Performance factors : the physical aspect

Performance factors are essential in top level sport, but they are not very well known in equestrian sports. However it rapidly becomes apparent that physical, technical, tactical, mental, social factors and « luck » are all a part of the mix contributing to success. From some examples taken from the discipline of eventing, this fact sheet is an aid to a personal reflexion on making sure all the conditions are present in the planning and preparation of the season to come.

After the general considerations, this first part will focus on the physical aspect, the first element contributing to performance.

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Technical level

Thibault Valette and QING DU BRIOT , competing at the Olympic Games in Rio (2016) © EKL

Introduction

Performance is not only the result of a technical demonstration by horse and rider; it occurs in very specific conditions, where all the components are not always totally controlled by the athlete. Numerous other elements can either make a successful performance or, on the contrary, contribute to thwarting an expected performance, or not reiterating a performance, which then becomes a «stroke of luck ». The aim of this fact sheet is to raise awareness of the different factors so that they can be integrated into scheduling the coming season right from the start, and in planning the goals to achieve for the season.

To quote the title of Lt Col Agotson L D'ENRODY' s book : « Give your horse a chance », let us give our horses a chance, through analysing all the components of performance.

Factors of performance- general considerations

Typically, performance factors involve the following elements :

- **Physical factor** : this includes optimising physiological (metabolic, energetic, cardiovascular) and muscular aptitudes for the effort to be made. General health will also be included.
- **Technical factor** : This includes the quality of gestures related to the sport, technical accuracy, speed of execution, and the capacity to repeat them and the quality of movement.
- **Technical-tactical factor** : This consists in analysing a given situation instantly, and being able to implement a stategy or a response, to cope with a time scedule, and to have an acute knowledge of the rules and the other competitors.
- **Mental factor** : This includes self confidence, will power, emotional control, capacity to concentrate, to take risks, to surpass oneself, to sometimes accept pain, to be agressive, the desire to win, and to enjoy oneself.
- **Social factor** : This is the influence of the social and relationship context on performance ; that of trainer/ athlete, the group, family and sentimental relationships and general lifestyle.
- **« Luck » factor, or the « uncertainties » of a competition environment** : This is unpredictable by definition, but one should be ready to grab a chance, or to counteract a situation which appears less favorable than expected. These « hazards » include weather conditions, the level of the competitors, the order of running, judging mistkes, injuries or withdrawal of team members, or of other competitors…

Even if the social factor is often considered as possibly contributing to counter-performances, the other factors, except physical and technical fators, can weigh differently in the balance depending on the individual, and on the discipline.

In our sport, where victory is a partnership of two athletes, performance factors for both horse and rider must combine to be successful ; it is quite rare to come across qualities which will compensate for any lackings, and very often the weak link will have the most influence on a counter-performance.

Each of the factors will now be examined in the context of equestrian sports, and more specifically in eventing.

Physical aspect

The challenge in eventing is to prepare both horse and rider for the physical effort to be made over three successive tests. Cross country day should not therefore draw on their reserves, so that on the final show-jumping day tiredness will not impair their performance. Training should prepare them to face these constraints, to get the horse and rider into a « routine » so that both are efficient, and lucid throughout the competition. In this triatheletic performance, it means rational management of effort throughout the competition, and optimisation of required capacities, more than a real intrinsic performance or attempt to break a record.

This physical aspect is influenced by physiological (metabolic, energetic, and cardiovascular) and muscular (suppleness, elasticity, strength, muscle tone) aptitudes to deal with effort. It often seems that training tends to neglect one or several of these components to concentrate solely on technique.

Physiological aptitude

Metabolic, energetic and cardiovascular aptitudes can be defined as the capacity to maximise all the functional elements which contribute to movement, to contraction, to precise gestures...They supply oxygen to the muscles, they produce energy, they help tolerate or eliminate waste…They are the heart muscle, the lungs, the vascular system right down to the irrigation of muscle fibers. Controlling and varying the intensity of workouts is necessary to genuinely improve their capacity.

For example during cross country phase, the horse's speed is close to the higher anaerobic threshold (V4). To compensate for the need to slow down through combinations or « clusters »[1], the actual speed will be much higher than the average speed ; the horse should therefore possess inherent speed and a comfortable lactic balance[2].

If we were to assess the level of preparation, a fit horse should be able to maintain a galloping speed equal to that of a cross country course over at least 3/4 of the distance[3], with a lactate concentration not exceeding 4mmol/l at the finish, this includes speed changes and changes of rhythm.

Chart 1 :showing distances and speeds in international eventing competitions (FEI 2017)

Level	Type	Distance	Speed	Duration of the cross	Test example
1 Star	CIC	2600 - 3120 m	520 m/min	5’00 to 6’00	4 ’at 520 m / min
	CCI	3640 – 4680 m	520 m/min	7’00 to 9’00	6’ at 520 m/min
2 star	CIC	3025 – 3575 m	550 m/min	5’30 to 6’30	4’30 at 550 m/min
	CCI	4400 – 5500 m	550 m/min	8’00 to 10’00	6’45 at 570 m/min
3 star	CIC	3420 – 3990 m	570 m/min	6’00 to 7’00	4’40 at 570 m/min
	CCI	5700 – 6270 m	570 m/min	10’00 to 11’00	7’00 at 570 m/min
4 star	CCI	6270 – 6840 m	570 m/min	11’00 to 12’00	8’00 at 570 m/min

1. Cluster : Several fences are grouped quite close together, in a fairly restricted area to enhance the audience’s view, and for the requirements of the media.

2 : Horses having had specific training reach a V4 of around 570m/min. Horses with higher training levels and a more appropriate gallop for eventing (horses with a high degree of thoroughbred blood) reach V4 at around 600m/min+.

3 : This test can be carried out in 3 repetitions (at two minute intervals) over a total time equal to 1,2, to 1,5 times that of the competition considered.

The rider, for his part, should be able to physically stay on top of this type of event so as to maintain quality of judgement and actions up to the finish line. It has been demonstrated that even intensive riding every day, is usually not enough to acquire mental speed, and thus sufficient reaction speed, stamina, and resistance. A rider needs additional physical preparation. Finally, the harshness of the test or the type of horse ridden (over energetic, or needing support) can also contribute to the energy expended in a competition. For jockeys, a physical

assessment, with imposed rein tension[4], is carried out on a simulator during their annual medical check-up.

Effort test for jockeys at Chantilly in simulated racing conditions © Jean-Louis Jouffroy

A fitness assessment protocol for high level riders at the IFCE, and those in the youth pole France has been implemented (see : Protocol and evaluation chart for fitness tests « G. Bessat / IFCE 2017). A stamina test, based on a Léger test, is carried out to determine heart rate, MAS[5] and VO^2max[6] according to the stage reached.

Dynamic and static force tests as well as suppleness tests have also been set up with relevant exercises for the discipline, this enables to determine priorities in the rider's preparation.

For example, a rider considered ready to compete in a top level competition, should be able to run for 20 to 25 minutes at a speed of between 13 to 16 km/h[7].

4 : Tension on the reins on a cross country training have been measured at over 25kg (between 15 and 40 kg)

5 : MAS : Maximum aerobic speed

6 : Maximum oxygen uptake

7 : For the riders tested in Saumur in a first test, the average score was 13,5km/h

Muscular aptitude

Muscular aptitude, which is often neglected in the horse as a capacity requiring development, includes suppleness, elasticity, muscle tone (specific quality of the muscle) and strength . The equipedia fact sheet « muscular reinforcement » deals with the principles and offers some examples to make some dressage and jumping training sessions more specific, and include dominant features such as strength or cardio development.

An event horse has to be capable of jumping several fences in rapid succession over short distances[8], which even though not at maximum heights and widths, still need substantial effort due to their position, or to the ground topography. The horse-athlete, will also need to restore his strength after an effort such as over a big fence jumped without momentum a tricky combination, or even just a bad and (or) slippery approach to a fence.

It is important to repeat series of jumps during training, with different ranges of contraction. The conditions of the exercise should then be precisely recorded and individually noted[9]. A fit horse must be able to jump a line of several elements (3 to 5) several times, with as much bounce and scope from first to last.

8 : In a 4 star CCI, the number of jumping efforts can reach 45, which equals 1 effort every 145 m, and combinations of up to 5 elements ; in a CIC efforts are closer together, with the lower limit being established at 1 effort every 100m.

9 : The dimensions of the fence, the obliqueness of the cavaletti rails, and the distance in the lines should all be measured and noted in the training notebook, in feet or with a decameter.

Health

The horse's health is vital to enable him to bear up to the training needed to get him physically fit. Often, the attraction of nice paces leads to neglecting a health check, and tolerating an unsatisfactory and insufficient state of health.

The other situation is trying to keep a horse in training after a serious health setback, particularly with regard to leg injuries, and to attempt to pursue a career at top level, by not over-straining him, arguing that we have already put a lot into him. A total come back is rare, it may be better to look into the causes of the injury, which could be due to insufficient training at the start of the horse's career, or to badly conducted training practices.

Partial conclusion

The physical factor is of utmost importance in top level performance ; without it, the horse and rider combination will be unable to express their technical prowess, as soon as tiredness sets in. In competitions which are becoming more and more technically demanding, it is tempting to want to rely on technique, rather than the physical factor ; but it is only through well-thought out planning, such as are presented in the following fact sheets, that both horse and rider will be able to balance and associate physical and technical preparation.

About our writers

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