



Left: Cattle in Doolin

## IDENTIGEN: OLD BONES, NEW TECHNOLOGY

**T**he link between extracting DNA from old cattle bones and developing a high-tech traceability system for the meat industry isn't entirely obvious. But IdentiGEN, a spinoff from the Smurfit Institute of Genetics at Trinity College Dublin, has parlayed its expertise in the former area into a distinctive niche as a guarantor of quality assurance to the meat industry. Its DNA TraceBack system uses genetic signatures, based on a panel of single nucleotide polymorphism (SNPs), to connect a given cut of meat back to the animal from which it originated. That enables retailers and processors to authenticate their marketing claims as well as product and quality attributes.

Although still a small enterprise with around 50 employees, IdentiGEN is profitable, and its ambition is large. Some of Ireland's biggest food retailers are using the TraceBack system, and the company is now extending its presence in Europe and the United States. It has established a North American subsidiary in Lawrence, KS, headed by Donald Marvin, a cofounder of Orchid Biosciences, a New Jersey-based DNA-testing services firm.

IdentiGEN's technology developed from academic research into the genetic distances among the world's main cattle breeds, which dates back almost two decades. "That was the beginning of genetic archaeology," says company chairperson and cofounder Patrick Cunningham, of Trinity College Dublin, who is also chief scientific adviser to the Irish government.

His group uncovered a startling result. Previously, the domestication of cattle was thought to have occurred only once.

However, the molecular clock his team devised – involving analyses of maternal mitochondrial DNA, microsatellite markers, and Y chromosomal markers passed on in the paternal line – indicated that two separate domestications of cattle occurred, in India and in the Middle East. The analysis suggested that Indian cattle separated from European and African populations around 500,000 years ago, whereas domestication started only around 10,000 years ago (*PNAS*, 91:2557–61, 1994; *PNAS*, 93:5131–5, 1996).

A similar analysis can be captured in the highly automated TraceBack system at a cost of around \$0.02 or \$0.03 per pound of meat. "It drives good practice, [but] that has a cost: It reduces flexibility," says Cunningham. The technology has already been used to uncover bad practice in the meat processing industry in Europe. The high-profile BBC current affairs program, "Panorama," employed IdentiGEN to demonstrate that Dutch chicken processors were bulking up their products with water and proteins from bovine and porcine origin. More recently, a BBC news investigation called on IdentiGEN's expertise to demonstrate that meat claimed as locally produced and then sold in restaurants in southwest England had actually originated in Brazil.

Those investigations reflect a growing awareness among consumers about the food choices they make every day. "That's a growing trend globally, and we certainly fit squarely within that," says Ronan Loftus, director of global commercial development at IdentiGEN. Loftus is now focused on the arcane mysteries of consumer marketing. "A keen understanding of the market is critical to our success." —C.S.