Long-term effects of clinical applications of pyrethrin and cyfluthrin, a synthetic pyrethroid, on bull reproductive parameters

College of Veterinary Medicine, University of Illinois at Urbana-Champaign, Urbana, IL

Effective fly control is crucial for cattle health and well-being; however, pyrethrin and pyrethroid insecticides can impair semen quality and inhibit testosterone production in mammals. Previous experiments demonstrated pour-on, ear tag, and spray applications of pyrethrin and pyrethroid insecticides had no effects on bull semen quality in the short-term (zero to nine weeks). However, spray applications of these insecticides decreased serum testosterone concentrations at nine weeks, suggesting potential detrimental effects on reproductive parameters if used long-term. The objectives of the current study were to determine the effects on bull reproductive parameters of pyrethrin and beta-cyfluthrin spray applications, used at labeled dosages over 18 weeks, in combination with cyfluthrin pour-on and ear tags. Our hypothesis was that addition of spray applications would negatively impact reproductive parameters in bulls after nine weeks. Angus, Simmental, and Angus x Simmental bulls (n = 27) were randomly assigned to one of three treatment groups: (1) no exposure to pyrethrins/pyrethroids (CONT; n = 10), (2) fly tags and pour-on (TRT1; n = 9), or (3) fly tags, pour-on, premise spray, and fog spray (TRT2; n = 8). The TRT1 and TRT2 bulls were treated with Cylence® pour-on (active ingredient cyfluthrin; 1%) at the labeled dose every three weeks and had two Cylence Ultra® fly tags (active ingredients beta-cyfluthrin; 8% and piperonyl butoxide; 20%) inserted, one in each ear, at week 0. Bulls receiving TRT2 also had Tempo® premise spray (active ingredients beta-cyfluthrin, cyano and methyl 3; 11.8%) applied to their barn once weekly and a fogging spray (pyrethrins; 0.5% and piperonyl butoxide; 4%) applied to the bull once daily at labeled dosages. Body weight (BW), body condition score (BCS) and scrotal circumference (SC) were assessed on weeks 0, 9, and 18. Semen was collected every three weeks via electroejaculation and assessed, using computer-assisted semen analysis, for overall and progressive sperm motility, and morphology. Whole blood, as a source of serum, was collected from the tail vein at approximately the same time every three weeks, and serum testosterone concentrations were measured by RIA. Data were analyzed using the MIXED procedures in SAS with repeated measures for sperm motility, sperm morphology, serum testosterone, and BW. There was a treatment x week interaction (P < 0.01) for sperm with primary defects; bulls in CONT group had a greater (P = 0.01) percentage of sperm with primary defects than bulls treated with insecticides at week 18. Overall and progressive sperm motility, normal sperm morphology, and serum testosterone concentrations changed (P < 0.01) over time in all bulls; however, treatment group did not affect (P ≥ 0.25) any of these parameters. There were also no treatment effects (P ≥ 0.14) on bull BW, BCS, and SC. The use of pyrethrin and cyfluthrin based insecticides, regardless of application, did not alter reproductive parameters in beef bulls when administered over 18 weeks.

Key words: Cattle, pyrethroid, reproduction, semen quality, testosterone