



BRAVE NEW EQUINE WORLD



FOALS ON ICE

by Christy Egan

You can breed a mare to an infertile or deceased stallion via frozen semen. Everyone knows that. It's accepted in our business now, but just over 30 years ago it was commonly believed among horse people that freezing and shipping equine semen was not a viable procedure. But even back then, the great cattle breeding services had perfected the process for horses and were waiting for the equine public and their registries to catch up.

They have: Now, via the combination of frozen semen and frozen embryos, it's entirely possible for a mare to produce a foal with a stallion even though both of them have been dead for many years. On Jan. 1, 2007, the first big OK came from the AQHA as the Quarter Horse Industry officially accepted foal registration on animals born from frozen embryos.

Freezing embryos is not entirely new. The first reports of foals from frozen, and subsequently thawed, equine embryos were in 1984 by the Japanese. In 1985 foals were born at Colorado State University from frozen embryos as well. Equine Embryos Inc., in Ontario, Canada, has long been a leader in the field, providing the services primarily for Warmbloods internationally. Now, 20 years after the first foals were born using this procedure, the process has achieved a level of efficiency. Thus, anticipating the AQHA approval regarding registrations, Colorado State University in Fort Collins, Colo., was including the process in its world-famous equine short courses.

"We had an embryo transfer course at Colorado State University in September that included the process of freezing embryos," notes Ed Squires of the Animal and Reproductive Biotechnical Laboratory, CSU, Fort Collins. "I also gave a 'wet lab' at the Blue Grass Reproduction Symposium in Kentucky

in October. Now that the AQHA is accepting foal registrations for frozen embryos, I assume that 2007 will include additional courses at CSU and more travel and seminars around the country for me. In the cattle business, thousands of calves have been born via embryo transfer, and currently 60 percent of all cattle 'ETs' are frozen for the sake of convenience and economics. There have been no increases in abnormalities in cattle produced through this process, and I expect the results will be the same for horses."

The advantages to freezing equine embryos are numerous:

- Maintaining fewer expensive embryo transfer recipient mares.
- Holding indefinitely the genetic material from valuable mares.
- Impregnating recipient mares when they are ready or when the time of year is more suitable to producing foals earlier in the following season.
- Convenient exporting and importing embryos from the United States to and from foreign countries.

In 2003 a colt was born from a frozen embryo transfer in Florida, at the Peterson and Smith Reproduction Center in Summerfield. Appropriately named "Frosty," he was the product of an Arabian stallion and a Thoroughbred mare. Peterson and Smith had decided in 2002 to practice equine embryo freezing and thawing techniques on their own mares prior to offering the service publicly. "Frosty" was the result.

In 2006 another foal was born at Equine Cryogenic Services at Santolina Farm in Cave Creek, Ariz., from a 2004 embryo. Named Eyce KL, this colt is a purebred Arabian by National Champion Psytanium, out of a 21-year-old mare named Kaborrs Love (Kaborr x Alove-Note, by *Bask).



“Kaborrs Love has been absolutely barren for 17 years,” notes owner Jack Farmer. “Now she has produced her first ‘futuraity foal’ via frozen embryo transfer. We began our embryo freezing program in the fall of 2004, flushing and freezing several embryos for transfer. One embryo was thawed and successfully transferred in April 2005. The colt was born to recipient mare ‘Betsy’ on March 30, 2006.”

Eyce KL appears to be the first purebred Arabian born via the frozen embryo transfer process. Less than a month after the colt’s birth, Farmer wrote a letter to the Arabian Horse Registry requesting a removal of the three-day time limit for transfer of the embryo to the surrogate mare, to pave the way for Eyce KL’s registration. In October 2006, the Arabian Horse Registry accepted Eyce KL and registered him as purebred Arabian #626252, an exception to the existing rules.

Although most equine registries have no embryo transfer time limit on the books, both the AQHA and the Arabian Horse Registry do. The AQHA was removing its 24-hour time limit restriction Jan. 1, and the AHR should be rescinding its three-day transfer rule in the near future. Currently the AHR concerns are primarily with permits, registrations and ownership, as there have been few inquiries regarding registering this kind of foal. Questions exist about multiple ownerships that have never before arisen. What if a foal has numerous owners before it’s born and application is made for registration? The paperwork involved appears to be similar to that regarding frozen stallion semen, so it may be just a matter of time before the logistics are worked out. In 2003 the Arabian Horse Registry allowed unlimited annual registrations of foals from a single mare, opening the door for multiple embryo transfers and frozen embryo transfers as well. To date the most foals registered to a single mare in one year has been five.

“The number of embryo transfer foals being registered on an annual basis has been small,” says the Arabian Registry’s Debbie Fuentes. “We registered fewer than 40 per year in 2002 and 2003. The number has grown considerably since then but currently still only constitutes a very small number of annual purebred Arabian registrations.”

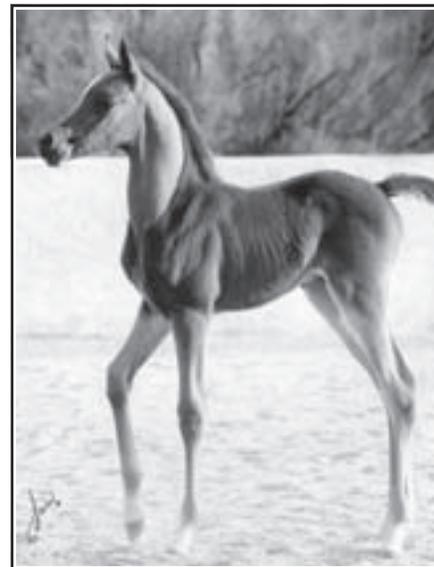
Meanwhile, Eyce KL has been growing up normally in Arizona, oblivious to his unusual birth and unique registration. In early December he was on his way to “school” at Palmira Arabians where he will be conditioned, spend some time in the horse pool and learn how to be a young Arabian halter horse with coaching from Rick Love.



EYCE KL (*Psyantium x Kaborrs Love*) and surrogate mare “Betsy” with Cammie, Sandy and Darryl Coker; Jack and Kim Farmer; Dr. Stacie Sickler and Kelly Varner.

“I’m also taking some lessons from Rick as I plan to show ‘Eyce’ in the Auction Futurity class at Scottsdale,” says Farmer. “I will be transferring two frozen embryos in 2007 for 2008. I now have a client in South Africa who owns several mares here in Arizona. He wants me to flush his mares here and ship the frozen embryos to South Africa where they will be inserted into recipient mares and born. It poses an interesting question. Where will these foals call home ... the land where they are conceived and their dam is located or the place where they are physically born?”

Santolina Farm and Farmer have always been a step ahead of the crowd. Farmer was collecting semen and breeding Saddlehorse stallions in the late 1970s and early 1980s. In 2003 he started buying cryogenic equipment and set up his Cryogenic Services business. Eyce KL currently has a full sibling in frozen embryo form, and Farmer believes that the use



EYCE KL



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of frozen embryos as a backup for exceptional horses will become more common in future years.

"If this process were available 20 or 30 years ago, we might have been able to freeze an embryonic full sibling to *Bask," Farmer says. "What would a full brother to *Bask, foaled 20 years after his death, be worth today? Right now the process might be expensive for some, but our economics change daily. In the last eight years I've gone from breeding just a few mares with frozen semen to breeding 50 percent with frozen semen. Convenience is paramount—no worries about holidays and weekends or that Fed Ex has a problem with your shipment. With the right equipment and knowledge, it's a simple process to freeze semen and store it, and I believe that soon the same will be true for freezing and storing equine embryos."

Vitrification is a process for freezing embryos and is currently available commercially in a kit form. Other processes include the slow-cooled method, which involves sophisticated equipment, and this is what Farmer uses. According to an article in the *Journal of Equine Veterinary Science*, February 2006, titled, *The Effects of Cooling and Vitrification of Embryos from Mares Treated with Equine Follicle-Stimulating Hormone on Pregnancy Rates after Nonsurgical Transfer*, "The overall pregnancy rates for vitrified (frozen) embryos was 70 percent. This is similar to rates obtained for non frozen embryos and slow-cooled frozen embryos. The viability of vitrified embryos from superovulated mares in this study was no different from that

of vitrified embryos from single-ovulating mares (16 of 26; 62 percent) in a previous study in our laboratory."

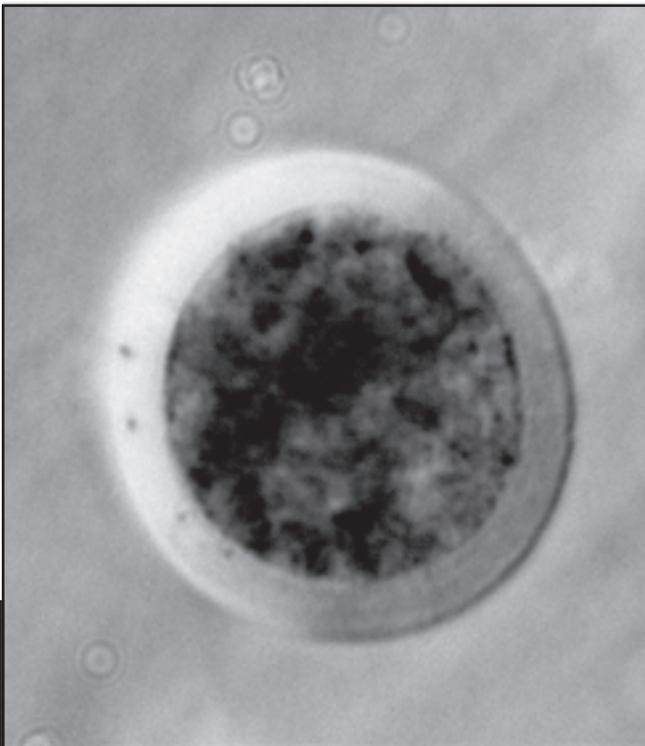
Problems involved with freezing embryos include the fact that the donor mare must be flushed earlier following conception—the size of the embryo must be quite a bit smaller to be frozen successfully. This makes the procedure less predictable. To complicate things further, most equine facilities have far less experience with frozen embryos than with cooled. But as freezing embryos becomes more commonplace, more statistics will become available regarding success rates for various procedures.

Khris Crowe, veterinarian at the Babcock Ranch of Gainesville, Texas, handles more than 400 Quarter Horse broodmares each year. Babcock Ranch stands 11 stallions, including the world famous Smart Chic Olena. Crowe successfully transferred 200 embryos in 2006 and plans to make frozen embryos an integral part of her program now that the AQHA is accepting them for registration.

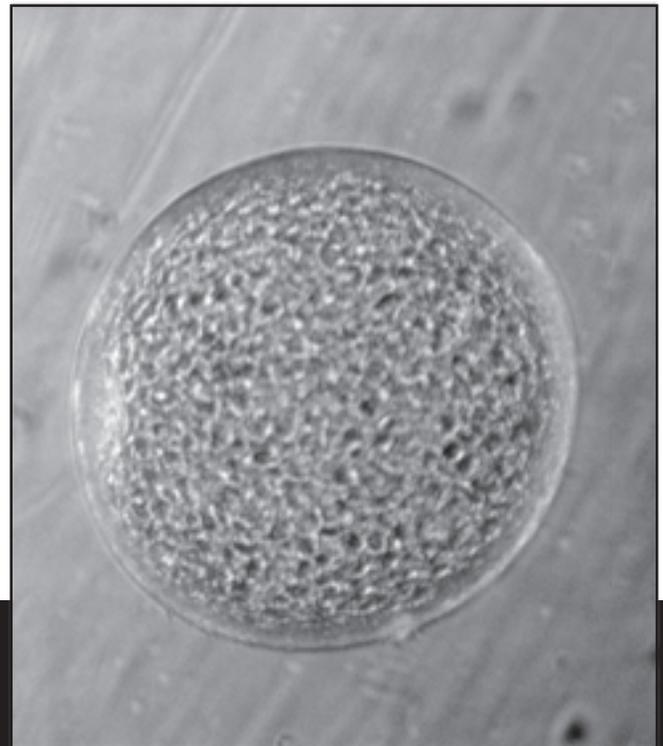
"We plan on doing it throughout 2007," Crowe says. "We expect a 50-60 percent success rate at the beginning. That's hard for me, as my current rate of success with embryo retrieval is 87-92 percent with an 80 percent pregnancy rate at 45 days. The earlier flushing time, the smaller embryos and the use of frozen semen all contribute to the headaches of freezing embryos."

Squires says that in the cattle industry it's now almost as cheap to transfer an embryo as it is to transfer semen. At Colorado State University the difference in cost between

Embryo Early on Day 7



Embryo on Day 8





equine transfer and frozen equine transfer is minimal, involving only an additional \$250 freezing charge. Squires sees no downside to breeding with frozen embryos. The fact that donor and recipient mares would not have to be synchronized is of great value in the breeding process, and freezing embryos opens the doorway to international import and export of rare and unique bloodlines.

It is now entirely possible to freeze an embryo and hold it indefinitely—60 days, 60 years, 600 years. Does this mean that someday we will have foals born 100 years after initial conception? Do we want horses six or 10 or 20 generations later? Thus far this theory hasn't proven out. Few bulls or stallions that have died continue to maintain demand for their frozen semen. Trends change; views change. Our opinion of what constitutes exceptional conformation and performance has altered dramatically over the last 30 years in all breeds of animals. Even so, there are always exceptions.

On the plus side, embryo transfer allows breeders access to a wider genetic pool. Frozen embryos provide owners with an international embryo market for their best mares. They make it possible to breed for foals at the optimum time of the year. They make possible top foals from mares that cannot carry foals to term. In the case of rare, unique or endangered bloodlines, it could make an important breeding possible halfway around the world. Pluses or minuses notwithstanding, frozen equine embryos are about to become an everyday part of the horse business. Our Brave New World has arrived. 

ANNUAL REGISTRATIONS FOR EMBRYO TRANSFER FOALS

These numbers will likely increase when registrations are allowed for foals born from frozen embryos. Currently the embryo must be transferred to the surrogate three days after removal.

1997 - 10

1998 - 19

1999 - 22

2000 - 30

2001 - 35

2002 - 39

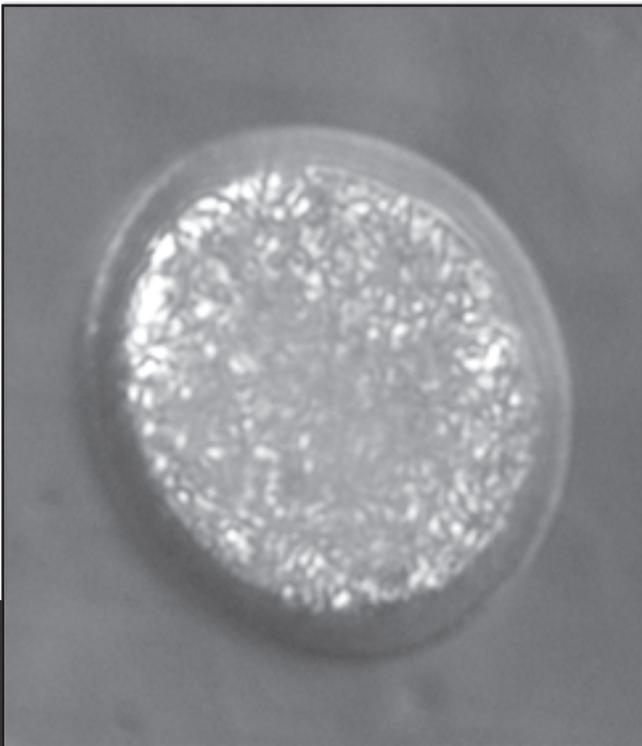
2003 - 38

2004 - 80

2005 - 111

Data provided by the Arabian Horse Association

Embryo Before Being Frozen



Embryo at 100% Rehydration, Just Before Implantation

