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Michigan Office of Racing Commissioner UNDERSTANDING TCO₂ TESTING

THE TCO₂ TESTING PROCESS

Testing for Total Carbon Dioxide (TCO₂) in race horses has been conducted by the Office of Racing Commissioner (ORC) on Michigan's racetracks for many years as part of the ORC's larger equine drug testing effort. In the past, blood samples were tested for TCO₂ at the Geagley Laboratory in East Lansing. Most recently, in December of 2008, the ORC began *on-site pre-race testing* for TCO₂, using an instrument called a Radiometer.

The Radiometer is a sophisticated and highly reliable instrument used widely in the medical field to monitor blood gases of human patients undergoing open heart surgeries and other critical-care procedures where there is no margin for error. The Radiometer is also in more narrow use by a number of state racing commissions to test for elevated TCO₂ levels in race horses.

Typically, blood samples are drawn just prior to each race and tested immediately for TCO₂. Testing is not intended to be random. In general, ORC Veterinarians are directed to test horses designated in the program as "favorites," because they are the most likely to place "in the money," but the ORC has the latitude under the Racing Rules to test any horse at any time.

Those horses found with an "overage" of TCO₂ above the published allowable threshold of 37 millimoles are scratched from the race and the trainers referred to the stewards for a hearing.

As of April 10, 2009, the ORC has conducted over 2700 TCO₂ pre-race tests using the Radiometer. Of the 2800 horses tested, there have been only 19 overages (less than one percent). Of those 19 overages, 17 were first time pre-race testing violations. Only two were repeat pre-race testing violations involving the same trainers.

PURPOSE OF TCO₂ TESTING

TCO₂ testing is intended to limit the unfair influence of elevated levels of TCO₂ on competition in the horse racing industry. Elevated levels of TCO₂ in horses are considered by many to have a performance-enhancing effect in horse racing by countering the naturally-occurring buildup of lactic acid that takes place during vigorous exercise, thereby limiting fatigue and increasing endurance.

Although there are a variety of factors that can lead to elevated TCO₂ levels in a horse, ***the Radiometer can only test for the level of TCO₂, not for "baking soda" or whatever other factors may have caused an elevated level.*** For that reason, a TCO₂ "overage" does not necessarily imply that a trainer has "milkshaked" a particular horse, but simply that the horse tested had an elevated level of TCO₂ in its system at the point in time when it was tested.

FACTORS TO CONSIDER REGARDING TCO2 LEVELS

Carbon Dioxide (CO₂) is a naturally occurring component in the blood of all living things, including horses. The Total Carbon Dioxide (TCO₂) level in a horse's blood at any given time is a function of the acid/alkaline "pH" balance in the horse, and that balance can be affected by a number of factors, including Lasix, medications, supplements, feed, dehydration, etc. *An alkaline pH will lead to an elevated TCO₂ level.*

Regardless of the cause of an elevated TCO₂ level, it will affect performance and, if over the published threshold, is a violation of the rules. Part of a licensed trainer's responsibility under the Racing Rules is to know 1) what substances (feed, medication, supplements, etc.) he or she is putting into the horse, 2) what effect those substances will have on the horse's overall health and its fitness for racing, and 3) when those substances may be used and when they should be withdrawn. (R431.1301 prohibits the administration of a "drug or foreign substance" between entry and race time, without the approval of the ORC.)

There are a number of factors a trainer should consider that can affect a horse's TCO₂ level at the time of testing, including the following:

Lasix: Administration of Lasix may influence the TCO₂ level and trainers may wish to consider adjusting the Lasix dosage and/or time of administration. Most studies of Lasix and TCO₂ levels are based on administration three to four hours before testing.

Dehydration: Depending on the cause, dehydration may lead to metabolic alkalosis, which could result in an elevated TCO₂ level. Decreased water consumption due to cold weather or deliberate withholding of water for long periods of time could have the same effect.

Supplements: Any supplements that could alter the acid/base (acid/alkaline) balance of the horse can affect TCO₂, primarily those containing bicarbonate, citrate and acetate.

Medications: Any substance that acts as an alkalinizing agent, or any substance that buffers or counteracts acid can raise TCO₂. Examples would include buffers, antacids and anti-ulcer medications.

Feed: Diets that are termed as having a high *cation-anion balance* (CAB or CAD) may increase TCO₂ levels. For example, alfalfa and soybean meal have a high CAB value.

Electrolytes and Salt: Some electrolyte formulations contain bicarbonate or other alkalinizing agents. Some experts believe that high levels of salt and electrolytes combined with limited water consumption can cause alkalosis, resulting in an elevated level of TCO₂.

Questions about these and other factors that could affect TCO₂ levels should be directed to your ORC-licensed veterinarian.