Exercise Management for the Prevention of Humeral Stress Fractures

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Modification of Thoroughbred racehorse training programs has potential for reducing incidence of complete humeral fracture. Authors’ addresses: Orthopaedic Research Laboratories, University of California, Davis, Sacramento, CA 95817 (Ferullo); J.D. Wheat Veterinary Orthopedic Research Laboratory, University of California, Davis, CA 95616 (Stover); and Biomedical and General Engineering Department, California Polytechnic State University, San Luis Obispo, CA 93407 (Hazelwood); e-mail: jrferullo@ucdavis.edu. © 2008 AAEP.

1. Introduction
Complete humeral fractures are associated with lay-ups interspersed with high-speed exercise.1 Fracture risk during the first 20 days after a lay-up is greater than at other times in a racehorse’s career.2 We hypothesized that length of lay-up and distribution of high-speed activities affect humeral damage and thus fracture risk.

2. Materials and Methods
Bone damage resulting from re-initiation of training after a lay-up was compared between two different lengths of lay-up using finite element modeling and exercise simulation techniques. Damage was also compared between a training program that included one high-speed gallop a week and a program in which the high-speed gallop was split between 2 days a week.

3. Results
Greater damage occurred at the stress fracture site than at a diaphyseal site. Humeral damage was lower after return to training after lay-up with a longer lay-up and with high-speed exercise split over 2 days a week.

4. Discussion
Greater damage observed at the stress fracture site compared with the diaphyseal (control) site confirmed that the damage environment resulting from the model is similar to that seen in vivo.3 Damage levels found after lay-up are consistent with results of an epidemiologic study that found the highest injury incidence after lay-up.1 Long lay-up was less harmful than short lay-up. Two short-distance high-speed events were less harmful than one, long-distance high-speed event. Hence, modified training may reduce humeral stress fractures.

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References
1. Carrier TK, Estberg L, Stover SM, et al. Association between long periods without high-speed workouts and risk of complete humeral or pelvic fracture in Thoroughbred race-
