

ADAPTATION OF EQUINES TO TROPICAL CLIMATES

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Knowledge concerning acclimatisation of equines to thermally stressful environmental conditions was limited and largely anecdotal preceding the 1996 Atlanta Olympic Games. A number of published scientific studies now describe acclimatisation responses of horses to elevated artificial (laboratory) or field conditions of increased environmental thermal load. Whilst these studies focused on the fit, well managed competition horse, there are undoubtedly many lessons that can be drawn to improve the welfare of the working animal in the developing world.

Acclimatisation in the context of thermally stressful environmental conditions is considered to be a process whereby improved thermal tolerance either at rest or during exercise is achieved through physiological adaptation, usually as a result of repeated bouts of exposure. Whilst the terms acclimatisation and acclimation are often used interchangeably, in strict scientific terms, the former refers to adaptation to a natural environment whilst the latter refers to artificial environmental conditions, such as would be created in a laboratory.

Acclimatisation may be seasonal in the case of animals that live in a region where there are cool and hot seasons, such that each year there must be a period of acclimatisation as temperatures or temperatures and humidity increase. Whilst physiological acclimatisation to thermally stressful conditions appears to take place rapidly (7-14 days) with an appropriate acclimatisation programme, the effects may also decline rapidly if the thermal stimulus is removed or bouts of exposure are widely spaced. This may have important implications for animals, for example, which are taken into a clinic for treatment and perhaps then do not work for 10-14 days. When the animal returns to work, the problem initiating the rest may have been resolved and it is also likely that there will have been minimal change in fitness, but some acclimatisation may have been lost.

Whilst animals living in a region with true seasons have generally been considered to have an advantage over animals being brought into a region for a short period (such as a competition) in terms of adaptation to dealing with thermal environmental stress, this is now subject to question. Certainly the animals living in a region which experiences seasonally high thermal environmental stress may have been selected either intentionally (by man) or naturally. For example, the Arabian horse appears to have a particularly high heat tolerance compared to some other breeds. One might imagine that individuals within a breed in a thermally stressful region that have poor heat tolerance would naturally be de-selected over time. The animals may not be good workers or may be ill more frequently and therefore might not be selected for breeding.

In recent years, it has become popular to think of high levels of thermal environmental stress as being typified by hot and humid conditions, such as those that occur each summer in the southern USA. However, in some recent work on anhidrosis (a condition which affects large numbers of equines in thermally stressful environments and is characterised by markedly diminished sweating responses in the presence of an appropriate thermal

stimulus), we have seen that it was almost as common in the very hot and dry conditions in Arizona as in the hot and humid conditions in Georgia. Interestingly, in this study, the wet bulb temperature was identical in the two regions.

The prevalence of anhidrosis may be underestimated in hot dry climates as any sweat that is produced rapidly evaporates. Horses sweating inappropriately in hot humid climates are much more easily recognised. It is also conceivable that anhidrosis is a condition that develops either from inappropriate acclimatisation or following a bout of severe hyperthermia induced by over-work in a thermally stressful environment.

A preliminary evaluation of working equines in Pakistan undertaken during the summer suggested that many animals were coping poorly with the extremely hot but dry conditions. Many of the animals studied appeared to have abnormal sweating responses. However, interpretation at this stage must be made with caution as poor nutrition, over-work and other concurrent disease will also be likely to have an influence.

The aim of trying to ensure appropriate acclimatisation and management of animals in thermally stressful environments in the developing world should be to maximise their work capacity in order to benefit their owners, whilst at the same time trying to maintain their health and welfare.