

result in pregnancies.

The number of times embryos can be recovered from a donor depends on the animal. Beef cows can be flushed five or six times a year at 60-day intervals and recovery of five or six embryos from one flush is excellent. An excellent dairy cow donor will produce perhaps 20 embryos a year which are collected twice at 60-day intervals, after which the cow is permitted to have a natural calf.

However, a Holstein donor of Via Pax Corporation Limited of Woodbridge, Ontario, produced 140 embryos in four years — a world record. It is estimated that 60 to 70 calves resulted from the embryos, compared to the four calves the dam would have delivered for that period in natural birth. Numerous other dams at Via Pax have produced more than 100 embryos in 25 or 30 flushings and are still regularly responding well to collection.

Research in bovine embryo transplants began in the 1940s but the first commercial transplant units began operation only ten years ago.

One of the first companies in the business was Alberta Livestock Transplants Limited of Calgary, Alberta, a beef cow operation. Established in 1971 the company had, by 1980, carried out more than 17 000 transplants and spent \$3.5 million on research to improve transfer technology.

The research has paid off. While three or four calves are generally expected to result from embryos recovered in a single flush of a cow, and as many as ten are not unusual, Alberta Livestock has several times produced more than 20 calves as a result of one flush, the highest being 26 born of 40 embryos recovered from a flush of a cow in New Zealand.

Alberta Livestock now is developing a method of fertilizing eggs outside the female that produced them. In this technique, eggs harvested from a superior cow are fertilized in another animal before they are transferred to a foster mother. Perfection of the technique would enable frozen egg banks to be set up to partner frozen semen banks which have been in use for many years.

#### Frozen embryos

Both Via Pax and Alberta Livestock pioneered the technique of freezing embryos and now store frozen fertilized eggs from select matings which they make available for transfer to recipients in other countries.



*A champion embryo producer — 140 in the last four years — Meadow Lee Sadie Supreme is one of approximately 1 000 cows from which Via Pax Corporation Limited has recovered embryos since it began operation in Woodbridge, Ontario in 1975. It is estimated that Sadie's superior traits have been inherited by at least 60 calves. Trained technicians from Via Pax, which specializes in embryo transfer from top Canadian Holsteins, travel the world helping farmers to improve the quality of their bovine herds.*

The Alberta company first exported frozen embryos three years ago to Costa Rica while Via Pax started shipping them in 1978, mostly to Italy and Hungary. They now account for almost a third of Via Pax exports and this percentage is expected to increase.

Frozen embryos produce pregnancies comparable to fresh embryos and offer several additional advantages. The best pregnancy rates are generally obtained when embryos are transferred to foster mothers during the spring, summer and fall months, but the freezing technique enables embryos to be collected also during winter for implantation at a later date. It also allows embryos collected during periods of low cattle prices to be stored until the markets improve — an advantage for breeders if not for consumers — and large numbers of the embryos, shipped by air in nitrogen tanks, are more economical to transport than live livestock.

Frozen embryos also avoid the urgency associated with the transfer of fresh embryos which require the reproductive cycles of the donor and recipient cows to be synchronized or the recipient will reject the embryo, and a transplant must take place within 24 hours of collection. This requirement has implications especially for the export of fresh embryos since flight connections, customs procedures and the transfer operation at the

receiving end must be well arranged. But frozen embryos can be transported at any time and thawed out as a recipient enters heat.

Along with fresh or frozen embryos, Canadian companies send specialists to countries which do not have the necessary expertise to perform transfer operations on recipients, and also train their personnel in the technique.

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#### Canadian aid to South American flood victims

Canada will provide funds totalling \$170 000 to victims of recent floods in Peru, Bolivia, Ecuador and Argentina.

Canada will provide two grants of \$50 000 each to the Pan American Health Organization (PAHO) on behalf of flood victims in Peru and Bolivia respectively. The World Council of Churches will receive \$50 000 for its relief program in Ecuador, and \$20 000 will go to the League of Red Cross Societies (LRCS) for assistance in Argentina.

The funds will be provided through the international humanitarian assistance program of the Canadian International Development Agency. Canadian assistance will be used to purchase medicines and medical supplies for victims of the flooding.