

The Balkans Scientific Center
of the Russian Academy of Natural Sciences

3rd
International
Symposium

**Modern
Trends
in Agricultural
Production
Rural Development
and Environmental
Protection**

P R O C E E D I N G S



1 - 3 July 2021, Vrnjačka Banja, Serbia

**The Balkans Scientific Center of the
Russian Academy of Natural Sciences**



3rd International Symposium:

**Modern Trends in Agricultural
Production Rural Development and
Environmental Protection**

**Vrnjacka Banja, Serbia
July, 01-03. 2021.**

**Modern Trends in Agricultural Production
Rural Development and Environmental Protection**

Publisher

The Balkans Scientific Center of the
Russian Academy of Natural Sciences
Belgrade

In cooperation

Faculty of Agriculture, Lesak
Faculty of Agriculture Cacak
Institute for Animal Husbandry, Belgrade, Zemun
Fruit Research Institute, Cacak
Faculty of Agriculture, East Sarajevo
Soil Science Institute, Belgrade
Faculty of Hotel Management and Tourism, Vrnjacka Banja

Editor

Acad. Prof, dr Mitar Lutovac
Prof. dr Zoran Ž. Ilić

Technical editor

Zoran Stanisavljević, SaTCIP

ISBN

978-86-6042-012-3

Circulation

100 exemplars

Printed by

SaTCIP d.o.o. Vrnjačka Banja

Belgrade, 2021.

Organizing Committee

Prof. dr Zoran Ilic, Faculty of Agriculture Lesak, Serbia, Chairman
Acad. Prof. dr Dragutin Djukic, Faculty of Agriculture, Cacak, Serbia, Vice-chairman
Dr Milan P. Petrovic, Institute for Animal Husbandry, Belgrade, Serbia, Vice-chairman
Prof. dr Bozidar Milosevic, Faculty of Agriculture, Lesak, Serbia
Prof. dr Drago Cvijanović, Faculty of Hotel Management and Tourism, V. Banja, Serbia
Prof. dr Marija Kostić, Faculty of Hotel Management and Tourism, V. Banja, Serbia
Prof. dr Slavica Ciric, Faculty of Agriculture, Lesak, Serbia
Prof. dr Jovan Stojkovic, Faculty of Agriculture, Lesak, Serbia
Prof. dr Milan Biberdzic, Faculty of Agriculture, Lesak, Serbia
Prof. dr Saša Barać, Faculty of Agriculture, Lesak, Serbia
Prof. dr Bratislav Cirkovic, Faculty of Agriculture, Lesak, Serbia
Prof. dr Nebojsa Lalic, Faculty of Agriculture, Lesak, Serbia
Doc. dr Ljiljana Anđušić, Faculty of Agriculture, Lesak, Serbia
Prof. dr Radojica Djokovic, Faculty of Agriculture, Cacak, Serbia
Prof. dr Vladimir Kurcubic, Faculty of Agriculture, Cacak, Serbia
Prof. dr Leka Mandic, Faculty of Agriculture, Cacak, Serbia
Prof. dr Aleksandar Paunovic, Faculty of Agriculture, Cacak, Serbia
Dr Cedomir Radovic, Institute for Animal Husbandry, Belgrade, Serbia
Dr Violeta Caro Petrovic, Institute for Animal Husbandry, Belgrade, Serbia
Dr Vesna Krnjaja, Institute for Animal Husbandry, Belgrade, Serbia
Dr Dusica Ostojic Andric, Institute for Animal Husbandry, Belgrade, Serbia
Dr Aleksandar Stanojkovic, Institute for Animal Husbandry, Belgrade, Serbia
Dr Marijana Pesakovic, Fruit Research Institute, Cacak, Serbia
Dr Svetlana Paunović, Fruit Research Institute, Cacak, Serbia
Doc. dr Dejana Stanic, Faculty of Agriculture, East Sarajevo, Bosnia and Herzegovina
Doc. dr Zarko Gutalj, Faculty of Agriculture, East Sarajevo, Bosnia and Herzegovina
Dr Radmila Pivic, Soil Science Institute, Belgrade, Serbia
Dr Aleksandra Stanojkovic Sebic, Soil Science Institute, Belgrade, Serbia
Dr Jelena Maksimovic, Soil Science Institute, Belgrade, Serbia
Msc Milos Petrovic, Faculty of Agriculture Cacak
Doc. dr Vera Rajcic, Faculty of Agriculture, Krusevac, Serbia
Doc. dr Violeta Babic, Faculty of Agriculture, Krusevac, Serbia
Doc. dr Sasa Obradovic, Faculty of Agriculture, Krusevac, Serbia
Dr Bojana Ristanovic, Faculty of Agriculture, Krusevac, Serbia

Scientific Committee

Acad. Prof. dr Ivanickaja Lida Vladimirovna, Vice President - Chief Scientific Secretary RAEN, Moscow, Russia
Acad. Prof. dr Mitar Lutovac, Union Nikola Tesla University, Belgrade, Serbia, Chairman
Acad. Prof. dr Ghazaryan Surik (Grair) Bakhshiyevich, American Center of the Russian Academy Natural Sciences, California, United States, Chairman
Acad. Prof. dr Dragutin Djukic, Faculty of Agriculture, Cacak, Serbia, Chairman
Aleksandr M. Semenov. Leading Research Scientist. Ph.D., Doctor of Sciences in Biology. Department of Microbiology. Biological Faculty, Moscow State University (M.V. Lomonosov University). Moscow, Russia. Vice- chairman
Prof. dr Zoran Ilic, Faculty of Agriculture Lesak, Serbia, Vice-chairman
Acad. Prof. dr Gordan Karaman, Montenegrin Academy of Sciences and Arts, Montenegro
Acad. Prof. dr Rudolf Kastori, Academy of sciences and arts of Vojvodina, Serbia
dr Milan P. Petrovic, Institute for Animal Husbandry, Belgrade, Serbia
Prof. dr Dragan Bataveljic, University of Kragujevac, Faculty of Law, Serbia
Prof. dr Drago Cvijanovic, Faculty of Hotel Management and Tourism, Vrnjacka Banja, Serbia
Prof. dr Desimir Knezevic, Agriculture, Lesak, Serbia
Prof. dr Moohamed Kenawi, Faculty of Agriculture, Minia, Egypt
Prof. dr Marina Ivanovna Selionovna, Russian Scientific Research Institute for Sheep and Goat Breeding, Stavropol, Russia
Prof. dr William C. Medrano, Isabela State University, Philippines
Prof. dr Tomo Milosevic, Faculty of Agriculture, Cacak, Serbia
Prof. dr Novo Przulj University of East Sarajevo, Faculty of Agriculture, Bosnia and Herzegovina
Prof. dr Dragi Dimitrievski, Cyril and Methodius university faculty of agriculture, Skopje, Macedonia
dr Valentine Bozhkova, Fruit growing institute, Plovdiv, Bulgaria
Prof. Igor S. Surovtsev, Voronezh State University of Agriculture and Civil Engineering, Russia
Prof. dr Karoly Duplechz, University of Panonia, Georgicon faculty of agriculture, Hungary
Prof. dr Ab van Kamen, Wageningen Agricultural University Department of Molecular Biology, Netherlands
Prof. dr Sorin Mihai Cimpeanu, University of Agronomic Sciences and veterinary Medicine of Bucharest, Romania
Prof. dr Narcisa Mederle, Banat's University of Agricultural Sciences and Veterinary Medicine „King Michael I of Romania”, Timisoara, Romania
Prof. dr Miladin Gligoric, University of East Sarajevo, Faculty of Technology, Bosnia and Herzegovina
Prof. dr Ольга Селицкая, Russian state agrarian university, Moscow Timiryazev, Russia

dr Marina Ivanovna Selionovna, Russian State Agrarian University – Moscow
Timiryazev Agricultural Academy, Moscow, 127550, Russia

dr Mony Roth Chuon, Department of Agro-Industry, Ministry of Agriculture Forestry
and Fisheries, Cambodia

Dr. Argir Zivondov, Institute of Fruit Production, Plovdiv, Bulgaria

Prof. dr Boris Krska, Mendel University of Agriculture and Foresty Brno,
Faculty of Agriculture Lednice, Department of Pomology, Slovak

dr Sukhavitskaya Ludmila Antonovna, National Academy of Sciences of Belarus,
Institute of Microbiology, Belarus

Dr David L. Pinskiy, Russian Academy of Sciences, Institute of Physico-chemical and
Biological Problems in Soil Science, Russia

Acad. Prof. dr Angel S. Galabov, Bulgarian Academy of Sciences, Institute of
Microbiology, Bulgaria

Prof. Zsolt Polgar, University Panon, Georgikon faculty of agriculture, Potato
research Centre, Hungary

Doc. dr Velibor Spalevic, University of Montenegro, Montenegro

dr Milan Zdravkovic, Soil Science Institute, Belgrade, Serbia

dr Ivan Pavlovic, Scientific Institute for Veterinary Medicine, Belgrade, Serbia

Prof. dr Marija Kostić, Faculty of Hotel Management and Tourism, Vrnjacka Banja,
Serbia

Prof. dr Atanaska Taneva, Faculty of Forestry, Sofia, Bulgaria

Doc. dr Milica Luković, Faculty of Hotel Management and Tourism, Vrnjacka Banja,
Serbia

Prof. dr Nikola Pacinovski, Cyril and Methodius university faculty of agriculture,
Skopje, Macedonia

Prof. dr Goce Cilev, Kliment Ohridski University Veterinary Faculty, Bitola,
Macedonia

Prof. dr Goran Kvirgic, Faculty of Management, Sremski Karlovci, Serbia

Prof. dr Vesna Cilerdzic, Faculty of Management, Sremski Karlovci, Serbia

COCCIDIOSIS IN LAMBS IN NORTHERN SERBIA (VOJVODINA)

Ivan Pavlović¹, Violeta Caro-Petrović², Ferenc Csordás³, Stanko Minić⁴,
Namanja Zdravković¹, Jovan Bojkovski⁵, Vukašin Stefanović⁶

¹Scientific Veterinary Institute of Serbia, Belgrade

²Institut for Animal Husbandry, Belgrade-Zemun

³Veterinary Ambulance FeriTom, Zrenjanin

⁴Veterinary Station Minić, Starčevo

⁵Faculty of Veterinary Medicine, University in Belgrade

⁶Agricultural Faculty, Lešak, University of Pristina

Abstract: *The paper examines the results of the research on the coccidiosis in lambs in Vojvodina. The present study was conducted in 90 sheep flocks from the all territory of Vojvodina in the period from March 2014 to January 2015. Sheep of both sexes (320 males and 580 females, for a total of 900) were randomly chosen. There were 610 adults (one-year-old and above) and 290 lambs. Collected faeces samples were examined using routine coprological methods. During our examination coccidiosis were found at 32.22% (29/90) flocks. We usually occurred mixed infection with 2-3 coccidia species. At sheep most abundant species were *E. ovinoidalis* found at 87.1%, followed by *E. faurei* (42%), *Eimeria ahsata* (37%), *E. granulosa* (31%), *E. intricata* (19%), and *E. pallida* (8%). Oocyst were found at adult and young animals, but clinical sign of disease were present only at young animals. The number of excreted oocysts was higher in lambs than in adult sheep*

Key words: *coccidiosis, lambs, sheep, Vojvodina*

Introduction

Coccidiosis in sheep is parasitic infection caused by protozoa in the genus *Eimeria*. Historically, some *Eimeria* spp were thought to be infectious and transmissible between sheep and goats, but the parasites are now considered host-specific (McDougald, 1979). At sheep were established next coccidial species: *Eimeria ahsata*, *E. ammonis*, *E. arkhari*, *E. crandallis*, *E. dalli*, *E. danielle*, *E. faurei*, *E. gilruthi*, *E. gonzalezi*, *E. granulosa*, *E. intricata*, *E. marsica*, *E. ovina*, *E. ovinoidalis*, *E. pallida*, *E. parva* Kotlán, *E. punctata* and *E. rachmatullinae* (Foreyt, 1987, 1990). Coccidia of sheep are present worldwide and it seems difficult to say that there is any particular geographical distribution for one or the other species of coccidia (Levine, 1985, Wright and Coop, 2007).

All species of coccidia are not disease causing. There are only some species that are responsible for the outbreak of the disease. *E. ovinoidalis* can be very pathogen and other species such as *E. bakuensis* (*E. ovina*) and *E.*

crandallis may exacerbate the symptoms of the former two species. Outbreaks of coccidiosis are usually acute and characterized by moderate morbidity and low mortality (O'Callaghan et al., 1987, Gregory,1990). Usually it is presented at animals at 4-10 weeks. Lamb and kids infection had moderate morbidity and low mortality rate. Environmental contamination and resulting clinical disease is generally influenced by local weather conditions and the grazing management practices of the flock (de la Fuente et al.,1993, Pavlović et al.2013). The economic impact of coccidiosis in small ruminants is not well documented and there is no published data about estimate for economic losses due to subclinical or clinical disease. The economic cost is considerable, in terms such as low growth performance, decrease in productivity, mortality, morbidity, and the cost of prevention and treatment Pavlović et al.,2009,2010). These losses can be linked to reduced production, in the case of moderate infection without clinical signs or direct consequences of diarrhea on the growth of the animals and on mortality, in the case of clinical coccidiosis (Foreyt,1990).

Coccidiosis in small ruminants (sheep and goats) in Serbia has been tested in the last fifteen years and in our paper we presented results of the our examination at norther part of Serbia – in Vojvodina.

Material And Methods

Vojvodina is situated in the northern quarter of Serbia, The region is divided into: Bačka in the northwest, Banat in the east and Srem in the southwest. Agriculture is a priority sector in Vojvodina. Traditionally, it has always been a significant part of the local economy and a generator of positive results, due to the abundance of fertile agricultural land which makes up 84% of its territory (Ognjenović, 2008). Vojvodina is rich in grasslands suitable for sheep grazing.

The present study was conducted in 90 sheep flocks from the all territory of Vojvodina in the period from March 2014 to January 2015. Sheep of both sexes (320 males and 580 females, for a total of 900) were randomly chosen. There were 610 adults (one-year-old and above) and 290 lambs. Collected faeces samples were examined using routine coprological methods (Soulsby,1977, Pavlović and Anđelić-Buzadžić,2010). Despite the general relationship between clinical coccidiosis and oocyst excretion, no threshold for treatment has been established, though a fecal oocyst count of >20,000 OPG of a pathogenic species is considered characteristic of coccidiosis in lambs. A necropsy is the most reliable method of diagnosis. The coccidia organisms themselves cannot be seen at necropsy, as they are microscopic from gut swabs and at histopathological examination. In total we examined 39 lambs slaughtered in a slaughterhouse. Determination of occidia we performed by morphological characteristic (Levine 1985, Foreyt, 1987,1990).

Results And Discussion

During our examination coccidiosis were found at 32.22% (29/90) flocks. We usually occurred mixed infection with 2-3 coccidia species. At sheep most abundant species were *E.ovinoidalis* found at 87.1%, followed by *E faurei* (42%), *Eimeria ahsata* (37%), *E. granulosa* (31%), *E. intricata* (19%), and *E. pallida* (8%). Oocyst were found at adult and young animals, but clinical signs of disease were present only at young animals. The number of excreted oocysts was higher in lambs (18325+/-23383 OPG) than in adult sheep (2597.3+/-12373 OPG).

At necropsy, macroscopic changes included mucosal hemorrhages and whitish nodular polyps in the jejunum were found. Histopathological changes were characterized by local hypertrophy and hyperplasia of intestinal villi, villus blunting and inflammatory infiltration in the lamina propria. Numerous developmental stages of the parasites were observed in enterocytes. These findings were identical to the pathological changes in lamb coccidiosis described by Khodakaram-Tafti and Mansourian (2008).

Coccidiosis, like other internal parasite problems, is directly linked to contamination of the lambing area or pastures with coccidia “eggs” (oocysts) passed in the manure of infected ewes and lambs (Pavlović,2009 Altaf and Hidayatu,2014). The symptoms observed are dependent on the species of *Eimeria*, how many are present, the animal’s age, production status, overcrowding, stress level and environmental factors. Immunity develops over time, so young animals are more susceptible than older animals (Gregory and Catchpole,1989). Adult animals can have coccidia, but not show symptoms. Lambs 1–6 month old in lambing pens, intensive grazing areas, and feedlots are at greatest risk as a result of shipping, ration change, crowding stress, severe weather, and contamination of the environment with oocysts from ewes or other lambs. When lambs are exposed to infection early in life as a result of infection from the ewe and a contaminated lambing ground, a solid immunity usually develops and problems are seen only when the stocking density is extremely high (Chartier and Paraud,2012).

In winter lambing production systems, coccidiosis outbreaks are common in 3 to 6-week-old lambs that are infected with coccidia oocysts shortly after birth (first few days of life). In our area, outbreaks of clinical disease in winter lambing flocks commonly occur when lambs are about 20 to 30 days old. Coccidiosis is also more common during the second half of winter lambing, when the wet and relatively warmer transitional weather of late February and March contributes to coccidiosis survival and spread in the environment.

Signs of clinical disease (scours) generally occur about 18 to 20 days after ingestion of sufficient amounts of coccidia oocysts from the contaminated

environment. Clinical coccidiosis occurs when damage to the gut is sufficiently severe to cause dysfunction. This normally occurs at the beginning of the parasite's sexual multiplication stage, when parasite numbers reach their peak. (Taylor et al., 2007). Due to the damage of the cells lining the intestines, the primary symptoms of coccidiosis in sheep is sheep diarrhea, which may be foul smelling and contain mucus and blood. Sheep diarrhea may have a dark tarry appearance and, in severe cases, large blood clots can be seen (Gregory,1990). The hindquarters and tail may be covered with manure. Additionally, the performance of sheep will suffer due to loss of appetite, weakness, abdominal pain and fatigue. Some animals may die before showing signs of coccidiosis if they are exposed to a large amount of coccidia in the sheep environment. Even though sheep may recover, there could be long-lasting effects due to intestinal damage that cause general unthriftiness, decreased growth, inferior sheep milk production and a greater predisposition to other diseases (Altaf and Hidayatu, 2014)

There are two aspects to preventing clinical coccidiosis. The first is eliminating or lowering the numbers of pathogenic oocysts ingested through good biosecurity, hygiene and management. Prior to lambing and between groups all housing and pen materials should be thoroughly cleaned to remove all organic material and then disinfected with a product effective against coccidia oocysts. At pasture, contamination levels are reduced by regularly moving to clean grazing and avoiding fields that carried young lambs in the previous season when possible. Lambs with ewes at lower stocking densities have a much lower risk of disease (Kusiluka and, Kambarage, 1996).

The second is timed and targeted preventative treatment. Because occurrence of coccidiosis under these management systems often becomes so predictable, coccidiostats should be administered prophylactically for 28 consecutive days beginning a few days after lambs are introduced into the environment. Treatment of affected sheep once coccidiosis has been diagnosed is not effective, but severity can be reduced if treatment is begun early. In groups of lambs at pasture, frequent rotation of pastures for parasite control also helps control coccidial infection (Vujić et al.1991).

Conclusions

Sheep coccidiosis was of great importance to health status of lambs and its performances. Lambs infection had moderate morbidity and low mortality rate. Consequence is significant increase of lamb accrescense, its weakens and less growth.The best preventive measure a lamb producer can take is to use a feed with a coccidiostat added. With careful management and sound preventive measures, the losses associated with this disease can be reduced to minimal levels.

Acknowledgements

This study was supported by the Ministry of Education, Science and Technological Development, Republic of Serbia (Contract for research funding No. 451-03-68/2020-14/200030) and its part of project BT 31053

Reference

Altaf A.R., Hidayatu A.(2014) Study of some potential risk factors associated with coccidia in sheep. *J. Agr. Vet. Sci.*, 2014, 65, 11-13.

Chartier C., Paraud C. (2012) Coccidiosis due to *Eimeria* in sheep and goats, a review. *Small Rumin Res.* 103(1):84–92

de la Fuente C, Cuquerella M, Carrera L, Alunda JM. (1993) Effect of subclinical coccidiosis in kids on subsequent trichostrongylid infection after weaning. *Vet Parasitol.* 45(3-4),177-183.

Eckert J., Taylor M., Catchpole J., Licois D., Coudert P., Buclar H. (1995) Identification of *Eimeria* species and strains. In: *Biotechnology; Guidelines on Techniques in Coccidiosis Research*, Brussels, Luxembourg, pp 103-119.

Foreyt W.J.Coccidiosis in sheep and goats.(1987) *Vet Hum Toxicol.*29,60-64.

Foreyt W.J. (1990) Coccidiosis and cryptosporidiosis in sheep and goats. *Vet Clin North Am Food Anim Pract.*6(3),655-670.

Gregory MW. Pathology of coccidial infections. Boca Raton Coccidiosis of man and domestic animals. Florida: CRC Press, Inc.; 1990. pp. 235–61.

Gregory M.W., Catchpole J. (1989) Ovine coccidiosis: heavy infection in young lambs increases resistance without causing disease. *Vet. Rec.*, 124, 458-461.

Khodakaram-Tafti A., Mansourian M. (2008) Pathologic lesions of naturally occurring coccidiosis in sheep and goats. *Comp. Clin. Pathol.*, 17, 87-91

Kusiluka L, Kambarage D.(1996) Disease of small ruminants, Easter Bush, Scotland. 1996, pp 87-90.

Levine N.D.: Phylum II. Apicomplexa. In: Lee J.J., Hunter S.H., Bovee E.C. (eds), *An Illustrated Guide to the Protozoa*, Allen Press, Lawrence. KS, 1985, pp 322-374

McDougald LR. (1979) Attempted cross-transmission of coccidia between sheep and goats and description of *Eimeria ovinoidalis* sp. n. *J Protozool.* 26(1), 109-113.

O'Callaghan MG, O'Donoghue PJ, Moore E. (1987) Coccidia in sheep in South Australia. *Vet Parasitol*, 24(3–4), 175–83.

Ognjenović S (2008) *Ilustrovani atlas Srbije*. Evro- Giunti, Beograd

Pavlović I., Ivanović S., Žujović M. (2009) Coccidiosis of goats and its role and importance of goat production. Proceeding of IV Balkan Conference of Animal Science BALNIMALCON 2009, Challenges of the Balkan Animal industry and the Role of science and Cooperation, Stara Zagora, Bulgaria, 393-395.

Pavlović Ivan, Anđelić-Buzadžić Gordana (2010) *Osnovi dijagnostike parazitskih bolesti životinja za studente visoke poljoprivredne škole strukovnih studija u Šapcu studijski program: strukovna veterina*. Naučni institut za veterinarstvo Srbije, Beograd

Pavlović I., Ivanović S., Žujović M., Tomić Z. (2010) Influence of cryptosporidiosis and coccidiosis to goat production. Proceeding of XIV International Symposium Feed Technology, XII International Symposium NODA, Novi Sad, 192-195

Pavlović I., Ivanović S., Bojkovski J., Kulišić Z., Savić B., Tambur Z. (2013) Eimeriosis of small ruminants in Belgrade area. Proceeding of XIII Middle European Buiatrics Congress, Belgrade, 480- 483.

Soulsby, E.J.L. (1977) *Helminths, arthropods and protozoa of domesticated animals*, and Cassell Co, London

Taylor M. (1995) Diagnosis and control of coccidiosis in sheep. In *Practice.*, 17, 172-177.

Vujić B., Bošković V., Savin Ž. (1991) Najznačajnije parazitske vrste ovaca i koza i njihovo suzbijanje. I International Conference of sheep and goat Production. Ohrid, 375-381.

Wright S.E., Coop R.: Cryptosporidiosis and coccidiosis. In: *Diseases of sheep*, 4th edn, Blackwell Publishing, Oxford, UK, 2007, pp 179-185.

CIP - Каталогизacija у публикацији - Народна библиотека Србије, Београд

63(082)

502/504(082)

INTERNATIONAL Symposium Modern Trends in Agricultural Production
Rural

Development and Environmental Protection (3 ; 2021 ; Vrnjacka Banja)

3rd International Symposium: Modern Trends in Agricultural Production
Rural Development and Environmental Protection, Vrnjacka Banja, Serbia
July, 01-03. 2021. / [editors Mitar Lutovac, Zoran Ž. Ilić]. - Belgrade :
Balkans Scientific Center of the Russian Academy of Natural Sciences, 2020
(Vrnjačka Banja : SaTCIP). - 438 str. : ilustr. ; 25 cm

Tiraž 100. - Napomene i bibliografske reference uz tekst. - Bibliografija
uz svaki rad.

ISBN 978-86-6042-012-3

a) Пољопривреда - Зборници b) Животна средина - Зборници

COBISS.SR-ID 41518857
