DEVELOPMENT OF AI AND ET OF FARMED DEER

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INTRODUCTION

Development of AI and ET technologies for red deer (Cervus elaphus) and fallow deer (Dama dama) within the last decade has been driven by awareness of the power of these manipulations to effect rapid genetic improvement of farmed stock. While industry adoption of such technology is still low compared to usage within the dairy industry, deer farming has yet to move decisively into large-scale genetic improvement programmes, and is presently geared toward rapid propagation of limited numbers of elite, but largely unproven, animals. Future development of co-ordinated programmes (e.g. group breeding schemes, sire referencing) will undoubtedly establish AI and ET as valuable tools within the deer farming industry.

ARTIFICIAL INSEMINATION

Oestrous synchronisation: Artificial synchronisation of oestrus is a crucial step in AI protocols because of difficulties in detecting natural oestrus in deer. The principle method involves delivery of progestagens via intravaginal devices, with application of the progesterone CIDR® device (type G) having been studied extensively for both red and fallow deer (1). Insertion of devices for 12-14 days induces a high degree of synchrony (6-10 h) within the breeding season, with average intervals of 48 h and 72 h from device removal to the onset of oestrus and ovulation, respectively (2, 3). The additional use of 200-300 i.u. PMSG (i.e. eCG) at device removal in red deer is believed to increase the proportion of responding hinds (especially early in the breeding season) and improve synchrony, while at the same time reducing the interval to oestrus/ovulation by 10-12 h. However, PMSG is contra-indicated for use in fallow deer due to increased incidences of multiple ovulation or complete ovulatory failure, leading to reduced fertility (4). Putative stimulatory effects of males on oestrus induction have not been demonstrated conclusively but are generally believed to occur. Consequently, vasectomised males are often joined with females during synchronisation. While prostaglandin analogues are efficacious in promoting a high degree of oestrous synchrony if delivered at the appropriate stage of the oestrous cycle (5), they are not widely used in AI programmes.

Semen collection/storage: Deer semen is collected by electroejaculation following sedation of the donor, with collections being limited to 4-6 months of the year (autumn/winter) when males are fertile. Semen from red and fallow deer is relatively robust, withstanding the rigors of cryopreservation on a par with cattle semen. Extenders and cryoprotectants are usually egg yolk/glycerol based, with semen frozen at concentrations of 50-100 x 10^6 spermatozoa ml^{-1}.

Insemination: Laparoscopic intrauterine insemination is practiced for red and fallow deer as transcervical insemination has proven difficult due to the small size of the animals. Techniques of laparoscopic insemination of deer are well documented (6, 7). Conception rates of 60-75% and 70-80% are now achieved routinely with cryopreversed and fresh semen, respectively. Intracervical insemination has often yielded inconsistent results (20-70%), although the use of fresh semen holds promise (4).

EMBRYO TRANSFER

Donor superovulation: Although normally monovular, induction of superovulation in donor hinds/does is achieved by administration of various gonadotrophin preparations, including PMSG, FSH and hCG, towards the end of the CIDR device treatment period (7). In general, ovulatory responses to a given regimen are more consistent for red deer than fallow deer. There appears to be a tendency for operators to move away from the use of PMSG (either alone or in "cocktail" preparations) due to high incidences of overstimulation and reduced embryo recovery. Most commercial application involves use of ovine FSH (sometimes with hCG).

Embryo recovery/storage: Surgical recovery of embryos on Days 7-9 differs little from that in other domestic ruminants. Non-surgical recovery techniques can be applied only to larger wapiti (Cervus elaphus nelsoni) donors. Embryo recovery rates (i.e. fertilised ova recovered relative to ovulations) range from 50-80% in red deer and 0-50% in fallow deer, the latter due largely to poor fertilisation rates (7). Cryopreservation techniques for deer embryos follow similar protocols to those for sheep and cattle embryos.

Recipient synchronisation/transfer: Co-synchronisation of recipients with donors utilises the same techniques as for AI. Transfer of single embryos is by either surgical techniques or, more commonly, laparoscopic transfer into the oviduct or uterine horn ipsilateral to the corpus luteum. Success of ET in deer, measured by surrogate pregnancies per donor, ranges from 3-4 for red deer and 1-1.5 for fallow deer (7), indicating considerable room for improvement in the latter species.

REFERENCES

1. Asher, G.W., Fisher, M.W., Fennessy, P.F., Mackintosh, C.G., Jabbour, H.N., Morrow, C.J. (1993). Anim. Reprod. Sci *33*: 241-265.
2. Asher, G.W., Fisher, M.W., Smith, J.F., Jabbour, H.N., Morrow, C.J. (1990). J. Reprod. Fert. *89*: 761-767.

(3) Asher, G.W., Fisher, M.W., Jabbour, H.N., Smith, J.F., Mulley, R.C., Morrow, C.J., Veldhuizen, F.A., Langridge, M. (1992). J. Reprod. Fert. *9*: 261-273.

(4) Jabbour, H.N., Veldhuizen, F.A., Green, G., Asher, G.W. (1993). J. Reprod. Fert. *98*: 495-502.

(5) Asher, G.W., Thompson, J.G.E. (1989). Anim. Reprod. Sci. *19*: 143-153.

(6) Fennessy, P.F., Mackintosh, C.G., Shackell, G.H. (1990). Anim. Prod. *51*: 613-621.

(7) Fennessy, P.F., Asher, G.W., Beatson, N.S., Dixon, T.E., Hunter, J.W., Bringans, M.J. (1994). Theriogenology (*in press*).