

# SCIENCE / HEALTH

## Japan views cloning as food for future

By Mari Yamaguchi  
ASSOCIATED PRESS

TSUKUBA, Japan — It is just after feeding time, and two calves are contentedly drinking water from a trough in their nondescript pen, a few stray pieces of hay stuck to their wet, brown noses.

The two 4-month-olds — ES1 and ES2 — are the prototypes of a brave new world of cloning that Japanese researchers, farmers and entrepreneurs are rapidly taking out of the laboratory and putting onto the dinner table.

Cloned potatoes, tomatoes and asparagus are already commonplace in Japanese grocery stores. Cloned orchids are sold by florists, and cloned goldfish are available at pet shops. Cloned flounder and salmon are in the works.

But with the domestic cattle industry being squeezed by cheaper imported beef, Japanese scientists and agricultural officials see the real goal of cloning to be the widespread genetic copying of mammals.

“Our primary interest is to revive

### Way for science to beef up industry

Japan’s cattle industry,” said Makoto Tabata, who is in charge of cloning research for the Ministry of Agriculture.

Cloning, it is hoped, will spawn a breed of supercattle and reliable source of high-quality beef that can be produced at lower cost.

Japan’s strides in cloning have generally been heralded in the media and welcomed by the public, with little of the angst and debate over ethics and safety that has been seen in the United States and elsewhere.

Mr. Tabata said Japan is probably the only country in the world where state-of-the-art cloning techniques are already being performed widely in rural breeding centers.

Robert Foote, professor of animal science at Cornell University, cautioned that the government’s claims of being ahead are sometimes more perceived than real. He said the overall level of research is similar in Japan and the United States.

But Mr. Foote agreed that one difference in Japan is the government’s involvement in allocating funds, compared with a stronger tendency for private financing in the United States.

Along with dozens of self-funded projects, more than 30 public and private livestock centers received a total of \$2.2 million from the ministry for cattle cloning research this year. A significant increase in government grants is expected next year.

Cloning techniques vary from simple plant cuttings — a method that has been used by farmers and gardeners for centuries — to the extremely delicate and still unreliable replication of adult mammals from their genetic material.

Even so, nearly 400 cows cloned from fertilized eggs have been brought to market as beef or breeders. Since early July, 15 calves have been born using the same technique used for Dolly, the Scottish sheep that made history as the world’s first

adult-animal clone. Nine have survived.

ES1 and ES2 are the products of a more primitive technique in which an embryo’s cell is inserted into an egg whose nucleus has been removed.

After the two are fused by an electric shock, the egg is put into the womb of a surrogate cow and carried to term.

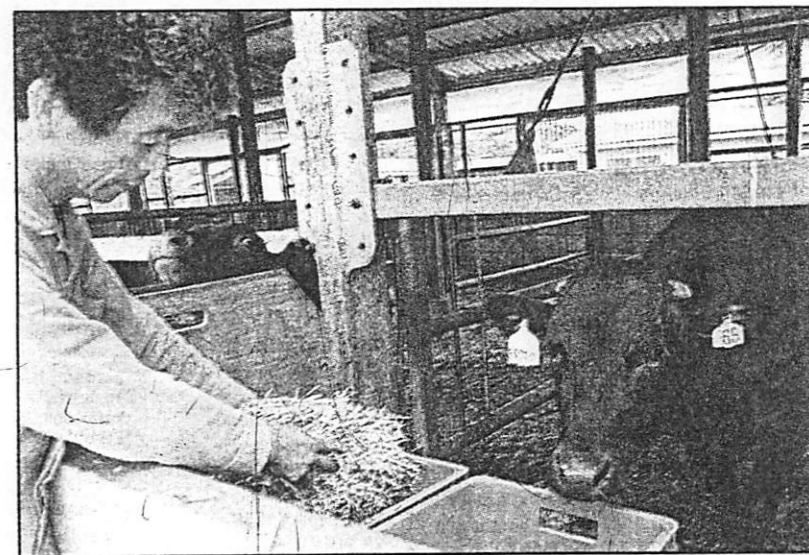
The ES stands for embryonic stem cell, the kind of cell from which the calves were cloned.

“What we are trying to do here is to help cattle farmers increase the number of superior cows,” said Yoshito Aoyagi, chief scientist at the government’s cloning research institute in Tsukuba, just north of Tokyo.

There are dissenters.

“Escalating research, fading ethics,” the Asahi, a major newspaper, said in a recent editorial. “Because the technology can be used to produce human clones, there is an urgent need for a social consensus for such an advanced reproductive technology.”

To cover all bases, the Science



Japanese cattle farmer Nro Kimora feeds cloned calf ES1 in September. Calf ES2 is in the next stall. The calves are now 4 months old.

and Technology Agency appointed a 16-member panel last January to ponder the ethics of cloning. Last year, the Education Ministry followed the United States’ lead by freezing funds on human cloning research.

But market forces continue to be the overriding concern.

“We have to find ways to reduce

costs to compete with foreign beef,” said Masanori Oka, an official in charge of promoting cattle production in the rural southern prefecture of Oita, one of Japan’s cattle-raising centers.

“If we can establish the technology, we can make a lot of clones and boost our supply of high-quality beef at a low cost,” he said.