

## CASE REPORT

### STRESS FACTOR CAUSING DEATH IN SAMBAR DEER (*CERVUS UNICOLOR*)

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**ABSTRACT.** An adult female Sambar Deer (*Cervus unicolor*) at Wildlife Conservation Centre, Sungkai, Perak was found dead in the paddock after abortion. The dead foetus was found on the paddock the day before this incident. The workers at the conservation centre also reported that the doe was attacked few times prior to death by a bull of the same group. The paddock in the Sungkai Conservation Centre was under construction and it was suspected that the noise from heavy machinery and animals being transferred into different paddocks caused further stress to the affected doe which led to abortion and death. Post-mortem lesions showed generalised congestion and haemorrhage of all vital organs including liver, heart, lungs, kidneys and spleen. Histopathology revealed all organs have evidence of generalised congestion. Cause of death in this case is failure of the body system due to generalised congestion of the vital organs due to stress factor.

**Keywords:** sambar deer, death, abortion, stress

### INTRODUCTION

Physiological or biological stress is an organism's response to a stressor such as an environmental condition or a stimulus. Vander, Sherman, and Luciano (2001) state that "these stimuli comprise an immense number of situations, including physical trauma, prolonged exposure to cold, prolonged heavy exercise, infection, shock, decreased oxygen supply, sleep deprivation, pain, fright, and other emotional stresses".

Stress is a body's method of reacting to a challenge. According to the stressful event, the body's way to respond to stress is by sympathetic nervous system activation which results in the "flight or fright" response. When that happens, the adrenal cortex increases secretion of the hormone cortisol resulting in increased epinephrine secretion from the adrenal medulla.

In particular animals including wildlife have brain structures that enable them to feel fear and suffering from pain, and it is likely that they suffer pain in the same way as humans. When animals become threatened or frightened, they usually will respond by "flight or fright".

Abortion is expulsion of a premature foetus before it reaches a viable stage of life, or expulsion of dead foetus at any stage of gestation. Some abortions in late pregnancy are due to injury or extreme stress. Stress can trigger release of hormones in the body that can start the animal into labour, calving prematurely.

## CASE BACKGROUND

### History

This is a case of adult female sambar deer (*Cervus unicolor*) that was found dead in the paddock at the Wildlife Conservation Centre in Sungkai, Perak on 21<sup>st</sup> January, 2014. The main objective of this conservation centre is to re-introduce wildlife species into the wild. The dead foetus was found on the paddock the day before this incident. The workers at the conservation centre also reported that the doe was attacked a few times by a bull of the same group before the doe was found dead.

The paddock in the Sungkai Conservation Centre was under construction and it is suspected that the noise from heavy machinery and animals being transferred into different paddocks may cause further stress to the affected doe which led to abortion and death. The upgrading work was on December 2013 until January 2014.

### Growth and Feeding

There were twenty (20) sambar deer in this conservation centre comprising ten (10) bulls and ten (10) does of different age stages, kept in the same paddock. The conservation

centre has kept the habitat in the same condition as in the wild.

The deer were fed with cornstalk and dairy cattle pallet (DCP), and anti-stress added daily in the drinking water.

### Clinical Observation

The carcass was found to have a superficial wound about 6 cm long on the right hip joint area, yellowish discharge oozing out from the vulva was also observed. The carcass was dehydrated and the body score was 2 out of 5.

## RESULTS

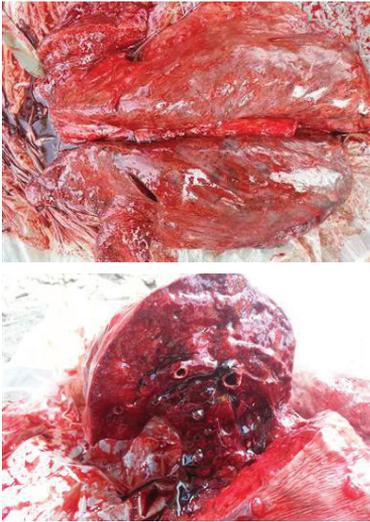
### Gross Pathology

The post-mortem findings showed generalised congestion and haemorrhage on all vital organs including liver, heart, lungs, kidneys and spleen. The uterus was enlarged and with yellowish discharge. The uterine wall was also haemorrhagic. (See Figures 1 to 5.)

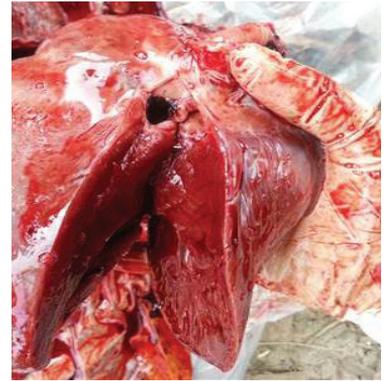
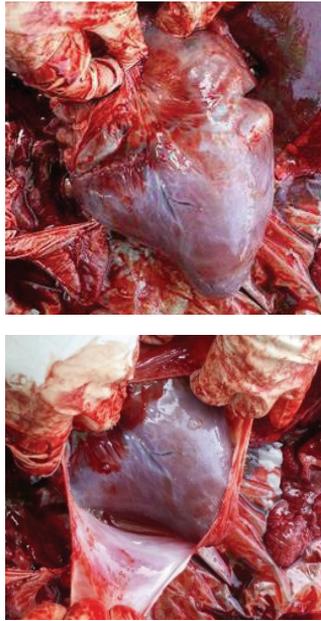
The post-mortem lesions included hydropericardium and thickening of the heart wall with white muscle appearance on the surface. The liver was congested and there were tiny whitish spots on the surface.

### Histopathology

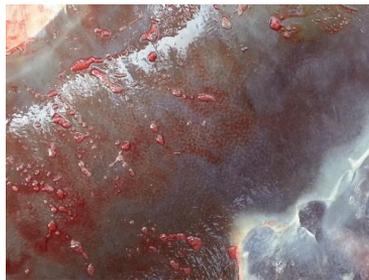
All organ shows evidence of generalised congestion. Lung have evidence of emphysema and congestion. Liver also have evidence of congestion. Kidney have evidence of congestion with infiltration of



**Figure 1.** Photos of the lungs showing generalised congestion and haemorrhage.



**Figure 2.** Photos of the heart showing generalised congestion and haemorrhage included hydropericardium and thickening of the heart wall with white muscle appearance on the surface.



**Figure 3.** Photos of the liver showing generalised congestion and tiny white spots on the surface.



**Figure 4.** Photos of the kidney showing generalised congestion and haemorrhage.



**Figure 5.** Photo showing enlarged uterus with yellowish discharge and haemorrhagic uterus wall.

inflammatory cells including shrunken and loss of glomerulus.

### **Bacteriology**

No *Brucella* sp. Isolated from the organ sample and uterus.

### **DISCUSSIONS**

From the post-mortem findings and laboratory results, the cause of death in this case is failure of the body system due to generalised congestion of the vital organs. The congestion of vital organs could be due to toxæmia from the aborted foetus. The abortion may be caused by stress factors. Stress could have triggered and released the hormones in the body that caused abortion in this case. In vertebrates, an important mechanism for coping with stressors begins with adrenally-derived glucocorticoid hormones: corticosterone in amphibians, reptiles, and birds, or cortisol in fish and many mammals. These molecules drive gluconeogenesis, suppress reproductive processes, alter movement and feeding rates, impact immune functions, and generally help an individual enter a "state of emergency" when an environmental stressor induces their release (Wingfield *et al.*, 1998).

In this case, stress factor could be caused by changes in the environment and attacks from other animals. Stress will lead to the "flight or fright" response in wild animals. During the "flight or fright" response, a complex series of changes occurs in the animal body. When this happens, the autonomic nervous system (ANS) will be activated.

ANS is responsible for many functions in the body that occur "automatically" such as digestion, heart rate, blood pressure, and body temperature. The ANS is controlled by the hypothalamus. The hypothalamus receives stimuli and transmits messages to all nerves in the whole body system. For example, the hypothalamus delivers a message to the endocrine system to initiate the secretion of hormones. The hormones primarily adrenalin and cortisol, flood the bloodstream and travel throughout the body to deliver information to cells and the system to aid in creating the ability to be speedier and more powerful.

The adrenal gland will also release the adrenalin, noradrenalin and cortisol (glucocorticoid hormone) into the bloodstream. These hormones flood every cell in the body with the specific message to prepare for "flight or fright", to increase more power and speed. Cortisol is a corticosteroid hormone that will suppress the immune system, and allows for disease to occur more easily. Glucocorticoid (GC) hormones, typically cortisol and corticosterone are the most frequently measured indicators of stress in vertebrates (Wingfield *et al.*, 1997).

Cortisol may also be directly or indirectly involved in some of the proximate mechanisms mediating the putative association between maternal stress and pregnancy loss. For example, cortisol may affect the production of luteal progesterone. Low progesterone levels can affect uterine maturation and pregnancy maintenance (Norwitz E.R. *et al.*, 2001).

Stress can be a cumulative process. Each stressor by itself may not be significant, but when they affect the animal sequentially

or simultaneously, they may push it over the threshold toward illness or death.

Wildlife species that highly susceptible to the stress such as deer (*Cervidae*) and wild cattle (*Bos gaurus*). To minimize stress to these animals, recommendation included to take more precaution during anaesthesia, transportation and handling this animals.

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