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SUPEROVULATION

Superovulation is a hormonal treatment that induces follicular growth allowing a more significant number of oocytes to be recovered in the donor female, being a pivotal procedure to maximize the number of viable embryos with a high capacity to produce pregnancy.

The basic principle of superovulation is to stimulate follicular development by hormonal treatment and induce ovulation of several follicles at once. Also, by natural reproduction, a cow can breed a calf per year, reaching an average of eight to ten calves in its entire life.

With an adequate hormonal regimen of superovulation, treated cows can release up to ten or more ovules in each ardor, decreasing the generational interval and increasing the genetic potential and production of livestock. Superovulation is a very useless method of obtaining oocytes from female ovaries and is likely to be replaced by other approaches within the next decade.

However, superovulation results in about ten times more embryos than single ovum recovery. Without superovulation, a usable embryo can be recovered about 60% of the time from normal donors by skilled technicians. Under similar conditions, superovulation usually yields an average of six usable embryos, although the variation is astounding.

An ideal response of five to 12 embryos is obtained from about 1-3 of the donors. However, a small percentage of donors yield more than 20 good embryos and, very rarely, more than 50.

Common superovulation regimes

In superovulation treatments, exogenous FSH, obtained from porcine and sheep pituitaries, is used to release secondary follicles from regression so that they could reach a dominant state too. The most common protocol for superovulation includes GnRH-induced ovulation of the persistent follicle and follicle wave emergence.

Then, the super stimulation starts with the administration of exogenous FSH for 4 days with twice-daily decreasing doses. The two generally accepted methods of

super ovulating in cattle are based on two different gonadotropins, although there are many minor variations of these methods.

A. First method (hCG or eCG+ $PGF_2\alpha$):

1. Give an intramuscular injection of hCG or eCG (usually 2000–2500 IU).
2. Followed by intramuscular injection of $PGF_2\alpha$ or an analog (2-3 days later).
3. A second $PGF_2\alpha$ injection is often given 12–24 hours after the first and seems to improve embryo production.

B. Second method (FSH+ $PGF_2\alpha$):

1. Give 8-10 injections of follicle-stimulating hormone (FSH) s/c or i/m. (12 h intervals).
2. The most common FSH regimen is (6, 6, 4, 4, 2, 2, 2, and 2 mg at 12 h intervals) with $PGF_2\alpha$ given with the sixth or seventh FSH injection.
3. PMSG, $PGF_2\alpha$ is given 48-72 h after initiation of treatment with the fifth, sixth, or seventh FSH injection.
4. About 20%, more gonadotropin should be given to cows weighing over 800 kg. Sometimes, higher doses are used for the first two days; others give 5 mg for each injection.

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