



## What is altitude training?

Normal atmospheric air contains 20.9% oxygen, 78% nitrogen, the balance is a mixture of gases known as argon.

At sea level athletes (human and animal) can comfortably ventilate adequate air to meet their body's requirements for oxygen during extended bouts of endurance exercise.

As an athlete travels up a mountain the "partial pressure" exerted on the air is such that the molecules making up the air mix of gases aren't as compressed as what they are at sea level.



Whilst the "mixture" of gases remains the same the partial pressure decreases making it harder for the athlete's body to "grab onto" the available oxygen in the air. As a result the body works harder and is forced to adapt (physiologically and biochemically) to this rarefied or "hypobaric hypoxic" environment.

Those that train in such environments term this "altitude training" and the practice has been popular since the 1960's following the Mexico Olympics. There has been much conjecture in both the scientific and athletic communities as to the effectiveness of altitude training in enhancing sea level performance.

During the late 1990's Professor Benjamin Levine proposed the concept of "Live High and Train Low", whereby athletes slept at altitude and then travelled down to sea level in order to train. The benefits associated with this practice created significant performance improvements in 5km performance times for distance runners.

Logistically, living at altitude (1800m plus) and travelling daily to sea level created problems. Soon thereafter there was a spate of entrepreneurs in the market "simulating" the effects of altitude.

By increasing the nitrogen content of the air and





artificially lowering the oxygen component of the air at sea level (normobaric hypoxic environment) athletes could live anywhere and still derive the benefits of altitude training.

Altitude Services has worked tirelessly to perfect this technology. Whilst general consensus supports a 1-3% performance improvement in human athletes with altitude exposure the scientific community is still reserves judgement as to the effectiveness of this practice in the equine athlete.



Our extensive practical and scientific experience in the horse racing market – with the highest calibre horses – validates this practice in horse racing.

## What are the effects of altitude?

Living at altitude (or simulated altitude) increases aerobic power at sea level primarily by increasing the ability of the circulatory system to supply oxygen to the muscles. This increase comes about by (i) an increase in the number of red cells which transport oxygen to muscles and (ii) the muscles ability to extract and use that available oxygen.

The extra red cells are produced in response to an increase in the release of erythropoetin (EPO) primarily during the first three weeks of altitude exposure.

Changes in buffering capacity of blood and muscles also occur, increasing the body's ability to buffer lactic acid at higher concentrations. Changes also occur in the respiratory system in relation to the depth and frequency of breathing.

Meaning the athlete can sustain peak speed for longer.

## Who benefits from altitude?

There is a large variation between athletes in the response to living at altitude.

Some athletes have much larger increases in EPO than others at a given elevation. Athletes who have a low EPO response may need to live at a higher altitude.

Research indicates approximately 85% of endurance athletes exposed to altitude or simulated altitude derive performance improvements, the remaining 15% show no effect.



## When should altitude be used?

Traditionally altitude training is used in the “peak” phase of training before competitions.

Our extensive experience however suggests a two pronged attack:

1. Firstly during the “base phase” of training the athlete is taken to higher altitudes, just prior to high-intensity training. The increased oxygen-carrying capacity and lactic acid buffering then allows higher intensity training to take place.



2. In order to maintain the benefits of altitude training the athlete is then maintained at a moderate altitude during higher intensity training phase leading into competition.

The benefits of altitude training in humans last for 4-6 weeks after return to sea level, our experience suggests the residual benefit to horses is even longer lasting – possibly due to the longer lifespan of the horses’ red blood cells.

Find out more about our General Manager **Rod Cedaro** here: <http://rodcedaro.com.au/>

For more on Altitude Training please visit <http://altitudeservices.com.au>