

PRODUCTION OF PRION GENE KO COW TO PREVENT SPONTANEOUS BSE AND THEIR CHARACTERISTICS

Noboru MANABE¹, Ichiro ONOYAMA², Yutaka SENDAI³, Yoshihito AOYAGI³, Kenn-Ichi RA⁴

¹Osaka International University, Osaka, Japan

²The University of Tokyo, Tokyo, Central Research Institute and Embryo Transfer Center of Zen-Noh, Tokyo, Japan

³Horai Food Co. Ltd., Osaka, Japan

E-mail: n-manabe@oiu.jp

Prion (Pr) protein plays a pivotal role in the infection of bovine spongiform encephalopathy (BSE). The aim of our research was to make Pr gene homo-knockout (KO) cows and to reveal their characteristics. Firstly, hetero Pr gene was knocked out in fibroblastic cells prepared from female Japanese black embryo. Somatic cell nucleus with Pr gene hetero KO was transferred into oocyte of female Japanese black. After activation and in vitro culture, somatic cell nucleus of blastocyst cell was transferred into oocyte to make Pr homo gene KO embryo. The Pr gene homo KO embryos were transferred in to the uterus of female Japanese black. Nine cows were born. Detailed data of Pr distribution in organs of wild-type and somatic cell nuclear cloning Japanese black cows were demonstrated as follows: Pr protein were shown in peripheral organs: 7 skeletal muscles, 5 areas of intestinal tracts and 5 areas of tongue (5- to 31- fold less Pr protein than the brain where high levels of that, 9.0-11.0 µg/g, were noted). Histochemistry showed that Pr protein was expressed in nerve cells not only in brain but also in the tongue, skeletal muscles and intestines, indicating that these organs may serve as potential sources of BSE infection. No positive reaction for Pr mRNA or for Pr protein was noted in Pr gene homo KO cows, indicating that the KO cows have no possibility of BSE infection. Molecular biochemical characteristics on protein expression, epigenesis etc. were also revealed in the KO cows. In conclusion, to produce the KO cattle is useful and the only way to make safe bovine derived foods, drugs and medical materials.