# Assessing the amount of training

Managing the amount of training, setting up a coherent and adapted progression with regard to the horse, knowing how to adjust it, evaluating the season's work... these are all essential tasks for any trainer or rider who wants to improve, to obtain sustainable and rational results. The aim of this fact sheet is to trigger considerations regarding training loads based on well known training methodology, but also based on trainers' experience and on the rare studies of the effect on the horse. The content will evolve as we gain in knowledge, especially as soon as tools designed to measure recovery enable us to assess the effects and the time needed to recover from each type of training session.

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Technical level

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# Introduction

Training a horse is the management of alternating periods of work and rest, the sucession of distinct periods for development, pre-competition, competition and recovery. It appears therefore necessary to have a precise idea of the succession of training sessions and the impact of each of them, to be able to quantify, control and adjust the work to suit the horse's level of preparation.

At the end of the season, the training programme should be reviewed with regard to the objectives and performances achieved, and compared to the previous year and to other horses. Aside from the physical aspects of a training session, the consequences can be weakening of bones, muscles and tendons, accumulation of fatigue through depletion of energy and metabolic ressources.

According to several authors, fatigue can be due to a wide range of causes :

- Massive lactate production leading to a lowering of the muscular pH, and thus inhibition of metabolic channels,
- Drop in the oxydation capacities of the muscles
- Increase of ammonia incurring chemical and neurological disorders
- Lowering of substrate ressources, especially glycogen (50 % decrease is sufficient to restrict the number of contractions and the role of glycolysis)
- Hormone and Ca++ ion concentration disruption, ionic and hydric imbalance, increase of internal body temperature,
- Lack of minerals (Fe) due to sweating
- Imbalance of the heart regulating the sympathetic and parasympathetic systems

# Defining the training load

A trainer will generally define the training load from the toll a training session takes on the organism. This is usually based on the analysis of energy sources used up during the session (Glucids, protein, O2, lactates…). In a lot of sports heart rate is used, taking into account the activities and correlating it to the duration and intensity of the effort. This value is supplied by modern human athlete's heart rate monitors. It should also be moderated depending on whether

the analysis relates to a dressage horse or a show jumper during their most energy consuming activities. The most recent systems based on heart rate to assess the load of a session also include individual values (age, sex, weight) and aptitude values such as V4.
See fact sheet « Assessing the horse's fitness ».

Assessing the training load can also be based on the human or equine athlete's capacity to recover from a session. This approach confirms the evaluation based on physiological parameters (Heart rate and lactate concentration), they are currently being used in studies to validate the theoretical data presented in this fact sheet.

The level of preparation must also be considered at the time the measurement is taken. Thus, as physical fitness improves, a typical training session will be tolerated differently. For example a 4000m gallop at a speed of 450 m/min will be considered as a genuine gallop in the general preparation phase, but becomes a gallop to recover in the final preparation phase ;  the level and trainability capacity of the horse can also lead to variations. There are in fact a number of parameters which intervene in the nature of the training load.

## Influence of the work on the training load

### The gallops

*Increasing the load of a gallop on an uphill track, in deep going © A. Laurioux*

For the gallops, the load depends mainly on the duration, the speed, the topography, and the quality of the ground, and less significantly[1] on weather conditions.

Recovery time between exercises,  and the way the gallop is carried out should also be considered : galloping at intervals is better tolerated than a continuous gallop at the same speed[2]. In the same vein, shortening recovery time between bursts will increase the work load : 3(1)3(1)3(1)[3] is harsher than 3(2)3(2)3(2). Another element which can influence the load of the session is staggering the exercise (for example 5-4-3 instead of 4-4-4).

Finally, working on an undulating track is easier than on a track with just one uphill and downhill portion.

Varying the intensity[4] during a session, is therefore different from working at constant intensity[5]. The mechanics and energetic expenditure linked to a horse's locomotion also intervene in calculating the load. Although this exercise is not much used for horses[7], repeating strides is energy consuming : therefore a tired horse will lengthen his strides , lessen elevation and balance[6] at the end of a course. A shorter stride with a higher frequency is more tiring than long, supple and ample strides[8] for the same speed. Each horse has a minimum energy expenditure level for each of his gaits.

1 : Less significantly, because one generally avoids a training session in extreme weather conditions.

2 : To be considered significant, recovery time between anaerobic threshold work periods is the time divided by two (e .g 2 minutes at a trot between 4 minute gallops at V4).

3 : The figure between brackets is the recovery time.

4 : Pushing work at the « threshold » is now questionned by the latest scientific studies which tend to demonstrate that an athlete performs better by varying the  intensity of work (« hybrid engine »).

5 : Heart rate is the indicator that the intensity of work is below maximum, heart rate is therefore kept constant, speed varies with the undulations of the track.

6 : Balance in this case means the capacity to change trajectory either upwards to jump, or longitudinally to become more collected.

7 : This type of situation can be found with horses being galloped with training aids, or in harness racing where the equipment is not properly adjusted.

8 : At the end of a race or a cross country course, a tired horse will naturally lengthen his stride to find the most economical locomotion.

The fact sheet « Defining each training session » classifies different forms of training session at a trot, or at a canter/gallop with regard to the average heart rate and final lactate concentration.

Chart 1 : Parameters which influence the training load of a gallop session.

| Session | Environment | Session mode | Recovery | Intensity mode |
|---|---|---|---|---|
| Duration, Intensity (Speed, heart rate) | Undulation of ground<br>Quality of ground<br>Weather conditions | Interval training<br>Continuous | Duration, gait, speed<br>Complete/ incomplete<br>Staggering exercises | Constant speed or varying speeds<br>With acceleration |

## Jumping sessions

It is easy to understand the effects of the number of jumps, the height and width of the fences. Speed on approach and the distance to take off point also need to be considered, as muscle power is the most solicited when the strides shorten and their frequency increases (giving either a rounded or more horizontal jump).

*Bounce jumps, plyometrics and sucessions of drop jumps, eccentric training, two types of exercise to be used carefully when they reach a certain level of difficulty and intensity © A. Laurioux*

Just a few jumps from a walk are rapidly exhausting. In the same way as lines of wide cavaletti close together from a trot will also lead to substantial effort over relatively low heights.

On the contrary, a well-built easy line, over more significant heights will be less harsh from a physiological point of view (excepting the constraints to the bones on landing).

The rider is aware that making a jump easy, generally means the take off stride is further away, whereas if the horse comes in close he will need more power. That is not forgetting approaching a vertical fence at a good speed, where a lot of strength is required for the horse to remain balanced. A succession of obstacles with intermediary rest phases of varying length, either active or passive…, will affect the intensity load of the session.

Finally the shape of the fences is important, as a wide fence approached slowly will require more effort than a vertical fence ; a step up, especially a succession of steps, require more effort than a vertical of the same height. Going down successive steps in an eccentric muscular effor, or a succession of bounces as a

plyometric exercise will probably require as much effort as a typical concentric exercise going uphill.

Chart 2 : Parameters which influence a jumping training sessionLanding (eccentric)

| Number of jumps | Outline of the jump | Recovery | Type of session | Type of muscle contraction |
|---|---|---|---|---|
| Isolated fences<br>Combinations<br>Complex lines<br>Height/ Width/ profile | Easy<br>Rounded<br>Long, balanced take-off | Rest time<br>Walking<br>Exercises in succession | Technique<br>Gymnastics<br>Core strength building<br>Exercises in succession | Landing (eccentric)<br>Bounce jump (plyometric) |

## Dressage sessions

*Stretching down in a round frame © A. Laurioux*

Considering that dressage sessions usually remain of low heart rate intensity, to analyse the training load we need to look at the muscular effects to assess the training load. There are three types of training session :

- Stretching sessions, these contribute to recovery and generate little solicitation;
- Sessions which are geared towards technical acquisitions, called mehanisation;
- The more energetic sessions mainly for muscular reinforcement.

Mechanisation geared towards technical acquisition, where speed of execution and fluidity of the movements is more important than developing strength can also be included in this progression. ( See fact sheet « Designing a training programme ») .

Mechanisation and dressage technique have a neutral effect and can be renewed without consequence, as long as the learning process went smoothly. The second type of session, geared towards muscular reinforcement, need to be carefully assessed in the load they generate, the recovery time needed and the time before the next competition.

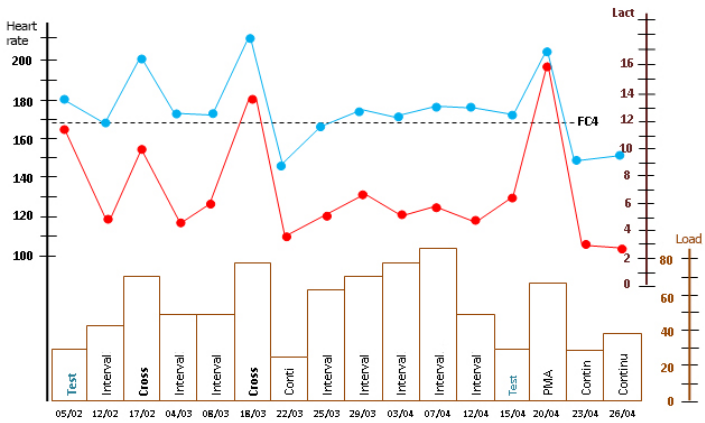
Chart 3 : Parameters influencing trainig load in a dressage session.

| Type of session | Volume of the session | Type of movement | Form of intensity | Recovery |
|---|---|---|---|---|
| Stretching<br>Learning technique<br>Mechanisation<br>Muscular reinforcement | Number of series and repetions<br>Isolated or succession of movements<br>Number of transitions<br>Time spent on the repetition. | Transitions and extending<br>Pirouette and 1/4 pirouette<br>Flying change and counter canter<br>rein back and striking off<br>Working on two tracks | Choice of gait<br>Discovering the movement<br>Search for tempo | Recovery time<br>Moving, at a halt... |

# Monitoring the training load

## Monitoring the gallops

In an approach used for an eventer, coefficients are used which are then multiplied by the length of time for each repetition of an exercise. For example :




- Trotting : coefficient 0.2
- Slow continuous canter : coefficient 0.5
- Aerobic threshold gallop : coefficient, interval gallops 1, continuous gallops 1.5
- Maximum aerobic speed gallop: coefficient 2
- Cross country or competition : coefficient 2

*Monitoring training of an event horse preparing for a CCI*** (Heart rate 4= 160 beats/minute), heart rate, lactate concentration, and training load*

The training load is represented by the bars below the average heart rates and final lactate concentration lines.

## Monitoring a horse over a period of time

In another approach all of the horse's activities are attributed a value which you will find in the following chart. As mentioned at the beginning of this fact sheet, a gallop in the general physical preparation (GPP*) 1 or 2 will have a different impact  at the beginnig of the period. To counteract this problem, the length of the exercise, recovery time and intensity all come into the equation : so for example different sessions can be given a value of 80, depending on when they are used in the training progression : the first gallops  with 3 x 3minutes with 1min30 rest in between, go up to 3 x 4 minute gallops with 2 minutes rest in between each, or to 3 x 3 minute gallops with 1 minute rest.

** GPP = general physical preparation*

| Category | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Rest** | Paddock | walking in hand | turned out | | | | | |
| | 10 | 10 | 20 | | | | | 20 to 40 |
| **Work from the ground** | Horse-walker (at a walk) | lunging | Lunging with a training aid | Lunging over ground poles | working in hand | long-reins | | |
| | 20 | 30 | 40 | 40 | 30 | 40 | | |
| **Light work** | hacking out | walking over undulating ground | trotting out (in fractions) | 30 minutes trotting out | trotting over undulating ground | | | |
| | 20 | 30 | 30 | 50 | 60 | | | |
| **Dressage** | Stretching | Technique | succession of dressage figures | Mechanisa-tion | muscular reinforce-ment | Warm up class | dressage competition | |
| | 40 | 60 | 60 | 70 | 80 | 80 | 90 | |
| **Jumping** | Grid work | jumping technique | Mechanisa-tion over jumps | succession of obstacles | muscular reinforce-ment | | show jumping phase of a horse trials competition | Show-jumping competition |
| | 40 | 50 | 60 | 70 | 80 | | 80 | 90 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Typical gallops** | GPP gallop-type 1 (2000m at 350m/min) | GPP gallop - type 2 (2000m at 450m/min) | GPP gallop-type 3 (4000m at 450m/min) | GPP gallop-type 4 (6000m at 470m/min) | GPP gallop-type 5 (8000m at 470m/min) | continuous gallop at varying speed type 6 *5x 1' 450m/min (profond) and 1' 350m/min* | gallop at varying speed type 7 *5x 1' 500m/mn (profond) and 1' 350m/mn* | succession of cross-country phase |
| | 1 50 | 2 55 | 3 60 | 4 65 | 5 70 | 6 80 | 7 90 | 70 |
| **Specific gallops** | continuous gallop $V_2$ | | Gallop at $V_4$ aerobic capacity | gallop at maximum aerobic capacity $V_{200}$ | | | | cross-country phase at a competition |
| | 50 | | 80 | 90 | | | | 100 to 120 |

Examples of an assessment of work load according to the type of session (value of the load for each session, where the duration is given in the definition of the session)

Take care : this chart is only given as an example, its approval is based on the specific work and experience of each rider. Its use is more in giving food for thought to prioritise the horse's work and organise recovery. It can help in quantifying the work load over a microcycle (e.g over a week) or a cycle (e.g over a month), or even a period. The chart can also be fine tuned to suit each horse with regard to its strengths and weaknesses.

## Recovery

The above chart will only be really complete if we associate each activity defined with a time scale, a time scale for recovery. Currently, some trainers will gallop their horses every 5 days, while others will gallop once a week. Basing their training on scientific data should enable them to manage recovery times and the effects of overcompensation.

When looking at means of recovery, some activities can contribute to accelerating recovery. These compensatory activities are considered as a « positive » load. For example following a cycle of aerobic capacity gallops, including sessions at V4, a V2 gallop is considered as a recovery gallop. Although it appears to be extra work, it actually has a beneficial effect on recovery and on the horse's tolerance to the work load.

## Example of monitoring an eventer's work load

This chart shows the preparation of a horse for the U25s Championship in 2017. On the left the chart shows the sequences as defined by the objectives to reach, the periods, cycles and microcycles.

The right hand column shows the accumulated load according to the previous chart.

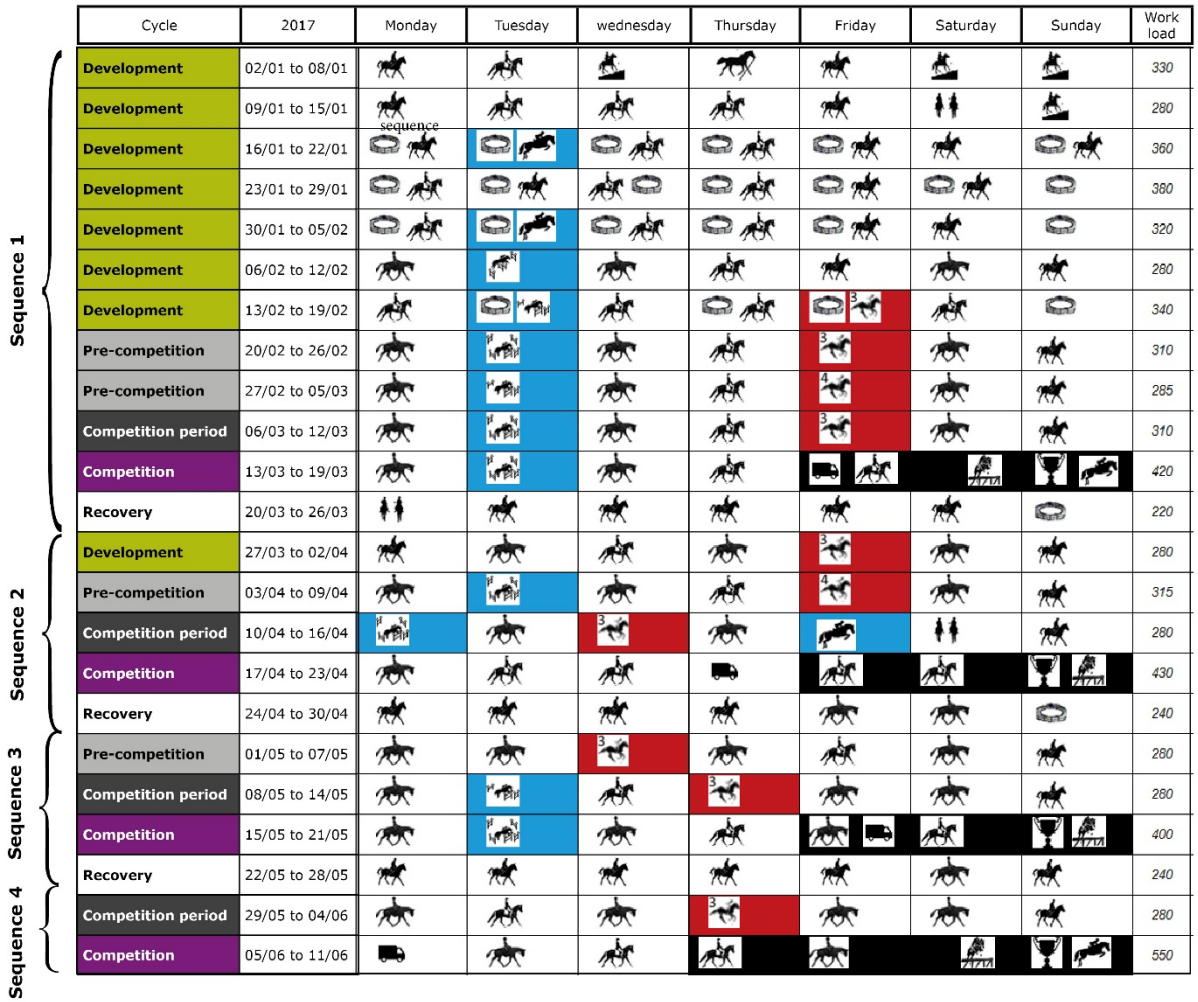
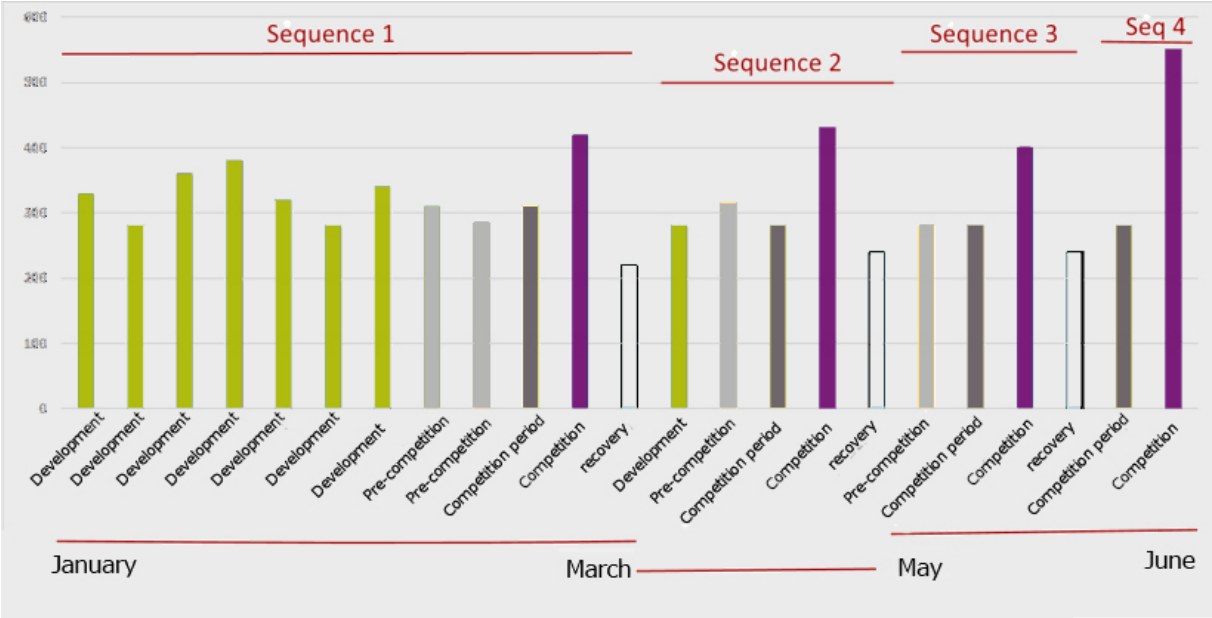



*Chart 2 : Example of the preparation for 2017 of a young rider's horse for Bramham three day event (U25s Championship 2017) over 4 sequences : blue : jumping sessions ; red : gallops ; and black : competitions.*

This trainer distinguished each period as being « development », « pre-competition », then « final competition preparation », « competition » followed by a « recovery » period.
Other patterns exist : see fact sheet : « Setting up a training microcycle period ».

From the above chart, a graph can be drawn up showing the training load over a sports season ; it shows the sequencing, the different periods organised into cycles and microcycles (weekly periods) leading up to intermediary or final competitions.




*Graph 1 : presents the cumulative training loads for a horse preparing the « U25s Championship » in 2017. The terms used are those retained by the French Youth Pole for eventing at Saumur. (Taken from the IFCE's Hippios horse management application).*

# Conclusion

The aim of this fact sheet is to raise the reader's awareness of the idea of workload, and its necessary corollary : recovery. The aim of a session must be clearly identified and the load should be thought through by the trainer. The purpose of this fact sheet is to help rider or trainer to build the first elements of an assessment of the training load borne by the sport horse ; with experience , the rider will be able to fine tune these theoretical values and rationalise his preparation, and overall his sports season.

**About our writers**

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