Advantages of artificial insemination on industrial poultry egg fertilization: Meta-analysis of published articles till 2022

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Objective: Artificial insemination has been a landmark procedure in improving animal agriculture over the past 150 years. Since the 1950s, AI has been used in commercial poultry production, initially in Australia and followed by the USA. AI technology use in poultry production has enabled the immediate dissemination of genetic material from a short number of superior males to a high number of females. AI can obtain excellent fertility in poultry compared to natural mating. Successful application of this technique needs acceptable quality semen that should be inseminated very close to the sperm storage tubules in the female to obtain optimum fertility in chicken. The efficiency of Al in poultry depends on the dose of sperm, sperm quality, motility, and inseminating activity of spermatozoa. This analysis seeks to determine the effects of artificial insemination applied at different times on fertilization in industrial poultry breeding.

Materials & Methods: Three databases (Google Scholar, PubMed, and Scopus) were searched for published articles on Al techniques and their effects on egg fertility in different poultry species from 2019 to 2022. Twenty-two related articles with complete abstracts were included in this study.Data were analyzed with artificial intelligence software R version 4.2.1. The confidence interval in this article is 95%.

Results & Conclusion: Higher fertility of eggs is because the new environment contributes to the preservation of the fertilizing ability of sperm, not only in vitro but also in the oviduct of females. The proposed biotechnological environment allows us to extend the collection of hatching eggs after each insemination and increase the intervals between subsequent insemination by 1-2 days. This reduces the number of insemination and reduces labor costs in obtaining incubation eggs by 10−15%. Dilution of the low and dense volume of avian semen is essential for handling and storage, and chicken semen typically requires a two to three-fold dilution. Collected samples should be preserved at 2-8°C for avian species, ideally with turkey sperm stored at 4-8°C and chicken semen at 7-8°C for suitable fertility. Dilution of sperm provides fertilizing ability in the genital tract of females of all types of poultry by extending the viability of sperm and reducing their enzymatic constant.Artificial insemination (AI) may provide a viable solution to improve fertility while reducing the number of males on farms by inseminating a more significant number of females with semen from fewer strongly selected males.

Keywords: Artificial insemination, poultry, breeding, egg, fertility.