Making embryo transfer work

Dairy farmers are using embryo transfer to improve their genetics, whether for show or for commercial use

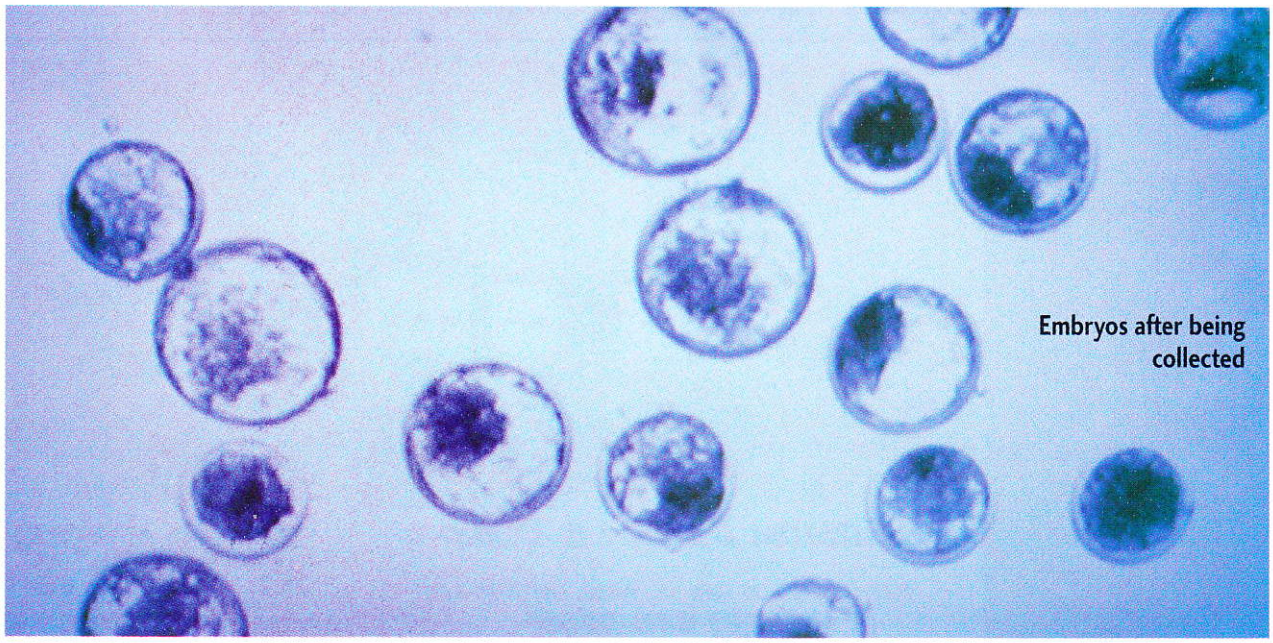
HISTORICALLY, THE MODEL FOR genetic improvement, through embryo transfer, has been to select the top 10 per cent of genetically superior cows as embryo donors and the lower 50 per cent as recipients. This still holds true today.

However, the term "genetically superior cows" varies greatly between farms and depends solely on the goals set for animals by each farm. For example, an owner that enjoys taking animals to shows may choose to flush the highest classified animals just as the owner of a commercial herd may choose to flush the highest producing animals with sound feet, legs, and udders.

Following this methodology, a herd can rapidly improve the quality, consistency, and number of desired animals.

There are many advantages to implementing an embryo transfer protocol in your herd. The first, as mentioned, is to improve the genetic quality of your herd. Additional advantages are to create extra revenue through the sale of embryos and resulting live animals, including selling to markets that are open to frozen embryos but not live cattle, and, the ability to propagate a favourite family line or animal more than would be possible if that animal produced only one offspring per year as in a conventional breeding program.

The 2008 results compiled by the Canadian Embryo Transfer Association (CETA) have just been completed and the average number of transferable embryos per flush is 6.4. The term "transferable" refers to embryos of qualities 1, 2, and 3 (or A, B, and C), with grade 1 being the best quality and grade 3 being the



Embryos after being collected

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poorest quality.

Grade 1, 2, and 3 embryos exhibit at least 85 per cent, 50 per cent, and 25 per cent, respectively of intact cellular material within the embryonic mass. Survivability of frozen embryos drops as the quality of the embryos becomes poorer, and in our practice, we do not freeze grade 3 embryos.

Instead, we implant the poorest quality embryos into recipients on flush day to maximize the potential for a pregnancy and freeze the better quality embryos that can withstand the process of freezing and thawing. While the average number of transferable embryos collected is 6.4, there can be quite a degree of variance.

Some cows do not respond well to the hormones of super-stimulation, they may have a uterine environment that is not suitable to support ova fertilization or embryo development, they have blocked oviducts, or they have some other factor that may result in no embryos recovered. Some cows and cow families are known to consistently produce in excess of 6.4 embryos with 10, 20, or more embryos being typical.

A plethora of factors can influence the number of embryos collected from a donor on flush day. The donor should be reproductively sound, displaying a heat at regular intervals, void of follicular cysts, and have a reproductive tract free of infection. She should be on an increasing plain of nutrition that is appropriately balanced for fibre, protein, energy, minerals, trace minerals, vitamins, and free of mycotoxins or other agents that can affect intakes.

She should be in good health with no lameness, mastitis, or other diseases or conditions that could affect intakes, comfort, or general health. If all of these conditions align, it should result in a successful flush.

Once the embryos have been recovered and evaluated the most important factor is recipient management. Like donors, recipients should be in good reproductive and general health and on a high quality and balanced ration. Optimum results are gained when a standing heat is observed seven days prior to implantation of the embryo.

The super-stimulation process varies slightly among practitioners but generally consists of four days of twice per day injections of follicle stimulating hormone (FSH), followed by at least one injection of prostaglandin, a gonadotropin releasing hormone (GnRH) injection, and finally at least one breeding.

The donor is then flushed approximately seven days after breeding. On flush day, the embryos are recovered from the cow using a catheter and an embryo flush media. The embryos are filtered from the recovered flush media, located and isolated using a microscope, evaluated, and either transferred into qualified recipients or frozen.

Prior to freezing embryos that are destined for export markets, they must be washed by a certified practitioner and remain in a certified facility and storage tank.

I hope you have gleaned a bit of insight into how the basics of embryo transfer can benefit your operation, no matter how big or small, commercial or registered, or breed or age of cow. Your veterinarian may offer embryo transfer services or will be able to recommend a qualified practitioner. Look for the second part of this embryo transfer information section in the next issue where some of the emerging technologies in the embryo transfer field will be further explored. ◘