

Stress and Capture Myopathy in Hares

Mike Rendle, January 2006



Executive Summary

- Capture myopathy (shock disease) is a little-studied condition that has been recognised in a number of wild animals, including lagomorphs.
- There is now compelling evidence that the well being of hares, and ultimately their survival, is compromised by capture, handling and captivity etc.
- Capture myopathy has ethical and practical implications for researchers, veterinary professionals, carers, conservationists and field sports enthusiasts.
- Stress is the single most important factor in capture myopathy.
- Stress induced damage can lead to the development of a pathological state.
- The outcome (usually fatal) may be sudden or it may take days or weeks for the symptoms to appear. *There may be few post-mortem signs.*
- There is no known cure for capture myopathy thus making prevention the only method of dealing with this condition.
- All of the stages and outcomes of capture myopathy are observed where hares are caught and held for enclosed coursing in Ireland.
- Stress related conditions such as liver failure, gut stasis or enteritis are likely to be incorrectly attributed to 'natural causes' involving diet, parasites or weather conditions.
- Capture myopathy should be brought to the attention of relevant persons who should be encouraged to become familiar with current guidelines and best practice.
- When the capture or handling of hares is necessary, it should be kept to a minimum and in line with current best practice.
- The precautionary principle should be applied when assessing any policy or proposal that may involve capture, transport or handling of hares.
- Legislative, advisory, academic and professional bodies should take account of the negative impact of activities that may result in capture myopathy when reviewing, planning or implementing policy.
- Research methodology involving the catching or disturbance of hares should be discouraged. In the case of Irish hares, research proposals should be subject to a species impact assessment.
- Law enforcement and environmental protection agencies should proactively enforce relevant legislation.

Stress and Capture Myopathy in Hares

Introduction

Capture myopathy is a little-studied condition that has been recognised in a number of wild animals, including hares and rabbits, for some time. The term "Shock Disease" was coined by researchers who became aware of this condition when they trapped snowshoe hares for study in the 1930's.¹ In recent years some work has been carried out in the context of hunting and coursing, where the use of nets, dogs or snares cause high levels of trauma before death or capture. Indeed, much of the evidence examined in this report has been collected from coursing related activities or studies. For this reason, there are direct references to the practice of enclosed coursing. There is now compelling evidence that the well being of hares, and ultimately their survival, is compromised by capture, handling and transport etc. This has ethical and practical implications for researchers, veterinary professionals, carers, conservationists and field sports enthusiasts.

Definitions

Welfare of an animal has been defined² as its state as regards its attempts to cope with its environment.^{3,4} Thus welfare refers to the state of an animal at a specific time and can be good or poor irrespective of what people think about the moral or ethical use of the animal concerned. If the individual is having difficulty in coping with its environment, or is failing to cope, then its welfare is poor.^{4,5} Since this definition of welfare refers to the state of an animal, we should be able to use measurements of that state to indicate welfare and Bateson⁶ has argued that the animal should be given the benefit of the doubt as regards the existence of anxiety, suffering and pain. Animal welfare science is a scientific discipline, which has developed rapidly in recent years. Much of the research has been carried out on domestic animals but the basic methodology is the same for all species including wild animals.⁷

Stress is the sum of the biological reactions to any adverse stimulus, internal or external, that tend to disturb the homeostasis of an organism. The need to minimise stress should be self-evident simply because of the problems related to it. Stress alters the "normal" physiology of an animal and can induce a pre-pathological state. In a prolonged situation of stress, the pre-pathological state provides an opportunity for the development of pathologic change. Both psychological stress and the physical stress of muscular exertion may result in damage that can lead to development of a pathological state.⁸

Capture Myopathy is a condition associated with capture or handling of any wild species of mammals or birds.⁹ It frequently occurs following prolonged or intense chases or manipulations (capture and handling). Capture, handling, transportation and captivity are stressful experiences for hares.¹⁰ There is a danger of spinal and other injury associated with attempts to escape. Loud noises, unfamiliar surroundings, transport: and the smell and presence of predators (including humans) contribute to the stress levels of a wild lagomorph.¹⁰ The proximate cause for capture myopathy is probably a combination of fear and anxiety accompanied by muscle exertion.⁸ Fear is the single most important factor in capture myopathy.⁹

The mechanism of capture myopathy

To understand why stress has such a serious an impact on hares¹², it is necessary to examine the mechanism of stress and, in particular, the way in which it affects the physiology and vital organs.

The perception of a dangerous or frightening situation causes the release of chemicals called neurotransmitters from the pituitary gland at the base of the brain. These neurotransmitters affect many tissues in the leporid's body, but most notably the adrenal glands that release epinephrine (adrenaline) and, with protracted periods of stress, glucocorticosteroids.^{10, 11}

Epinephrine (a catecholamine) causes the leporid's heart rate and blood pressure to increase. Catecholamine release initiates a number of problems and in the short term it can cause heart failure or fatal oliguria.¹⁰ Blood flow is directed to vital muscles and organs and away from those that are nonessential in this dangerous situation. The leporid's respiratory rate increases, his eyes dilate, and his blood sugar (the fuel for the body's tissues) soars.¹¹

The effects of these hormones for the short term are obvious. The hare is placed in a heightened level of awareness and in a physical state where he can better sense the danger, and can run faster to get away from that danger. Inhibiting the flight response by restraining or enclosing the hare can place the heart under a great deal of stress, resulting in heart failure and death.^{8,13}

When these physiological conditions exist for a long period, they affect the animal negatively. Restriction of blood supply to "nonessential tissues" leads to their dysfunction. Exhaustion of liver energy stores leads to a starvation of body tissues that may be lethal.¹¹

Other neurotransmitter and hormonal effects of fear, not as easily understood, are that they can disrupt normal function of the gastrointestinal (GI) tract.¹¹ This is particularly serious for hares because, as lagomorphs, they are hindgut fermenters. This term describes the process used by hares to efficiently extract nutrients from a high-volume, low-energy diet. The high fibre food passes through the stomach into the small intestine (ileum). Food passes to the ileocaecocolonic junction where the ileum is joined to both the caecum and large intestine (colon). From here, freshly eaten food passes directly to the caecum, where it is broken down by bacteria. From the caecum it passes through the colon to emerge as caecotrophs, moist dark droppings that resemble small bunches of grapes. These caecotrophs are eaten immediately (refection) and the second stage of digestion begins. This time, nutrients that have been unlocked in the caecal part of the first stage are absorbed as they pass through the ileum. However, as the food material now consists only of fibre, it passes directly to the colon from which it is expelled as the hard fibrous droppings, which are left on the ground.

Normal gastrointestinal function and the correct balance of gut and caecal flora are crucial to the health, and ultimately survival, of the individual.

In the long term, stress affects many physiological functions. Stimulation of the sympathetic nervous system inhibits activity of the gastrointestinal tract. Impaired gut function, in association with disruptions in carbohydrate metabolism, can have a potentially serious knock-on effect that results in hepatic lipidosis, liver failure and death. Reduced gut function also affects the caecal microflora and enterotoxaemia or gut stasis can result from any stressful situation.¹⁰

Stress related conditions such as liver failure, gut stasis or enteritis are likely to be incorrectly attributed to 'natural causes' involving diet, parasites or weather conditions.¹⁴ The outcome is often fatal and there may be few post-mortem signs.⁹

As more than one organ is involved, the onset, progression and symptoms will vary. There are four recognised categories of capture myopathy according to the way the condition presents itself. These are peracute, acute, sub-acute and chronic.⁹

Peracute capture myopathy

Death may occur suddenly or in a matter of minutes. Consistent with cardiac arrest^{10,13}

Acute capture myopathy

Death occurs in 24 - 48 hrs. Consistent with enteritis or enterotoxemia¹⁰

Sub-acute capture myopathy

Death takes a few days. Consistent with hepatic lipidosis¹⁰

Chronic capture myopathy

These animals live for several days or months but their ability to survive may be compromised. Consistent with compromised immune system resulting in pathogen or parasite related illness¹⁷

Treatment

There is no treatment for this condition,⁹ however it may be prevented by effective risk assessment, implementing best practice and by applying the *Precautionary Principle*. (See recommendations)

Practical implications

There are serious practical implications for a number of activities, including coursing and research.

Coursing

All of the stages and outcomes of capture myopathy can be observed in hares caught and used in enclosed coursing. Stress is likely to be cumulative, starting from capture and compounded by handling and captivity. There is clear evidence to support a link between hare deaths caused by poor animal welfare and enclosed coursing. It is likely that hare coursing or other hunting with dogs will cause very poor welfare in hares.²

Professor Donald M. Broom, Professor of Animal Welfare, University of Cambridge states that²

"When a mammal like a hare is chased by a predator like a dog, it will show physiological changes associated with extreme fear. These include greatly elevated heart rate and high levels of emergency adrenal hormone production as well as other changes in hormone levels and enzymes. Extreme responses like those shown when chased by a predator can result in reduced life expectancy due to the immediate dangers of injury during very vigorous activity and greater risk of cardiovascular or other breakdown as a consequence of the response. We must conclude that, whether or not the hare is caught, its welfare is very poor during the chase and for periods afterwards which will be prolonged in some cases."

The Irish Coursing Club's veterinary surgeon, JJ O'Sullivan,¹⁵ states that

"it is impossible to completely avoid stress in hares once you manhandle them, and take them out of their natural environment. Stress can come in many shapes and forms and as long as you have the hare in captivity, he is prone to it - resulting in his disability and even death at times. I believe a lot of damage can be done to hares by rough handling and netting."

There is a substantial body of evidence that stress and capture myopathy are a significant cause of hare deaths in Ireland, as the following case study illustrates.

In December 2003, 83 hares were captured and coursed at an Irish Coursing Club meet in Wexford. On that occasion 40 hares died, a mortality rate of 48%¹⁶.

The dead hares were examined by veterinary surgeon, Dr Peter A. Murphy PhD, MVB, MRCVS.¹⁷ A number of pathogens were identified in post-mortem examinations¹⁸ and Dr Murphy says in his report,

'under the influence of stress, the hare's immune system is compromised and these organisms suddenly multiply rapidly to cause a severe clinical disease and untimely death. Hares being normally solitary animals are significantly stressed when corralled and coursed, and this combination of circumstances has resulted in the deaths in this case'.

These observations apply to the more acute stages of capture myopathy, however hares may die from sub-acute or chronic capture myopathy after release. In 2002, after being coursed, eight hares were radio tracked for 13 weeks following their release.¹⁹ Two individuals died within eleven days in circumstances consistent with capture myopathy.

Research

There are implications too for researchers. Methodology involving the catching or disturbance of hares is not benign and is likely to introduce significant bias, as well as influence natural mortality and population dynamics. Invasive projects involving contact with humans should be avoided in favour of studies using passive

techniques. All research proposals should be subject to a species impact assessment.

Conclusion

The capture, handling, confinement or chasing of hares are all likely to cause capture myopathy. The outcome, often fatal, may be immediate (peracute capture myopathy) or may take several weeks to become apparent (chronic capture myopathy).⁹

Deaths arising from sub-acute or chronic capture myopathy are normally likely to go unrecorded and the actual number of hare deaths may exceed reported figures by an order of magnitude.

The symptoms, enteritis, wasting, depression and death may be mistakenly attributed to a dietary or pathogenic cause. There is no known cure for capture myopathy thus making prevention the only method of dealing with this condition.^{8,9}

Recommendations

1. Capture myopathy should be brought to the attention of relevant persons who should be encouraged to become familiar with current guidelines and best practice.
2. The capture or handling of hares should be avoided. When it is necessary, it should be kept to a minimum and in line with current best practice.
3. The precautionary principle should be applied when assessing any policy or proposal that may involve capture, transport or handling of hares.
4. Research methodology involving the catching or disturbance of hares should be discouraged. In the case of Irish hares, research proposals should be subject to a species impact assessment.
5. Legislative, advisory, academic and professional bodies should take account of the negative impact of activities that may result in capture myopathy when reviewing, planning or implementing policy.
6. Law enforcement and environmental protection agencies should proactively enforce relevant legislation.

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