Felids *(Felidae)* are a biodiverse group of animals that are mostly highly endangered. All Felidae species, excluding the domestic cat, are threatened with extinction in their natural habitat. This situation also applied to our nature populations of lynx *(Lynx lynx)* and wildcat *(Felis silvestris)*. Endangered species conservation programs implemented all over the world are being supported with the latest developments in the assisted reproductive technologies (*Assisted Reproduction Techniques* - ART). Actually, many assisted reproduction methods are tested using the domestic cat model (*Felis catus*) due to widespread availability of this research material because gametes and embryos of wild felids are too valuable to carry out experimental research on them. One of the assisted reproductive technologies, which is important for conserving endangered species of animals, is the *in vitro fertilization* (IVF), which makes it possible to have offspring without time or place limitations, even many years after the death of the animal. However, in the case of the domestic cat, the efficiency of IVF is low, compared to other animal species. It is possible to obtain 50% of embryos, 20% of which are blastocysts. Therefore, it seems essential to conduct detailed studies in order to determine the occurrence of morphological defects and chromosomal aberrations in cat embryos, as well as to define their developmental potential, so as to enable the creation of optimal criteria to select embryos for embryo transfer.

Hence, the purpose of the project is to analyse the developmental potential and chromosomal aberrations of cat embryos after *in vitro fertilization*, based on the timing of first cleavages and the occurrence of developmental defects.

The research hypothesis involves the presence of chromosomal aberrations and the incorrect timing of cleavages in improperly developing embryos.

The most common morphological defects occurring in embryos are: cytoplasmic fragmentation, direct cleavage, reverse cleavage and vacuoles within the cytoplasm. The visual representation of morphological defects will be possible thanks to the using of a modern system of monitoring embryo development in real time (time lapse – *Primo vision*).

To carry out the research, the ovaries of female cats, which are obtained during routine surgical sterilization in vet clinics, will be used. Next, oocytes collected from the ovaries will be subjected to *in vitro maturation* (IVM). Mature oocytes will be fertilized using frozen semen, then cultured *in vitro* and monitored in the time lapse system. The monitoring will make it possible to establish the following parameters: time of the first cleavage, time of the formation of the blastocyst cavity, the beginning of the blastocyst hatching, number and duration of collapse, frequency and time of the occurrence of particular developmental defects, as well as the interdependence between the occurrence of defects and the ability of embryos to reach the blastocyst stage and blastocyst hatching.

Embryos at the blastocyst stage or embryos in which within 24 hours further cleavages have not been observed, will be subjected to the effects of colchicine in order to stop cell divisions at the metaphase stage. Six hours after colchicine has been added, the embryos will be transferred to the microscope slide, subjected to the effects of hypotonic solution and preserved using Carnoy's solution. In order to distinguish chromosomes, the preparations will be stained using Giemsa's solution. Clear metaphases will be archived by means of a computer program, which will be followed by *fluorescent in situ hybridization* (FISH), with probes specific for sex chromosomes and chosen autosomal chromosomes, enabling the precise identification of cells with an incorrect set of chromosomes (haploid, polyploid and aneuploid).

The analysis of obtained data will make it possible to determine the frequency of occurrence of chromosomal aberrations in cat embryos, depending on their morphokinetics and morphology, becoming a valuable selection tool in the context of increasing the efficiency of embryo transfer. Greater knowledge concerning the genetic quality of domestic cat embryos as a research model will enable a more effective application of gametes derived from felids, consequently increasing the number of pregnancies and improving the health of offspring in terms of genetic aspect. The choice of the most promising embryos for embryo transfer will have influence on improving the efficiency of assisted reproductive technologies in the protection of the Felidae species, which are threatened with extinction.