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Furosemide Study Discussed at AAEP Convention

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Exercise-induced pulmonary hemorrhage (EIPH), or bleeding into the airways, is an "extremely prevalent condition associated with high-intensity exercise in horses," according to Paul S. Morley, DVM, PhD, Dipl. ACVIM, professor of clinical sciences at Colorado State University. At the 2009 American Association of Equine Practitioners Convention, held Dec. 5-9 in Las Vegas, Nev., Morley discussed the landmark study he conducted on the effects of furosemide, marketed as Salix for horses (but also called Lasix in humans), with co-investigators Kenneth W. Hinchcliff, BVSc, PhD, Dipl. ACVIM, professor and Dean of the Faculty of Veterinary Science at the University of Melbourne, Australia; and Alan J. Guthrie, BVSc, PhD, Director of the Equine Research Centre at the University of Pretoria in South Africa.

The study's impending publication in the *Journal of the American Veterinary Medical Association (JAVMA)* was announced in June 2009, at which point it gained massive attention even in non-horse media such as the *New York Times*. The study, previously discussed on TheHorse.com and published in the July 1, 2009, issue of JAVMA, unequivocally answered the question: Does furosemide reduce the incidence of EIPH in horses? The randomized, placebo-controlled, blinded, cross-over field trial proved beyond doubt that furosemide does reduce the incidence and severity of EIPH in racehorses.

Investigators found that giving furosemide before racing reduced a horse's odds of having any EIPH at all by 3.3-4 times. As for EIPH severity, furosemide reduced a horse's chances of bleeding at a grade 2 or higher level (shown to impair performance in previous research) by 6.9-11 times. Nearly 68% of horses that had EIPH when not on furosemide had at least one grade of improvement in their EIPH on furosemide.

A number of convention attendees participated in the question/answer session following the presentation, and the first question was probably the first on many minds: Did the horses run any faster on furosemide? The short answer was: We didn't design the study to show that. Why? Morley explained that there were a number of reasons why performance data was not included in the study:

Statistical significance Good research only lends weight to results if they have statistical significance, and large studies are needed to detect statistically significant differences between study groups if the differences are small. Unfortunately, large studies on horses are very difficult and expensive to conduct. Morley explained that while they were able to show statistical significance in EIPH incidence and severity with 167 horses, it would take far more horses to detect statistically significant differences in racing times on furosemide, particularly if those differences were small.

"To detect a half-second difference in race times, we would need 1,196 horses to run twice under the same study design," he noted. "To detect a 0.4-second difference, we'd need 2,692 horses. If we published performance data out of this 167-horse study, it would be almost impossible to find any realistic, significant difference between running on furosemide and not, so we would have to say there's no statistically significant difference, and then we're in the same position we want to avoid (not enough horses to definitively answer the question)."

Race times Accurate race times of every horse in every race would have to be recorded, not just the winning time.

All-out efforts Every single horse must race to the absolute maximum of his ability for the entire race (both races). "Often if you're running in 8th place, you'll pull up some to save the horse, and for a study on performance data you couldn't do that," Morley explained.

"We have been criticized by some for not designing this study to look at performance," said Morley. "But you can see how much time and money went into designing it for what we did; we just could not make it big enough to

look at performance."

Above sea level? Another question concerned the altitude of the track used for the study, and whether Salix would have the same effects at higher-altitude tracks. That question remains unanswered, although Morley did note that lower incidences of EIPH have been observed at coastal (near sea level) tracks compared to those at higher altitudes.

More discussion centered around the legality of using furosemide in various countries and racing jurisdictions; many North and South American countries allow it at least in some jurisdictions (and nearly all horses in those jurisdictions will race on it), while most other countries do not. There appears to be a tough line to walk between not allowing medications that might enhance performance (especially under a zero-tolerance policy) and allowing medications that may improve horse welfare, but might be performance-enhancing.

**Readers are cautioned to seek the advice of a qualified veterinarian
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