reproduced in the same year. The present study established efficient and sustainable breeding strategy to provide riding horses for the handicapped people.

However, on the other hand, the current technology is not in widespread use. In addition, the needs of estrus synchronized-recipient mares and proper frozen-serum storage are also essential to gain success in our breeding methodology. To make this breeding technology more practical, there are some challenges we need to overcome.

In the future, our efficient equine breeding technique will contribute to reproduce safe riding horses and to preserve valuable native horse breeds.

## Publication

Successful embryo transfer from Hokkaido native pony after artificial insemination with frozen semen. Hannan MA, Haneda S, Itami Y, Wachi S, Saitoh T, Cheong SH, Nambo YJ. Vet. Med. Sci. 81(2) 241-244, 2019.

Birth of first foals through embryo transfer after artificial insemination using frozen semen in Japan.

Hannan MA, Haneda S, Murata K, Takeuchi S, Cheong SH, Nambo Y. J. Reprod. Dev. Jan26, 2020.

### Conference presentation

Nambo Y. Status and prospect of Horse breeding and reproductive treatment in Japan. Joint Polish-Japanese Seminar "Cutting edge of Reproductive Physiology-Key processes for birth of a new life, Warsaw, Poland, 2019.9

Hannan MA et al. Birth of first foals through embryo transfer from Hokkaido native pony after artificial insemination using frozen semen. Annual meeting of Society of Reproduction and Development, Sapporo, Japan, 2019.9