

Study Reveals Thyroxine Detrimental to Racing Performance and Horse Health

Responding to research needs of the Ontario racing commission (now AGCO), a recent study led by Dr. Janice E. Kritchevsky at Purdue University College of Veterinary Medicine, reveals use of thyroxine supplementation is deleterious to racehorse's performance and may result in cardiac arrhythmias. Researcher Dr. Janice E. Kritchevsky was selected by the Equine Guelph research committee in collaboration with AGCO support.

Kritchevsky explains, "thyroid issues are actually rare in horses." Blood thyroid hormone concentrations outside the normal ranges that are seen on blood tests can lead one to believe hypothyroidism may be the cause of a horse looking a little lethargic. However, abnormal thyroid hormone concentrations can occur after a high grain diet meal, after trailering fatigue, training stress, or if horse has a sickness (e.g. flu). In actuality you could make matters worse for a horse fighting a cold by supplementing with thyroid medication as it can compromise the equine's natural response to infection.

Horses that benefit from thyroid hormone supplement tend to be suffering from Equine Metabolic Syndrome (EMS) or insulin resistance. Over conditioned (obese) horses, at risk for laminitis, should undergo more than just a one-time blood test to determine whether a thyroid condition is the cause. A function test gives more conclusive results. In a function test, both T4 and T3 are measured in the blood, then the horse is given a thyroid-releasing hormone. If the thyroid doesn't change at this point, then there is an issue. It is the same test that is performed for Pituitary Pars Intermedia Dysfunction (PPID). Kritchevsky adds, "In the case of over conditioned horses, thyroxine supplementation is to be used only until the horse reaches a normal body weight."

The misconception over thyroxine supplement use among horse owners and trainers may stem from the initial reaction to the drug, which can cause a flat or less spirited horse to appear more alert and hypersensitive. In Kritchevsky's study using fit Standardbreds, they did find a behaviour change after administration of Levothyroxine. The horses became quite alert and more difficult to handle but then they fatigued quicker.

When given a .25mg/kg dose of Levothyroxine, horses actually went to maximum heart rate quicker. The horse's level of lactate did not change post-exercise, which told the researchers that they had the same level of fitness. The drug was not performance enhancing. In fact, four out of the six horses in the study developed spontaneous cardiac arrhythmias when on Levothyroxine and one developed atrial fibrillation. Atrial fibrillation is a serious performance limiting condition that can be career ending. Horses suffering from atrial fibrillation have been treated with [TVEC, a procedure pioneered at the University of Guelph](#).

One purpose of the study was to determine whether supra-physiologic doses (doses above naturally occurring levels) of levothyroxine increase resting T4, free T4 and T3 blood concentrations and whether they affect response to **thyrotropin releasing hormone** (TRH) in healthy horses. Administration of levothyroxine increased resting concentrations of all measured hormones in a dose-dependent manner.

Supra-physiologic thyroxine supplementation produces significant alterations in the thyroid gland's ability to respond to TRH stimulation. This suggests that the hypothalamic-pituitary-thyroid axis is down-regulated by exogenous levothyroxine administration.

Kritchevsky thanks Equine Guelph and AGCO for providing the lion's share of the funding for this important research on thyroxine supplementation. This research was done in response to reports of open containers of thyroxine supplement that were observed during barn visits as part of out of competition testing by ORC (now AGCO). Elevated blood concentration of thyroxine has been documented on numerous occasions on post-race blood testing of horses from Ontario tracks.

Kritchevsky says, "This is an important problem anywhere! People are using thyroid supplement and it does not do what they think it is doing. This research is important for all, including racing commissions. While thyroxine is not a foreign substance, as this study indicates, high levels render the horse unfit to race."

Some officials believe thyroxine should be regulated and next steps in research may include developing an assay to test for a carrier protein that is excreted indicating a high thyroid.