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Effect of eCG dose and ovulation induction treatments on embryo recovery and in vitro development post-vitrification in two selected lines of rabbit does

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Abstract

The aim of this work was to evaluate the effect of different doses of eCG administered subcutaneously (0, 50 and 200 IU) and the hormonal induction of ovulation (GnRH or hCG) on embryo recovery and in vitro development of embryos post-vitrification in two selected lines of rabbit does. The two selected lines were line V (selected for the litter size at weaning) and line R (selected for growth rate). Administration of 200 IU of eCG significantly increased ovulation rate (19.2 ± 1.2 versus 15.5 ± 1.1 and 12.2 ± 1.3 , and the number of haemorrhagic follicles (13.8 ± 1.6 versus 3.8 ± 1.4 and 3.8 ± 1.7), but significantly decreased recovery rate (28.8 ± 6.3 versus 47.7 ± 5.7 and 48.7 ± 6.7 , 200 IU versus 50 IU and 0 IU eCG, respectively), the number of normal embryos recovered per doe with at least one embryo (5.8 ± 0.9 versus 8.2 ± 0.9 , 200 IU versus 50 IU eCG doses) and the in vitro development of embryos post-vitrification (51.9% versus 66.1% , 200 IU versus 50 IU eCG doses, respectively). Inducing ovulation with hCG significantly increased ovulation rate when compared with GnRH (17.3 ± 0.8 versus 13.8 ± 1.4), but no significant differences in embryo recovery and embryo development post-vitrification were observed between the two treatments. No significant differences

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were observed between the two selected lines in ovulation and recovery rates, the number of haemorrhagic follicles and the number of recovered embryos per doe. However, the post-vitrification in vitro rate of development was 59.7% for line R and 51.9% for line V ($p < 0.05$). It was concluded that the use of 50 IU of eCG subcutaneous with hCG or GnRH prior to embryo cryopreservation programmes in rabbits achieves the best results for embryo recovery, with the best development of recovered embryos post-vitrification.

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Keywords: eCG; Ovulation induction; Embryo recovery; In vitro development; Line; Rabbit

1. Introduction

One of the main problems in cryoconservation of oocytes and embryos of farm animals is establishing an abundant source of oocytes and, consequently, embryos. Superovulation is considered to be an efficient economic method for producing additional embryos or oocytes from females of high genetic merit.

In previous studies with rabbits, Kennelly and Foote (1965), Maurer et al. (1968), Joly (1997) and Rebollar et al. (2000) observed a higher superovulatory response to FSH treatment than to eCG treatment. On the other hand, Besenfelder (1991) and Kauffman et al. (1998) reported a higher superovulatory response to eCG treatment than to FSH treatment. Many authors have reported that eCG treatment improves the receptivity of rabbit does (Mirabito et al., 1994; Theau-Clément and Lebas, 1996; Theau-Clément et al., 1998). However, Bourdillon et al. (1992) found a non-significant effect of eCG treatment on receptivity and negative effects on conception rate, fertility and viability rate at birth have been observed (Canali et al., 1991; Alabiso et al., 1994; Maertens and Luzi, 1995).

Higher doses of both FSH and eCG result in the production of a higher numbers of embryos (Kennelly and Foote, 1965; Schmidt et al., 1992; Joly et al., 1996). However, this positive correlation is limited by the induction of the ovary hyperstimulation. Compared with the use of lower levels of hormones, hyperstimulation induces ovulation of a higher number of abnormal and immature follicles (Kim et al., 1988; García-Ximénez and Vicente, 1990; Schmidt et al., 1992), and reduces embryo recovery rates (Kennelly and Foote, 1965; Hafez, 1969; Schmidt et al., 1992). Moreover, cytogenetic defects and chromosomal alterations in embryos may occur (Fechheimer and Beatty, 1974; Pauffler et al., 1975).

Most studies related to embryo cryopreservation in rabbits have focused on technical factors which affect the efficiency of the process, but few comparative studies have been done concerning the effect of animal genotype (Maurer and Haseman, 1976; Vicente and García-Ximénez, 1993; Viudes-de-Castro et al., 1995; García et al., 2000; Vicente et al., 2003). Furthermore, few comparative studies have been carried out on the hormonal treatment used for ovulation induction in relation to embryo recovery and its in vitro and in vivo survival rates in rabbits (García-Ximénez and Vicente, 1992; Viudes-de-Castro et al., 1995; García et al., 2000; Vicente et al., 2003).

The aim of this study was to evaluate the effect of different doses of eCG and the hormonal treatment used for ovulation induction (GnRH or hCG) on embryo recovery and in vitro development of embryos post-vitrification in two selected lines of rabbit does.

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