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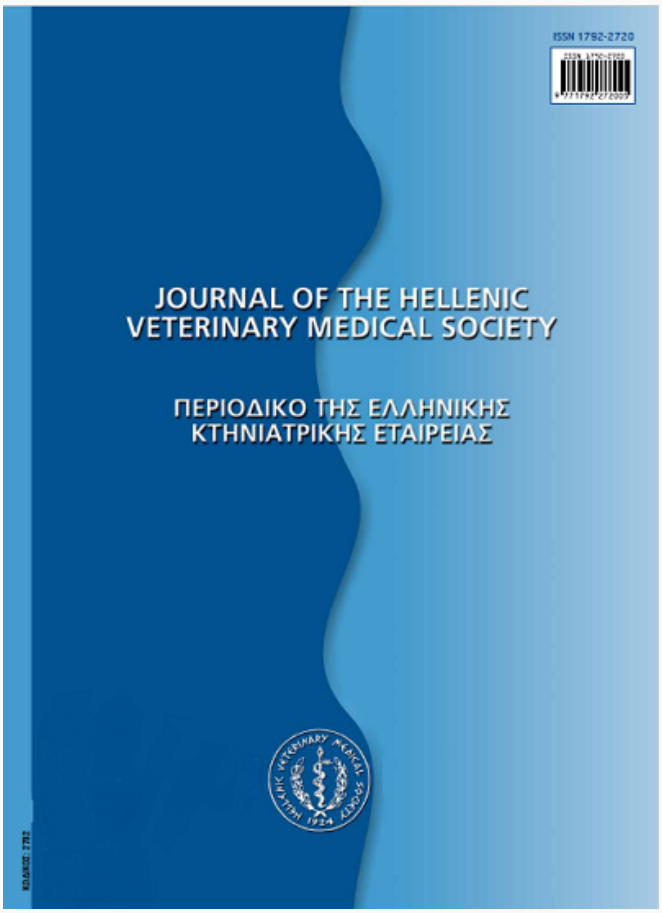

Ενδοπαράσιτα του Ελληνικού βουβάλου (Bubalus bubalis) στην περιοχή της Βορείου Ελλάδας

A. FOUNTA, E. PAPADOPOULOS, S. CHLIOUNAKIS, V. A. BAMPIDIS, M. PAPAZAHARIADOU

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Presence of endoparasites in the Greek buffalo (*Bubalus bubalis*) from Northern Greece

A. Founta[1], E. Papadopoulos[2], S. Chliounakis[1], V.A. Bampidis[1], M. Papazahariadou[2]

[1] *Laboratory of Parasitology, Department of Agricultural Technology, School of Agricultural Technology, Food Technology and Nutrition, Alexander Technological Educational Institute of Thessaloniki, Greece,*

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

Ενδοπαράσιτα του Ελληνικού βουβάλου (*Bubalus bubalis*) στην περιοχή της Βορείου Ελλάδας

Α. Φούντα[1], Η. Παπαδόπουλος[2], Σ. Χλειουνάκης[1], Β.Α. Μπαμπίδης[1], Μ. Παπαζαχαριάδου[2]

[1] *Εργαστήριο Παρασιτολογίας, Τμήμα Τεχνολόγων Γεωπόνων, Σχολή Τεχνολογίας Γεωπονίας και Τεχνολογίας Τροφίμων και Διατροφής, Αλεξάνδρειο Τεχνολογικό Εκπαιδευτικό Ίδρυμα Θεσσαλονίκης*

[2] *Εργαστήριο Παρασιτολογίας και Παρασιτικών Νοσημάτων, Τμήμα Κτηνιατρικής, Αριστοτέλειο Πανεπιστήμιο Θεσσαλονίκης*

ABSTRACT. This study was conducted in order to determine the presence of parasitic infections of the Greek buffalo (*Bubalus bubalis*) in the Prefecture of Serres, Northern Greece. During the period from February to October 2014, faecal samples from 110 buffaloes of the Greek buffalo breed (*Bubalus bubalis*), from 9 farms located in proximity to Lake Kerkini, in the Prefecture of Serres, Northern Greece, were examined, in order to find reproductive elements of parasites. Out of 110 faecal samples examined, 102 (92.73%) were found infected with reproductive elements (eggs, larvae, cysts and oocysts) of parasites. Specifically, the parasites found were: *Eimeria* spp. (40%), *Entamoeba bovis* (16.36%), *Paramphistomum cervi* (10%), *Fasciola hepatica* (16.36%), *Dicrocoelium dendriticum* (28.18%), *Moniezia*

Corresponding Author: V.A. Bampidis, Department of Agricultural Technology, School of Agricultural Technology, Food Technology and Nutrition, Alexander Technological Educational Institute of Thessaloniki, 57400 Thessaloniki, Greece.
E-mail address: bampidis@ap.teithe.gr.

Συγγραφέας αλληλογραφίας: Β.Α. Μπαμπίδης, Τμήμα Τεχνολόγων Γεωπόνων, Σχολή Τεχνολογίας Γεωπονίας και Τεχνολογίας Τροφίμων και Διατροφής, Αλεξάνδρειο Τεχνολογικό Εκπαιδευτικό Ίδρυμα Θεσσαλονίκης, 57400 Θεσσαλονίκη.
E-mail address: bampidis@ap.teithe.gr.

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benedeni (27.27%), *Toxocara vitulorum* (11.82%), Strongylida (gastrointestinal nematodes) (31.82%) and lungworms (28.18%). The present study appears to be the first report of the detection of lungworms in buffaloes, in Greece.

Keywords: *Greek buffalo, parasites, Northern Greece*

ΠΕΡΙΛΗΨΗ. Σκοπός της παρούσας έρευνας ήταν η διερεύνηση της παρουσίας παρασίτων σε δείγματα κοπράνων βουβάλων, της φυλής του Ελληνικού βουβάλου (*Bubalus bubalis*), που εκτρέφονται σε περιοχές της Περιφερειακής Ενότητας Σερρών στη Βόρεια Ελλάδα. Κατά το χρονικό διάστημα Φεβρουάριος – Οκτώβριος 2014, εξετάσθηκαν δείγματα κοπράνων από 110 βουβάλους της φυλής του Ελληνικού βουβάλου (*Bubalus bubalis*), από 9 εκτροφές που βρίσκονται σε αγροτικούς οικισμούς περιμετρικά της λίμνης Κερκίνης, με σκοπό την ανεύρεση αναπαραγωγικών στοιχείων παρασίτων (αυγών, προνυμφών, κύστεων και ωοκύστεων). Κατά την εξέταση των 110 δειγμάτων κοπράνων, τα 102 (92,73%) βρέθηκαν μολυσμένα με αναπαραγωγικά στοιχεία παρασίτων. Συγκεκριμένα, τα παράσιτα που βρέθηκαν ήταν: *Eimeria* spp. (40%), *Entamoeba bovis* (16,36%), *Paramphistomum cervi* (10%), *Fasciola hepatica* (16,36%), *Dicrocoelium dendriticum* (28,18%), *Moniezia benedeni* (27,27%), *Toxocara vitulorum* (11,82%), Στρογγυλοειδή (γαστρεντερικά νηματώδη) (31,82%) και πνευμονικά παράσιτα (28,18%). Στην παρούσα έρευνα γίνεται η πρώτη αναφορά της ανεύρεσης πνευμονικών παρασίτων στους βουβάλους, στην Ελλάδα.

Λέξεις ευρετηρίασης: *Ελληνικός βούβαλος, παράσιτα, Βόρειος Ελλάδα*

INTRODUCTION

Bubalus bubalis is one of the important species of domestic livestock as a source of good quality meat and milk (Hinrichs, 2004; Infascelli et al., 2004; Zicarelli, 2004; Zotos and Bampidis, 2014). The largest population of these animals in Europe is in Italy, Bulgaria and Romania (Galiero et al., 2005; Kobak and Pilarczyk, 2012).

The Food and Agriculture Organization of the United Nations refers to the Greek buffalo (*Bubalus bubalis*) population as a separate breed named "Ellinikos vouvalos (Greek buffalo)", and characterizes this population as endangered-maintained species (FAO, 2007). The Greek buffalo is part of biodiversity of many Greek wetlands (mainly Lake Kerkini, Prefecture of Serres, Northern Greece), thereby enriching ecosystems with its aesthetic value. Moreover, the Greek buffalo, as a food producing animal, provides valuable products (milk, meat; Zotos and Bampidis, 2014), thus increasing the interest in breeding this particular species in Greece; current population is approximately 4,000 head (GBBC, 2018).

The parasitic diseases in buffaloes cause economic losses in a variety of ways: lowered fertility, reduced rates of weight gain, lower milk production, treatment costs etc. The survey of parasitic infection is an important aid to combat infections more effectively and in controlling economic losses by adopting effective control measures (Sreedevi and Hafeez, 2014). Thus, the aim of the present study was to determine the current presence of the endoparasites in the population of the Greek buffalo breed, in the Prefecture of Serres, Northern Greece.

MATERIALS AND METHODS

During the period from February to October 2014, faecal samples from 110 buffaloes of the Greek buffalo breed (*Bubalus bubalis*), from 9 farms located in proximity to Lake Kerkini, in the Prefecture of Serres, Northern Greece (41°14′ N, 23°06′ E), were examined in order to find reproductive elements of parasites. The number of buffaloes per farm (adult females/males and heifers) and the number of examined buffaloes (faecal samples) per farm are given in Table 1. All faecal samples examined were obtained from adult buffaloes, randomly selected and apparently healthy, 105 samples from females and 5 samples from males, and were collected from the pasture directly after defecation of the animals. Each faecal sample was collected with hand glove and was kept in separate plastic bag to avoid contamination, tied carefully, labeled and sent to the Laboratory of Para-

sitology and Parasitic Diseases, Faculty of Veterinary Medicine, Aristotle University of Thessaloniki, for examination.

Faecal samples were examined using the sedimentation method Teleman (Pierkazski, 1954), which is a qualitative method that detects all parasitic elements in faeces, in order to find reproductive elements of parasites (eggs or larvae from worms and cysts or oocysts from protozoa) and to identify them (Soulsby, 1982; Thienpont et al., 1986) using microscope (×10, ×40). Descriptive statistics were performed with the Statistical Package for the Social Sciences (2008).

RESULTS

Out of 110 faecal samples examined, 102 (92.73%) were found infected with reproductive elements of parasites. Detailed results are presented in Table 2. Single infection was observed in 30 (27.27%) faecal samples and mixed infection in 69 (62.73%) faecal samples with two, three and four species of parasites. In addition, mixed infection was revealed in one sample (0.91%) with five species of parasites and in two samples (1.82%) with six species of parasites.

DISCUSSION

The results of the present study revealed two species of protozoa, *Eimeria* spp. and *E. bovis*, both of them were found in a previous research, in our country and indicated that the prevalence of infection was 100% for both of them (Himonas et al., 1998). In another investigation, Founta et al. (2007) observed that the infection rate of *Eimeria* spp. and *E. bovis* were 0.16% and 11%, respectively. They also found the presence of *Buxtonella sulcata* (55%) and *Blastocystis* spp. (8%), which was not found in this survey. In the present study, the higher presence of *Eimeria* spp. (40%) infection, possible due to the intensive breeding in buffalo farms in the last years, implies a high density of animals thus leading to the spread of protozoa (Rinaldi et al., 2007). Moreover, buffaloes are exposed to ingestion of *Eimeria* spp. infective oocysts with drinking water contaminated with faeces and the presence of older buffaloes, acting as asymptomatic carriers, in the same place where newborns live (Bastianetto et al., 2007). Similar findings were reported by Karanikola et al. (2012) in Greece, where the mean prevalence of *Eimeria* spp. and *E. bovis* were 40% and 14.8%, respectively. Different results were obtained by Nalbantoglou et al. (2008) in the Province of Afyon, Turkey, where the prevalence of *Eimeria* spp. in buffaloes was 3.8%-55.1%, whereas Singh et al. (2012) in India (Ludhiana District, Punjab) found prevalence of the infection which amounted to 0.95% and Mamun et al. (2011) in Bangladesh (Kurigram district) found 3.39%.

In the current study, the presence of helminths in buffaloes is much higher than the previous report of Founta et al. (2007), who noticed lower infection rate related to *P. cervi* 1.15%, *D. dendriticum* 0.49%, *M. benedeni* 0.16% and Strongylida 12.6%. Furthermore, the present study appears to be the first report of the detection of lungworms in buffaloes, in Greece. The high presence of infection is caused by the lack of appropriate parasite control programme, which is necessary for these animals. Buffaloes are raised on marshy pasture with high humidity which favors the growth and multiplication of parasites as well as their vectors (Kobak and Pilarczyk, 2012). Karanikola et al. (2012) also found high prevalence of helminthes infection in Greece (*F. hepatica* 11.1%, *P. cervi* 5.9%, *M. benedeni* 13.3%, *T. vitulorum* 8.9% and Strongylida 3.7%), but lower when compared to our results. Lower prevalence of helminths infection, using the FLOTAC technique, was observed in buffaloes by Cringoli et al. (2009) in the Lazio region in Italy and by Condoleo et al. (2007) in central Italy (*F. hepatica* 1.3%, *P. cervi* 2.1%, *D. dendriticum* 0.2%, *Moniezia* spp. 0.2%, Strongylida 5.4% and *Strongyloides* spp. 0.4%). Kobak and Pilarczyk (2012) found *F. hepatica* in 32% of buffaloes in the Notecka Forest region in Poland, which is almost twice the rate of infection with the present study. Racioppi et al. (2007) also found high prevalence of *F. hepatica* infection (28.5%) in the province of Corrientes, Argentina. Buffaloes are usually exposed to a higher risk of infection with snail-borne helminths due to their tendency to seek rivers, pools or swamps for wallowing (Cockrill, 1974). This research work indicated that the buffaloes were very much susceptible to parasitic infection with possible effects on their productivity. It is imperative that integrated strategies and measures be taken to control parasitic infections in buffaloes in Kerkini district and elsewhere in Greece.

CONCLUSIONS

The present study appears to be the first report of the detection of lungworms in buffaloes, in Greece. The high presence of parasites infection, in this study, should be an indication for devising an appropriate parasite control programme, it also highlights the need to carry out a larger study, including more samples and estimating the parasitic burdens, in order to estimate economic losses associated with parasitic invasions. To prevent contamination of buffaloes by parasites, preserve their population and to improve their yields, early detection and treatment of infected animals is recommended, in combination with improving their breeding conditions.

CONFLICT OF INTEREST STATEMENT

The authors declare that they have no conflict of interest.

Table 1: Number of buffaloes (total and examined) per farm.

Farm number	Total number of buffaloes/farm	Number of examined buffaloes (faecal samples)/farm
1	451 (307 ♀, 126 ♂, 18 heifers)	10 ♀
2	159 (88 ♀, 51 ♂, 20 heifers)	15 ♀
3	72 (63 ♀, 9 ♂)	10 ♀
4	362 (241 ♀, 100 ♂, 21 heifers)	10 ♀
5	183 (115 ♀, 40 ♂, 28 heifers)	12 ♀
6	30 (30 ♂)	5 ♂
7	151 (85 ♀, 41 ♂, 25 heifers)	12 ♀
8	49 (33 ♀, 15 ♂, 1 heifer)	12 ♀
9	603 (423 ♀, 125 ♂, 55 heifers)	24 ♀
Total	2060	110

Table 2. Presence of parasitic infections in the faeces of examined buffaloes (n=110).

Parasites	Parasitic elements	Number of infected samples (%)	95% Confidence interval (%)
Protozoa			
Eimeria spp.	oocyst	44 (40.00%)	30.8 – 49.8 %
Entamoeba bovis	cyst	18 (16.36%)	10.0 – 24.6 %
Helminths			
Strongylida	egg	35 (31.82%)	23.3 – 41.4 %
Dicrocoelium dendriticum	egg	31 (28.18%)	20.0 – 37.6 %
Lungworms	larva	31 (28.18%)	20.0 – 37.6 %
Moniezia benedeni	egg	30 (27.27%)	19.2 – 36.6 %
Fasciola hepatica	egg	18 (16.36%)	10.0 – 24.6 %
Toxocara vitulorum	egg	13 (11.82%)	6.4 – 19.4 %
Paramphistomum cervi	egg	11 (10.00%)	5.1 – 17.2 %

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