Cloning: after technical problem, ethical conundrum

PARIS (AFP) - Officials from 17 countries gathered here Monday to sign the first agreement to ban human cloning, less than a year after the ethical floodgates opened to an announcement that scientists had cloned a live sheep named Dolly.

On February 23 last year, British scientists from the Roslin Institute in Edinburgh said they had created an adult sheep from a single cell taken from the udder of a six-year old ewe.

Heated debates on the ethical implications of cloning human beings were swift to follow.

In the experiment to produce Dolly, the nucleus containing all her DNA genetic information was removed from the original donor cell and fused by an electric spark into an unfertilised egg from another ewe.

The nucleus including all the chromosomal material or DNA had been removed from the egg.

The cell made up of the egg membranes from the second ewe and the nucleus of the donor developed as an embryo, containing the identical genetic make-up of the donor.

The embryo was then put into the uterus of a third ewe who acted as the surrogate mother.She was given hormones to prevent her from rejecting the embryo.Six months later a lamb was born which is identical to the original donor.

The process of cloning creates a "photocopy" of the donor animal — the clone is genetically identical, and thus identical in every way to its "parent".

Although the scientific principle behind the process is essentially straightforward, the process within the laboratory is fraught with problems.

Dolly was created on the 276th attempt. In all previous attempts the embryo had failed to survive.

In a separate experiment, another sheep clone, Polly, was born on July 9, but this time the experimenters included a human gene in her genetic makeup.

She was created by the same team in Edinburgh in conjunction with their financial backers PPL Therapeutics.

To produce Polly, scientists combined two techniques: cloning from an embryo cell, and transgenics, or the grafting of a human gene onto an animal's DNA.

The human gene was added to the nucleus of a sheep cell taken from an adult sheep, which was then fused with a sheep embryo cell from which the nucleus had been removed. The resulting embryo was then transplanted into a ewe.

Human genes were added so that the developing cloned embryos would incorporate key human proteins and other substances which could produce desired pharmaceuticals in the animal's milk, beneficial for haemophiliacs and bone disease sufferers.

Polly was the first of five lambs to be born from such a process, and a blood test confirmed she was carrying the human gene, which is also expected to be found in at least two of her siblings.

"These lambs are the realisation of our vision to produce instant flocks or herds which express high concentrations of valuable therapeutic proteins very quickly, and represent the next step in the commercialisation of Roslin's pioneering nuclear transfer work," said PPL research director Alan Colman.

An American laboratory is expected to announce a more effective process in the near future involving the cloning of cells taken from the already cloned embryo.This method is expected to counterbalance the high per centage of failure due to the death of embryos. The successful cloning of Dolly and Polly has fuelled heated argument over the ethics behind cloning, particularly the cloning of human beings, which experts agree is scientifically possible.

In Britain, Dolly's Scottish creators Harry Griffin, assistant director of the Roslin Institute in Edinburgh, and colleague Ian Wilmut, while recognising the huge scope and benefits of animal cloning for medical progress condemn plans to clone human beings as "grossly unethical."