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Activators of protein kinase A and oxytocin affect rabbit reproduction

Communication

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Abstract: The aim of this study was to examine the effect of activators of protein kinase A - 3-isobutyl-1-methyl-xanthine (IBMX) and dibutyryl cyclic adenosine monophosphate (dbcAMP) – and of oxytocin (OT) on rabbit female reproductive function. We used equine chorionic gonadotropin (eCG) to improve follicular development and rabbit estrous synchronization and human chorionic gonadotropin (hCG) to induce ovulation. In the experimental group, the females were stimulated using gonadotropins together with either IBMX, dbcAMP or OT. In the animals kept until parturition, the conception rate, parturition rate, and numbers of stillborn and weaned pups were recorded. In the animals euthanized 18-19 hours after insemination, the eggs were flushed from the oviducts and cultured up to the blastocyst cell stage. Numbers of corpora lutea, zygotes, morulas and blastocysts were determined. Both dbcAMP and OT, but not IBMX, decreased conception and parturition rate. Both IBMX and OT, but not dbcAMP, decreased pup mortality rate. All three tested substances increased the weaning rate. Both IBMX and dbcAMP, but not OT, increased the numbers of corpora lutea, zygotes, and embryos at morula and hatching blastocyst stages. These observations confirm the stimulatory role of the protein kinase A-dependent signaling pathway activated by IBMX and dbcAMP in rabbit reproduction. OT may decrease pups mortality.

Keywords: *IBMX • dbcAMP • Oxytocin • Reproduction • Conception rate • Parturition rate • Stillborn pups • Embryos*

1. Introduction

Reproduction is an important criterion in economic terms in livestock breeding, as well as in rabbit breeding. In our work we have tried to improve the reproductive parameters in rabbits. Based on these requirements, we chose two substances that have been tested in rabbit reproduction previously (IBMX, dbcAMP) and a hormone (OT) which was not previously tested together with gonadotropin administration.

The involvement of cyclic nucleotides (cyclic adenosine monophosphate (cAMP) and cyclic guanosine monophosphate (cGMP)) and their targets (protein kinases A (PKA) and G (PKG)) in the control of reproductive processes is well documented. Both cAMP [1-5] and cGMP [6,7] play an important role in the control of ovarian cell proliferation, apoptosis, secretory activity, and oocyte maturation and in mediating the effect of hormonal stimulators on these processes. cAMP can mediate the effect of some hormones on oviduct functions too [8-10]. Both cyclic nucleotides are hydrolyzed by the enzymes known as phosphodiesterases (PDEs). Concerning the role of PDEs in control of mice reproduction, the available

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