



# Your Horse

## Fitness Health and Nutritional needs

*This handout was compiled by Sue Johnson from a number of different reference sources. The reference list is attached. This handout has been written in an easy to understand format with much of the technical detail generalised for a large cross section of varying levels of reader. There are many excellent information sources available about your horse, its performance and fitness.*



## *Basics about your Horse*

Did you know .....

*that your horse is one of the most athletic animals in the world. It is a true performance creature that can adapt its body as it gets fitter to allow for even greater fitness and performance.*

- To make use information, you first need to know when your horse is fit.

### *Your horse's vitals*

#### At rest

temperature	37.5 -38.6 °celius
respiratory rate	8- 16 breaths per minute
heart rate	36- 42 beats/ min (fit 26/min)

#### Strenuous work

respiratory rate	120 breaths /min
Heart rate	240 beats /min

#### Fever/ illness

temperature	between 39.2- 41+ °celius
heart rate	increases about 16beats/min each 1°celius
elevated respiration	above average (Clayton 1991; Evans 2000)

Rectal temperature is taken on a horse. It is your first indication, that something is wrong and may need your attention. Become familiar with taking your horses temperature. The digital thermometer is good however the older glass type is all right if you are careful.

Heart rate can be taken using a stethoscope on the near side girth, just behind the elbow. Remember a fit horse has a very low heart beat so is often difficult to detect. Be patient. Unlike the human who's heart beat has only one long sound, a horses heart beat has 2 sounds. A horse is also very aware of strangers and if someone different takes their heart beat it can be elevated due to stress. You can also take a pulse on the artery found just below the cheek, running over their jaw on the near side. Again feel around until you find the artery, then wait as you may not get a pulse for between 2 and 4 seconds depending on the fitness and heart capacity of your horse.



Respiration/ breathing can be done by either checking the rise and fall of their rib cage or by your hand in front of the nostrils to detect each exhaled breath

## *Basics about maintaining your horse's performance*

All things living, moving and eating require energy. Energy is produced in the animal through several processes but requires carbohydrate and glycogen to be present. Carbohydrates are found in most feeds especially grains, pasture and molasses.

Energy needs to be replaced regularly in the body however a horse has a large reserve & not eating over one or two nights at a competition isn't life threatening under normal conditions. However after this time the energy levels need to be replaced. Always ensure your energy levels are above minimum levels in high performance horses. Too much energy and they will put on fat and too little they will lose weight, normally.

The availability of oxygen is the other major concern in the horse's performance. Generally the more oxygen the horse can get, the greater the horses performance. Oxygen gets into the horse by respiration.

### *Respiration*

The respiration process has 2 parts:-

Breathing: to get the oxygen in

Tissue respiration : to use the oxygen

### *Breathing*

The rate of respiration is linked to the horses gait. At a gallop, step & respiratory rates average. 110-130 per minute with a maximum of 148. At the gallop the horse lifts its front legs, raises its head and its gut moves back & the horse breathes in. As the legs hit the ground the head drops the gut moves forward & the horse breathes out (Clayton 1991).



After fast work a horse's respiration may increase to allow for the increase oxygen intake necessary to reduce anaerobic respiration (This will be discussed later). Respiration rate is not a good indicator of fitness, as it varies with climatic conditions.

The other part of respiration is when oxygen arrives via the blood to the muscle, for use in the body. This is called tissue respiration. Tissue respiration makes energy for the body from glycogen, through a series of complex reactions.

### *Aerobic respiration*

Aerobic (means with oxygen) respiration occurs in the presence of oxygen and is the most common way of getting energy. When oxygen is present the horse uses the oxygen to burn up the glycogen present and energy is released for the horse's use. The longer the horse can stay in an aerobic respiration state the fitter the horse and the higher the performance level. **1 unit of oxygen produces 36 units of energy** so it is very efficient. Carbon dioxide and water are the waste products produced from this process of energy making (Evans 2000).

### *Anaerobic Respiration*

Anaerobic (means without air) respiration occurs in the absence of oxygen. This respiration occurs only when the demand on the horse's energy level is greater than can be supplied by aerobic respiration, (the oxygen present in the blood). This occurs at galloping or fast work. Muscle to continue working in the absence of oxygen, needs to use the reserves of glycogen within itself. It converts this glycogen to energy and lactic acid is produced as the waste product. Lactic acid is what causes cramps. The muscle cannot continue very long in an anaerobic state. The horse does not sweat when in anaerobic mode and only resumes once the horse starts using oxygen from their blood supply. **Anaerobic respiration is very inefficient with 1 unit glycogen making only 3 units of energy** (Evans 2000).

### *Lactic Acid*

Lactic acid is poisonous and is the waste product of anaerobic respiration. After exercise lactic acid usually will break down to carbon dioxide ( $\text{CO}_2$ ) and water ( $\text{H}_2\text{O}$ ) or gets converted by liver into glycogen. If excess amounts are



produced they accumulate and poison the muscle cells. This then restricts the horse's movement (like cramping). In severe cases it is known as tying up. **The movement of oxygen through the muscles after anaerobic work helps remove the buildup of lactic acid. This is the reason your horse should always be walked or trotted for a minimum of 15 minutes after a match or fast work.** The build up of lactic acid contributes to fatigue in the horse.

## *When your horse is fit*

### *Changes in the fit horse*

As stated before your horse is a superb athlete. Unlike most animals including humans, horses can develop their body to allow for even greater fitness levels. This occurs as they get fitter. **Firstly muscle develops the ability to store more glycogen.** This allows for greater anaerobic work before fatigue sets in. **Secondly the muscle increases its ability to neutralise (buffer) lactic acid build up** so it can stand higher levels before poisoning the muscle. **Thirdly it increases the number of special fibres that carry oxygen to muscle & waste product removal.** The number of capillaries is increased by as much as 50%, thus greater blood supply to muscles, bringing more oxygen. **Fourthly it can through sustained exercise increase its heart size** from an average of 4kg to 5.5kg in a fit horse. This increases blood flow around the body bringing more oxygen and removing waste products. The galloping horse circulates blood through its body in 5 sec. The slower the heart rate, the quicker your horse's recovery. **Finally the amount of red blood cells (RBC), that carry oxygen increases and the replacement rate of RBC increases.** (Evans 2000)

So you can see that it is very important to ensure that your horse is fit. Your horse's fitness is determined by the amount of time taken to return its body vitals to their normal resting state. The quicker the recovery, the fitter your horse. So the aim is to increase the horse's aerobic respiration level, so it can do harder work before going into the anaerobic stage. Heart rate increases with the horses speed (Evans 2000). **Remember however you need to elevate your horses heart rate above about 120 to start any of these changes** ( at galloping its up to 240) but this needs to be gradual. Training is outlined below.



### *Exhaustion or fatigue*

This is a safety device for the horse. It is done to shut down their system so death doesn't occur. It has many causes and these are outlined below.

Causes:

- depletion of energy(glycogen)
- lactic acid buildup in the muscles
- dehydration/ stress
- lameness, by putting added burden onto the horses system (Clayton 1991)

There are means to prevent fatigue or ways of overcoming it. Fatigue is not unusual for an unfit horse but should be avoided if possible. Ways to avoid or overcome it are:-

- Cool down with water, between back legs, under tail & head, limit the water on the back or rump. However Williamson et. al (1995) found the application of cold water to entire body surface relieves over heating and myopathy(cramping)was not common
- remove lactic acid build in muscles by walking or slow trot
- limit the use of ice cold water for drinking at this stage as it can cause colic

However more dangerous than this is heat stroke and dehydration. This is potentially fatal and needs urgent attention when signs of it are present. It is most commonly caused by over working of unfit horses, excess stress or a combination of these with extreme climatic conditions (hot & humid).

### *Heat stroke & dehydration*

During any exertion by the horse heat is generated by the muscles. **A heart rate of 140-160 beats/min gives a temperature rise of 1°C every 3 minutes.** Thus if your horse is in an anaerobic phase its heart rate could be over 200. In extreme conditions where bodily controls are inadequate and the horses temperature rises too high, it can be fatal. Therefore heat regulation on behalf of the horse is paramount (Evans 2000).

Heat is lost via the skin, through the lungs by panting in extreme situations and sweating. Sweating not as effective in humid conditions or if insulated by rugs, tack or a wet coat. So a hot horse that is washed, needs to be scrapped of excess water immediately to allow for sweat loss otherwise it could overheat. Horses can lose 15 litres of sweat in an hour of hard work in hot conditions. When 22 litres of sweat is lost, without drinking, dehydration occurs. Dehydration is where the body takes the fluid from plasma (in blood)



and its tissues. At this point organ function in the body is impaired. From this point on a chain of events occurs which can escalate out of control. If the chain of events is not broken it can be life threatening. The chain of events are:-

- heat exhaustion occurs at body temp at 43°C
- **blood volume falls** (as the horse sweats it) which then leads to less sweating and body temperature rises higher
- therefore the **O<sub>2</sub> carrying capacity of the blood is reduced** & energy then is derived by anaerobic means, causing the build up of lactic acid - tying up is seen
- as it is not sweating, horse begins to pant **if panting is greater then the heart rate, the horse is in heat stress**
- sweating also causes a reduction in electrolytes, leading to **exhaustion and this is seen by quivering muscles** (Evans 2000 & Clayton 1991).

The horse's body temperature at this point needs to be lowered as quick as possible by whatever means. Your horse's life is at risk. Sensible horsemanship and an understanding of your horse's fitness and performance ability in varying environments will normally prevent this from happening.

## *Fitness & Training*

The longer & faster a horse can work aerobically, before going into anaerobic respiration, the fitter the horse. Factors affecting your horse's fitness program are:-

- Age- young horses need more daily exercise to keep fit and cannot sustain training as long as older horses
- Previous training- if your horse has done a lot of previous training then it will be easier to get fit again.
- The length of time the horse has rested- the shorter the rest the easier to get fit
- Temperament- highly strung horses are difficult to maintain their fitness
- Soundness- an injury affects the horse's fitness
- Breed- some breeds such as an Arabian can maintain their fitness better than some other breeds (Clayton 1991).

### *Types of training*

Fitness takes time. As it can be seen from previously the horse goes through many changes when getting fit, so it is paramount that your horse is given the



time to do this. Training should comprise of several stages. Exactly what you do in these stages can be your choice but try not to miss the stages, especially in high performance horses. The 3 main stages are:-

### *1. Legging Up/ Basic Training.*

**This is the initial period of 4 to 6 weeks**, where you walk & basically trot only. Toward the end of the period you would be cantering. This is necessary to tone up ligaments, tendons & muscles. Young horses need more time than older horses to tone their ligaments. It is often younger horses that will strain tendons and ligaments as they were overworked too soon. It is during this period, you need to develop the aerobic capacity of your horse. **To increase the aerobic capacity, you must increase the distance & speed of the work out every 10-12 days** (Clayton 1991).

### *2. Development/ Education.*

This is the middle stage of training. Where you would start to stick & ball and train the basics of polocrosse. Also **introduce the more strenuous work needed** including stopping, turning and marking up to increase aerobic capacity. Along with this short gallop work should be done. This takes about 2 to 4 weeks (Clayton 1991).

**6-10 wks**

### *3. Finishing Exercise*

This is the final stage and is done to achieve stamina & endurance. It is mainly aerobic work done by distances. It is at this stage however that fast work can be reduced in your training program after you commence playing your horse regularly (Clayton 1991).

A horse needs a period of recovery after hard work so it is not uncommon to give them a day off when they have commenced playing. This will depend on the individual horse. It is often better to give them a light work on the Monday, to remove lactic acid buildup and stiffness and give them Tuesday off. However some horses don't need a break, others will tie up if given a break, so they need to have the work levels maintained. **Remember a fit horse will take up to 6 weeks to lose its aerobic fitness** so DON'T push a lame fit horse. A horse can rest for a period without affecting it's fitness. If your horse is fit it will not lose anything by not being worked on the way to Darwin. If your horse is lame or sore cut down its ration and don't work it, so it will heal faster.