Sperm-egg penetration assay assessment of the contraceptive effects of glycerol and egg yolk in rooster sperm diluents


Abstract:

Abstract Glycerol (GLY) and egg yolk (EY) are good cryoprotectants of avian and mammalian sperm, but in birds, they strongly inhibit the eventual fertilization of ova. Using the sperm penetration (SP-holes) assay and fertility trials, the present study investigates (1) the possible mechanism by which this contraceptive effect occurs in chickens and (2) the maximum concentrations of GLY and EY tolerated by fresh rooster sperm. Seventy Black-Barred Andaluza hens (five per treatment) were inseminated four times (twice per week) with 0.1 mL of fresh semen from roosters of the same breed diluted 1:1 (v:v) with Lake and Ravie medium containing different concentrations of GLY or EY. No adverse effects on acrosome integrity, sperm motility, or viability were seen with any concentration of GLY or EY. The number of SP-holes on perivitelline layer samples taken from above the germinal disc became progressively lower at GLY concentrations of 1.5% or greater (P > 0.05). No holes caused by sperms were seen in unfertilized eggs. The corresponding fertility results showed similar reductions when the GLY concentration was 1.5% or greater. No changes in the number of SP-holes were seen with increasing EY concentrations (0%-7.5%), nor were any differences in fertility observed, except for a reduction when 15% EY was used. The results therefore reveal that GLY affects the transit of sperms through the oviduct in their attempt to reach the infundibulum area, limiting their access to the ovum perivitelline layer. Egg yolk had no such effect, nor did it influence acrosome reaction capacity; its mechanism of contraceptive action therefore remains unknown. The maximum GLY and EY concentrations tolerated by the rooster sperm were 0.75% and 7.5%, respectively. Copyright © 2015 Elsevier Inc. All rights reserved.

Keywords:

Artificial insemination; Chicken spermatozoa; Contraception; Cryoprotectant

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