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Semen donor selection by in vitro sperm mobility increases fertility and semen storage in the turkey hen

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Commercial turkey production relies on the artificial insemination (AI) of pooled semen. However, semen quality ultimately depends on the quality of individual ejaculates. The purpose of this study was to evaluate semen from individual toms by means of an objective sperm-mobility assay. Semen was then pooled by mobility phenotype and inseminated into hens, and the percentages of fertile and hatched eggs were determined after egg incubation. To indirectly evaluate hens' sperm storage, we determined the number of sperm holes in the perivitelline layer (PL) of freshly laid eggs. Semen from individual ejaculates (two trials, total of 169 toms) was evaluated by use of the sperm-mobility test (SMT). Semen was diluted to 1 x 10(9) sperm/ml, in prewarmed N-tris-[hydroxymethyl] methyl-2-amino-ethanesulfonic acid (TES)-buffered saline, and was placed over 3 ml of a 2% (w/v) Accudenz solution at 41degrees C. After a 5-minute incubation period, the cuvette was placed in a densimeter, and percentage transmission was recorded after 1 minute. Semen samples from toms ranked, according to sperm mobility, in the highest 10% and the lowest 10%, after three evaluations, were pooled by group and were used to inseminate hens weekly (trial 1: n = 20 hens/group, for 10 weeks, AI dose 150 x 10(6) spermatozoa inseminated fresh and after 24-hour in vitro storage at 5 degrees C; trial 2: n = 60 hens/group, for 16 weeks, AI dose = 75 x 10(6) spermatozoa inseminated fresh). Each week, eggs from day 6 post-AI were evaluated for holes in the PL, vestiges of acrosomal induced hydrolysis. Spermatozoa from toms of different mobility phenotypes were also evaluated individually, for sperm chromatin structure and motility variables, by use of the Hobson Sperm Tracker. Toms characterized by high and low in vitro sperm-mobility phenotype were categorized as "high mobility" and "low mobility," respectively. The percentage of fertile eggs from hens inseminated with semen from the high-mobility toms was higher than the percentage of fertile eggs from the low-mobility group, in each trial (95.8+/-1.3% vs. 90.4+/-2.2%, and 88.7+/-4.0% vs. 82.4+/-0.4%, trials 1 and 2, respectively; $P < 0.05$). More sperm holes were observed in the PL of eggs fertilized by the high-mobility toms than in the PL of eggs fertilized by the low-mobility toms ($P < 0.05$). No differences in susceptibility of sperm nuclear DNA to denature in situ, as measured by the flow-cytometric sperm chromatin-structure assay, were detected between toms of differing mobility phenotypes. Sperm-motility variables, straight-line velocity, and average-path velocity were significantly greater for high-mobility toms compared to

low-mobility toms ($P < 0.05$). Sperm-mobility differences between toms (detected by means of the SMT) influenced sperm storage, as indicated by the number of sperm in the PL and by the percentage of fertile eggs produced.

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