

Advances in Bovine Embryo Transfer- Using DNA Analysis to Select the Sex and Genotypes of Calves.

Brian Shea,
Alta Embryo Group Ltd., Site 12, Box 105, RR 4, Calgary, AB, T2M 4L4.
Email address: shea@altagenetics.com

Specific genetic characteristics are desired for dairy calves. The most obvious trait is sex. For those interested in producing milk, heifer calves are valued. For companies interested in selling semen, bulls are important. One method for controlling the sex is to combine it with embryo transfer. Embryos are produced using superovulation or in vitro fertilization. These embryos are biopsied and the sex determined in as little as two hours. Our laboratory has been active in this area since 1992, sexing more than 6,000 embryos. With embryos resulting from superovulation, 47% were determined to be female.

As research continues with the bovine genome project, specific genes are being identified as potentially important in milk production. One that our group has explored is κ -casein. In conjunction with researchers at the University of Calgary, we have developed a technique for determining which alleles are present in embryonic tissue. Using the biopsy taken for sex determination and applying PCR and RFLP procedures allowed the separation of three alleles for this gene (A, B, and E). The frequency with which the alleles appeared in the embryos reflected the overall population from which they were derived. The importance of this project was to demonstrate that from one biopsy, more than a single determination (sex and κ -casein genotype) could be completed. In the future, as important DNA markers are identified, we will be able to determine which embryos are carrying the desired sequences.

Thus, the dairy producer can generate many embryos from planned breedings and can analyze the DNA in them to identify which ones have the desired genetic traits. The valuable embryos then can be transferred to suitable recipients immediately or be frozen for later use, including such possibilities as selling to domestic or foreign markets or being used in a cloning program.