

# Резюмета на трудовете

## (гл. ас. Койчо Петков Коев)

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*Original Scientific Article*

### ANTICOAGULANT RESISTANCE IN SYNANTHROPIC RODENTS IN THE STARA ZAGORA REGION, BULGARIA

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#### ABSTRACT

The anticoagulant rodenticides are the most commonly used toxicants to control rodents nowadays. Therefore, developing resistance to them is an issue of great importance for pest control. The aim of this study was to investigate the sensitivity of synanthropic rodents in the Stara Zagora region, Bulgaria to some of the most significant first (warfarin and coumatetralyl) and second (bromadiolone and brodifacoum) generation anticoagulants. Resistance tests were carried out by a standard protocol using lethal feeding period tests and blood clotting response tests according to the European and Mediterranean Plant Protection Organization (Paris, France) standard. Studies were performed on 278 wild synanthropic rodents – 67 house mice (*Mus musculus*), 153 roof rats (*Rattus rattus*) and 58 brown rats (*Rattus norvegicus*). The rodents belonged to 11 populations inhabiting 9 animal farms in the region of Stara Zagora, Southern Bulgaria. High-level resistance to warfarin was established in 100% of surveyed house mice and 92.1% of roof rats. Resistance to coumatetralyl was registered in 62.5% of the tested roof rats. Low-level resistance to bromadiolone was found in 38.5% of the surveyed roof rats and 23.1% of house mice. There was no resistance registered in brown rats. The sensitivity of all three rodent species to the strategic anticoagulant brodifacoum was high, and there were no signs of resistance. The results proved the resistance among synanthropic rodents and led to the conclusion that the resistance in house mice and roof rats to warfarin and coumatetralyl tends to be the main issue in pest control.

**Key words:** resistance, anticoagulant rodenticides, synanthropic rodents



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*Original Contribution*

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**RODENTICIDAL EFFECTIVENESS OF INDOMETHACIN BAITS IN  
WARFARIN-RESISTANT ROOF RATS (*RATTUS RATTUS*) AND HOUSE  
MICE (*MUS MUSCULUS*)**

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**ABSTRACT**

Deratisation is one of the basic anti-epidemic measures, directed to protect the health of humans and animals. Nowadays, anticoagulants are still the most commonly used rodenticides. In recent years, the problem of development of resistant synanthropic rodents to these agents is becoming more serious. This is the reason for increasing interest in discovering alternative methods for controlling the resistant populations. It is known that some non-steroidal anti-inflammatory drugs (NSAIDs) act as synergists and significantly increase the toxicity of anticoagulant rodenticides, but convincing information on their effectiveness in anticoagulant-resistant rodents is still missing. The aim of the present research is to contribute to solve this problem, by studying the effectiveness of 0.025% indomethacin baits, administered alone and combined with warfarin, in warfarin-resistant wild synanthropic rodents. In the conducted laboratory food tests 36 roof rats (*Rattus rattus*) and 60 house mice (*Mus musculus*) were included. A very high toxicity of indomethacin baits in resistant rodents, leading up to 100% mortality, occurring between 24 to 48 hours post acceptance were found. NSAIDs mechanism of action, clinical signs and pathological findings in the intoxicated rodents are discussed. Based on the laboratory conducted tests and scientific data analysis, we conclude that 0.025% indomethacin baits have high effectiveness in anticoagulant-resistant synanthropic rodents and could be used as an alternative method for control of resistant populations.

**Key words:** indomethacin, rodenticide, anticoagulant resistance, deratisation



*Original Contribution*

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**PATHO-MORPHOLOGICAL AND CLINICAL EXAMINATIONS IN  
EXPERIMENTAL INFECTION OF GUINEA FOWL (*NUMIDA MELEAGRIS*)  
WITH LPAIV H6N2**

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**ABSTRACT**

Eighteen 2-month-old guinea fowl (*Numididae meleagris*) birds were intravenously infected with 100 µL H6N2 virus, while three formed a control group – non-infected. The birds were clinically examined daily throughout the entire experimental period and no clinical symptoms of disease were observed. On days 7, 14 and 21, six infected and 1 control birds were slaughtered for pathological investigations. All visceral organs were macroscopically analysed and samples from lungs, heart, spleen, liver, kidneys, pancreas, thymus, bursa and duodenum were immediately removed and fixed in 10% buffered formalin for at least 2 days. Slices of 5 µm thickness were prepared, embedded in paraffin and stained with haematoxylin and eosin (H/E) by standard procedures. The preparations were examined on Leitz light microscope. From the conducted pathoanatomical examinations, notable findings included the smaller size of the spleen, thymus, and the bursa of Fabricius in all examined birds, compared to the control group. Microscopically, however, as a constant find in all infected birds, we observed reactions of different type and extent within the lymphoid tissue of the central and peripheral immunocompetent organs, which could be summarised in two primary groups – lymphoid-proliferative and degenerative. The changes observed in the birds' euthanised 21 days p.i. were considerably more pronounced. Within the organs of the central immune system (thymus and spleen) lesions of the atrophic-degenerative type were found out. The organs of the peripheral immune system (the spleen and the entire mucosa-associated lymphoid tissue, including the respiratory tract, the alimentary tract with Peyer's patches, separate follicles and caecal tonsils) exhibited simultaneously atrophic regressive changes in the spleen and varying degrees of lymphoid activity in the other areas. In two of the euthanised 14 days p.i. and three 21 days p.i. birds, a lymphoid proliferation of the nodular type within the mucosa-associated lymphoid tissue of the lungs was discovered.

**Key words:** Avian influenza virus, H6N2 subtype, *Numida meleagris*, histology



*Original Contribution*

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**SHEDDING OF THE AVIAN INFLUENZA A H6N2 SUBTYPE VIRUS ISOLATE  
IN *NUMIDA MELEAGRIS***

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**ABSTRACT**

An experimental intravenous infection of 7 guinea fowl (*Numididae meleagris*) with Influenza A virus (AIV) isolate has been performed. The results indicated that over the entire period of observation (21 days) the virus was reisolated in all infected birds from the cloaca and the oropharynx. The maximum percentage of positive birds was observed by the 7<sup>th</sup> post infection day. Reisolation was established in 51.2 % of studied cloacal and 41.9 % oropharyngeal samples, with their number varying with time. The major part of samples was found on the 7<sup>th</sup> post infection day – 92.9 % of all tested samples. The average period of virus shedding from the cloaca was 5.4 days, and from the oropharynx - 4.6 days.

**Key words:** Avian influenza virus, H6N2 subtype, shedding, *Numididae meleagris*.

# Pathomorphological investigations on the incidence of chronic liver lesions and their association with welfare in White Pekin ducks

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## SUMMARY

Pathomorphological investigations were carried out in a flock of 7150 White Pekin ducks (*Anas platyrhynchos domestica*) at the age of 51–68 weeks. Morbidity and mortality rates were determined. The overall mortality during the 18-week period of the study was 710 (9.93%) ducks. Eighty five carcasses referred in groups of 7-10 at 2-week intervals were submitted to gross anatomy examinations and macroscopic lesions were described. Microscopic lesions were detected in 68 (80%) of 85 liver samples. Lesions specific for amyloidosis were found out in 48 (56.48%) cases, specific for both amyloidosis and cirrhosis – in 14 (16.47%) cases and 6 samples (7.05%) exhibited neoplastic growths classified as cholangiomas. According to these results, amyloidosis was identified as the most frequent cause of morbidity due to chronic liver lesions in White Pekin ducks, followed by amyloidosis associated with cirrhosis and last but not least, cholangioma.

**Keywords:** White Pekin duck, amyloidosis, cirrhosis, cholangioma, ascites.

## RÉSUMÉ

**Etudes pathomorphologiques sur la distribution de lésions hépatiques chroniques et leur association avec le bien-être chez les canards Pékin Blanc**

Des études pathomorphologiques ont été effectuées dans un troupeau de 7150 canards de Pékin blanc (*Anas platyrhynchos domestica*) à l'âge de 51-68 semaines. La morbidité et la mortalité ont été déterminées. La mortalité totale au cours de la période expérimentale de 18 semaines a été de 710 (9,93 %) canards. Quarante-cinq carcasses par groupes de 7-10 à intervalles de 2 semaines ont été examinées et les lésions macroscopiques ont été décrites. Des lésions microscopiques ont été trouvées dans 68 (80 %) des 85 échantillons de foie. Des lésions spécifiques de l'amyloïdose ont été trouvées dans 48 (56,48 %) des cas, lésions spécifiques à la fois pour amyloïdose et cirrhose - dans 14 cas (16,47 %). Six échantillons (7,05 %) ont présenté des croissances néoplasiques classées comme cholangiomes. Selon ces résultats, l'amyloïdose a été identifiée comme la cause la plus fréquente de morbidité due à lésions chroniques du foie chez les canards de Pékin blanc, suivie par l'amyloïdose associée à la cirrhose et le dernier mais non le moindre, cholangiome.

**Mots clés :** Canard de Pékin blanc, amyloïdose, cirrhose, cholangiome, ascite.





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## Chronic atrophic endometritis and pyometra in a ferret: A case report

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## ABSTRACT

The aim of this report was to describe a clinical case of chronic atrophic endometritis as a complication of cystic endometrial hyperplasia-pyometra complex in a non-spayed ferret. The ferret was presented with a slight abdominal distension and odorless purulent vulvar discharge after unsuccessful medical treatment with enrofloxacin and aglepristone 2 months ago in another clinic. Ultrasonography revealed enlarged uterine horns filled with fluid and blood laboratory analysis showed anaemia and leukocytosis, so diagnosis of pyometra was made. Laparotomy and ovariohysterectomy were performed. Histopathological and microbiological examination of the uterus revealed the presence of purulent atrophic endometritis caused by *Staphylococcus* spp. In conclusion, this is a very rare case of endometrial atrophy after chronic uterine inflammation in a ferret.

## ЕПИДЕМИОЛОГИЧНИ ПРОЯВИ НА НЕОНАТАЛНАТА КОЛИБАКТЕРИОЗА ПРИ ТЕЛЕТА ОТ ИНТЕНЗИВНИ ФЕРМИ

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В големите говедовъдни ферми стомашно-чревните инфекции са едни от най-честите причини за смъртност при новородените и бозаещите телета (Sivula et al., 1996; Svensson et al., 2003). Причините за тях са комплексни, но най-често се потвърждава участието на инфекциозни агенти - бактерии и вируси. При телетата в първите дни от живота диарии се асоциират преди всичко с ентеробактерии и на първо място с представители на вида *Escherichia coli* (Snodgrass, et al., 1986; Holland, R. E. 1990). Не всички щамове на този вид обаче имат диарогенен потенциал. Отговорни за чревното разстройство са щамове, обединени в няколко патовара *E. coli* - ентеротоксигенни (ETEC), ентеропатогенни (EPEC), дифузно адхерентни (DAEC) и др.

Ентеротоксигенните *E. coli* проявяват своя

мощност да придобият пасивен коластрален имунитет и са налице фактори, улесняващи реализирането на предавателните механизми. Анализират се тези фактори и изясняват параметрите на епидемичния процес е наложително условие за ефективност на превантивните мерки и контрола на тези заболявания. (Myers et al., 1984; Bendali et al., 1999b).

Целта на настоящото проучване беше да се направи анализ и опит за обобщение на най-важните и перманентно проявяващи се рискови фактори, както и да се анализират базисни количествени измерители на епидемичния процес в големи кравеферми, проблемни откъм неонатална колиинфекция.

### МАТЕРИАЛ И МЕТОДИ

## **EPIDEMIOLOGICAL EVIDENCE OF CALF NEONATAL COLIBACTERIOSIS IN LARGE INTENSIVE DAIRY FARMS**

*Mihni Lyutskanov, Valentina Urumova, Koicho Koev*

**Резюме:** During the period 2009-2010 twenty two large intensive dairy farms in 12 regions of Bulgaria were investigated for neonatal calf diarrhea. Epidemiological studies were purposely for determination of prevalence of enterotoxigenic *E. coli* as a primary causative agent and to determine the parameters of the disease in newborn calves population. A total of 188 samples were studied which 155 of suckler's faeces and 33 samples of bowel contents of dead calves after illness from diarrhea. In the period of study in 49.5% of samples were positive for bacterial findings. One hundred and fourteen strains were isolated belonging to seven taxonomic varieties. This species is designated as a primary agent in the etiopathogenesis of intestinal diseases of calves during the first week of the live. A higher prevalence of neonatal colibacteriosis were find out in the farms were do not use immunization as active prophylactic of pregnant cows against neonatal diarrhea. In the same farms a higher morbidity, case fatality and cumulative mortality were determinated among the heifers compared to those borned from older cows. No significant seasonal fluctuations have established in these indicators.

**Ключови думи:** case fatality; cumulative mortality; ETEC; neonatal colibacteriosis; prevalence





## PERFORMANCE OF LABORATORY ELISA AND RAPID ELISA TESTS FOR *EHRLICHIA* SPP. AND *ANAPLASMA* SPP. ANTIBODY DETECTION IN DOGS

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### Summary

Gospodinova, K., K. Koev & V. Petrov, 2022. Performance of laboratory ELISA and rapid ELISA tests for *Ehrlichia* spp. and *Anaplasma* spp. antibody detection in dogs. *Bulg. J. Vet. Med.*, **25**, No 4, 658–664.

The aim of the study was to compare the performance of two diagnostic approaches for the detection of antibodies against *Ehrlichia canis* (*E. canis*) and *Anaplasma phagocytophilum* (*A. phagocytophilum*). Two types of tests were used. Anti-*E. canis* ELISA Dog (IgG) and Anti-*A. phagocytophilum* ELISA Dog (IgG) are ELISA kits for the detection of relevant antibodies in laboratory conditions, and SNAP® 4Dx Plus is a pet-side ELISA-based serological screening test for simultaneous detection of antibodies against *A. phagocytophilum/A. platys*, *E. canis/E. ewingii*, *B. burgdorferi* and *Dirofilaria immitis* antigens. A total of 61 blood samples obtained from dogs with clinical signs and haematological changes suspect for granulocytic anaplasmosis or monocytic ehrlichiosis were analysed. Antibodies against *E. canis* were found out in 29 (47.54%) and *A. phagocytophilum* in 7 (11.48%) of the samples tested by laboratory ELISA. When using the SNAP test, the results were 35 (57.38%) and 11 (18.03%), respectively. Using the laboratory ELISA kit, 18 samples (29.50%) were positive for antibodies against both pathogens vs 9 (14.75%) samples tested by SNAP. The comparison of the two tests showed a greater agreement of the results in the detection of antibodies against *Ehrlichia* spp. (52 samples) than against *Anaplasma* spp. (44 samples). This difference was attributed to possible cross-reactions.

**Key words:** *Anaplasma phagocytophilum*, *Ehrlichia canis*, ELISA test kit, SNAP® 4Dx Plus Test

## EVALUATION OF WASTEWATER QUALITY AT THE INLET-OUTLET OF THE MOST MODERN WASTEWATER TREATMENT PLANT IN BULGARIA

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### ABSTRACT

The study was carried out during the period 2015-2016 based on 24 physicochemical and 5 microbiological wastewater (WW) parameters. WW samples were collected twice per month from both monitoring points (MPs) of the Municipal Wastewater Treatment Plant (MWWTP) - MP-1 (inlet) and MP-2 (outlet) and screened parameters were analyzed according to Bulgarian standards complied with ISO standards. For the estimation of total and specific microbial load, selective chromogenic culture medium sheets were used. Multivariate statistical technique was applied to analyze the data for different parameters. It was found the ranges of variability and trends of inlet-outlet WW values changes. The MWWTP demonstrated different removal efficiency (8.31-97.8%) referring to different WW parameters. 127 strong positive and negative correlations exist between controlled WW parameters. The parameters involved in the most numerous statistically significant correlations were T°C and Cl. EC at inlet/outlet affected at a great extent Factor 1 of Rotated factor loading matrix. The factor analysis determined MP as a factor influencing the largest number of parameters (14), followed by factors Month (7) and Year (2). PCA revealed different WW parameters at inlet-outlet that were affected by F1 and F2. The treated WW did not meet the requirements for discharge in the receiving water body (with respect to the total P content) and for irrigation (as fats content and the number of total Coliforms, *E. coli*, *Enterobacteriaceae* and *Salmonella* spp. was concerned).

### INTRODUCTION

Urbanization, progressive population growth, industrial and agricultural development are global processes related to constant increase in the generated wastewater amount. Wastewater from settlements, both within a country and between the different countries in the world are characterized with extremely diverse physicochemical composition, microorganisms' content and invasive forms of parasites [1-3]. The level of wastewater purification determines whether they will pose an ecological risk to the receiving water bodies where they discharged [4-6] or to the soil [7-10] and the crops grown when used for irrigation [11-16].

Wastewater discharges can deteriorate the physicochemical and biological properties of water of the receiving water bodies when discharge quality does not comply with the norms [17-19]. Achieving the required quality of treated wastewater depends to a large extent on the purification methods and equipment used in the MWWTPs [20-26]. In order to solve the wastewater problems, Bulgaria strictly follows the EU Directives concerning urban wastewater treatment - for the construction of WWTPs in all settlements with a population equivalent of more than 10 000 [27] and emission-based regulation for effluent quality in terms of COD, BOD, total N and total P [28]. Currently, 174 MWWTPs (7 with primary, 97 with secondary and 109 with tertiary treatment, respectively) are operating in the country. They purify about 75% of the generated wastewater, which in the period 2010-2017 consisted of 786.6-811.2 mill.m<sup>3</sup>/y [29]. The most modern MWWTP in Bulgaria was put into operation



## MICROBIOLOGICAL AND ANTIBACTERIAL RESISTANCE PROFILE IN CANINE OTITIS EXTERNA – A COMPARATIVE ANALYSIS

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### Summary

Petrov, V., G. Zhelev, P. Marutsov, K. Koev, S. Georgieva, I. Toneva & V. Urumova, 2019. Microbiological and antibacterial resistance profile in canine otitis externa – a comparative analysis. *Bulg. J. Vet. Med.*, **22**, No 4, 447–456.

The aim of the present study was to compare the prevalence of microbial agents involved in canine otitis externa and their sensitivity to antibacterial drugs in two periods: 2007–2011 and 2013–2017. For 2013–2017, coagulase-positive staphylococci were the dominating bacterial species (186 isolates), followed by *Pseudomonas aeruginosa* (82 strains). The rate of isolated yeasts (mainly *Malassezia pachydermatis*) was substantially high (152 isolates). Compared to the earlier period (2007–2011) a tendency to more frequent occurrence of co-infections was noted – 61.7% and more than 80% of co-infections involved yeasts. Antibacterial resistance patterns showed a clear trend to increased resistance of coagulase-positive staphylococci and  $\beta$ -haemolytic streptococci to amoxicillin/clavulanic acid (42% and 50% respectively) and gentamicin (29%, 40%). Increased resistance of *P. aeruginosa* was established to gentamicin (16%) and amikacin (18%). The prevalence of pseudomonads resistant to enrofloxacin was lower (27%).

**Key words:** antimicrobial susceptibility, dog, microbial profile, otitis externa



Case report

A CLINICAL CASE OF *TRICHOPHYTON MENTHAGROPHYTES*  
AND *MICROSPORUM CANIS* CO-INFECTION IN A SIBERIAN  
TIGER (*PANTHERA TIGRIS ALTAICA*)

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Summary

Mihaylov, G., I. Tsachev, V. Petrov, P. Marutsov, G. Zhelev, K. Koev & R. Mihaylov, 2016. A clinical case of *Trichophyton menthagrophytes* and *Microsporum canis* co-infection in a Siberian tiger (*Panthera tigris altaica*). *Bulg. J. Vet. Med.*, 19, No 4, 340–345.

A clinical case of co-infection with *Trichophyton menthagrophytes* and *Microsporum canis* in a Siberian tiger (*Panthera tigris altaica*) is described. Clinical and laboratory mycological examinations were carried out. Two dermatophytic species were isolated from hairs, crusts and swab samples from different parts of the cage. A systemic oral therapy with itraconazole (Sporanox, Janssen) at a dose of 10 mg/kg with food was initiated and body surface was treated with 0.2% enilconazole solution (Imaverol, Janssen). The skin lesions of the tiger healed after the treatments, but recurred a month later. We recommended a thorough disinfection of the cage area inhabited by tigers and inventory in it. The therapeutic protocol was repeated. Clinical signs disappeared. Information about disease recurrence was obtained.

**Key words:** dermatophytosis, *Microsporum canis*, *Panthera tigris altaica*, treatment, *Trichophyton menthagrophytes*



# Otitis externa in dogs: microbiology and antimicrobial susceptibility

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## SUMMARY

The aims of the study were to determine the prevalence of bacterial/yeast otitis externa in dogs and to analyse antimicrobial susceptibility. Among 257 swab ear samples from Bulgarian dogs with otitis externa, bacteria and yeast species were isolated in 93.77% of cases as mono-infections (109 cases) involving mainly coagulase positive staphylococci (60 strains), *Malassezia pachidermatis* (97 strains) and *Pseudomonas aeruginosa* (42 strains) and more often as poly-infections (132 cases). The other agents scarcely identified were  $\beta$ -haemolytic *Streptococcus* spp., *Proteus mirabilis* and *Escherichia coli*, the 2 last species being almost exclusively found in poly-infections. The sensitivity of isolated bacteria to antimicrobial drugs, most commonly used treatment of otitis externa has been tested. The high sensitivity to beta-lactams and aminoglycoside-aminocyclitols was established in Gram positive bacteria, while Gram negative bacteria were sensitive to aminoglycoside-aminocyclitols, polymyxin B and enrofloxacin. These results highlight the relative high frequency of yeasts and the necessity of coupling antimicrobial susceptibility tests to bacterial isolation.

**Keywords :** Otitis externa, dogs, bacterial isolation, yeast, antimicrobial susceptibility.

## RESUME

**Otite externe chez le chien: analyse microbiologique et résistance aux antibiotiques**

Les objectifs de cette étude ont été de déterminer la prévalence des otites externes bactériennes ou mycosiques chez le chien et d'établir la résistance des germes aux antibiotiques. Parmi les 257 prélèvements auriculaires réalisés sur des chiens atteints d'otite externe en Bulgarie, des bactéries ou des levures ont été mises en évidence dans 93.77% des cas, sous forme de mono-infections (109 cas) principalement dues à des staphylocoques coagulase + (60 souches), à *Malassezia pachidermatis* (97 souches) et à *Pseudomonas aeruginosa* (42 souches), et le plus souvent sous forme de poly-infections (132 cas). Les autres agents plus rarement identifiés ont été des streptocoques  $\beta$ -hémolytiques, *Proteus mirabilis* et *Escherichia coli*, les 2 dernières espèces étant presque exclusivement retrouvées dans des cas de poly-infections. La sensibilité des isolats aux différents antimicrobiens les plus couramment utilisés dans le traitement des otites externes du chien a été évaluée : les bactéries Gram + ont montré une forte sensibilité aux  $\beta$ -lactames et aux aminoglycosides / aminocyclitols alors que les bactéries Gram - ont surtout été sensibles aux aminoglycosides / aminocyclitols, à la polymyxine B et à l'enrofloxacin. Ces résultats soulignent la fréquence relativement élevée des levures et la nécessité de déterminer la résistance aux antibiotiques des germes en parallèle de leur isolement.

**Mots-clés:** Otite externe, chien, isolation bactérienne, levures, résistance aux antibiotiques.

## Dynamics of microbial contamination in a poultry hatchery

ARTICLES

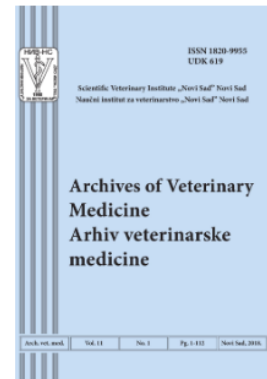
<https://doi.org/10.46784/e-avm.v11i1.15>

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Iliqn Lazarov<sup>\*</sup>, Georgi Zhelev<sup>\*</sup>, Mihni Lytzkanov<sup>\*</sup>, Koycho Koev<sup>\*</sup>, Vladimir Petrov<sup>\*</sup>

### Abstract

The hatcheries may become contaminated with pathogenic bacteria which could spread in the hatchery through the air. That is why the implementation of an effective cleaning and disinfection program and the maintenance of good hygiene are extremely important for the normal course of production and for reducing the spread of infectious agents. In this study, data on the degree and dynamics of bacterial contamination in a poultry hatchery are presented. In the incubation sector, bacterial contamination on the surfaces was found to be low-level ranging from 0.25 to  $4.43 \times 10^1$  CFU/cm<sup>2</sup> but in the air it was strongly influenced by the hatching. In the hatchery sector, bacterial contamination on the surface and in the air was high, with the highest values found on the egg shells ( $1.77 \times 10^6$  CFU/cm<sup>2</sup>), on the floor ( $3.2 \times 10^4$  CFU/cm<sup>2</sup>) and in the air ( $1.77 \times 10^5$  CFU/cm<sup>3</sup>) of hatcher cabinets during hatching. The results obtained show that the most important source of microbial contamination in the hatchery is the hatchery sector, especially during hatching, when highly contaminated materials as fluff, shells and dried secretions are released. In case of poor organization of working process, the bacteria could spread by air and contaminate the other sectors of the hatchery. The study confirms the importance of a different approach in the development of preventive measures, depending on the degree of risk in different zones in the hatchery, which is the basis for the effective



### Keywords

poultry  
hatchery  
microbial contamination  
hygiene  
risk

### How to Cite



## Electronic rat-control devices – solution or scam? Results of field trials and a summary of the literary data

ARTICLES

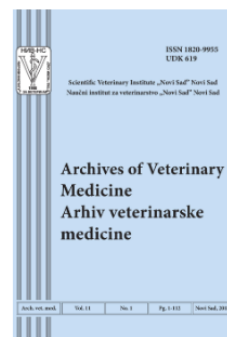
<https://doi.org/10.46784/e-avm.v11i1.14>

Published 16-09-2018

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### Abstract

The electronic rat-control devices are humane means of controlling harmful rodents without toxic substances. They are relatively inexpensive and very easy to use and have gained increasing popularity in recent years. Although they have been introduced long ago in the practice of deratization, scientific information about their real effectiveness is scarce and at the same time very controversial. The purpose of this study was to evaluate the repellent efficiency of an electronic device using the combined action of ultrasonic waves, light signals, and electromagnetic field change in practice. Two field trials were carried out on a cattle-breeding farm and a feed warehouse inhabited by brown rats (*Rattus norvegicus*) and roof rats (*Rattus rattus*). Repellent efficacy was determined by comparing the indicators evaluating the presence and activity of rodents during the pre-testing period before the inclusion of the device and after its activation during the test period. A lack of repellent effect was found in both field studies. The results obtained are supported by an analysis of the scientific literature confirming the inadequate effectiveness of electronic rat control devices in practical conditions. Emphasis is placed on the deficiencies and the need for regulatory adjustments governing the control and admission of electronic devices to control rats on the market.



### Keywords

deratization  
ultrasound  
electromagnetic  
electronic device  
rat control

### How to Cite

## ЕТИОЛОГИЧНА СТРУКТУРА НА БАКТЕРИАЛНИТЕ ИНФЕКЦИИ ПРИ ПОДРАСТВАЩИ ПАТЕТА-МЮЛАРИ И ЧУВСТВИТЕЛНОСТ НА ИЗОЛАТИТЕ КЪМ АНТИМИКРОБНИ СРЕДСТВА

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Презентативното състояние на водоплаващото птицевъдство в нашата страна отбелязва някои положителни и градивни прояви и практики. То се очертава като един от стабилно развиващите се подотрасли. Налице е трайна тенденция за увеличаване на относителния му дял в общото птицевъдство. В тази връзка нов момент е създаването на родителски стада вместо да се разчита на импорт на разплодни яйца и/или на едnodневни патета. Друга положителна практика е изграждането на специализирани съвременни люпилни. Налице е и процес на специализация на подотрасъла, при доминиращо отглеждане на патици за черен дроб и по-малко с яйценосно направление или за угояване. Не на последно място е и

значими стопански щети не само поради завишаване на смъртността, но и вследствие на разходите за медикаменти, труд, време и пр.

Третирането с антимикробни средства на тази група заболявания следва да става след *in vitro* тестване поради нарастващата антимикробна резистентност, която затруднява превенцията и контрола (Saikia, 1995; Tsai and Hsiang, 2005; Dahlia et al., 2005).

Като цяло познаването и мониторирането на бактериалните заболявания при водоплаващите е важна предпоставка за изработването на стратегически подходи и тактически решения за успешното им контролиране.

### МАТЕРИАЛИ И МЕТОДИ

## ETHIOLOGICAL STRUCTURE OF BACTERIAL INFECTIONS OF GROWING MULARDS AND SENSITIVITY TO ANTIMICROBIAL AGENTS

*Mihni Lyutskanov, Valentina Urumova, Koicho Koev, Georgi Zhelev*

**Резюме:** Analyses were performed of the composition of microbial factors responsible for emergence infectious processes of hatchlings and growing Mulard with epidemic manifestation. The references of isolates of dominant species were checked to antimicrobial agents to optimize measures for prevention and control. The object of the study are 1 hatchery and 4 farms. The bacterial findings are analyzed in three age groups: the first week after hatching, the period from 2nd to 5th week of life and the period from 6th to 10th week. Overall, researches have isolated microbial strains belonging to at least 8 taxonomic categories. Enterobacteriaceae predominate and most often dominated *E. coli* isolates. During the 2 - to 5 nd week of life among the dominant species *E. coli*, increasingly establishes the presence of *Salmonella* spp. and *Riemerella anatipestifer*, and in the third age category (6th - 10 - week) most frequently found representatives of Pasteurellaceae. *E. coli* strains showed preserved sensitivity to aminoglycosides, colistin, and fluoroquinolones, but there is an increase in the percentage of resistant to tetracyclines, amoxicillin and potentiated with trimethoprim sulfonamides. *Pasteurella* spp. strains show relatively preserved sensitivity to all antimicrobial testings.

**Ключови думи:** antinicrobials; bacterial infection; duck- mulard; resistance; sensitivity

*Bulgarian Journal of Veterinary Medicine* (2012), **15**, No 2, 131–136

## EFFICACY OF A SODIUM PERBORATE AGENT FOR PROPHYLACTIC DISINFECTION OF WATERFOWL INCUBATORS

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Faculty of Veterinary Medicine, Trakia University, Stara Zagora, Bulgaria

### Summary

Zhelev, G., M. Lyutskanov, V. Urumova & K. Koev, 2012. Efficacy of a sodium perborate agent for prophylactic disinfection of waterfowl incubators. *Bulg. J. Vet. Med.*, **15**, No 2, 131–136.

The results of two examinations on the effect of a sodium perborate bleaching agent (Oksisept) for cleaning and disinfection of waterfowl incubators, applied by coarse spray and cold aerosol spray are presented. The comparative evaluation of the disinfection was done via microbiological examinations of the microbial count reduction, presence of residual microflora, and detection of indicator bacterial species. The efficacy of both disinfection protocols was assessed as high. The elements of the ventilation/cooling system of the incubator were evaluated as critical for disinfection, due to the high microbial contamination rate and the more difficult cleaning and disinfection.

**Key words:** disinfection, hatchery, Oksisept

**Приложение 8.2. Г.8. Статии и доклади, публикувани в нереферирани списания с научно рецензиране или публикувани в редактирани колективни томове**

# Случаи на паратуберкулоза при крави

Д-р Койчо Коев<sup>1</sup>, доц. г-р Иван Динев<sup>3</sup> и г-р Иван Атев<sup>2</sup>

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<sup>2</sup> Кравеферма, гр. Исперих

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## ПАРАТУБЕРКУЛОЗАТА

се описва като хроничен, грануломатозен, неподдаващ се на лекуване заразен ентерит при говедата и по-рядко – при овцете. Клинично се проявява с перзистиреща диария и прогресивна загуба на тегло, водещи до изтощение и обикновено завършва със смърт. Болестта е известна още като *Johnes disease* или MAP-синдром. Представлява сериозен проблем за млечните стада в много страни с развито говедовъдство и въпреки това някои от епидемиологичните ѝ характеристики са недостатъчно добре проучени [4 и 1]. В последните години актуалността на паратуберкулозата се повиши и заради обстоятелството, че макар и ограничени, се появиха сведения, според които причиняващият я агент евентуално взема участие в етиогенезата на Крон-синдрома при човека (*Crohn's disease*) [7].

докато някои групи (като козите и биволиите) са устойчиви. От непрехивните животни е изолиран от птици, мишки, лисици, мишки мечки, невестулки и др., но при тях много рядко се проявява клинична симптоматика. Болестта обаче е описана още при коне, свине, зайци и лисици [2].

При естествени условия паратуберкулозната инфекция при говедата се предава хоризонтално чрез поглъщане на MAP с контаминирана храна и вода или от заразената среда [5]. Освен по хоризонтален път, според *Larson et al.* (1970), предаване на причинителя може да се реализира и вертикално от майката през плацентата на плода, както и чрез инфектиран семенен материал [3]. В здрави стада, болестта прониква обикновено след интродуциране на заразени животни – носители, респ. излечители на MAP.

## КЛИНИЧНИ

## ***Clostridium perfringens* type A infection in European bison (*Bison bonasus*) – case report**

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**Abstract:** A clinical case of *Clostridium perfringens* type A infection in European bison (*Bison bonasus*) is described. Clinical, autopsy, histological and bacteriological examinations were carried out. A *Clostridium perfringens* strain was isolated from intestinal content. Gross and microscopic lesions were described in detail. The disease was characterized with anorexia, abdominal pain, tachypnea, scanty stool, depression, dehydration and melena. General anatomy findings consisted in catarrhal haemorrhagic inflammation of the abomasum, excessive ballooning of intestines, haemorrhages in intestines, peritoneum, pleura, diaphragm, spleen and kidney. The liver and kidneys were dystrophic. Histopathologically, severe granular and fatty dystrophy of liver and kidney cells, as well as dystrophic and necrobiotic changes mainly in small intestine mucosa, the abomasum and fore stomachs were detected.

**Key words:** *Bison bonasus*, *Clostridium perfringens*, enterotoxaemia

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## 17. EFFICIENCY OF DISINFECTION BY FUMIGATION WITH "FUMISPORE OPP" IN A DUCK HATCHERY

Zhelev G., Lyutskanov M., Urumova V., Mihaylov G., Petrov V., Koev K.\*

### Abstract

The high-microbial contamination in hatcheries plays a significant role both, in the pathology of the avian embryo and newly hatched birds, and in the spread of many infectious diseases. This defines disinfection as a major anti-epidemic measures in hatcheries.

The article presents the results of three controlling studies associated with the efficiency of disinfection on incubators by fumigation with "*Fumispore OOP*" (LCB, France).

Disinfecting effect was determined by microbiological studies of samples from surfaces and air obtained before and after the fumigation.

The average reduction was achieved 99.77% of microbial contamination in the conducted disinfection.

The established high efficiency and easy to use make fumigation with "*Fumispore OOP*" appropriate method of disinfection in hatchery practice and an alternative to fumigation with considerably more toxic formaldehyde.

**Key words:** disinfection, fumigation, hatchery, *Fumispore OOP*

# ACUTE NITRATE INTOXICATION IN SHEEP – CASE REPORT

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## РЕЗЮМЕ

Представяме клиничен случай на спонтанна интоксикация с амониев нитрат във ферма с около 300 овце, собственост на частен стопанин от с. Загорци, обл. Сливен. Анамнестичните данни сочат, че на 22.01.2014г. вечерта при прибиране от пасището част от животните приемат отточна вода от измиване на селскостопанска техника, използвана същия ден за наторяване на рапица. Около 1 – 2 часа след това 15 овце умират внезапно. На следващия ден беше извършен токсикологичен анализ на водата, която животните са приели. Направена беше аутопсия на умрелите овце и бяха взети проби от вътрешните органи

## SUMMARY

We present a clinical case of spontaneous intoxication with ammonium nitrate in a private farm with 300 sheep, from the village Zagortsi, Sliven District. History shows that on the evening of 22.01.2014, during retraction of the pasture deal of the animals accept waste water from washing of agricultural equipment used that day to fertilize rapeseed. Approximately 1 – 2 hours later 15 sheep died suddenly.

The next day was made toxicological analysis of the water from which the animals have drunk. Autopsy was made of dead animals and samples were taken from the internal organs

# Кислород-отделящите дезинфектанти в програмите за биологична сигурност на свиневъдни обекти

Георги Желев<sup>1</sup>, Илиян Лазаров<sup>2</sup>, Даниел Младенов<sup>3</sup>, Александър Коджаманов<sup>3</sup>, Койчо Коев<sup>1</sup>, Красимира Господинова<sup>2</sup>, Бетина Вълева<sup>1</sup>, Владимир Петров<sup>1</sup>

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## АБСТРАКТ

Статията представя резултати от теренно изпитване на дезинфекционната ефективност на кислород-отделящ дезинфектант (Ecocid S, KRKA, Словения) в условията на индустриален свинекомплекс. Установена е висока ефективност на проведените дезинфекционни обработки при различни подобекти в свинекомплекса. При всички контролни повърхности е постигната над 97%-на редукция на общата бактериална контаминация ( $>1.55 \text{ Log}_{10}$ ) и 100% на редукция на колиформите. Микробната контаминация на дезинфекционните площадки е под максимално допустимите хигиенни параметри, което е индикация за съхранена висока активност на дезинфекционните разтвори.

Ключови думи: дезинфекция, свиневъдство, кислород-отделящи дезинфектанти, Ecocid S

# Кислород-отделящи дезинфектанти – предимства и приложение в клиники за домашни любимци

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## РЕЗЮМЕ

Инфекциозните заболявания съставляват съществена част от здравните проблеми при домашните любимци. Поддържането на добра хигиена и регулярните дезинфекции намаляват до възможния минимум риска от разпространението им сред животните и хората при извършване на ветеринарномедицинските прегледи и манипулации.

Статията представя информация за основните критерии при избора на дезинфекционно средство и влиянието на различни фактори върху дезинфекционния процес, които са основа за постигане на високо ефективна и безопасна дезинфекция в практиката.

Ключови думи: дезинфекция, ветеринарни клиники, кислород-отделящи дезинфектанти





## АНТИБАКТЕРИАЛНА АКТИВНОСТ НА ПРАХООБРАЗЕН ПРОДУКТ ЗА ХИГИЕНА НА ПОД И ПОСТЕЛЯ В ИНТЕНЗИВНОТО ПТИЦЕВЪДСТВО

Г. ЖЕЛЕВ<sup>1</sup>, И. ЛАЗАРОВ<sup>2</sup>, В. ПЕТРОВ<sup>1</sup>, К. КОЕВ<sup>1</sup>  
& М. ЛЮЦКАНОВ<sup>1</sup>

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### Summary

Zhelev, G., I. Lazarov, V. Petrov, K. Koev, M. Lyutskanov, 2017. Antibacterial activity of a powder product for floor and litter sanitation in intensive poultry farming. *Bulg. J. Vet. Med.*, 20, Suppl. 1, 204–211.

The article presents the results of laboratory and field studies on the antimicrobial activity of powder product (Stalosan F, Vitfoss, Denmark), widely used in animal farms in the Republic of Bulgaria in order to improve floors and litter hygiene. It was determined, from the implemented laboratory suspension test, that the minimum bactericidal concentration of Stalosan F for *Escherichia coli* (ATCC 25922), and for *Salmonella* Typhimurium (ATCC 14028) was 5% (50 000 mg/L), and for *Staphylococcus aureus* (ATCC 25923) it was 4% (40 000 mg/L). From the implemented tests, with test carrier (concrete floor) – 100% microbe reduction of *S. aureus* ATCC 25923 ( $6.78 \log_{10}$ ) was achieved at the 30<sup>th</sup> min, of *S. Typhimurium* ATCC 14028 ( $5.95 \log_{10}$ ) – at the 6<sup>th</sup> h, and of *E. coli* ATCC 25922 ( $5.22 \log_{10}$ ) – at the 24<sup>th</sup> h. From the carried field studies in industrial poultry farms, a distinct difference between the effects of Stalosan F on vertical and horizontal surfaces was demonstrated. The antimicrobial effect from the Stalosan F treatment of the floor was very high – 99.96% reduction of microbial contamination ( $3.37 \log_{10}$ ) of 24-hour exposure, whereas the treatment of the walls was unsatisfactory – 21.71% ( $0.11 \log_{10}$ ). The ascertained high antibacterial activity is a reason for wider introduction of Stalosan F in the disinfection practice for achieving good floor and litter hygiene in animal farms.

**Key words:** disinfection, hygiene, Stalosan F, poultry farming



## КИСЛОРОД-ОТДЕЛЯЩИТЕ ДЕЗИНФЕКТАНТИ: ВИСОКО ЕФЕКТИВНИ СРЕДСТВА С УНИВЕРСАЛНО ПРИЛОЖЕНИЕ В ПТИЦЕВЪДСТВОТО

Г. ЖЕЛЕВ<sup>1</sup>, И. ЛАЗАРОВ<sup>2</sup>, Д. МЛАДЕНОВ<sup>3</sup>, К. КОЕВ<sup>1</sup>,  
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### Summary

Zhelev, G., I. Lazarov, D. Mladenov, K. Koev, K. Gospodinova & I. Ivanova, 2019. Oxygen-releasing disinfectants: Highly effective agents with universal application in poultry farming. *Bulg. J. Vet. Med.*, **22**, Suppl. 1, 166–172.

Good hygiene and regular disinfection are among the important factors to minimise the risk of infectious diseases in poultry operations and are at the core of measures to combat epidemic outbreaks. The "ideal" disinfectant in poultry farming should combine a high antimicrobial activity and a broad spectrum of action, no damage to eggs, birds and equipment, as well as harm to personnel and the environment. One of the few disinfectants that meet all these criteria are peroxide-based oxygen release agents, represented by Ecocid S (KRKA, Slovenia). The study presents the results on the effectiveness of field disinfection with Ecocid S in two poultry farms: a broiler fattening centre and a hatchery. Very high disinfection efficiencies were found at both sites, with reduction of microbial contamination on all control surfaces above 97%, ranging between 97.1–99.98% (1.55–3.7 Log<sub>10</sub>). The high disinfectant efficiency and the aforementioned advantages of oxygen-releasing disinfectants make Ecocid S a suitable disinfectant for universal use in poultry farming.

**Key words:** disinfection, Ecocid S, oxygen-releasing disinfectants, poultry



## **P2.4      A study on the effectiveness of combined electronic devices to repel rodents**

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*Introduction and aim:* Electronic repellent devices are alternatives of the chemical method for controlling harmful rodents. During the last years, they have become more popular, because of their advantages – absence of toxic substances, safety for non-target animals, humans and the environment, low cost and easy to use. There is a great variety of different models, widely advertised in the media. Devices use different principles to repel rodents – some of them emit ultrasonic waves that affect negatively the rodents, while others alter the electromagnetic field around the electrical wires. In literature data, information about these devices and their efficiency is scarce, although they have been introduced in deratisation practice a long time ago, and there is a serious contradiction between the results of tests conducted in the laboratory and in field conditions. At the same time, many users reported unsatisfactory performance in the practice.

Advantages of electronic devices and contradictory information about their effectiveness motivated us to conduct our own researches to assess the efficacy of these devices for rat control in real conditions of deratisation practice.

*Material and methods:* Repellent effectiveness of electronic device for rodent control *Pest X Repel*, model *PR-500.3* (Microsys Co., Ltd., Bulgaria) was investigated in field conditions. The device used the combined effects of ultrasound signals, the change in the electromagnetic field around the electrical wires, and emits sudden and strong light signals using flash lamp. The device was also programmed to change continuously the shape and the frequency of impulses in order to avoid the habituation of rodents to them. One device is sufficient to repel rodents from an area of 200 m<sup>2</sup>, according to the manufacturer. Studies were conducted at two sites, inhabited by rodents. Site No 1: Barn for dairy cows with an area of about 180 m<sup>2</sup> infested by brown rat (*Rattus norvegicus*) with high strength and density. Site No 2: Storehouse for feed with an area of 50 m<sup>2</sup> infested by black rat (*Rattus rattus*) with an average strength and density. At both sites, the devices were placed near the electric switchboards, in accordance with the recommendations of the manufacturer. Repellent efficacy was determined by comparing the indicators evaluating the activity and abundance of rodents during the pre-testing period (7 days) before the turning on the device and after its activation during the test period (35 days at site No 1 and 60 days in the facility No 2). The average daily consumption of non-toxic food, number of visited food sources (n=10), number of visited dusty track plates (n=10) and the intensity of left traces, and number of active holes (only in site No 1) were determined. These parameters were checked twice during the pre-testing period, every five days during the test period, and values were averaged.

*Results:* The results from the investigations are presented in Table 1.

EFFICACY OF A CELLULOSE-BASED RODENTICIDE FOR  
CONTROL OF WARFARIN-RESISTANT BLACK RATS  
(*RATTUS RATTUS*)

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**Summary**

Zhelev, G., M. Lyutskanov, V. Petrov, G. Mihaylov, P. Marutsov, K. Koev & Ts. Tsvetanov, 2013. Efficacy of a cellulose-based rodenticide for control of warfarin-resistant black rats (*Rattus rattus*). *Bulg. J. Vet. Med.*, 16, Suppl. 1, 134–140.

The resistance of synanthropic rodents to anticoagulant rodenticides is an emerging problem whose spread is constantly increasing. This is at the background of the growing interest towards the implementation of various non-anticoagulant rodenticides in deratisation practice, including cellulose-based baits. The aim of this study was to evaluate the efficacy of the cellulose-based rodenticide Eradirat (Republic Mills, USA) for control of warfarin-resistant black rats (*Rattus rattus*). The palatability and efficacy of cellulose-based rodenticide Eradirat were evaluated in field tests and a series of lethal feeding tests with (*choice test*) and without choice (*no-choice test*) on wild warfarin-resistant black rats (*Rattus rattus*). The palatability of Eradirat baits for studied black rats was extremely low, which resulted in zero efficacy of choice tests and field deratisation procedures. The 14-day no-choice feeding test with Eradirat, supplemented with additional attractants resulted in high efficacy (90%) in warfarin-resistant black rats. The results suggested a high deratisation potential of cellulose-based rodenticide Eradirat, but at the same time, outlined its low palatability for black rats as a very serious disadvantage thus making it inappropriate for use in practice.

**Key words:** anticoagulant resistance, cellulose, *Rattus rattus*



## INVESTIGATIONS ON THE WARFARIN RESISTANCE OF SYNANTHROPIC RODENTS

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### Summary

Zhelev, G., M. Lyutskanov, V. Petrov, G. Mihaylov, P. Marutsov, K. Koev & Ts. Tsvetanov, 2013. Investigations on the warfarin resistance of synanthropic rodents. *Bulg. J. Vet. Med.*, 16, Suppl. 1, 141–146.

Anticoagulant rodenticides are the most widely used chemical agents for control of harmful rodents, and therefore, the onset of resistance to them poses a serious problem in deratisation practice. The aim of this study was to detect the presence of resistance to warfarin among synanthropic rodents inhabiting animal production facilities. Synanthropic rodents from the black rat (*Rattus rattus*) and house mouse (*Mus musculus sensu lato*) species, caught in animal production facilities in the Stara Zagora region were tested for warfarin resistance. A lethal feeding test with 0.025% warfarin was applied for 28 days in black rats and 21 days in house mice. Out of all tested 117 synanthropic rodents – 41 house mice and 76 black rats, 111 were determined as resistant (94.87 %), and only 6 (5.13%) – as sensitive to warfarin. The results demonstrate a substantial prevalence of warfarin resistance among house mice and black rat populations in animal production facilities in the surveyed region.

**Key words:** *Mus musculus*, *Rattus rattus*, resistance, susceptibility, warfarin

## AN OUTBREAK OF LATE-TERM ABORTIONS AND STILLBIRTHS ASSOCIATED WITH BOVINE VIRAL DIARRHOEA VIRUS

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### Summary

Marutsov, P., G. JeleV, V. Petrov, G. Mihaylov & K. KoeV, 2013. An outbreak of late-term abortions and stillbirths associated with bovine viral diarrhoea virus. *Bulg. J. Vet. Med.*, 16, Suppl. 1, 152–155.

An outbreak of abortions and stillbirths due to bovine viral diarrhoea virus (BVDV) infection was established at a dairy farm with about 600 cows. An interesting fact was that three stillbirths occurred exactly at the respective pregnancy term, and that all were detected in primiparous cows. The aim of the study was to detect the specific cause of the abortions and stillbirths and identification of measures for control. By the end of June and early July 2012, a total of 7 abortions (5 in primiparous and 2 in biparous cows), and approximately 5% births of calves with reduced vitality that died during the first 10 postpartum days have occurred at the farm. From the specimens collected with diagnostic purpose, BVDV antigens were detected via antigen capture enzyme-linked immunosorbent assay (ACE). Two of the stillborn calves, together with serum and placental samples from their dams were referred to the Faculty of Veterinary Medicine, Trakia University. The necropsy of both calves showed similar findings – bleeding diathesis. The samples from calves were submitted to bacteriological examination, whereas serum samples from calves and their dams were assayed for presence of viral antigen and antibodies against mucosal disease virus – BVDV and infectious rhinotracheitis (bovine herpesvirus-1). The initial screening demonstrated post-infection antibodies against BVD and BHV-1. Viral antigen was identified from tissue samples from calf A. The serological analysis of paired sera samples revealed seroconversion in dam A and raising OD value of the sample (dam B). The serological screening of cattle herds showed a high prevalence of BVDV-induced disease. This is especially typical for countries and parts of the world, where purposeful and regular measures of control are absent. The insidious nature of the virus categorises it rather as causing a silent infection, which thereafter becomes stationary. The present study makes clear that the lack of efficient and regular control of the disease results in occasional clinical outbreaks of infection among non-immune animal groups. This would inevitably result in significant and permanent economic losses associated with reproductive failure, abortions, congenital disorders, immunosuppression and exacerbation of secondary infections, as well as higher susceptibility to enteric and respiratory pathogens.

**Key words:** BVDV, primiparous cows, stillbirths





РОДЕНТИЦИДНА ЕФЕКТИВНОСТ НА ГИПС-БАЗИРАНИ  
ПРИМАМКИ ПРИ ВАРФАРИН-РЕЗИСТЕНТНИ ЧЕРНИ  
ПЛЪХОВЕ (*RATTUS RATTUS*) И ДОМАШНИ МИШКИ  
(*MUS MUSCULUS*) В ЛАБОРАТОРНИ УСЛОВИЯ

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**Summary**

Zhelev, G., K. Koev, K. Gospodinova & V. Petrov, 2019. Rodenticidal effectiveness of plaster-based baits in warfarin resistant roof rats (*Rattus rattus*) and house mice (*Mus musculus*) in laboratory conditions. *Bulg. J. Vet. Med.*, **22**, Suppl. 1, 173–179.

Synanthropic rodents cause major economic damage and pose high health risks to animals and humans. In recent decades, there has been a major change in the arsenal of funds used to control harmful rodents. Almost all representatives of acute rodenticides were gradually banned, and anticoagulant rodenticides proved to be the only available rodent control agents. However, their effectiveness in practice is becoming increasingly uncertain due to the development of resistance among synanthropic rodents. This leads to increased scientific interest in the development and implementation of new rodenticidal agents. The use of gypsum mixtures is a commonly recommended method (mainly in the non-scientific literature and mass media) for controlling rodents, including in the presence of anticoagulant resistance. However, information on the effectiveness of this method in the scientific literature is scarce and controversial. The article presents results of laboratory tests on the effectiveness of plaster- and rapid hardening cement-based baits in warfarin-resistant roof rats (*Rattus rattus*) and house mice (*Mus musculus*). High attractiveness and excellent intake of test baits, but without subsequent manifestations of intoxication or mortality in experimental animals were found. Based on the tests performed, it can be concluded that the mixture of 70% plaster and 30% nutrient substrate, as well as the analogous compound with rapid hardening cement did not have rodenticidal activity in black rats and domestic mice.

**Key words:** black rats, cement, deratisation, house mice, plaster, rodenticides

## *SALMONELLA MBANDAKA, BALL ST 3502 И VIRCHOW ST16 –* НОВОВЪЗНИКНАЛИ ПАТОГЕНИ В АГРОХРАНИТЕЛНАТА ВЕРИГА, КРИЕЦИ РИСКОВЕ ЗА ОБЩЕСТВЕННОТО ЗДРАВЕ

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### Резюме

Нетифоидната *Salmonella* е основен хранителен патоген, като най-висок процент положителни за *Salmonella* проби са докладвани при бройлери (14%), пуйки (7,4%), прасета (1,7%) и овце (1,2%), по данни от обобщения годишен доклад за зоонозите на Европейския орган по безопасност на храните за 2023 г. За 2022 – 2023 г. има регистрирани три големи хранителни взрива, причинени от серовари *Mbandaka*, *Ball ST 3502* и *Virchow ST16*, които не са често срещани, но поради широката гама гостоприемници, които инвазират и хранителни матрици, от които се изолират, влезнаха в топ 20 на най-често разпространените серовари *Salmonella*. Повече от 99,5% от изолатите пренасят фактор на вирулентност *fim*, кодиран от 9 гени (*fimA*, *C*, *D*, *F*, *H*, *L*, *W*, *Y* и *Z*).

Идентифицирани са голям набор гени на резистентност в генома на изолатите *S. Mbandaka*, *Virchow ST16* и *Ball ST 3502*. Изолатите от птици съдържат най-голям брой детерминанти за резистентност.

Необходимо е внедряване на молекулярно биологични методи, с цел бърза диагностика, вземане на адекватни и навременни мерки и решения, свързани с контрола и намаляване разпространението на *Salmonella*. Надзорът следва да се разшири и следва да бъдат засилени мерките за хигиенен контрол и дезинфекция на всеки един етап от агрохранителната верига, за да има възможност за предприемане на адекватни, навременни и ефективни мерки при евентуално откриване на *Salmonella* серовари *Mbandaka*, *Virchow* и *Ball* в България.

**Ключови думи:** Нетифоидната *Salmonella*, серовари *Mbandaka*, *Ball*, *Virchow*, наблюдение





## STUDY OF BEE MORTALITY IN BULGARIA DURING THE WINTER PERIOD OF 2022/2023

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### Abstract

*The purpose of the study is to investigate and define the main reasons involved in the winter mortality of honeybee colonies during the last winter season of 2022/2023 in Bulgaria. In the survey were included 94 respondents that have reported mortality. The mortality rate for farms with up to 50 bee colonies is 31%, for those with 50-150 bee colonies it is 19.27%, and for the largest bee farms that are with over 150 bee colonies, it is 19.9%. Cumulative mortality in the mortality of bee colonies is 29.66% - 1937 bee colonies died from total of 6530 in winter period of 2022/2023. The study identifies several factors such as Varroasis, insufficient nutritional substrate, unfavorable climatic changes, pesticides use, queen bee problems and others.*

**Keywords:** bee colony losses, winter mortality, survey