



Artificial Insemination

Artificial Insemination (A.I.) in horses has a long history. Arabic texts from the thirteenth century describe how mares were successfully inseminated with fresh transported semen and the technique may have been known in China from a much earlier period. Western interest in the technique was re-awakened in the late eighteenth century in Italy by a biologist called Spallanzani who successfully inseminated dogs and is credited with discovering the fact that chilling of semen can practically extend its life. About a hundred years later the technique had become established to at least a theoretical level in many of the universities in Europe. During the first half of the 20th century, however, interest in the technique declined in the west, as the horse became less economically important. However, in Russia and China where there was still much reliance on horse transport, extensive programmes were developed initially in Russia and massively after the Revolution in China. By 1938 according to centralised records approximately 120,000 mares had been artificially inseminated in Russia. Two rather more remarkable statistics came out of China in that 1959 approximately 600,000 mares were artificially inseminated with an overall pregnancy rate of 61% and in 1960 China's two most popular stallions were used to inseminate 4,415 and 3,093 mares with resulting pregnancy rates of 76.9% respectively.

In the West interest in breeding horses by A.I. has increased the rise in popularity of horse sports. On the continent in Germany, Switzerland, The Netherlands and France, extensive A.I. programmes have been established, monitored and in some cases run by the state. Apart from quality control and maintenance of high standards the stallions themselves are subject to official evaluation schemes thereby continuously improving the quality of stock. A remarkable proportion of the sports horses bred on the continent are now produced by A.I. In some parts of Germany and The Netherlands over 80% of horses are being bred in this way. In the U.S.A. extensive use of A.I. has been made in the breeding of the Standardbred since the early 1950's.

Here in the U.K. Equine A.I. has taken off rather more slowly but has progressively gained in popularity over the last 15 years. This reflects several factors peculiar to the U.K.;

a) We have a decentralised breeding industry for non-thoroughbreds with negligible controls and a totally 'free market' situation. This partly reflects the peculiar status of the horse in the United Kingdom which is regarded partly

as agricultural and partly as a pet or recreational animal whereas in Europe horse breeding is seen fundamentally as an agricultural activity with corresponding state control and economic interest.

- b) In the U.K. we have a highly developed thoroughbred breeding industry which specifically bans the use of A.I. in horses to be used for racing. This has spin offs into the non-thoroughbred breeding industry particularly regarding the breeding of eventers where one wishes to use thoroughbred sires. Wetherbys, have recently established a separate register for animals produced by A.I. (as of 1998) to cater for this situation and allows A.I. produced eventers, for example, to be registered. Such animals still cannot currently race under rules anywhere in the world however.
- c) The incidence of venereal disease in horses in the U.K. is at present lower than on the continent. (venereal disease is readily controlled with AI techniques.)
- d) We have a large number of moderate but inexpensive stallions available with traditionally little veterinary input or preventative veterinary medicine techniques applied to mares visiting these stallions.
- e) The market for sports horses in the U.K. is decidedly weaker than almost any other area of the developed world; hence the pressure to improve stock by selective breeding is less.

In spite of the above there has never been more interest in the technique and this is now being fuelled by increasing the criticism of the standards of our home bred stock. There is no reason why British bred sports horses should not be winning at international levels in the spheres of dressage and show jumping in exactly the same way as they excel at eventing and racing. We have an ideal climate in many respects for horse breeding and a strong tradition of top class equine husbandry in this country.

In the last few years, two more factors have come into play which should give a considerable impetus to the development of our AI programme.

Firstly, chilled and frozen semen from a wide variety of stallions has now become available including many of

the top stallions in the world. While the quality and variety have increased dramatically, prices, if anything, have fallen, making it far more economical to consider using semen from the best stallions in the world to improve your homebred stock. Marketing of this semen in some cases has been in conjunction with innovative schemes to ensure against pregnancy failure, which can further reduce financial risk.

Secondly the British Equine Veterinary Association (B.E.V.A) has sponsored a scheme for approval of Artificial Insemination centres at veterinary practices throughout the country involving a detailed inspection by senior B.E.V.A. officials. **B.E.V.A approved AI Centres** have to satisfy inspectors they have adequate facilities, accommodation for mares, adequate diagnostic laboratory equipment together with both adequate lay staff and properly trained veterinary surgeons to ensure the general public can have the highest confidence in those centres.

ARTIFICIAL INSEMINATION—A FEW GUIDELINES FOR THE STALLION AND MARE OWNER

Large scale AI programmes are well established on the continent. It is only recently that there has been more demand and interest for AI in England, and most horse owners, stud managers and veterinary surgeons have been poorly prepared for the recent increased interest from the UK industry.

The UK Jockey Club's objections to the use of AI in racehorses does not apply to the non-thoroughbred industry but some breed societies still have similar rules, which would require clarification before AI can be recommended. Almost all register AI foals however.

Why AI?

AI has the following advantages over natural mating:

1. Individual mares who are unable to be mated naturally for reasons of aggression, injury, infection or contagious disease. This prevents injury and allows effective disease control.
2. Mares who have demonstrated 'susceptibility' to uterine infections. AI reduces the chances of uterine infection.
3. Stallions may provide semen for more than three mares per day, traditionally used as a maximum of natural mating. One ejaculate can be split, depending on its density and volume into 3-4 or even more doses. This helps to maintain the stallion's semen quality by avoiding overuse.
4. The 'splitting of semen collected may also be a major labour saving management tool when compared to three natural matings per day.
5. Stallions may provide semen for transportation after dilution with semen extender and specially cooled to, and maintained at, 4°C in a specially designed container (for transportation and use within 48 hours).
6. Mares can stay near or at home and continue competing and training programmes. It also reduces the travelling cost to the stud and there is

no stud livery fee.

7. Some stallions provide semen for freezing and storage. Frozen sperm can be stored for years. For competing stallions, it allows semen collection to be arranged at times which do not interfere with training and competing programmes.
8. Where conception and live foal rates are poor, AI may provide significant improvement primarily because of the necessary imposition of greater veterinary supervision and improved management.

What Insemination Entails

(Fresh or chilled semen)

- A tail bandage or plastic sleeve is put on the mare to ensure cleanliness. The perineal region around the mare's anus and vulva are washed thoroughly. Antiseptic solutions are avoided, as these are spermicidal.
- Semen arrives by courier in a specially constructed container.
- The semen is drawn into a syringe and inseminated into the mare via the AI catheter passed through the cervix so that the semen is deposited directly into the mare's uterus.
- With chilled semen the mare should be scanned 24 hours after the first AI to check for ovulation. If not a second AI may be required.
- If fresh semen is used and the AI is performed on mares staying at the stud these mares are re-examined after 48 hours for ovulation. If still not ovulated a second AI may be performed with new fresh-collected semen.
- **All semen is checked by the veterinary surgeon for quality and viability.**

Management Requirements

AI is not a means of overcoming or short-cutting good management. **A careful monitoring by scanning of the mare's follicular status is of paramount importance.** The vet in consultation with the owner of the mare carries this out. Usually good AI management requires more skilled veterinary attention, which means increased veterinary involvement. AI has the advantage that, due to the close monitoring of the mare's cycles, abnormalities will be picked up quickly which allows immediate treatment.

A lack of veterinary involvement with natural mating is often responsible for late recognition of problems as the vet is often only consulted after 2 or 3 cycles of unsuccessful covering.

Collection of Semen

The stud supplying the semen carries this out.

Semen is collected from a stallion with the aid of an artificial vagina (A.V.). Most stallions can be taught to

cover into an A.V.

The stallion is encouraged to mount a co-operative mare in oestrus; alternatively an oestrogen treated mare or 'phantom' can be used. The penis is deflected into the prepared A.V. and after ejaculation, the whole ejaculate is available for analysis, processing and insemination.

Proper Preparation of the A.V. is very important for successful covering into the A.V.

- Temperatures of the A.V. should be around 45°C; cold weather requires particular care.
- The 'counter pressure' of the A.V. has to be adjusted to the stallion's preference.
- A thermal protective jacket is used; this protects the semen against 'cold shock' and direct sunlight. The latter is very toxic for semen.

The Collection Mare

Uses the normal safety procedures as with natural mating.

The Ejaculate

The analysis of the semen, splitting, dilution and preparation for insemination (fresh, chilled or frozen) is carried out by the veterinary surgeon with semen collection. The semen is examined for volume, motility, colour, density and by microscopy.

A microscopic examination includes an assessment of:

- Concentration (approx. 200,000 per mm³)
- Morphology - (looking for abnormal sperm)
- Live:dead ratios
- Bacteriology
- Motility

The 'gel' fraction is removed and depending on the volume and density the ejaculate is split into several doses.

Necessary Certificates

Mares

In general the following certificates may be required for a stud before supplying semen for a mare.

1. Has no congenital abnormalities or any known hereditary diseases.
2. A certificate stating that the mare has been examined internally and no reason found why she should not breed.
3. A certificate stating that a recent cervical swab and smear were taken from the mare when in oestrus, for bacteriological examination, which did

not grow any pathogenic bacteria indicative of uterine infection.

Forms accompanying semen from the stallion

1. An ID form for the mare to be inseminated. The veterinary surgeon inseminating the mare will complete this ID and check it against a copy of the stud's nomination agreement.
2. A form with date and time of semen collection, name of stallion, name of owner, mare's name, mare's owner, date and time of transporting to clients, time and date of first and/or second AI
3. A semen quality certificate stating the amount of semen and its concentration. A minimum of 600 million sperms per dose is required.

The above forms 1 and 2 will be completed by the veterinary surgeon performing the AI and they will be sent together with the container to the AI stud.

The veterinary surgeon in charge of the insemination will destroy all the chilled sperm that has not been used.

The semen can be used as follows:-

1. **Fresh semen** can be used directly after collection. Extended (within 3 hours) or un-extended (within approx. 1 hour).
2. **Chilled semen** is mixed with an extender containing nutrients and antibiotics. The extended semen is placed immediately in a special 'Equitainer' bucket, which cools it slowly and maintains it at 4°C.

The average fertility of the cooled semen is as follows:-

Up to 24 hours	-	Excellent
24-48 hours	-	Good
48-72 hours	-	Fair

We advise the chilled semen be used within 24-48 hours after collection. The storage time differs from stallion to stallion and from ejaculate to ejaculate.

Frozen Semen

- Increasingly popular.
- Massive choice of stallions from all over the world.
- Frozen semen in liquid nitrogen stores indefinitely.
- Requires high quality mare management - mares need to be examined 3-4 times daily near to ovulation (see below).
- Semen is stored in straws.

- Not all stallions semen is suitable for freezing.
- Requires specialised labs for semen freezing.

Correct time for insemination

The mare's ovaries are examined by ultrasound to ascertain the correct time for insemination. While the optimum time to inseminate for chilled and fresh semen is 12 hours before to 12 hours after ovulation, **with frozen semen insemination must be within 6 hours of ovulation.**

FOR PRACTICAL REASONS AI USING FROZEN SEMEN HAS TO BE CARRIED OUT AT AN AI CENTRE

What happens next?

If the inseminated mare has ovulated as predicted it is advisable to determine her possible pregnancy as soon as possible. An ultrasound scan should be performed 14-16 days after the last date of insemination to check for pregnancy and twins.

The AI stud will require an additional pregnancy diagnosis between 42-60 days after the last date of insemination to check for pregnancy and twins and a pregnancy diagnosis certificate sent to the stud stating whether the pregnancy diagnosis is positive or negative. A stallion-

covering certificate might only be issued to the mare owner on receipt of a P.D. certificate (read carefully the agreements made with the AI stud that you are ordering from).

It is also recommended that the mare owner has the mare checked again just before 1st October (frequently to comply with the terms of their negotiation agreements, but a good idea in all cases).

Expected success rates (approx.) based on success after two cycles

Natural unmanaged covering	- 64%
Chilled semen, all mares	- 72%
Frozen semen, all mares	- 50-60%
Managed **mares, chilled semen	- 90%+
Managed **mares, frozen semen	- 80%+

** Where poor and repeat breeders excluded.