Sperm fertility parameters in male dogs have largely been derived from research performed in other species. Age-related changes are expected to occur as dogs mature, affecting the overall fertility of the animal. Our objectives with this study were to 1) establish baseline parameters of fresh semen for a healthy population of actively breeding stud dogs with known fertility, and 2) compare semen quality between different age groups of studs. We hypothesized that older dogs have decreased fertility and semen quality in their ejaculates, as compared to younger dogs. A breeding group of Labrador retrievers (n=39; age range 1-10 years) were subdivided into three groups: young (Y, 1-3 years; n=21), middle-aged (M, 4-6 years; n=13), and senior (S, >7 years; n=5) for comparison. Lifetime conception rate and average number of puppies per litter were documented for each dog. Two semen collections from each dog were acquired using manual collection and fractionation. An aliquot of each sperm-rich fraction was extended 1:1 (semen:extender; AndroPRO ChillGuard, MOFA Global, Verona, WI) and transported at 24°C to the laboratory. All samples were evaluated within six hours of collection. Each ejaculate was evaluated for total motility, progressive motility, and velocity of the average path (VAP) using computer assisted sperm analysis (SpermVision, MOFA Global, Verona, WI). Morphology was evaluated using eosin-nigrosin stain. An additional aliquot, extended 1:3, was slowly chilled to 4°C and warmed 48 h later to 24°C for analysis with flow cytometry using dihydroethidium (DHE) and BODIPY fluorescence probes to evaluate cellular oxidation and membrane lipid peroxidation, respectively. All data were analyzed using mixed effects models. Post-hoc multiple comparisons were conducted. Significance was set at p<0.05. No differences were noted between the two ejaculates from each dog. Significant differences in sperm velocity existed among all age groups, with velocity decreasing as age increased (Y>M>S). Percent morphologically normal sperm was significantly lower in older dogs (S<Y&M). No differences were noted in total motility, progressive motility, superoxide anion production, membrane lipid peroxidation, conception rate, or average litter size between any age groups. In this population of dogs, fertility does not appear to decrease with age, though sperm velocity and normal morphology decrease with age. To our knowledge, this study is the first to evaluate semen and fertility parameters as they relate to canine age. The use of advanced laboratory tests to evaluate sperm parameters beyond the classic motility, morphology, and concentration may open the door to more specific and sensitive fertility tests in canine reproduction.

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Keywords: Canine sperm, male fertility, reproductive senescence