

Responses of hematological parameters, beta-endorphin, cortisol, reactive oxygen metabolites, and biological antioxidant potential in horses participating in a traditional tournament¹

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ABSTRACT: Several concerns have been raised over the health of animals used in equestrian games that have their origins in historical or religious events and are currently held in many countries. This study investigated physiological stress response and health status of horses participating in the Sartiglia, a historical horse tournament held in the city of Oristano, Italy, which is principally based on the attempts of masked horsemen at a gallop to run a sword through a hole in a suspended silver star. Blood samples were collected from 21 horses the day before the tournament (D0), during the tournament (D1), and the day after the tournament (D2). Samples were analyzed for complete blood count and biochemical, hormonal, and oxidative stress assays. Data were analyzed using the mixed effect model with sampling session as one of the fixed effects. On the whole, blood parameters evidenced an optimal health status of horses at D0. Significant dehydration and increase of circulating glucose, enzymes, cortisol, and β -endorphin were

registered at D1 ($P < 0.001$) with a complete recovery of physiological values just at D2. The reactive oxygen metabolites (d-ROM), from which the oxidant activity can be evaluated, showed an increase from D0 to D1 and D2. Concentration of biological antioxidant potential, which measured the antioxidant capacity, was characterized by the maximum level registered during the tournament and counteracted the simultaneous increase of d-ROM. It can be hypothesized that the tournament played an important role in causing high levels of oxidant markers not only because of the physical exercise represented by the gallop but also because the emotional stressors. In conclusion, the tournament caused significant changes of most parameters, which rapidly recovered to baseline values within the day after. These data will certainly be useful for a future implementation of tests in equine medicine and for the improvements of knowledge of changes of blood parameters and health of horses in similar tournaments.

Key words: blood parameters, horse, oxidative metabolism, sport event

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doi:10.2527/jas2014-8341

INTRODUCTION

The current global economics crisis has produced a “growing horse crisis” characterized by continuous reductions of animal management costs (Yoder et al., 2011) and double the number of neglected and unwanted horses (Lenz, 2009; Holcomb et al., 2010). In many countries, equestrian games and tournaments that have their origins in historical and religious events represent an alternative use of horses other than in official trot, gallop, and show jumping competitions.

The Sartiglia is a historic horse tournament that takes place since the 16th century in the city of Oristano, Sardinia, Italy, during the celebration of the Carnival (Sartiglia Foundation, 2013). The origins of this tournament are in the numerous races of chivalry that took place during the Crusades in Medieval Europe.

Several concerns have been raised over the use of animals in such equestrian tournaments. To date, no study has examined the effects of these events on horses, which have to face different demands in comparison with official sport events as show jumping and race courses. Grouping with other unknown horses, loud and crowded places, and other distinctive features of such events should be taken into consideration as possible stressors that could affect horses. The absence of specific studies on this particular and other historical events justifies the need to evaluate physiology changes and the health status of horses during traditional tournaments.

Some approaches are available in the literature to measure alteration of physiological and endocrine responses in horses after competition (Gordon et al., 2007) or transportation (Baucus et al., 1990; Stull and Rodiek, 2000) and the possible effects on animal health and welfare. Moreover, a large number of scientific papers have recently investigated the effect of oxidant/antioxidant equilibrium on physiological and pathological conditions of horses (Kirschvink et al., 2008; Williams, 2008; Williams et al., 2008).

The objective of this study was to investigate physiological stress response of horses participating in the Sartiglia and the effect of the tournament on the variation of blood parameters used as markers of the animal health status.

MATERIALS AND METHODS

As regards the Sartiglia, the tournament takes place with the observance of international and national laws concerning the health and welfare of horses. Protocols used for the trial were approved by the Veterinary Committee of the Sartiglia Foundation (approval number 025/2012) and all blood samples were collected by experienced veterinarians. Horses were included in this trial with the agreement of the respective riders and owners, who decided to join the study on the voluntary basis.

Tournament, Animals, and Sampling

The study was conducted during the 2012 edition of the Sartiglia. The design of the study and the data and samples collection were planned in accordance with the different phases and the traditional succession of events.



Figure 1. The masked horsemen at a gallop during the attempt to run a sword through a hole in a suspended silver star (courtesy of Sartiglia Foundation archives).

Each year, 120 horsemen participate in the Sartiglia with their horses, in the presence of about 120 thousand spectators (Sartiglia Foundation, 2013). The tournament is performed 2 times per year during the celebration of the Carnival in a sinusoidal racing course of about 400 m, prepared in the city center by strewing the streets with a compacted bedding sand layer. The Sartiglia is principally based on the attempts of masked horsemen at a full gallop to run a sword through a hole in a suspended silver star (Fig. 1). Horses are warmed up before the competition and it takes approximately from 25 to 30 s for a horse to complete the race. Each horseman is allowed to make only 1 attempt for each edition of the Sartiglia. All horses and related horsemen are at rest on the race course while waiting to make their own attempt, and the duration of the whole tournament is about 3 h (from 1400 and 1700 h). The horses participating in the Sartiglia are commonly trained for 3 mo, and the training is based on gradually increasing light exercises (10-min warm up and alternation of walking, trotting, and gal-

¹The authors gratefully thank the “Fondazione Sa Sartiglia Onlus” (Sartiglia Foundation) and “A.S.D. Cavalieri Sa Sartiglia” (Sartiglia Horsemen Association). M. Pazzola since 2014 and G. Sedda since 2010 have been voluntary unpaid members of the Veterinary Committee of the Sartiglia Foundation. None of the authors has any financial or personal relationship that could inappropriately influence or bias the content of the paper.

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Received July 31, 2014.

Accepted January 22, 2015.