

How Much Will Cloning Figure In Dairy's Future?

A Lot, Says Cloning Company Rep

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ATLANTIC CITY, N.J. — You may never really have to part with that favorite cow.

Technology today can keep her — all of her genetic traits anyway — around for a long time, theoretically forever.

Her future selves may have slightly different markings or differ in traits such as size a little, depending on influences other than genes. But their genetic makeup, and thus their innate ability to produce a lot of milk and calve easily, for example, will be identical to that of the original cow.

Cloning will likely have a strong influence on the future of the dairy industry, according to a marketing specialist with Cyagra, the Massachusetts company that has produced more than 50 cloned calves to date.

Since the 1998 birth of "George" and "Charlie," the first calves cloned from active cells, Cyagra has been at work improving cloning technology, with a goal of eventually producing cloned calves for a cost under \$5,000 to customers, said Ron Gillespie, Cyagra vice president of marketing. Dairy and beef breeders cloning a favorite animal today need to ante up \$19,000.

Gillespie outline this technology at a National Holstein Convention session Wednesday in Atlantic City, N.J.

"I personally believe (cloning) is going to have a huge impact on the dairy industry," he said.

According to Gillespie the chief challenges to cloning come from the public's perception of the process.

"Part of our problem with this technology is it's so new, so revolutionary, a lot of people don't understand it very well," he said. One of the most misunderstood aspects is the word "clone" itself, Gillespie said.

He defined a clone as an identical twin that has been made with the aid of humans. This process is called "nuclear transfer"

by scientists to refer to what actually happens: the genetic (nuclear) material of a desirable animal is swapped with the genetic material of another animal inside a single egg cell. The egg cell is then implanted into the uterus of a healthy cow and goes through a full gestation period.

The process begins with tissue taken from the donor animal's ear - a sample about one-tenth the size of a quarter dollar. This small patch of tissue contains the entire genetic code of the donor animal. After a period of incubation, the nuclei from these cells are literally injected one by one into salvaged egg cells from another cow's uterus. The genetics of the cow contributing the egg cells are of no importance in this process — the nuclei have been removed before the donor nuclei are inserted.

Robotically controlled microscopes that cost about \$150,000 each, Gillespie said, perform this nucleus transfer work.

If successful, the whole process from ear tissue sample to newborn clone calf takes about 10 months, Gillespie said.

A common problem with newborn clone calves is they tend to have enlarged navels that are subject to infection. Also, cows giving birth to clones generally need to undergo a Caesarian section to deliver the calf. These problems are likely related to the fact that the calf is genetically foreign to the recipient cow, Gillespie said.

Cyagra is working on those problems as well as on improving the efficiency of the process. That rate of successfully cloned calves has jumped from 2.5 percent in 2001 to 10 percent so far this year, and is expected to hit 20 percent in 2003, Gillespie said.

The cloning industry also faces regulatory hurdles, including food and animal safety concerns. USDA and FDA hearings scheduled to take place in Texas in September will address these issues.

If widely accepted, cloning will enable dairy producers to make

use of an unlimited supply of top genetics, pushing far beyond embryo transfer (ET) technology, according to Gillespie.

"ET helps you maximize returns," said Gillespie. "Now there (will be) no holding back."

Producers will be able to develop herds with traits such as uniformly high producing cows, cows resistant to mastitis, or cows better suited to a particular climate or to technology such as robotic milking, Gillespie said.

Through cloning, dairy farmers may also be able to market products other than milk from the genetically selected and cloned cows. These would include fibers, nutraceuticals, and human proteins found in the milk of the selected animals, according to Gillespie.

Other cloning outcomes could be the ability to produce bulls that make only male or female semen.

A counterpart to cloning is the ability to preserve genomes of selected animals. Also on the way is the ability to identify desirable or undesirable traits from studying the genome, according to Gillespie.

"At some point, you'll be able to look at the genome of your dairy animals and determine whether or not it's desirable," he said.

The "bottom line" of livestock cloning is to enhance food quality and ensure uniformity of product, Garrison said. In his view, that will mean greater profits for dairy producers.

So far, about 60 percent of the cattle successfully cloned by Cyagra have been dairy animals, with beef making up the other 40 percent. The company has also preserved the genomes of, and in many cases cloned, a wide variety of other animals, including pigs, dogs, cats, mice, horses, sheep, and a rare kind of ox.

The Cyagra method involves the cloning of active cells, unlike the way Dolly, the first successfully cloned sheep, was made. Dolly was developed out of resting or "quiescent" cells, Gillespie said.

Dedication, Open House Conducted At New MAEF Headquarters

WEST FRIENDSHIP, Md. — After 13 years of operating the Maryland Agricultural Education Foundation (MAEF) out of temporary offices, the foundation dedicated their new office center at Swan Harbor Farm on June 4 with more than 200 industry and political friends in attendance.

President Ewing McDowell, Rising Sun, chaired the ceremony that included welcoming remarks by Harford County Executive Jim Harkins, Maryland's Secretary of Agriculture Hagner Mister, founding board member Martha Clark and Ann Ferro, MVA Administration, along with several other important guests. Donations from the Philip Morris Company and from Forum for Rural Maryland were presented to the foundation.

The building has been named after Senator Bill Amoss who was a great friend of Maryland's agricultural industry. Led by his brother George, the Amoss family held a stirring tribute to Sena-

tor Amoss and presented a photo of the late Senator to the foundation for display in the Senator William H. Amoss Agricultural Center.

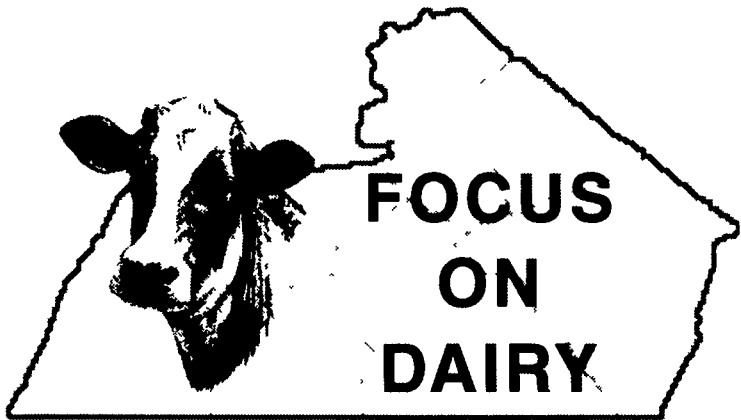
A delegation of state delegates and senators, led by Delegate Mary Dulaney James, presented a Maryland Citation to the Foundation recognizing them for their outstanding efforts in educating Maryland's school children about the importance of agriculture in their daily lives.

Marty Stephens was introduced as the new executive director of MAEF and is replacing Steve Connelly who led the organization for six years. A Pennsylvania native, Stephens worked for the Ohio Cooperative Extension Service as a 4-H agent, was executive secretary of the Maryland Agricultural Fair Board and, most recently, served as director of events for the Home Builders Association of Maryland.

Ann Ferro, MVA administra-

tor, announced that over 40,000 Maryland "Ag Tags" have been sold in the first 10 months of sale to Maryland drivers. Introduced in July 2001, a portion of the fee from each sale is being donated to the foundation for support of their educational efforts.

Founded in 1989, MAEF is a non-profit organization that promotes and enhances the understanding and appreciation of agriculture in the daily lives of Marylanders. Currents Foundation programs include Ag In The Classroom, mobile educational labs, Excellence in Teaching about Agriculture Awards, Mini-Grants for agricultural projects and support of the Maryland FFA organization. Support for the foundation comes from public and private grants, donations and the sale of Maryland's "Ag Tag." For information about the Maryland Agricultural Education Foundation, contact Marty Stephens, executive director at (410) 489-9030 (or 410-939-9030 after July 1).



Penn State Cooperative Extension Capitol Region Dairy Team

IMPROVING WATER AVAILABILITY IN TIESTALL BARN
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Dairy producers realize the importance of drinking water to good production and animal health. Dairy cows will drink 25 to 40 gallons of water a day, depending on their production level and moisture content of the ration. Intake will increase during hot weather.

Cows prefer to drink soon after eating and after being milked. Therefore, an adequate supply of water should be available after these events. The preferred drinking posture is to insert their muzzle into the water 1 to 2 inches, leaving their nostrils exposed. Cows can drink 3 to 5 gallons per minute, so adequate supply is necessary to prevent them from "slurping" or drawing in air.

In an effort to reduce water waste and keep the device clean, some watering units used in stall barns have made it difficult for the occupants to drink water. The stall structure (the tie rail, divider, tie chain, and cow trainer) should not restrict access to the watering unit. Often cows must insert their muzzle into the water at an awkward angle to activate the valve and drink, limiting intake. Many producers notice improved intake and reduced splashing after water bowls are moved and/or the stall structure modified to allow better access.

Studies indicate that water intake and milk production can increase by providing a water unit for each stall. This reduces the dominant/submissive behavior that can occur between neighboring cows. Access is also improved since the bowl is mounted toward the stall. One local producer noticed a milk production increase of 5 pounds/cow/day in the section of the barn where he installed individual water bowls for each stall. Was it the due to reduced dominance, better access, or improved water bowl design? Probably a combination, but it has convinced this dairyman to complete installation in the rest of the barn.

Assuming the supply (well) to the barn is adequate, the supply and branch lines in the barn must be sized and installed to deliver the water on demand, as needed. Bringing the supply line into the middle of the stall area and tying into the middle of each row of stalls, plus "looping" the branch lines at the ends can help.

Another feature that can limit



Dan F. McFarland

water intake is the valves. Pressure-reducing valves on the system may be required so the cows can operate the watering unit valves more easily. Of course, bent, broken, or missing paddles should be replaced. Automatic valves are also used to supply water to each unit, but producers have discovered they need regular maintenance to prevent malfunction and overflowing.

Both large and small bowls are available and used in stall barns. Large bowls (that hold up to 3 gallons) may provide better access and have water readily available, but can be difficult to clean and keep clean. Smaller bowls are easier to clean, but require a dependable supply to keep up with demand.

Some stall barn water systems use reservoir tanks (400 to 600 gallons) "ahead" of the watering units to supply plenty of water as needed. Another system uses a 6-inch to 8-inch PVC loop as a reservoir, securely mounted above the stalls.

Of course, keeping the water source clean at each stall is essential. Feedstuffs, bedding material, and other contaminants collect in the water unit deteriorate and reduce water quality. This material should be removed frequently and each bowl scrubbed weekly, or as required, so that good quality water is offered.

Troughs have been installed at tie rail height to improve water availability in stall barns with some success. However, since the water source is shared by several cows, it can become dirty quickly and must be cleaned regularly.

Take a "cow's eye view" of the watering units in your barn and see how cow access, water quality, and quantity can be improved. You will like the results.

If you would like more information on drinking water systems in stall barns, contact Dan McFarland at (717) 840-7408.

