Introduction
Nutritional myodegeneration (white muscle disease, WMD) results from selenium and/or vitamin E deficiency and affects a wide range of domestic and wild animal species including sheep, goats, cattle, deer, horses, swine, poultry, rabbits, marsupials, monkeys, laboratory and exotic animals, monkeys and even fish [8, 12, 15]. It is a degenerative disease of the striated muscles, without neural involvement. Lesions are probably initiated following free-radical damage [8, 20]. In ruminants, two clinical forms of the disease are recognized, the congenital and the delayed form [8, 12]. The former affects neonatal animals, which are stillborn or weak and usually die soon after birth, while the latter affects animals older than 3 weeks of age [12, 15].

The Cypriot mouflon or agrino (Ovis orientalis ophion) is a wild sheep species endemic and unique to Cyprus. According to historical records, it has been present in the island for at least 10,000 years and is of Asiatic origin. It is the largest terrestrial mammal found in Cyprus [14, 21]. It is smaller than other wild sheep, the male weighing 35-45 kg and the female 25-35 kg; the males bear supracervical horns while the females are hornless. The current mouflon population is estimated to be approximately 3,000 animals. Mouflon inhabit the Paphos forest, a mountainous area of 620,000 ha in the North-western part of the Troodos mountain range. Along with the mouflon of Sardinia and Corsica (Ovis gmelini mus-simon) it is the only forest dweller among the Caprinae [6, 14].

The species’ health is closely monitored by the Game Fund Service in collaboration with the Department of Cyprus Veterinary Services. Under Cypriot legislation, it is a strictly protected species and has been included in Annex II/IV of 92/43 EU Habitats Directive, as a European priority species. It is also referred as endangered under the International Union for the Conservation of Nature 1996 Red list [18]. All deaths observed in recent years are recorded and its population status monitored. Furthermore, the Cypriot mouflon is one of the symbols of Cyprus, even featuring on the Cyprus Euro coin.

SUMMARY
A five days old Cypriot mouflon (Ovis orientalis ophion) lamb was found dead without premonitory signs in the Platania mouflon enclosure. Necropsy revealed generalized pale discoloration of skeletal muscles and to a lesser extent of the myocardium. Extensive and severe muscular degeneration and necrosis were evidenced by histology. Liver selenium and vitamin E contents were 0.23 mg/kg and 21 mg/kg, respectively. Based on the post mortem findings, the diagnosis of white muscle disease was established and was presumptively attributed to vitamin E deficiency by comparison with usual values obtained in other zoo ruminants. It is the first reported case of white muscle disease in any mouflon species, and particularly in the wild Cypriot mouflon that is endangered and under strict surveillance.

Keywords: Endangered species, Cypriot mouflon, congenital form, nutritional myodegeneration, selenium, vitamin E deficiency.
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a fact that may indeed help its survival. On the other hand, it can also be threatened by likely transmission of infectious agents from domestic ruminants in shared pastures. To date, there is little information on its physiology and pathology, whether free-ranging or semi-enclosed.

To date white muscle disease has not been diagnosed in Cypriot mouflon or other mouflon species. This short paper describes a case of congenital white muscle disease in a Cypriot mouflon lamb and its clinical and pathological findings.

Clinical Case

CASE HISTORY

A five days old mouflon lamb was found suddenly dead in the Platania mouflon enclosure in Cyprus. No signs of disease were observed prior to death. The enclosure also contained 3 adult males and one female mouflon sheep. The adults were free-ranging in a 2.7 hectare area and were additionally provided with alfalfa hay ad libitum and concentrate mixture not containing extra vitamins, macro- or micro- minerals, while the aforementioned lamb was suckling.

POST MORTEM AND LABORATORY FINDINGS

Necropsy revealed a generalized pale discoloration of skeletal muscles (figure 1), and myocardium. Histopathological examination showed severe and extensive myodegeneration and necrosis of the skeletal muscles, as well as extensive mineral deposition (figures 2a and 2b); degeneration was also observed in the myocardium, albeit to a markedly lesser degree and extent. Based on the above, the diagnosis of white muscle disease was established. Liver selenium and liver vitamin E contents (determined by fluorometry) were 0.23 mg/kg and 21 mg/kg of liver weight, respectively.

Discussion

White muscle disease in the Cypriot mouflon lamb was diagnosed based on the observed gross and histological lesions. Findings similar to the ones described here have been described for white muscle disease in other ruminant species, in Greece and other countries. Sudden death can be attributed to heart failure, a condition that also seems to be common in other WMD cases in ruminants [9, 15].

To date, most reported cases of WMD in young animals of various ruminant species, such as calves, lambs, kids and deer calves have mainly been attributed to selenium deficiency or combined selenium and vitamin E deficiency [1, 4, 15, 17]. However, a smaller number of WMD cases in lambs and zoo ruminants have been attributed solely to vitamin E deficiency [3, 5, 9, 10, 13, 19].
In the present case WMD can be presumptively attributed solely to vitamin E deficiency. Reference values for selenium and vitamin E are not currently available for the Cypriot mouflon or other mouflon species. However, although knowledge based on sheep or other ruminants cannot necessarily be extrapolated for the Cypriot mouflon, the liver selenium value obtained falls within the usual values measured in various other ruminant zoo species, such as Antelopes, editorial input.

Acknowledgement

The authors thank Dr Marie Savina-Rolland for her helpful editorial input.

References


