Animal Biotechnology

[A.1]

Biotechnological opportunities in veterinary interventions and challenges in their Global adoption: the research perspective

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During the last 40 years studies in the mouse, including the production of chimeras, development of pronuclear injection techniques and the establishment of embryonic stem (ES) cells have provided models for the study of development and differentiation, precise and routes for genetic modification of the nuclear genome. The use of ES cells combined with homologous recombination allowed precise genetic modifications of the mouse genome including gene knockouts, knockins and modification of specific sequences producing models to study function of individual genes and their role in disease. Over this period parallel studies in other species were less successful, pronuclear injection produced transgenic animals in a range of species, however, this technique is limited to gene addition. The isolation of ES cells in domestic species would provide a more precise route to genetic modification although the extended generation times of many species as compared to the mouse may limit its use. To date, attempts to isolate ES cells have only proved successful in humans and monkeys. The development of somatic cell nuclear transfer provided novel opportunities not only for animal production but also for precise genetic manipulation. Continued research on adult derived stem cells, epiblast stem cells and studies on reprogramming which lead to the production of induced pluripotent cells (iPS). All of these technologies provide routes to the modification of domestic species in a range of basic and applied research including; models for human disease and cell based therapeutic medicine, biopharmaceuticals, modification of animal traits, genetic intervention for disease prevention and cell based therapies for animal medicine. However, application of these technologies is slow, in part this may be due to cost, but, in addition to economic considerations social, ethical and religious factors need to be discussed and addressed. This paper will review the potential biological opportunities provided by these technologies in domestic species and discuss factors restricting their global acceptance.

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[A.2]

Cloning of anatolian grey cows

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Keywords: Nuclear transfer; Cloning; Bovine embryo

In the present study, cloning of native Anatolian Grey Cows living semi-wildly especially in Marmara Region was aimed. Cartilage, fibroblast and granulosa cells obtained from the ear tissue and ovarian follicles of an Anatolian Grey Cows as nuclear material source and oocytes isolated from slaughterhouse ovaries from Holstein cows as cytoplasm source were used. NT units were cultured in Sage® medium supplemented with BSA and FCS for 7 days. Development rate to blastocyst of embryos from granulosa cells (33.33%; 90/270) was significantly higher than the rate of embryos from cartilage cells and fibroblast cells (21.5%; 134/623, 19.48%; 30/154 respectively). Thirty two embryos from cartilage cells, 10 embryos from fibroblast cells and 15 embryos from granulosa cells were transferred into recipient cows (1–2 blastocysts/a recipient cow). Day 35 pregnancies were diagnosed in 10 cows from cartilage cells (43.48% 10/23), in two cows from fibroblast cells (33.33% 2/6) and in four cows from granulosa cell (36.36% 4/11). One healthy male calf from fibroblast and two female calves from granulosa cells were born healthy and normal weight. Genotyping by using 11 microsatellite DNA loci was shown that the calves had the same genotype with the donor cells. In addition, partial mtDNA PCR sequencing results had shown that the calves and the donor cells did not have the same mtDNA type. Furthermore, the heteroplasmy analysis based on SSCP and RFLP methods revealed no mtDNA heteroplasmy. Finally, telom er length analysis did not reveal significant results indicating short telomere lengths in the cloned calves. VEGF and IGF-1 stimulations were observed in epitelial region of clon and control plasentas and the leptin antibody was not found in clon and control groups as the pregnancies lasted more than 150 days by immunohistochemistry analyses.

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[A.3]

Correlations between Growth Traits and Heterozygosity, Allelic Distance (d2) at Microsatellite Loci in the Yellow Perch, Perca flavescens

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Keywords: Heterozygosity-fitness correlations (HFCs); Growth traits; Microsatellites; Yellow perch

The correlations between individual genetic heterozygosity observed at marker loci and fitness-related traits (HFCs) have been studied in a number of taxa. Although significantly positive HFCs have been observed in many organisms, they are not universal. Their strength and stability vary according to species, populations, ages and sexes. Yellow perch, Perca flavescens, is an important aquacultural and recreational fish species in the United States and Canada. Because of the high market demand and dramatic reductions in population sizes of yellow perch, this species holds tremendous potential for aquaculture in the USA. Advanced knowledge of HFCs and its relation to heterozygosity are important for species conservation and selective breeding (heterosis). The objective of this study was to determine the relationships between individual genetic heterozygosity and growth traits in cultured yellow perch.

1165 individuals were genotyped with eight microsatellite markers. Using regression analyses, correlations between genetic parameters (microsatellite heterozygosity and mean square allelic distance (d2)) and total length, body weight of yellow perch reared