



Is Embryo Transfer for You?



SUSAN SEXTON PHOTO

AND BABY MAKES FOUR? *In this instance the answer is yes. ES Winterprinz (top left) was bred to EM Larisa (top center) who produced an embryo which was transferred to a recipient mare, in this case, a large Clydesdale. The result is the chestnut foal Whittier (Winterprinz-EM Larisa/Lanthan), owned and bred by Jo Anne Balling, Va., who was named the Top Colt at the 2003 Hilton Farm Inspection. The presentation of this colt elicited a big laugh from all as his surrogate mother is definitely "old style, heavy type." The real mother, EM Larisa, is a competition horse for Jo Anne's daughter so she has a dual career at this time.*

[BY **BARB CRABBE, DVM**]

Find out how this high-tech breeding option works, what it costs, whether you should consider it for your mare – and if so, how to up your odds of success.

YOUR MARE PERFORMS HER FIRST Grand Prix dressage test – the same day her foal is born. Or perhaps you gaze across your pasture at two foals that your nationally ranked hunter mare produced this year – several months apart. Sound impossible? Not with Embryo Transfer (ET), a high-tech breeding technique that involves implanting an embryo from your mare into the womb of a recipient (surrogate) mare, leaving your mare free to compete or be bred again.

Embryo transfer is a procedure in which a mare is bred and conceives an embryo, which is then removed from her uterus and transferred to a surrogate mare that carries it to term.

The American Hanoverian Society rules allow registration of ET foals, making this a viable option for you. But is ET right for your mare? In the following Q&A, questions about the procedure heard frequently from clients are answered. These include what happens during the procedure, how much it costs and when to consider it for your mare. If you choose to go the ET route, tips are provided for maximizing success.

Exactly what is Embryo Transfer?

Embryo transfer is a procedure in which a mare is bred and conceives an embryo, which is then removed from her uterus and transferred to a surrogate mare that carries it to term. The following steps are involved in ET:

Step 1: Fertilization

Your mare is bred by whatever technique you choose, including live cover (mare and stallion meet and breed); artificial insemination with fresh semen (used when the stallion is on site, but owners prefer to avoid risk of breeding-related injuries); artificial insemination with cooled, transported semen (used when a stallion lives off-site, so semen must be shipped); or artificial insemination with frozen semen

(used if a stallion is very far away – such as in a different country, or if he’s actively competing and not available for semen collection.

During the breeding process, your veterinarian will regularly monitor your mare (known in ET circles as the “donor mare”) with ultrasound examinations, in which an ultrasound probe is inserted into her rectum, allowing your vet to transmit images of her uterus and ovaries to a

screen. This allows him or her to determine the precise time of ovulation (discharge of a mature egg ready for fertilization), which is critical for timing insemination. Such exams also are used for precisely tracking the timing of embryo recovery. He may also treat the mare with hormones (such as prostaglandin, human chorionic gonadotrophin (HCG) or gonadotropin releasing hormone), to help stimulate a heat cycle or encourage ovulation at the appropriate time. At the same time the recipient mare is also monitored during her heat cycle to determine when she has ovulated – it is critical that donor and recipient cycles are perfectly synchronized. (More about recipient mares in a minute.)

Step 2: Embryo Recovery

Between six and eight days following ovulation, your vet will perform an embryo flushing procedure on your mare. He or she will insert a tube into your mare’s uterus, through which fluids are infused, then removed. The recovered fluid is then filtered through a specially designed cup. The cup is then searched for a tiny embryo, using a special microscope. (If an embryo isn’t recovered during the flush, you’ll repeat the breeding process).

Step 3: Embryo Implant

If and when an embryo is recovered, your vet will place it into the recipient mare’s uterus. If the recipient mare lives off-site, the embryo will be chilled and transported, then implanted. After that you wait to see whether the recipient mare settles (becomes pregnant).

Step 4: Pregnancy Check

Approximately five days following implantation, your vet – or the one attending the recipient mare – will perform an ultrasound exam on the recipient mare for pregnancy. He or she will then check the mare at regular intervals until the pregnancy is well confirmed at 30 days. If the pregnancy ultrasound comes up negative at any point, your mare must be rebred, and the whole procedure must begin again.

When Should I Consider the ET Option?

There are a number of reasons to consider ET, including:

- **Your mare is a top-level competitor with bloodlines to die for.** You want a foal from her without seriously interrupting her competitive career.
- **Your mare is a proven producer.** You’d like to get multiple foals from her each year.
- **Your mare still ovulates normally, but she’s physically unable to carry a foal to term.** This can be due to uterine problems or other non-breeding health issues, such as severe unsoundness that would make pregnancy and foaling physically difficult or impossible.

Regardless of which of the above reasons (or others) you choose, consider this rule of thumb: Your mare should have the potential to produce a foal that will hit the ground with a value equal to or greater than ▶

the cost of ET (about \$6,000 to \$7,000 minimum, not including stud fee – see page 23 for details). Of course, if you are breeding for sentimental reasons, the foal's potential value may be less of a factor.

What's the risk to my mare?

Minimal – in fact, much less than if she were to carry a foal to term. The multiple ultrasound examinations can carry a slight risk or trauma or tears to her rectum. Breeding/flushing procedures and hormone treatments can also carry a minimal risk. However, once you have harvested an embryo, the mare is relieved of the stress and risk of pregnancy and foaling. That is the recipient mare's job.

Where does the ET typically take place?

You can choose to harvest an embryo at a veterinary facility near your barn if you have a local veterinarian skilled in the procedure, or you may have to transport your mare to a reproductive specialist. The embryo can then be transplanted into an on-site recipient mare, or transported to a facility that specializes in ET for transplantation into a recipient mare there. Finally, you can send your donor mare to such a facility for the entire procedure, from breeding (via A/I) to ET. This will raise the procedure's initial cost, as you'll have to factor in shipping and board, but it may up your odds for success. A top ET facility will have the experienced staff (vets at large ET facilities perform as many as 750 transfers every year), equipment, and recipient mares to ensure the ET timing is as close to ideal as possible. That means you can save money in the long run, as it may take less time to successfully harvest and implant an embryo than if you try to do it locally.

What criteria should I use to select a recipient mare?

Selection of a recipient will depend on where you will be conducting the ET. If you ship your mare or the embryo to an



REG CORNUM PHOTO

OWNERS OF PROVEN PRODUCERS MAY USE EMBRYO TRANSFER TO GET MULTIPLE FOALS FROM THESE VALUABLE MARES EACH YEAR – Rubizza (Rubinstein I -Sendermaerchen/Sendbote), an AHS Champion non-Hanoverian inspection mare, has produced several outstanding Hanoverian foals including daughter EMC Wintermaske by Weltbekannt (see the MAHB Mare Show report on page 10). Owner Mary Lou Winn, Fla., is planning to breed Rubizza by ET as well as conventionally in 2004 to increase her number of potential foals. EMC Wintermaske, now owned by Patti Thompson, Pa., will continue to contribute to Mary Lou's breeding program through ET, even as she maintains her performance career with a new owner, an option not possible just a few short years ago.

TESTING, TESTING, TESTING

The AHS requires proof that Foal X really came from Mare Y and Sire Z. Labs use DNA testing on samples from the stallion, mare and foal.

- **The Technique** – DNA testing compares specific sequences of the actual genetic material obtained from your horse's hair.
- **Test Samples** – For DNA testing, you'll obtain a hair sample (including roots) from your horse, and mail it to a lab yourself. [Note: DNA testing is included in the comprehensive AHS foal registration fee. The central office will send an all-inclusive kit, including instructions, when your completed registration form and payment are received.]

ET facility, experts there will select a recipient mare from their herd (some facilities have as many as 800 recipients). Such mares have been screened for breeding soundness. Normally you are asked to buy the recipient mare that will carry and deliver the foal, then nurse it until weaning. (For more information on recipient mare costs, see "How much will it cost?").

Once you have weaned the foal you can keep the mare for future embryo transplantations, or sell her. The ET facility you choose may also have a system that allows you to return the mare to their herd.

If you plan to use a recipient from your own band of mares, choose a young (ideally under ten years of age), healthy mare that's been checked by your veterinarian for reproductive soundness. A mare with

a history of settling with minimal breeding attempts of two or less – and producing healthy foals with minimal delivery problems – would be ideal. [Note: having two or more mares with healthy reproductive tracts as potential recipients will increase your odds that the mare to be implanted ovulates at the same time as your mare.]

How much will it cost?

Overall cost will depend on how many attempts it takes to successfully harvest and implant an embryo. If all goes well and you have a successful transfer following your first breeding attempt, expect to spend \$5,000 to \$6,000 – above and beyond the stud fee – for a pregnancy.

Caveat: It's natural to expect you'll be one of the lucky ones. However my advice would be to budget for the worst-case ▶

scenario. For example, say it will take three heat cycles before your mare conceives, and, although you're able to recover an embryo on your third try, it doesn't survive at implantation. You try again, and this time you get an embryo right away that survives implantation, but the recipient mare fails to hold the pregnancy. Two more heat cycles later; you decide to give it up. How much did it cost? Approximately \$8,000 – again, not including your stud fee – with nothing to show for it. It can happen.

Here's a ballpark cost breakdown:

- **Insemination Fees:** \$250 to \$500 per cycle (attempt). Expect to pay more if frozen semen is used because it requires more intensive management than fresh transported semen; freezing reduces longevity once the semen is in your mare, meaning timing between insemination and ovulation is more critical. If you do live cover or an on-site insemination with fresh semen, fees will be less. If you send your mare or the embryo to an ET facility, you'll usually have to sign a contract at the beginning of breeding season, with a deposit of approximately \$1,000, which will cover as many as four attempted implantations. You can lose the deposit if you decide to give up after a single attempt.
- **Embryo-flush fee:** \$250 to \$400
- **Embryo transport:** \$75 to \$100, plus \$50 to \$100 for the special fluids the embryo requires. (Your vet may offer a package deal that combines breeding and flushing procedures into a single fee.)
- **Recipient mare:** Large ET facilities generally charge a set fee of approximately \$2,500 to \$3,500 which purchases a recipient mare. This generally allows you several implantation attempts, meaning if you ship an embryo that doesn't take, there's no additional charge to attempt implantation of as many as two or three more. Expect an additional nonrefundable deposit of \$1,000 to \$1,500 to enroll in the program.
- **Implantation:** Your vet may be willing to attempt a single "at home" implantation for \$300 to \$500. If you ship your mare or the embryo to an ET facility, see "Recipient mare," above.

- **Recipient-mare shipping fee:** If you opt to buy a recipient mare from an ET facility, then bring her home to your own barn for her pregnancy and foaling, you'll have to pay the shipping costs. How much you'll pay will vary with the distance shipped and other factors (such as the size of the shipping stall), but could be as much as \$1500 or more for a cross-country trip.

📌 What are the odds for success?

Success rates vary – and depend on a number of variables. In fact, there's a success-percentage factor at each step along the way. Here are some averages to help you calculate your chances:

- **Conception rates:** These vary depending on your donor mare's fertility as well as that of the stallion, and whether you use fresh or frozen semen. Overall conception rates with fresh, transported semen can be as high as 80 to 90 percent. With frozen semen, the range is 40 to 60 percent.
- **Embryo-recovery rates:** Approximately 50 percent. Again, this will vary with conception rates and will be lower with subfertile mares or stallions, or when frozen semen is used.
- **Implantation success rates:** As high as 80 percent for experienced practitioners with a large herd of recipient mares from which to choose.

📌 How can I up my odds for success?

Carefully choose the stallion and your ET breeding specialist. Here's how:

Choose a stallion with good pregnancy rates.

Ask the stallion's breeding manager the following:

- **What was the stallion's first cycle (first-try) conception rate?** This will tell you more about the stallion's fertility than how many mares he impregnated for the year. For example, if the overall pregnancy rate for the year was 80 percent, but first-cycle conception rates were only 10 percent, it means you're likely to be faced with multiple breeding attempts. However, if the first-cycle

conception rate was 80 percent, your odds will improve.

- **How many mares did the stallion breed last year?** Look for one that bred enough mares to ensure he was successfully achieving pregnancies. I'd suggest a minimum of ten breedings for a reasonable estimate of fertility. A 100 percent conception rate doesn't mean much if he only bred one mare, while an 80 percent first-cycle conception rate is quite impressive if he bred 80 mares.

Choose a vet experienced with reproduction and ET.

Make sure he or she performs a minimum of ten artificial inseminations per year, and has performed successful embryo transfers in the past. If your vet doesn't fit the bill, ask him or her to recommend one who does, or to suggest a well-established embryo-transfer facility.

📌 Will ET become easier and less expensive as time goes by? Is it the wave of the future?

Easier? Probably. Less expensive? Probably not. Like any high-tech medical procedure, ET will get easier as more vets gain proficiency and more successful techniques are developed. However, as you can see, the procedure takes a lot of work that requires expensive equipment and a huge time commitment, which translates into high cost. And, no matter how streamlined ET becomes, the fact remains that horse embryos are very delicate and sensitive, a factor that will continue to affect success.

As for whether ET is the wave of the future, I think it will become more popular as techniques evolve and breed organizations loosen registration requirements, but the practice of live cover or A/I in good, producing broodmares will not likely be displaced by ET anytime soon. ■

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