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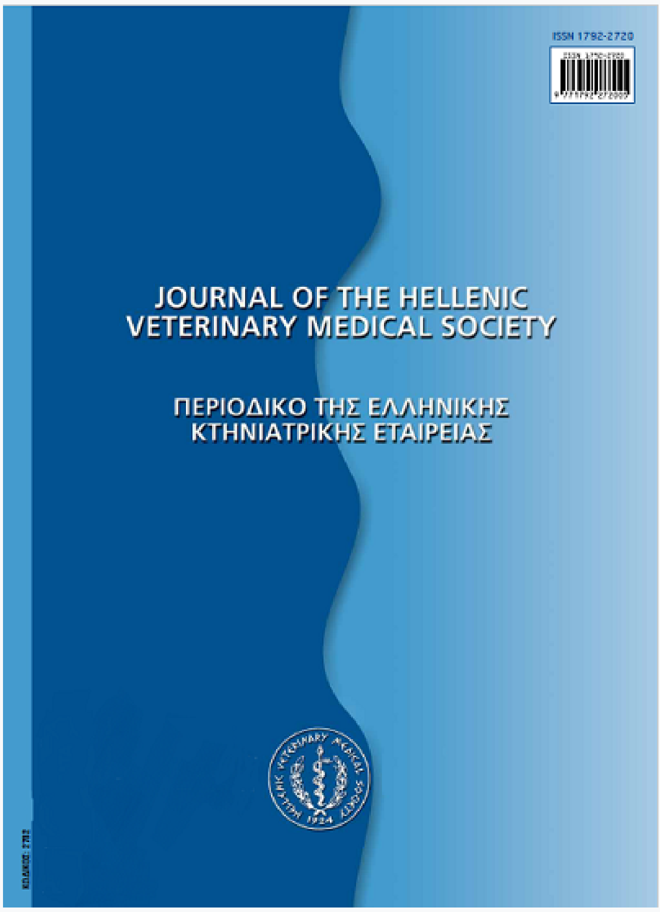

Case of syngamosis in partridges of a backyard farm

M. ANDREOPOULOU (Μ. ΑΝΔΡΕΟΠΟΥΛΟΥ), V. TSIOURIS (Β. ΤΣΙΟΥΡΗΣ), I. GEORGOPOULOU (Ι. ΓΕΩΡΓΟΠΟΥΛΟΥ), E. PAPADOPOULOS (Η.ΠΑΠΑΔΟΠΟΥΛΟΣ)

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Case report
Κλινικό περιστατικό

Case of syngamosis in partridges of a backyard farm

Andreopoulou M.[1], DVM, **Tsiouris V.**[1], DVM, PhD, **Georgopoulou I.**[1], DVM, PhD, **Papadopoulos E.**[2], DVM, MSc, PhD, DipEVPC

[1] Unit of Avian Medicine, Veterinary Faculty, Aristotle University of Thessaloniki

[2] Laboratory of Parasitology and Parasitic Diseases, Faculty of Veterinary Medicine, Aristotle University of Thessaloniki, Thessaloniki Greece

Περιστατικό συνγκάμωσης σε πέρδικες οικόσιτης εκτροφής

Μ. Ανδρεοπούλου[1], DVM, **Β. Τσιούρης**[1], DVM, PhD, **Ι. Γεωργοπούλου**[1], DVM, PhD, **Η. Παπαδόπουλος**[2], DVM, MSc, PhD, DipEVPC

[1] Μονάδα Παθολογίας Πτηνών, Κτηνιατρική Σχολή Α.Π.Θ.

[2] Εργαστήριο Παρασιτολογίας και Παρασιτικών Νοσημάτων, Κτηνιατρική Σχολή Α.Π.Θ.

ABSTRACT. Sick and dead 2-months-old partridges (*Alectoris chukar*) were presented to the unit of Avian Medicine, Faculty of Veterinary Medicine, Aristotle University of Thessaloniki, Greece. The birds were reared at a specially constructed wire cage, which covered 600 m^2 of the ground, including self-growing flora, in the region of Diavata, in the countryside of Thessaloniki. The farm consisted of young partridges, adult pheasants and wild passerines. Two months after placing the birds, 5 partridges were found dead. During the clinical examination of the submitted sick partridges, severe respiratory distress was observed, while some birds had anemic combs and others were breathing with open beaks and had their necks stretched. The necropsy revealed the presence of numerous gapeworms in the lumen of the trachea, forming the typical "Y" shape, since male and female *Syngamus trachea* are locked in copulation. The mucosa of trachea was, also, thickened, irritated and congested. No lesions to other organs were observed and the microbiological examination of liver, spleen and air-sacs samples was negative. Meanwhile, faecal samples were collected from the farm for parasitological examination. A sedimentation method was used and eggs of *S. trachea* were found. Syngamosis was determined to be the cause of the partridges' death. The gapeworms are considered potentially dangerous, especially for backyard, game-birds and free-living birds, while the control of the disease is complicated. This fact, along with the selective appearance of the clinical signs and the mortality only in the partridges of the farm are the remarkable points discussed in this article.

Keywords: Syngamosis, *Syngamus trachea*, gaping, partridges, game-bird farm.

ΠΕΡΙΛΗΨΗ. Ζωντανές και νεκρές πέρδικες (*Alectoris chukar*), ηλικίας 2 μηνών, προερχόμενες από οικόσιτη εκτροφή στην περιοχή Διαβατών Θεσσαλονίκης, προσκομίστηκαν στη μονάδα Παθολογίας Πτηνών της Κτηνιατρικής Σχολής Α.Π.Θ. Οι πέρδικες διαβιούσαν μαζί με ενήλικους φασιανούς (*Phasianus colchicus*) και ελεύθερα διαβιούντα είδη Στρουθιόμορφων (Passeriformes), σε έναν ειδικά διαμορφωμένο περιφραγμένο κλωβό 600 m^2, στο έδαφος του οποίου υπήρχε αυτοφυής χλωρίδα. Δύο μήνες μετά την τοποθέτηση των πτηνών στο κλωβό, παρατηρήθηκαν 5 θάνατοι στις πέρδικες, γεγονός που αποτέλεσε και την αιτία προσκόμισης ασθενών πτηνών για εξέταση. Κατά την κλινική εξέταση διαπιστώθηκε έντονη αναπνευστική δυσχέρεια,

Correspondence: Andreopoulou M.
Unit of Avian Medicine, Veterinary Faculty A.U.TH., St. Voutira 11, 546 27 Thessaloniki, Greece
Tel.: 2310 994556, Fax: 2310 994557, e-mail: ioannag@vet.auth.gr

Αλληλογραφία: Μ. Ανδρεοπούλου
Μονάδα Παθολογίας Πτηνών, Κτηνιατρική Σχολή Α.Π.Θ., Στ. Βουτυρά 11, 546 27 Θεσσαλονίκη
Τηλ: 2310 994556, Fax: 2310 994557, e-mail: ioannag@vet.auth.gr

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κοπιώδης αναπνοή, με ανοικτό ράμφος, ανύψωση της κεφαλής με ταυτόχρονη έκταση του τραχήλου και αναιμικά κάλλαια. Κατά τη νεκροτομική εξέταση, παρατηρήθηκε πάχυνση και συμφόρηση του βλεννογόνου της τραχείας, καθώς και μεγάλος αριθμός παρασίτων *Syngamus trachea* στον αυλό της. Τα παράσιτα σχημάτιζαν το χαρακτηριστικό 'Υ', δηλωτικό της παραμονής θηλυκού και αρσενικού παρασίτου σε σύζευξη. Τα υπόλοιπα όργανα δεν έφεραν αλλοιώσεις, ενώ οι μικροβιολογικές εξετάσεις που διενεργήθηκαν από δείγματα ήπατος, σπλήνα και αεροφόρων σάκων ήταν αρνητικές. Παράλληλα, εξετάστηκαν δείγματα κοπράνων από την εκτροφή, όπου με τη μέθοδο καθίζησης ανιχνεύτηκαν αυγά *S. trachea*. Ο θάνατος των νεαρών περδικών αποδόθηκε στην έντονη παρασίτωση της τραχείας από *S. trachea*. Η σημασία του νοσήματος για οικόσιτα ή ελεύθερα διαβιούντα πτηνά, η δυσκολία αντιμετώπισης και ελέγχου της νόσου, καθώς και η ιδιομορφία εμφάνισης των συμπτωμάτων και της θνησιμότητας, ειδικά στις πέρδικες της εκτροφής αυτής, είναι τα ενδιαφέροντα σημεία που συζητούνται στο άρθρο αυτό.

Λέξεις ευρετηρίασης: συνγκάμωση, *Syngamus trachea*, δύσπνοια, πέρδικες, οικόσιτη εκτροφή.

INTRODUCTION

Syngamosis is a disease of the respiratory tract of birds, caused by *Syngamus trachea*. The causative agent is a nematode parasite, first described as *Syngamus trachealis*, from Weisenthal, in 1797. The parasite is, also, called "redworm", because of its colour, or gapeworm, due to the basic clinical sign observed to its hosts, which is described as "gaping". There is a wide variety of hosts, including partridges, guinea fowl, geese, ratites, passerine birds, rooks, quails, peacocks, emus, pheasants and chickens. The disease is commonly reported in free-ranging, wild, backyard and game birds and it is more severe in turkeys and starlings. The dominant location of the adult parasite is the trachea, but it can, also, be found in the bronchi or even the bronchioles (Morgan and Clapham 1934).

The life cycle of the parasite was believed to be only direct until 1934 (Clapham 1939), but, nowadays, it has been widely demonstrated that transmission from bird to bird can be either direct or indirect. The female adult parasite lays eggs, which reach the bird's mouth cavity, are swallowed and secreted to the environment through the droppings. In this phase, the eggs are developed to the infective stage. Usually, the egg-hatching takes 8-14 days and the larvae (L3) live free in the soil. The hosts are infected by numerous ways, such as swallowing an embryonated egg that contains the L3 infective larva, swallowing the L3 larvae directly from the soil or eating a transport or paratenic host. The main transfer hosts are snails and slugs, while the basic paratenic hosts are believed to be the earthworms, including *Eisenia foetidus* and *Allolobophora caliginosus*, as well as the flies *Musca domestica* and *Lucilia sericata* (Clapham 1939, Petrak 1982). The L3 larvae encyst in their body cavity and remain infective for a very long time. As a matter of fact, experimental challenge of the disease has shown that this indirect type of transmission, through earthworms, is easier and more common to occur. After indigestion of the larvae, they penetrate the wall of the crop or the oesophagus or even the duodenum and reach the lungs and the bronchi or they reach the lungs carried by the portal bloodstream (Kassai 1999). No matter the route they follow to reach the respiratory system it usually takes the larvae 4-5 days to develop to the adult stage and about 2 weeks for the first eggs to be produced (Yazwinski and Tucker 2008).

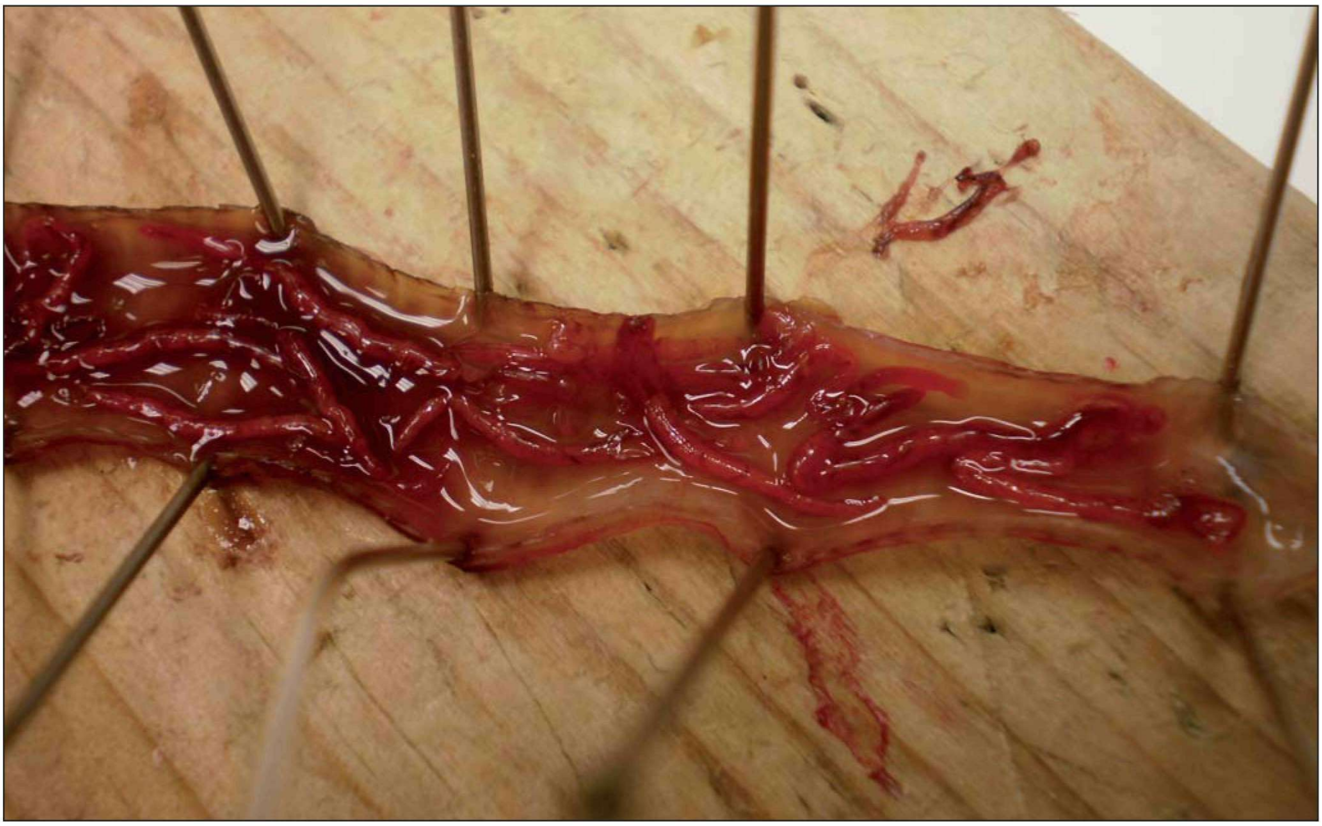
The growth of the adult worms in the trachea results in the obstruction of its lumen, causing more or less severe signs. The severity of the symptoms depends on the degree of the infection, the size and the age of the bird, since smaller-sized as well as younger birds, have narrower airways that are easier to dam (Nevarez et al. 2002). Mild infections are not followed by clinical signs, except a hardly recognized respiratory distress. On the contrary, heavy infections cause breath with open mouth, head shaking, neck stretching, cough, sneeze and the infected birds produce a hissing noise, as an attempt to dislodge the parasites. Besides, all these symptoms represent the most typical sign of syngamosis, briefly described as "gaping". The consequence of such a respiratory distress, especially for young birds, is the rapid weight loss due to anorexia and depression that can even lead to the death of the bird. Death can, also, occur due to pneumonia during the larvae migration from the lungs to the trachea. Generally, the mortality rate can reach up to 25%. Another sign that may be indicative of syngamosis is the presence of anaemic wattles, as a result of the net blood loss caused by the adult worms, which are bloodsuckers (Yazwinski and Tucker 2008).

CASE HISTORY

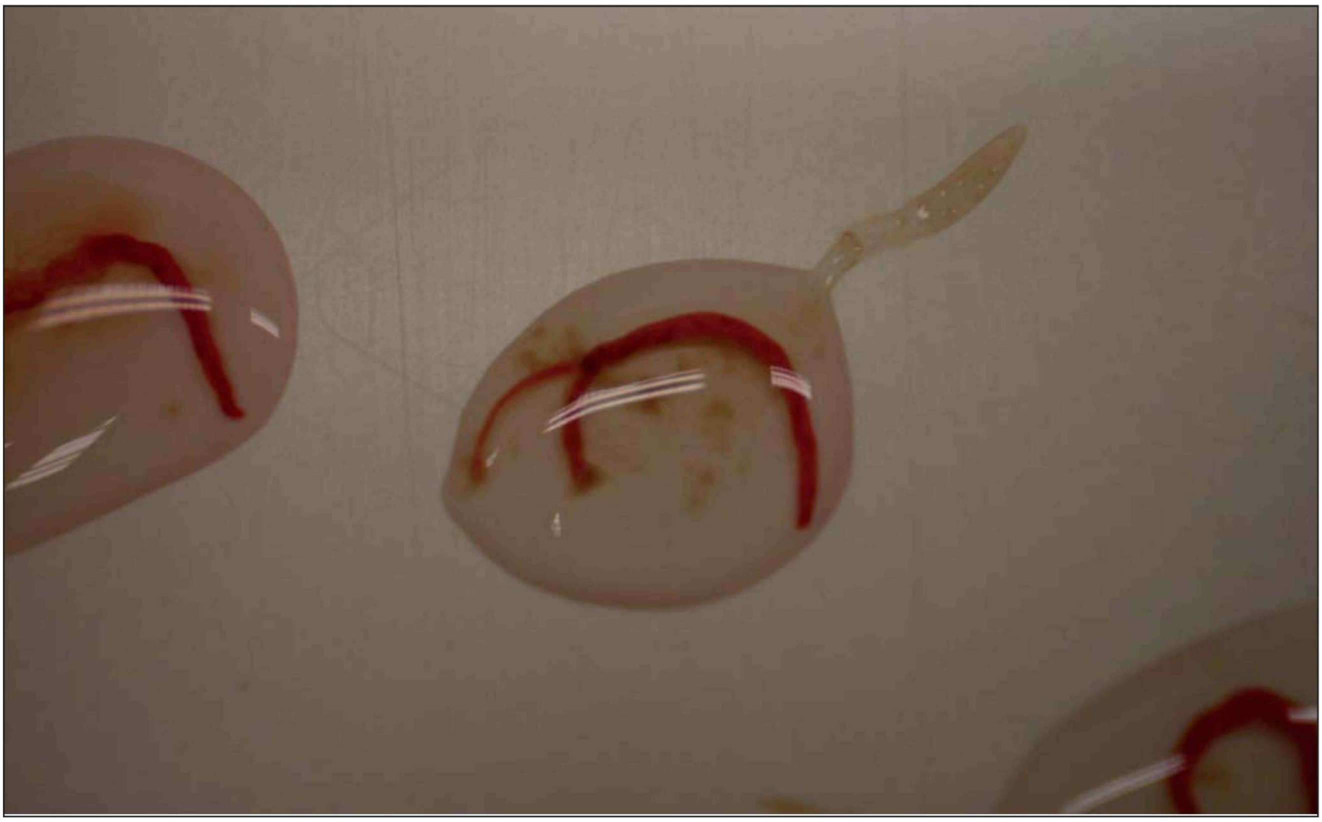
This report describes a rather typical case of syngamosis at a game-bird farm of partridges (*Alectoris chukar*) and other species. The farm was located in the region of Diavata in the west countryside of Thessaloniki. It consisted of 20 young partridges 2-months-old, 20 adult pheasants and 37 wild birds of different passerine species of unknown age. The birds were placed at the same time at a wire-fenced cage covering 600m^2 of the ground, with self-growing flora (Fig.1). An adequate ration for partridges and fresh water were provided to the birds *ad libitum*. Two months after placing the birds in the cage, 5 deaths of partridges were observed on a daily basis. Under these circumstances, 2 sick and 3 dead partridges were submitted to the unit of Avian Medicine, Faculty of Veterinary Medicine, Aristotle University of Thessaloniki. During the clinical examination, severe respiratory distress was observed. The live partridges had anaemic combs, were breathing with open beaks and stretched their necks. The findings of the necropsy were focused mainly on the trachea, where the mucosa was congested, thickened and irritated. The lumen of the trachea was filled with numerous parasites, both males and females, forming the typical "Y" shape, since they are locked in copulation (Fig. 2 & 3). No macroscopic lesions were observed on other organs. The microscopic examination of the intestinal content revealed the presence of a very small number of oocysts, while the bacteriological examination of the liver, the spleen and the air-sacs was negative.

Faecal samples of live birds were transferred to the Laboratory of Parasitology, Veterinary Faculty of Aristotle University of Thessaloniki. The faeces sampling was carried out separately of the partridges, pheasants and wild birds. This was achieved by isolating the different bird species using suitable wire mesh. Totally, 20 faecal samples were tested per species. The parasitological examination of the faeces by Teleman's technique resulted in the finding of numerous *S. trachea* eggs in all species (Fig. 4). A very small number of *Eimeria* spp. oocysts were, also, detected.

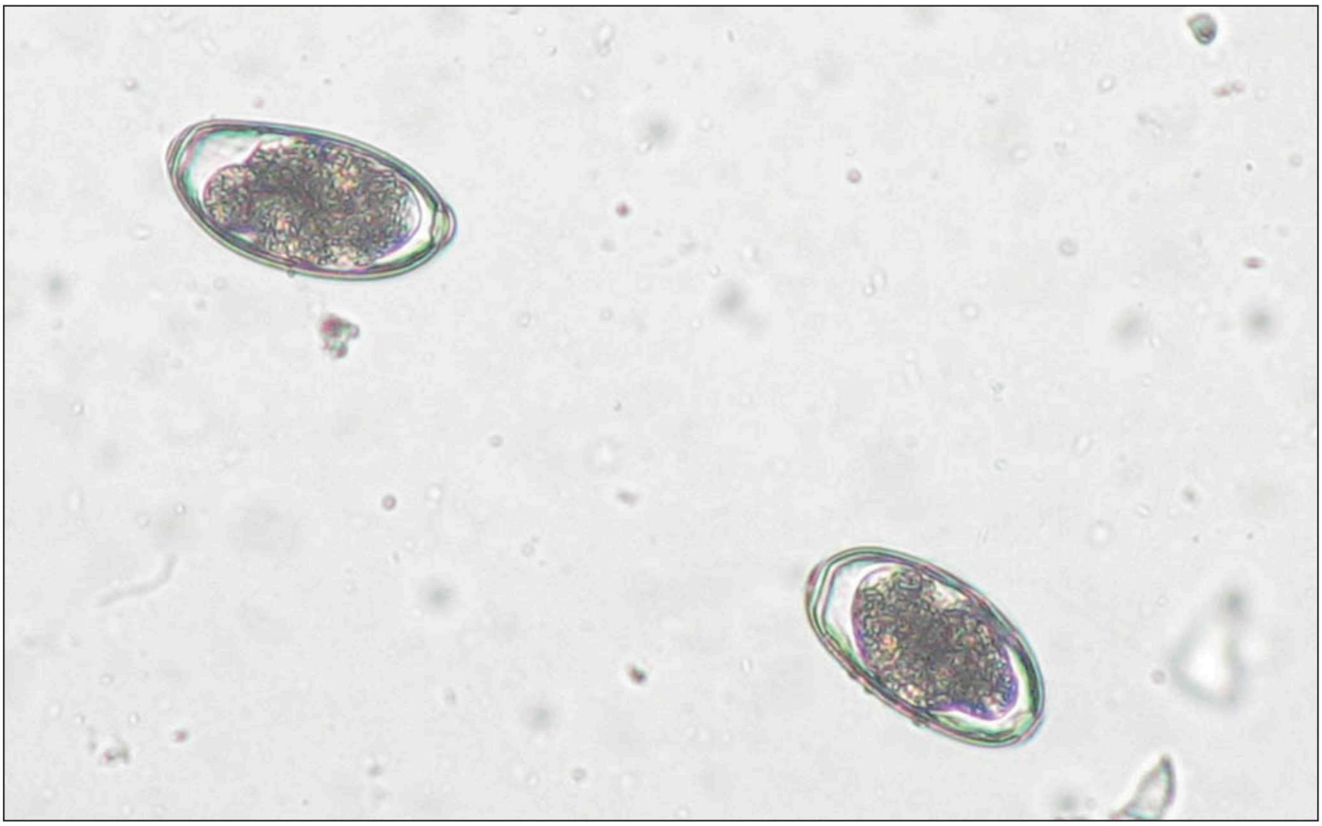
Figures 1. The interior of the wire-cage where the partridges were bred.



Figures 2. Numerous *S. trachea* parasites were found in the lumen of the trachea during the post-mortem examination.



Figures 3. The typical “Y” shape between the male and female adult *S. trachea*.



Figures 4. The eggs of *S. trachea*, as found at the parasitological examination of the faeces (Teleman's technique).

According to the findings of the clinical, post-mortem and laboratory examination, syngamosis was determined to be the cause of the partridges' death (Coles 2009).

DISCUSSION

The fact that is interesting is that mortality, as well as the clinical signs of the disease, were noted only in partridges, while the pheasants and the other wild passerines did not show signs of syngamosis. However, the parasitological examination of the faeces from all the species living in the cage demonstrated the presence of *S. trachea* eggs, which means that both pheasants and passerines were infected. The most possible explanation for the species selected in this case of syngamosis was the age of the final host, since younger birds (young partridges) seem to be extremely susceptible, while adult birds (pheasants) show higher resistance and may only be carriers (Yazwinski and Tucker 2008). The susceptibility of the younger birds is the reason why syngamosis is associated with the breeding cycles in the spring to summer months for free-ranging birds (Cole 2001, Nevarez et al. 2002). Besides, the seasonality of the disease is compatible with this certain case, since the partridges were most severely affected in the middle days of May.

Apart from the seasonality, the infection was more likely to occur due to the breeding of many different species at the same time and place. The presence of worm eggs at the faeces of all species living in the same cage demonstrates the disseminated infection between them and makes the transmission and, therefore, the appearance of the disease easier. Single species breeding is a fundamental principle as far as the prevention of diseases is concerned and, in this case, having the birds in the same cage was a rather uprising danger (McGregor et al. 1961).

The construction of the cage itself was another aggravating factor affecting the birds, since this type of wire cages with ground floor was not as protective as it should be. First of all, the wire cage had openings through which, wild birds, flying around the cage could come in contact with those living inside the cage or even contaminate the place with faeces containing worm eggs. Furthermore, the ground floor with the self-growing flora allowed the earthworms, flies, slugs or snails to live there, consisting uncontrollable populations, and play the role of transport or paratenic hosts (Tsiouris et al. 2007). Under these circumstances, the infection level in the cage would remain high, even after performing deworming programmes. The soil would remain contaminated with large numbers of earthworms and re-infection would occur. It is referred that encysted worm larvae can remain infective to young birds for as long as four years. This can explain why syngamosis was so intensively present with that kind of ground-floor-cage (Yazwinski and Tucker 2008, Crosta and Timossi 2009).

In order to deal with this fatal case of syngamosis, as successfully as possible, both chemotherapeutics and management measures were used, although it is widely accepted that there is no feasible method of controlling tracheal worms in free-ranging birds (Cole 2001). Modern poultry practices, such as confinement rearing of broilers and pullets and caging of laying hens, have significantly decreased the quantity and variety of nematode infections in commercial poultry flocks, including syngamosis. However, there are still many nematode infections that cause extensive problems in farmyard or backyard flocks. The increasing trend for "organic" and "humane" bird maintenance and production wherein birds are placed in more natural settings without the prophylactic use of drugs, such as parasiticides, at a time when chemical intervention is decreased, has led to greater parasite incidence. Another limiting factor is that only a few compounds have been approved by the Food and Drug Administration (FDA) for use in poultry and this is why control of syngamosis basically includes sanitation measures and interruption of the life cycle rather than chemotherapy (Yazwinski and Tucker 2008).

Even from 1950, the experts had admitted that treatment of syngamosis is not an easy matter, since *S. trachea* is one of the most difficult parasites to dislodge, owing to its position in the trachea. Many so-called gapeworms cures consisted of substances which stimulated the respiratory musculature and induced a sudden explosive cough. A few worms might dislodge by this means, but far more were left. Some considerable success had been achieved among pheasants with barium-antimonyl tartrate, but partridges are less satisfactory subjects because they seemed to have difficulty in coughing up the worms. In almost every case, the worms had become packed into a solid mass, obstructed the trachea and caused rapid death of the birds. Phenothiazine was, also, used to treat gapeworm disease and was believed to be the best choice possible for many years, because of the killing effect on the worms, the minimized consequences for the organism and the wide margin of safety between the clinical and the lethal doses (Clapham 1950).

Nowadays, several compounds have been shown effective against *S. trachea* and can be used in a deworming program. Flubendazole at 60g/tonne feed for 7 days (Bishop 2005) is believed to be the most suitable compound for *S. trachea* when given mixed with the diet or in the drinking water (Yazwinski and Tucker 2008). However, the most commonly used compounds are mebendazole at 120 mg/kg of food for 3 days (Petrak 1982), febendazole at 7-10 mg/kg of body weight for 14 days or 1 kg per ton of food (Bishop 2005), ivermectin at 200 μg/kg of body weight, once and repeated after 10-14 days (Rupley 1997) and levamisole hydrochloride at 850 mg/kg of drinking water once and repeated after 10-14 days (Bishop 2005).

This case of syngamosis was treated with levamisole given once, at the dose referred above, and repeated after 10 days. A strategic deworming programme was determined, taking into account the fact that it should target the entire farm and have a drastic fall of the farm infection pressure within a limited time. The intervals between treatments should be determined by the prepatent period of the parasite (*S. trachea* 18-20 days) and be shorter than that. When the infection pressure decreases, intervals can be enlarged. In that way, all animals can remain free of adult egg laying worms and maintain this for a sufficiently long period, without having outbreaks of the disease. If the deworming programmes are random and non-time-planned, the average infection of the farm will remain high, decreasing only for a few days after the deworming to increase again and cause severe re-infection and disease outbreak. To avoid this, in our case, dewormings were first performed every 10 days for 4 times. Then, the deworming was performed after 30 days and, finally, the last one after 60 days. An antibiotic should be given *per os* or with nebulisation up to six weeks to prevent from secondary infections (Beynon et al. 1996).

In conjunction with the dewormings, management measures were recommended to control the disease. Reassuring a safe level of sanitation in the cage, providing fresh water and feed daily, dividing the cage into compartments based on species, quarantine for new birds and covering the floor of the cage with 10-15 cm of coarse river sand were some really beneficial measures. Coarse sand dries out rapidly and, hopefully, desiccates worm eggs quicker than substrate that retains moisture. This soil should be replaced several times a year (Crosta and Timossy 2009).

Furthermore, Levine (1969) recommends the treatment of soil, meaning the use of chemical agents to control the soil stages of the nematodes. According to Dunn and Greiner (2005), the use of common salt brine or borax on bare ground could decrease the parasitic burden. Lowering the density of the birds in the cage would be another beneficial measure. In our case, that was practically difficult, so the cage was divided into compartments per species instead.

Based on the worldwide literature, these are the recommendations that must be made in any case of syngamosis. When a respiratory problem in a game bird or backyard flock occurs, *S. trachea* should always be part of the differential diagnosis.

REFERENCES

Beynon, P.H, Harcourt-Brown N.H and Forbes N.A (1996) Respiratory Problems. In: Manual of Raptors, Pigeons and Waterfowl, BSAVA, England : pp 184-186.

Bishop Y. (2005) Drugs for Roundworms (nematodes). In: The Veterinary Formulary, 6th ed., Pharmaceutical Press, London: pp 236-247.

Clapham A.P (1939) On Flies as Intermediate Hosts of Syngamus trachea, Journal of Helminthology, Vol. XVII(2):61-64.

Clapham A.P (1939) On the Larval Migration of Syngamus trachea and its causal relationship to Pneumonia in young birds, Journal of Helminthology, Vol. XVII(3):159-162.

Clapham A. P. (1950) On Treating and Preventing Gapeworm Disease, Journal of Helminthology, Vol. XXIV:53-60.

Cole A. R.(2001) Tracheal Worms. In: Field Manual of Wildlife Diseases: Birds: USGS: pp 229-231.

Coles H.B.(2009) Galliformes. In: Handbook of Avian Medicine, 2nd ed., Saunders Elsevier Limited: pp 309-334.

Crosta L. and Timossi L.(2009) The management of a multi-species bird collection in a zoological park. In: Handbook of Avian Medicine, 2nd ed., Saunders Elsevier Limited: pp 404-435.

Dunn A.R. and Greiner E.C. (2005) http://edis.ifas.ufl.edu/ng007 [accessed on 25/6/2011].

Kassai T. (1999) Syngamosis. In: Veterinary Helminthology, Butterworth-Heineman, Oxford.: pp 71-72.

Levine N.D (1969) Chemical Control of Soil Stages of Animal Parasitic Nematodes,Transactions of the American Microscopical Society, Vol.88(1):135-141.

McGregor J.K., Kingscote A.A., Remmler F.W.(1961) Field trials in the control of gapeworm infections in pheasants, Avian Diseases 5(1): 11-18.

Morgan D.O. and Clapham A.P (1934) Some Observations on Gapeworm in Poultry and Game Birds, Journal of Helminthology, Vol. XII(2): 63-70.

Nevarez J.G, Gamble K.C, Tully T.N (2002) Syngamus trachea infection in two red and yellow barbets (Trachyphonus Erythrocephalus), Journal of Avian Medicine and Surgery, Vol. 16(1): 31-33.

Petrak M.L (1982) Nematodes of the Respiratory System. In: Diseases of Cage and Aviary Birds, 2nd ed., Lea and Febiger, Philadelphia: pp 554-556.

Rupley E.A. (1997) Formulary. In: Manual of Avian Practice, W.B. Saunders Company, Philadelphia, Pensylvania, USA: pp 502-517.

Tsiouris V., Diakou A., Georgopoulou I. (2008) Syngamosis at a game-bird farm of pheasants (Phasianus Colchicus). In: Proceedings of the 5th International Congress on Wild Fauna, Chalkidiki, Greece: pp 35.

Yazwinski A.T. and Tucker A.C.(2008) Internal Parasites, Nematodes and Acanthocephalaus. In: Diseases of Poultry, 12nd ed., Blackwell Publishing, Ames, Iowa, USA: pp 1025-1066.