

Embryo Bisection (splitting)

Embryos from some mammalian species can be divided into two parts, and the halves, frequently called *demi embryos*, can potentially develop into identical twins following ET.

Embryo bisection, often referred to as splitting, is usually accomplished at the late morula or blastocyst stage prior to hatching from the zona.

When bovine embryo bisection was first used commercially in the mid 1980s, it was thought that each demi embryo needed to be placed back into a zona. Consequently, zones of unfertilized ova were used to provide a home for the extra demi embryos.

This approach to embryo splitting required two micromanipulators: one with an **aspiration pipette attached**, the other with a **microsurgical blade**. It was soon discovered, however, that the pregnancy rate of demi embryos was the same whether they were in a zona or not. In addition, pregnancy rates were similar whether embryos were divided with a glass microneedle or a metal micro-blade .

Survival of demi-embryos:

In general, survival of half-embryos or demi-embryos is such that more offspring can be produced per donor female by transferring demi-embryos than by transferring embryos intact.

Survival of each demiembryo, on the other hand, is lower than that of intact embryos; additional insults applied to demi-embryos (e.g. freezing and thawing) reduce demi-embryo survival even lower.

Reduced survival of demiembryos may result from 1- an insufficient number of viable cells to sustain normal development or 2- because the smaller embryonic mass provides a weaker antiluteolytic signal, which is essential for the maintenance of pregnancy.

Once produced, demi-embryos have either been transferred fresh to synchronized recipients of the same species or frozen in liquid nitrogen.

FIGURE 31
Immobilizing a blastocyst by means of suction using a micropipette and bisecting the embryo with a fragment of razor blade (A), and removing one demi-embryo from the zona pellucida. (These figures first appeared in Williams *et al.*, *Theriogenology*, 22:524, 1984)

