AN INTERNATIONAL GENE BANK FOR GUIDE DOGS: ORGANISATION, UTILIZATION AND POTENTIAL

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SUMMARY

Many Guide Dog Schools around the world have established selective breeding programs which aim to produce dogs suitable to train as guides for the visually impaired. An International Guide Dog Gene Bank is being established to collect and store frozen semen from top quality breeding stock. This semen is shared amongst participating schools to minimise the amount of inbreeding in these (typically) small breeding populations, thus improving the production and performance of future Guide Dogs.

Keywords: Guide dogs, artificial insemination, gene bank, frozen semen.

INTRODUCTION

Royal Guide Dogs Associations of Australia (RGDAA) has been using frozen semen for artificial insemination since 1994, with excellent results.

RGDAA is a non-profit charitable organisation which provides mobility training for visually impaired people, with dogs bred and trained as guides. The closed selectively bred population of Labrador Retrievers comprises 30 Brood Bitches and 11 Stud Dogs.

The RGDAA breeding program is divided into three sections.

1. Proven Breeding Stock (including Frozen Semen) - to produce Testing Breeding stock.
2. Test stock - to produce Guide Dogs , and the best of them to become Proven Stock.
3. Production Breeding Stock - to produce Guide Dogs - reserve Breeding Stock producers.

DISCUSSION

The use of frozen semen in a Guide Dog breeding program. It is possible that large Guide Dog Schools with an extensive breeding stock population could function without ever introducing new blood lines to their existing program. (This does not mean that they would not benefit from imports to improve genetic diversity.)

Medium sized Guide Dog Centers such as RGDAA have restricted success from their closed selective breeding population because of the inevitable problems associated with inbreeding. As most Guide Dog Schools around the world have similar selection goals (regarding their dogs temperament and health) the optimum alternative to minimise this problem is to share genetic material between schools.

RGDAA trialed this concept in 1994. Since then seventeen Guide Dog Producer brood bitches have been inseminated with frozen semen from The Guide Dogs for the Blind, Inc. (In the US) and from the Guide Dogs For the Blind Association (in the UK).'We have achieved a 100% conception rate. The average litter size is 6.28 compared with 6 from natural matings. The qualifying success rate of dogs from these matings has been better than average.

Our success with the frozen semen insemination gives us the potential - and the optimism - to establish an International Guide Dog Gene Bank which will assist the future world supply of Guide Dogs.

The principles, construction and establishment of a Guide Dog Gene Bank. Our aim is to identify dogs with the best breeding potential; then collect, freeze, store and finally disseminate their semen to participating Guide Dog School.

The advantages of a Gene Bank would be twofold: it would create a reserve for current ongoing breeding programs, it could also create a permanent reference reserve of selected elite breeders from each generation as future insurance.

The success of the International Guide Dog Gene Bank will depend on the following:

- development of clear breeding objectives;
- capability to collect and store reproductive material (e.g. semen, ova, embryos);
- capability to undertake AI and assisted breeding technology.

Breeding objectives. Breeding stock have to pass temperamental assessments and veterinarian examinations. They have to have good concentration, willingness to work and suitable hearing and body sensitivity. They cannot be suspicious, anxious or excitable. They should not show cat/dog/food or human distraction. Also they cannot be aggressive, fearful, dominant or exhibit fright from sudden loud noises (i.e. gunfire). Breeding dogs are also selected to avoid genetic problems such as hip and elbow dysplasia, eye diseases and epilepsy etc. We aim to breed with "the best of the best".

Collection and storage of reproductive material. Such techniques were originally developed for use in humans and domestic livestock. These techniques have also proven successful with canines. These techniques of artificial breeding and those of in vitro fertilisation are viable adjuncts to natural breeding programs. They are not a substitute to natural breeding but do offer the possibility of establishing a viable international genetic resource and reserve bank. Semen is artificially collected from the selected breeding dog, processed in a special protective chemical media and then frozen to - 196°C in 0.5 ml plastic straws.

Artificial Insemination (AI). This is the assisted transfer of semen (once it has been thawed and removed from the plastic straws) directly into the uterus. There are two commonly adopted procedures to achieve this, a surgical operation (similar to a small ovarian hysterectomy operation)

in which the uterus is identified and the semen injected directly into the lumen of the uterus; or the transcervical, where the bitch is retained in a serving cradle and, with the aid
of a fibre optic light scope, a small diameter catheter is threaded through the vagina and cervix into the body of the uterus where the semen is deposited.

Goals of a Guide Dog Gene Bank. The goals are as follows:

- conservation and preservation of selected elite genetic lines (sires/dams) to provide insurance reserves for the future i.e. 10 - 100 years;
- establishment of a gene pool from selected top quality dogs for storage, transfer and dissemination to breeding programs from participating countries;
- maintenance of an accessible record and information data base available to centers with full details of the dogs, genetic resources (semen, embryos and ova) and the quality of these resources.

Operations strategy. It is essential to develop a clear and uniform operational strategy for the proposed Gene Bank to ensure that such a center will achieve set goals, i.e.

(i)The selection of the source of the genetic material to be included in the bank, criteria of this selection, breed qualities, performance, etc.

(ii) The genetic material and how much of this should be collected and stored in the Bank, i.e. semen, embryos ova, ovary or ovarian tissues, testes or testicular tissues.

Benefit and potential of a Guide Dog Gene Bank. The benefits and rewards that can be expected from a Guide Dog Gene Bank will be significant, and will be critical to the future success of world wide breeding programs. These benefits include the following:

- insurance - breed and genetic preservation against disease, fires, war etc.;
- access to high quality genetic material;
- breed reserves - selected lines of dogs classified as 'elite' can be preserved for generations;
- ability to collect and store genetic resources from dogs while they are of optimum breeding age range (3-5 years) for central use of current breeding programs;
- capacity of a small Gene Bank facility to store genetic resources from large and diverse breed populations;
- low cost to maintain Gene Bank Centre -less space, equipment and staff required;
- ability to transfer and transport stored frozen genetic resources with ease and safety throughout the world, without quarantine barriers and without the stress or problems of handling live animals;
- ability to rapidly transfer gene resources from an identified and proven breeder to multiple centers internationally without those donor animals leaving their breeding colony;
- ability to have the most cost-effective way of widening a particular Guide Dog Breeding Colony's gene pool.

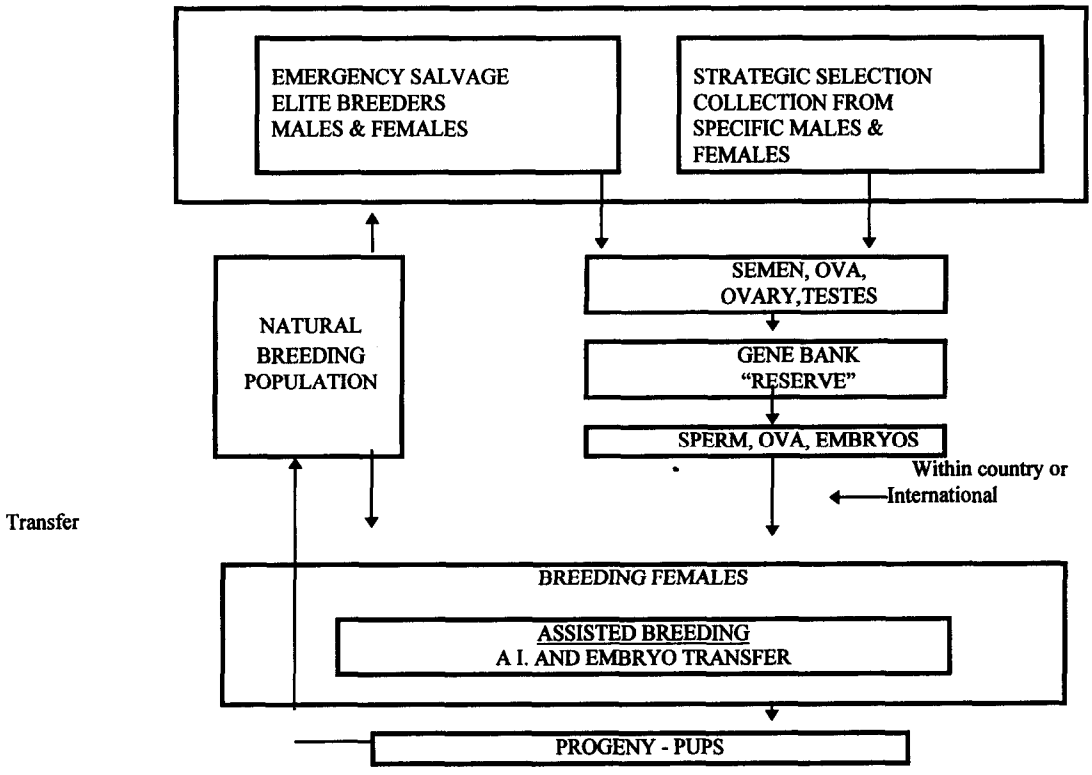

Diagram 1: The integrated services of a guide dog gene bank.

CONCLUSION

In the future it will be possible to incorporate further assisted reproduction procedures, such as embryo collection and transfer; collection and freezing of testes; ovaries; oocytes; embryos; and in vitro - maturation and fertilisation of oocytes, to increase the efficiency of the operations of an International Gene Bank.

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