

## **A Brief Introduction to Frozen Semen**

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### **Reasons for Using Frozen Semen**

The advantages of frozen semen stem from the fact that, once sperm are frozen and stored in liquid nitrogen, they will remain viable for many years. This gives breeders a number of options not available with other forms of stored semen. For example:

- a. Semen can be collected and frozen at convenient times of the year thus freeing a stallion to be used for other activities during the stud season.
- b. Reserves of semen can be laid down when a stallion is young and fertile.
- c. Long distance transport of semen becomes feasible, opening up more markets for stallion owners and giving greater genetic choice to mare owners.
- d. Disease control is improved.

### **Some Limitations of Frozen Semen**

Not all otherwise fertile stallions produce sperm that survive the freezing process. Even when semen does freeze well, frozen/thawed sperm have a shorter survival time in a mare's uterus after insemination and may be less fertile than if the semen had been inseminated fresh (either by AI or by natural mating) or after chilling and short term storage. Therefore, it is important to select mares carefully – there is no point in wasting frozen semen on mares that have poor reproductive prospects.

In addition, during insemination, expert handling of both mares and semen is essential. Mares must be carefully monitored during their cycle by frequent palpation and ultra sound scanning of the ovaries to ensure that insemination takes place close to the point of ovulation. This need for increased veterinary involvement during insemination, coupled with the relatively high production costs of the semen, means that it may not be a worthwhile option for some breeders.

### **Selection of a Stallion to Produce Semen for Freezing**

It is not worth attempting to freeze semen from a stallion if there is reason to doubt his natural fertility. In addition, because semen quality tends to decrease with age, relatively few old stallions have semen that is worth freezing.

Usually, the inability of a stallion's sperm to withstand freezing is revealed as poor post-thaw survival which is quickly detected during routine evaluation. However, some stallions produce sperm that appear to survive well following freezing but which, when inseminated, give poor conception rate. Therefore, the only proof of fertility of frozen semen is that provided by the pregnancy rate following insemination.

### **Sperm Production by the Stallion**

A stallion's sperm output varies with the season, being at its lowest at mid-winter and rising to a peak in the summer. There is, however, no similar variation in sperm quality so, apart from a lower yield, there is no major disadvantage in collecting and freezing semen during the winter.

There is great variability between stallions. Some regularly ejaculate enough sperm to give 20 or more insemination doses per collection whilst others, with comparable natural conception rates, may produce enough for only 4 doses. In a week of regular collections, a "normal" stallion may give as many as 60 doses or as few as 12 but, in most cases, the average weekly output should be

between 15 and 30 doses.

Frozen semen may be sold at a set price per dose (with or without a concession on repeat inseminations) or as a nomination consisting of 3 or more insemination doses per mare. If the semen has frozen well and if the mare is fertile and, most importantly, competently handled during the insemination period, a 3-dose nomination may be sufficient to give a chance of conception over three cycles.

#### **Preparing a Stallion for Semen Collection**

Ideally, before semen is collected and frozen for use in a commercial breeding programme, a full evaluation, including freezing of one or more ejaculates, followed by some test inseminations, should have been carried out.

If possible, before collections are made for freezing, a stallion should have ejaculated at least twice in the fortnight preceding the first collection (to flush old, damaged sperm from his system). This should be followed by at least five days' sexual rest before a collection (to build up sperm reserves).

In the short term, if a stallion has been well rested sexually and has good sperm reserves, two collections a day or three taken over 36 hours can be made, but the best yield of sperm during an extended period of semen collection is achieved by allowing the stallion 48 hours' rest between collections.

#### **Choice of Location for Freezing Semen**

For breeders who wish to have semen from their stallions frozen, best results are achieved if the horses are sent to a collection centre either for a day to have one or two ejaculates collected and frozen for evaluation or, preferably, for a stay of several days to allow a freezing method to be adapted to fit the semen characteristics of an individual stallion.

For owners who prefer not to send their stallions away, a temporary laboratory may be set up to freeze semen at a stallion's home stud. A teaser mare, well in season, will be needed for semen collection. Several stallions can be handled in a day so that, should nearby owners wish to have semen from their stallions frozen on the same occasion, the facilities and costs can be shared.

On-stud collection and freezing can be useful for initial evaluation and for building up limited reserves to use for test inseminations. However, if larger reserves of semen are required for domestic use or if the semen is wanted for export, collection and processing must take place at an approved centre.

#### **Exporting Stallion Semen**

Semen frozen for export must meet the health requirements of the importing country. The authorities in most major export markets, including other EU countries, the USA, NZ, Australia and the RSA, all have strict standards regarding a stallion's health status and lay down conditions under which semen must have been collected and processed before an import license will be granted. In all cases, semen for export must have been collected at a MAFF approved collection centre. Whilst a stallion is at the centre, a series of blood samples and swabs must be taken from him and sent to the MAFF laboratory for testing.

For some countries, the stallion must be isolated at the centre for 30 days before semen for export is collected. This period can be used to evaluate the semen and to determine the most suitable freezing technique. Reserves of semen can also be built up for the domestic market or for export to countries that do not require a horse to be quarantined before collection. After the quarantine period, a stallion may need to spend several weeks having semen collected and frozen depending on how many doses are required.

### **Conclusion**

It was once thought that stallion semen was unsuitable for freezing but, as a result of recent research which has led to improvements in freezing techniques, acceptable conception rates are now being achieved using frozen semen from selected stallions. Already, frozen semen is widely used in some European countries and in the USA and there is an expanding import/export market. With further research, there is no doubt that the proportion of stallions with freezable semen will increase. Frozen semen is not appropriate for all breeding situations and, unless there is careful attention to detail at all stages from semen production to mare selection, management and insemination, conception rates may be disappointing. Nevertheless, it has been shown that the technique can be used with great success and, because of the potential benefits frozen semen offers horse breeders, it is likely to play an increasingly important part in horse breeding in the future.

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