



# Embryo Plus

## Veeartse / Veterinary Surgeons

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## BASIC INFORMATION REGARDING EMBRYO TRANSFERS

### Introduction

It is acknowledged worldwide that the fastest and most economical method of genetic multiplication is by way of embryo transfer. In both dairy and beef cattle it is of great value to increase the top genetics of a herd. In beef cattle genetic improvement can not be measured to the same extent as with dairy cows (milk production) and therefore the economic value not as easily evaluated.

In the same way that semen collection multiplies a bull's genetics, embryo transfer is regarded as the most economic method to increase and preserve cow genetics at this stage.

The donor cow receives hormone injections in order to produce more ova (eggs). This cow will be impregnated with bull semen of choice. The fertilised egg cells will develop into embryos and flushed from the donor cow after 7 days. The embryos will be transferred into the recipients (one embryo per recipient) that are of genetically lesser quality. The recipient serves as bearers, supplies the embryo of the needed nutrition and raises the calf.

The donor cow can be flushed repeatedly every 7-8 weeks or be inseminated to get pregnant again. Most breed societies takes this period that a cow is kept for embryo flushing into consideration when calculating the cow's intercalving period or lactation for milk recording.

### Selecting the donors

The selection of donors is very important. Use the knowledge at your disposal as well as that of recognised experts to help you make the right choices.

Guidelines for donor selection:

- Use an **old cow** or a debilitated cow that can no longer calf or breed.
- Use a cow that proved herself as a **good breeder**. For instance the mother of a show champion or the mother of an AI bull.
- A **heifer** with **valuable genetics** can be flushed to shorten the generation interval.
- A **very valuable cow's** offspring can be increased.
- The ability to choose and increase specific **genetic lines**.
- Very **expensive/rare semen** can be used to achieve more pregnancies.

## Criteria of flushing the donors

Not all cows are good donors, and therefore they must first be flushed in order to determine their potential as donors. We recommend that a cow must be flushed at least 3 times because there are so many factors that determine the success of the flushing. This will enable us and the breeder to sort out any problems and possibly try another super ovulation program. Problems can arise systemically in the cow, problems in the uterus, stress on the cow, management on the farm, environmental factors like climate and rain, nutrition, semen quality etc.

The quantity of embryos from the donor cow differs greatly according to:

1. Breed
  - a) Crossbreeds like Bonsmara, Simbra and Beefmaster produce good number of embryos.
  - b) Most European breeds are also good producers
  - c) The problem with dairy breeds is normally lactation stress and produces fewer embryos.
  - d) Indigenous breeds and Zebu breeds produce less embryos (avg. 4-6 embryos per cow)
2. Age
  - a) Heifers produce fewer embryos.
  - b) First calver cows are normally under stress and also produce few embryos.
  - c) 3<sup>rd</sup> up to 7<sup>th</sup> lactation cows are the best producers of embryos.
  - d) Old cows vary tremendously, depending on their genetics and the production stress she has endured in her life.
3. Stage of lactation
  - a) Between 70 and 100 days after given birth is the best time for flushing embryos. This is after a complete involution happened of the uterus and just before milk stress starts to play a major role.
  - b) Between 100 and 200 days after given birth, milk stress plays a major role. Some cows can cope with it but a smaller quantity of embryos can be expected.
  - c) After 200 days in lactation, milk stress decreases and the cow will start to super ovulate better again.
  - d) A dry cow is by far the best donor, because of much less stress.

Because all the donors react differently to hormones in terms of the above-mentioned framework, we suggest putting at least 3 cows in the program. If one does not react, the other two can make up the number of embryos produced. It happens very seldom that all three cows will not produce as donors. If only a single donor is flushed and she doesn't produce, all the money and effort would have been wasted.

The common question is how many times and how regular must the cow be flushed?

A cow can be flushed every 7-8 weeks as long as embryos are produced. The production of the cows in the long run normally differs a great deal. Some cows can be flushed up to 30 times and still produce embryos while other cows stop producing after 3 flushings and then they can only be flushed again after having calved down.

To get a cow pregnant again after being flushed 2 or 3 times is rather easy and no problems should arise from it. If a cow was flushed more than 8 times, you can expect to battle in the case of some cows.

Injuries to the genital tract of cows in an embryo program should not occur if you use a reputable embryo transfer veterinarian to do the job.

## Handling of donors

We gladly work together with the local veterinarians to do routine preparation work. The local veterinarians usually are familiar with the farms with regards to the cows and the management of the farm.

1. We prefer the veterinarians to examine the donor/s before she is placed into a program:
  - a) To make sure her uterus has undergone normal involution after calving
  - b) She is clean and healthy – no endometritis or other pathology
    - ❖ clean her with Jodium Intra Uterine Installation if needed
  - c) Her ovaries condition – cyclic or non-cyclic
  - d) To determine her condition and then to adjust her feeding status:
    - ❖ an overweight cow(count of  $\geq 3.5$ ) has to lose the weight
    - ❖ a thin cow ( $\leq 1.5$ ) must increase in condition
    - ❖ a cow with increasing condition will be much more active reproductively than an overweight cow or a cow in decreasing condition
  - e) To assist us in determining the date of flushing and drugs to be used with regards to ovulation, any information need to be shared with us
2. The donors have to be kept **calm** and free from stress.
3. **Do not dip the donors with a pour on medium** from 7 days before the start of super ovulation up to and on the day of flushing.
4. The donor must be **adapted to her nutrition** at least 3 weeks before the start of the program, and that should then remain constant.
5. Injections can be done by the farmer as it is easy enough.
6. Make sure to follow the program diligently and precisely. Do not allow an uneducated person to run the program, as it is too expensive and too sensitive.

## A.I. of donors

The veterinarian can do A.I., especially beef cattle, but in dairy cattle the farmer can do it himself.

- a) It is very important for flushing **fertilised embryos**.
- b) If possible, examine a dose of semen from the same group of semen, which will be used for AI.
- c) Alternatively, the veterinarian can examine a drop of semen, while busy with AI, by placing a drop of semen with the pistolet onto a glass-slide. This has to happen quickly, as not to damage the semen in the pistolet.
- d) Make sure the semen is being thawed at the right temperature in the water bath between 32°C and 35°C.
- e) Inseminate **cleanly**, fast and effectively:
  - i) Wipe of the vulva.
  - ii) Open the vulva lips.
  - iii) Use the sanitary sleeves, to pull over the pistolet. Place the pistolet with sheath and sleeve in the mouth of the cervix, tear the sleeve by pulling the sleeve towards you.
- f) Place **all the semen just through the cervix** in the uterus and don't try and place the semen deeper into the uterus. Any blood or damage to the wall of the uterus is bad for the semen and can result in poor fertilization.
- g) We prefer to A.I. 3 times. The first A.I. with the onset of standing heat, the second 12 hours thereafter and the third 24 hours after the onset of standing heat.

**Do not handle the ovaries during A.I.** – it disturbs and damages the fimbria and induces premature ovulation with resulting ovulation into the abdomen.

Please keep us up to date with the development of the program. Let us know in case of any problems, so that we can assist and try and resolve the situation before it is too late.

## Recipients

**Recipients are one of the most important aspects for success** and not enough attention is given to this. It is also one of the most important costs aspects which have to be calculated. Feeding, handling and condition of the recipients are very important areas that are often neglected.

### **Selecting of recipients:**

1. **Use fertile animals.** Do not use cows or heifers that can not become pregnant by use of A.I. or by a bull.
2. **Heifers** make good recipients, provided the heifer has reached puberty and are at breeding weight.
3. Thereafter follows 3<sup>rd</sup> to 6<sup>th</sup> calvers with a good calving record.
4. **The worst recipients are the 1<sup>st</sup> calvers.** One battles to get them pregnant naturally, what chance would you have of getting them pregnant artificially with another cows' embryos. They are much more stressed than other animals.
5. Utilise the animals at your disposal according to their potential. It is cheaper and safer than buying unknown animals.
6. Select the recipients that are big enough to carry the donors' calves.
7. Condition is very important: A condition score from 2.5 to 3 is ideal. Increasing condition is also an advantage. Overweight cows are bad, worse than a cow with a score of 1.5 and in increasing nutritional phase.
8. It is desirable to make use of cyclical animals, animals that are on heat regularly or have been palpated by your veterinarian and found to be cycling.
9. Transfer should take place at least 80 days after calving and the required involution of the uterus has taken place in recipients.
10. Do not make use of recipients that has been prepared unsuccessfully twice before. They have proven themselves to be bad recipients.

**NB!! Let your veterinarian examine the recipients before the start of the program!**

## Preparation of recipients

1. **Follow the program closely.**
2. We synchronise with Crestar or CIDR. The percentage of cows coming on heat is higher than when synchronising with prostaglandin (Prosolvin or Estrumate or Lutalyse) and the synchronization is closer, making heat observation easier. From the group of cows on heat, a smaller percentage is used, but in total more recipients are able to receive an embryo.
3. About **50-60%** of the recipients which have been placed in a program, should be **suitable as a recipient.**
4. We recommend preparing 10 recipients for each cow flushed. Provided there are enough recipients available of course (our biggest problem).

## Management

### **Where would you find recipients?**

#### 1. Stud herd

- In the case where commercial cattle is not available.
- Make use of cattle that you know whose genetic potential would not generate top quality calves.
- Give them the chance to calve from a top cow in the herd.
- After an embryo was transferred and not pregnant, A.I. with good quality semen.
- Lastly she will be served by a bull to produce a calf.
- Suggestion:
  - ✧ Use the top 5% from the herd as donors.
  - ✧ Use the weakest 72% from the herd as bearers.
  - ✧ The middle 20% should first be AI'd and then mated by a bull.

#### 2. Commercial Herd

- The same route is followed if the farmer has stud and commercial herds available.
- All commercial cattle are used as recipients, provided they are up to standard.
- It is much more valuable to the farmer to have a stud calve from his top stud cows than to have a commercial calve from his best commercial cow.
- First she gets a chance of being pregnant with an embryo.
- Then A.I.'d by a good bull.
- Lastly a bull serves her.

In both above-mentioned herds the lesser quality cows are used to increase the genetic potential of the top cows.

Embryo transfer is the only way to increase cow genetics and numerous farmers have seen the potential in a herd from good cow-families or bull-mothers.

## Management Systems

Most problems with intercalving period that increases can be solved with the correct management in different management systems.

### **Having a breeding season:**

#### 1. Flushing of selected donor cows:

- Donors can be flushed throughout the year and embryos frozen and stored until transfers are done. The donors are then used as producers of embryos and the intercalving period for that year ignored.
- Donors can be flushed the day of transfer and the embryos transferred fresh. The donors can be mated 14 days after flushing and very little is lost in terms of the intercalving period.

#### 2. Transferring into recipients:

- The cows must be mated during mating season, whether it is stud or commercial herds.

- Recipients are synchronised at the start of breeding season.
- Those who are unfit for the use of transfers can be injected with Prostaglandin and 72 hours later AI'd. Or they can be synchronised again and AI'd.
- The recipients, who are not pregnant, can be mated by a bull when they come on heat again. (21 days after the previous heat)
- Therefore in 63 days the cows have 3 chances of being bred.
- NB! It is important to do the transfers at the beginning of the breeding season and to make use of the fertile cows, rather than after the breeding season and to make use of all non-pregnant cows.

### **During the year breeding and calving season:**

Mainly stud herds make use of this system, but what is of importance here is the selection of fertile animals.

#### 1. Flushing of selected donor cows:

- The same is taken into consideration as with the mating season system.  
Cows are flushed throughout the year and embryos transferred as recipients are available. Alternatively a cow is flushed once or twice and then mated. Her embryos are then transferred when recipients are available, or embryos are frozen.

#### 2. Transferring into recipients:

- As the recipients calve, they are prepared to coincide with the flushing of the donors.
- Thereafter the abovementioned applies to mate the cows as soon as possible.
- The recipients can only have one more chance to receive an embryo, but must be bred thereafter.

### Handling and maintenance of recipients

1. The cows need to be kept as **calmly** as possible. Make them familiar with the crush pen where transfers will take place.
2. Give **Vit. A, D and E and minerals** 4-6 weeks before the transfers (We use Multimin with Cu, Zn, Se and Mn).
3. The cows must be kept on the same grazing or feeding and receive the same supplements from 6 weeks before transfer until pregnancy is confirmed at 2 months.
4. **Do not change feeding shortly hereafter.** Gradually change over a period of 3-4 weeks.
5. Pregnancy examinations must be done at 2 months. The transferred embryo develops slower than in the case of natural conception. The foetus is also much more sensitive, and therefore resorption takes place easier.

### Around Calving

Most of the recommendations are the same than for normal circumstances. Everything is much more sensitive and the financial importance much bigger. **Remember, the calf is worth much more than the recipient.**

In most cases the donor is a big cow (that is the one reason why she is flushed) and her calves much bigger than the recipients' natural calves, so calving problems are always a possibility.

1. Do not overfeed the recipient in the last trimester, to prevent the calf from growing too big.

2. At the centre we induce the most of our recipients to calve 285 days after transfer, but normally they calve before the 285 days. We don't want the cows to carry too long and for the following reasons we would induce calving:
  - The transfer date is known and accurate.
  - Prevent the calf from growing bigger.
  - Induction is given 10:00 at night which induces calving  $\pm 36$  hours later, that means at 10:00 the 2<sup>nd</sup> morning which simplifies monitoring and support. NB! It is possible that she can calve earlier, because she will be near calving in any case.
  - A person can then handle problems like retained placenta, and the calf can be saved.
  - We use 30mg Dexametasone and 1.5mg Prostaglandin (example 10ml Dexa and 2ml Estrumate).
3. Save the calf. If it is too big, do a caesarean.
4. Be sure your veterinarian is available when the recipients calve.

Follow the program closely. Contact us immediately in case of any problem situations or queries.  
**Everybody works for success!** Only with good results can embryo transfers be applied economically.