

GOAT BREEDING AND HERDS HEALTH STATUS IN THE NORTHEAST AREA OF ROMANIA – A SHORT REVIEW

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Abstract

The goat is a species that managed to attract attention to the breeders due to the fact that they are suitable for an efficient holding in small households, have a high lactogenic capacity, high prolificacy, precocity and high degree of adaptability and resistance, occupying areas where the natural resources and field conditions do not allow the growth of other species, which is why the goat herds in our country is constantly growing. Thus, the goat population in Romania increased from 1009794 animals in 2005 to 2057309 in December 2018. Our country occupying the third place in the hierarchy of Member States of the European Union, in 2019, following countries with tradition in the goat breeding, such as United Kingdom and Spain. The most numerous are the Carpathian native goats and Banat White, a crossbreed obtained from the Carpathian and Saanen breeds, followed by French Alpine and Saanen, imported lately to improve milk production. To date, in Romanian literature had been reported researches on the subject of diseases and health problems in goats, there are studies on paratuberculosis, contagious ecthyma, infectious respiratory disorders, gangrenous mastitis, contagious agalactia, bluetongue, caprine arthritis and encephalitis, and parasitic infections as coccidiosis, tapeworm (Monezia, Cestoda) and round worms (Nematoda - Trichostrongylus sp.) infestation, etc. Although Romania has a national program for surveillance and control program for goat health status, the problems in livestock goat diagnosed and published in recent years, are poor and changing, unsystematic and insufficient. The epidemiological situation in Romania has undergone significant changes in recent years, our country is the southeastern border of the European Union, which implies an increased risk for all major animal diseases and, of course, monitoring programs and greater control than in other Member States of the European Union. An effective animal health program is an essential part of a successful dairy goat management program.

Keywords: goat, health status, infectious, metabolic, parasitic

Introduction

The aim of the present paper is to analyze the goat health status in Romania and to present the reported data on the subject of diagnosed diseases. In Romania goat herds are mainly traditionally raised, their productive potential depends on the geographical area, the type of maintenance and feeds, the owner's experience and level of knowledge on goat farming. The Carpathian and Banat White breeds accounted for 70% of the national livestock population, with the proportion now decreasing due to the import of specialized breeds, especially for milk production - Saanen, French Alpine, Anglo Nubian, Murcina Granadina, German Nobility and Toggenburg. The main goal of goat's breeding is milk production and meat production, especially kids. Goat farming is mainly organized into mini farms (10-50 goats), whose main product is milk, that is usually processed into cheese in family farms. Better use of underutilized pastures, the country holds five million hectares of pastures mostly situated in regions listed as less favoured areas, indicates significant development potential of goats in Romania. Significant investments in modernization and wider use of new technological procedure will raise productivity, improve welfare and quality of better monitoring the health of individual animals and goat herds and increase economic efficiency.

The health of a herd is assessed in relation to infectious diseases, parasitic and metabolic specific to goats.

Infectious diseases

Caprine arthritis-encephalitis (*Caprine Arthritis Encephalitis Virus* - CAEV) is a goat viral disease caused by a lentivirus belonging to the Family *Retroviridae*. The virus induces a persistent infection by incorporation of the CAEV genome into the DNA of host cell. The monocyte-macrophage cells are the main target of this virus. In clinical cases were described arthritis, mastitis, pneumonia, weight loss and encephalitis. Investigations on this infection in Romania were conducted by Gurău M. et al., 2015, in southeastern Romanian farm and by Mihai I. et al., 2018, in northeastern counties. The investigation results in southeastern farm revealed a high prevalence of CAEV-infection (38.46%), proved by serological investigation (active surveillance by ELISA-Ab exams), associated with low clinical cases of CAE, supporting the assertion that most of CAEV infected animals remains asymptomatic. The second study (Mihai I. et al., 2018) purpose was the detection of CAEV antibodies among goat populations from Vaslui County. During 2014-2016, blood samples were collected both from healthy animals and with clinical signs of disease. All serum samples were tested for CAEV antibody by agar gel immunodiffusion (AGID) test. The results of the investigation revealed a 31.86% (94 out of 295) seroprevalence.

A common infection of the respiratory tract of goats throughout the world is parainfluenza type 3 (PI-3). As with other respiratory viruses, PI-3 virus infection impairs the function of the alveolar macrophages and destroys cilia on the bronchial mucosa. This compromises the animal's natural clearance mechanism (defense mechanism) for removing pathogenic organisms from the lower respiratory tract making them susceptible to secondary bacterial infection particularly *P. haemolytica* infection. Uncomplicated PI-3 virus infection doesn't appear to be an important cause of death, but it may result in death because of bacterial pneumonia frequently in kids. In Romania Aniță et al., 2015, tested the immunodetection suitability of viral antigens in routinely fixed tissue specimens as a diagnostic tool for PI-3 infection in goats. Results of this study demonstrate that PI-3 infection should be considered as a possible cause of pneumonia in goats, along with respiratory syncytial virus and bacterial infections (*Mycoplasma* and *Mannhiemia spp.*).

A common infection of the respiratory tract of goats is *Pasteurella* infections result in pneumonia along with septicemia, arthritis, and otitis media. Spring outbreaks are more likely in kids 2 weeks to 2 months of age and frequently are seen in association with severe weather. Fall outbreaks are more likely to occur in 5- to 7-month-old goats after shipment to feedlots. The bacteriological examination for *Pasteurella spp.* was performed for 149 samples collected from animals with or without respiratory clinical signs. Of these, 109 was positive for *Pasteurella spp.*, resulting in a prevalence of 73.15% and 40 samples (23.85%) with a negative result. Samples come from goats from Botoșani, Iași, Suceava and Vaslui counties, from Saanen, French Alpine, Carpathian and Saanen breeds, aged between 1.5 and 11, raised in extensive and intensive system, in free or permanent stabling (Mihai I. et al, 2018). *Pasteurella* outbreaks are associated with morbidity rates of up to 50% of the flock or herd, but mortality rates typically are low (Plummer P.J. et al, 2012). *Pasteurella* infections frequently are secondary infections that follow an initial infection with one of several different viral or bacterial agents such as parainfluenza type 3, adenovirus type 6, respiratory syncytial virus, caprin herpesvirus 1, *Bordetella parapertussis* and *Mycoplasma ovipneumoniae* (Brogden Kim A. et al., 1998; Buddle B.M. et al., 1990).

Most of the infectious agents that cause respiratory disease are usually common inhabitants of the respiratory system. Of all goat maladies, those affecting the respiratory system can cause substantial loss through high morbidity and mortality (Bordeanu A.D. et al., 2012).

Researches on contagious ecthyma (Sore Mouth) in goats were described in many counties of Romania. Ecthyma is an infectious disease of sheep and goats, with acute evolution produced by an epitheliotropic virus, clinically characterized by vesiculo - pustular eruption, with

predominantly buccal, podal, genital, mammary and ocular localizations. Clinically, the disease develops overactive in lambs and goes out, with deterioration in health, swelling of the nose, followed by a confluent and massive vesiculo - pustular eruption, on the lips and the mucous membrane, with regional adenopathy. Sometimes due to the spread of lesions on the respiratory and digestive mucosa, symptoms of ronchopneumonia or enteritis with a fatal outcome occur in 36-40 hours. This infectious disease caused by an epitheliotropic virus (ORF, family *Poxviridae*), has usually an acute evolution. The disease was first recoded in Romania by Riegler in 1935, near Bucharest. Latest epidemiological investigations in Romania (during 2008-2012) on Sore Mouth 490 were made by Rusu R.O., highlighting the circulation of ORF virus in goat herds from Iași and Botoșani Counties, using molecular methods for viral detection and characterization (Rusu RO et al., 2014). The same author studied the efficacy of vaccine protection (Scabivax) on goat herds: in kids and adults (Rusu RO et al., 2014). An outbreak of ectima was semnaleted in Suceava County at 50 adult goats and 20 kids, Saanen half-breed (Mihai I. et al, 2018).

Laminitis is a contagious disease with a polyfactorial etiology, characterized by a necrotic inflammation of the keratogenic membrane, followed in many cases by de-congestion. The main etiological agent is *Dichelobacter* (*Bacteroides*) *nodosus*, but from lesions are constantly isolated *Fusobacterium necrophorum* subsp. *necrophorum* and *Arcanobacter pyogenes*, and inconstantly *Spirocheta penortha*, *Clostridium perfringens*, *Staphylococcus* spp., *Streptococcus* spp., *Dichelobacter nodosus* (Velescu Elena, 1996). 59 cases of pododermatitis was diagnosticated in Vaslui county, Carpathian adult goats (Mihai I. et al., 2018). Goat hoof problems involve significant economic losses. Regular hoof adjustment and early diagnosis are the key to prevention and foot therapy. Lamé goats spend more time lying down, eat less, milk production decreases and reproductive traits are less expressed. Once introduced into a herd, the disease spreads rapidly, most commonly affecting young animals up to one year of age. When the lameness is severe, the affected goats have a fever, are apathetic, with warm and painful coronary bands on the hooves. Foot injuries can become chronic if the initial phase is not diagnosed in time.

Another infectious disease prevalent in goats reared in small farms is gangrenous mastitis caused by *Staphylococcus aureus*. Romania pays special attention to development of livestock sector growth through the introduction of goat breeds with high milk production and genetic improvement of indigenous characters. For this purpose, there were created optimal conditions for maintenance and proper nutrition, and the genetic potential of animals is scientifically directed towards high yields of milk and meat. These, would greatly increase profitability if the morbidity and mortality due to udder disease were reduced. The main consequence of an incorrectly milking is mastitis. These are inflammation affecting the secretory epithelium, the lining of milk ducts and interstitial tissue. Microbial etiology of mastitis in goats includes a wide range of bacterial species, the most important being *Staphylococcus* spp. and *Mycoplasma* Spp. Gangrenous mastitis, caused by *Staphylococcus aureus*, is the most severe reported in goats, resulting in the animal's death or in incomplete or partial sloughing of the udder. In Romania, recent studies were made by Velescu et al., 2009 and Tudose A. et al., 2010 highlighting the importance of the early treatment of this infection. Tudose A. et al. 2010, also evaluated the immune response after vaccination against gangrenous mastitis, by dynamic research of serum protein fractions in goats in vaccinated and unvaccinated groups, revealing the increasing concentration of γ -globulins and decreasing of albumin levels.

Parasitic diseases

Is well known that goats are very sensitive to internal parasitism, which can cause a decrease in fertility, abortion, an increased susceptibility to diseases and death. In 2011, Iacob O.C.

conducted a study on 1450 Carpathian breed goats, in order to reveal different aspects of their digestive and pulmonary parasitogram. Following examinations, the author claims that *Eimeria* genus was dominant to all age categories, with an extensivity of 90- 100% and a value of OPG (oocysts per gram of faeces) between 0-2500. According to Iacob O.C. (2011), nematodes of the family Trichostrongylidae were dominant in adult goats, with an extensivity of 100% and an OPG value between 2000-5100, which defines a strong infestation; in young goats and bucks (treated against parasites two weeks previous to going out to pasture), trichostrongillids had an extensivity of 0-10% and a 0-50 OPG value. Pulmonary nematodes of the *Protostrongylus* genus and *Protostrongylus rufescens* species were dominant through unique infestation in adult goats and pregnant youth (Iacob O.C., 2011). Trematodes of the *Dicrocoelium* genus and *Dicrocoelium lanceatum* species were represented by rare invasional elements identified in young individuals and adult does (Iacob O.C., 2011). Finally, Iacob O.C. (2011) claims that a medical prophylaxis applied selectively in the herd according to age and short-term economic interest, contributes to the infestation and disease of animals at their first grazing, to the parasitological pollution of grazing areas and to the recording of much higher economical losses.

Metabolic disorders

Iodine deficiency determines the appearance of goiter, which is a characteristic of thyroid gland enlargement in all domestic mammals, birds and reptiles (Osame S. et al., 1994; Corradini P. et al., 2000; Garner M.M. et al., 2002; Fyfe J.C. et al., 2003). Sometimes, iodine deficiency during pregnancy could be the cause and the kids surviving after birth develop goiter in later stages of life (Vijlder D., 2003). Goiter in utero is caused by either primary or secondary iodine deficiency (Maxi M.G. et al., 2007). Among the incriminated cases in the appearance of kids goiter is the feeding of pregnant females with low iodine feed or goitrogenic compounds which interfere with thyroxinogenesis (brassica plants, soybean byproducts and water with high content of calcium and nitrates) (Blood D.C. et al., 2000; Radostits O.M. et al., 2007; Sing R. and Beigh S.A., 2013). The last outbreak reported in Romania regarding iodine deficiency in kids, was recorded by Mihai I. et al. (2018) within an Anglo Nubian goat farm. According to Mihai I. et al. (2018), the pregnant goats were fed with goitrogenic plants (cabbage), but there was no palpable enlargement of the dams thyroid glands. Clinically, iodine deficiency is characterized by the presence in the upper third of the neck of a submandibular bilobata formation that overlays the trachea just below the larynx, symmetrical, united in the distal part (Liklater & Smith, 1993). In order to reduce the economical wastage caused both the therapeutic expenses and an increased mortality rate, Mihai I. et al. (2018), recommended supplementing the iodized salt fodder ration as well as avoiding the goitrogenic feeding of goats in the last months of pregnancy.

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The National Sanitary Veterinary and Food Safety Authority (ANSVSA), in accordance with European legislation, lays down rules and implementing measures for veterinary actions, which are included in the program for the surveillance, prevention, control and eradication of animal diseases, those transmitted by in humans, animal welfare and the environment, as well as the identification and registration of animals of the bovine, porcine, ovine, caprine and equine species. National programs include specifications on reportable diseases, maneuvers performed for clinical monitoring, serological surveillance (active/passive) and virological surveillance.

The list of reportable diseases in goats includes foot-and-mouth disease, anthrax, small ruminant plague, ovine and caprine smallpox, ovine and caprine brucellosis, *Brucella melitensis* infection, ovine brucellosis or *Brucella ovis* infection, campylobacteriosis, Maedi Visna, contagious agalaxia goat, pulmonary adenomatosis, communicable diseases, zoonoses and emerging diseases: bacterial (streptococcus, staphylococcus, colibacillosis) fungal (aspergillosis), viral (papillomatosis), parasitic (echinococcosis / hydatidosis, pneumocystosis, tetanus, sarcocystosis, skin caused by mites).

Passive serological surveillance includes taking samples to assess health status and monitoring tests for the suspected pathogen, samples may be: blood / serum, secretions / excretions, abortions, etc. The analyzes and laboratory examinations performed during the official control must be performed only with accredited methods in accordance with the provisions of art. 12 of Regulation (EC) No 882/2004 of the European Parliament and of the Council of 29 April 2004 on official controls performed to ensure compliance with feed and food law, animal health and animal welfare, as subsequently amended.

The risk of introducing new diseases in Romania can be represented by: the evolution of diseases in the countries close to the Romanian borders; the unknown epidemiological status of these countries; - illegal crossing of borders with animals; the movement of persons and vehicles, in particular at the border.

On the Romanian territory, the risk can be represented by: the absence of biosecurity conditions on the farm; uncontrolled movements of animals; direct or indirect contact of dwellings with animals of unknown health.

The development of solutions for goat farmers in our country in the context of current challenges involves establishing the epidemiological status, health of goats and defining biosecurity measures to reduce the risks of introduction and spread of diseases in the herd.

References

1. Aniță A, Aniță D, Răileanu C, Savuța G. (2015). Detection of Parainfluenza Type 3 Virus Antigens in Goats. Bulletin USAVM Veterinary Medicine 72(1), Print ISSN 1843-5270; Electronic ISSN 1843-5378 DOI:10.15835/buasvmcn-vm: 10385
2. Blood D.C. & Radostits O.M., (2000). Disease caused by nutritional deficiencies. Veterinary Medicine, Bailliere Tindall, London 1174-1177.
3. Brogden Kim A., Lehmkuahl Howard D., Cutlip Randall C., 1998. Pasteurella haemolytica complicated respiratory infections in sheep and goats. Veterinary Research, BioMed Central, 29 (3-4), 233-254.
4. Buddle B.M., Pfeiffer A., Cole D.J., Pulford H.D., Ralston M.J., 1990. A caprine pneumonia outbreak associated with caprine herpesvirus and Pasteurella haemolytica respiratory infection. New Zealand Veterinary Journal, 38:28-31.
5. Corradini, P., Larenas J., and Toro H. (2000). Goiter in pigeon (Columba livia domestica). Adv. Cien. Vet. 15, 54–57. 492 8. Emikpe B.O. (2009). Isolation and antibiogram of aerobic nasal bacteria flora of apparently healthy west african dwarf goats REV. Med. Payes trop.
6. Fyfe, J. C., K. Kampschmidt, V. Dang, B. A. Poteet, Q. C. He, C. Lowrie, P. A. Graham, and Fetro V. M. (2003). Congenital hypothyroidism with in toy fox terriers. J Vet. Intern. Med. 17, 50–57.
7. Garner, M. M., C. Shwetz, J. C. Ramer, J. M. Rasmussen, K. Petrini, D. F. Cowan, J. T. Raymond, G. D. Bossart, and Levine G. A. (2002). Congenital diffuse hyperplastic goiter associated with perinatal mortality in 11 captive-born bottlenose dolphins (Tursiops truncatus). J. Zoo Wildl. Med. 33, 350–355.
8. Gurău M. R., Barăităreanu S., Daneș D. (2015). Serological survey of caprine arthritis-encephalitis virus infection in a southeastern Romanian farm. Scientific Works. Series C. Veterinary Medicine, Vol. LXI, ISSN 2065-1295, 169-171
9. Iacob O.C. (2011). Dynamics of Digestive and Pulmonary Parasitic Elements in Carpathian Goats, At The End of Stabulation, Lucrări Științifice – vol. 55 seria Medicină Veterinară, ISSN: 1454-7406. 13. Linklater K.A., Smith M.C. (1993). Colour Atlas of the Diseases and Disorders of the Sheep and Goat. Mosby-Wolfe, London.
10. Maxi M.G. (2007). Jubb, Kennedy and Palmer's Pathology of Domestic Animals. 5th Edition Vol 3rd, Saunders's Elsevier, New York, USA.

11. Mihai I, Crivei IC, Horhoga C, Savuța G, Velescu E. (2018). Preliminary serological investigation on caprine arthritidis and encephalitis virus infection in a goat farm from north-eastern Romanian region. , *Bulletin of University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca. Veterinary Medicine*, vol.75 (2), 243-245.
12. Mihai I., Tipisca M., Ursache G., Tanase O.I., Velescu E. (2017). Kids Goiter: Case Study, *Lucrări Științifice USAMV Iași – seria Medicină Veterinară*, Ed. "Ion Ionescu de la Brad" Iași, Vol.60, 19(4), 449-453.
13. Osame, S., and Ichijo S. (1994). Clinicopathological observations on thoroughbred foals with enlarged thyroid gland. *J. Vet. Med. Sci.* 56, 771–772.
14. Paul J. Plummer, Cassandra L. Plummer, Kelly M. Still, 2012. *Sheep and Goat Medicine (Second Edition), Diseases of the Respiratory System*, 126-149.
15. Radostits O.M., Gay C.C., Hinchcliff K.W. & Constable P.D. (2007). *Veterinary Medicine*. 10th Edition Saunders Elsevier, New York, USA.
16. Rusu RO, Velescu E, Dascălu MA, Scagliarini A. (2014). Nested-multiplex PCR detection of parapoxvirus (ORF virus) and papillomavirus directly from samples collected from goats and cattle from Romania. *Lucrări Științifice, Universitatea de Științe Agricole și Medicină Veterinară "Ion Ionescu de la Brad Iași"*, seria *Medicină Veterinară*, 57 (16): 272-275.
17. Rusu RO, Velescu E, Dascălu MA, Scagliarini A. (2014). Researches regarding the contagious ecthyma immunoprophylaxis in sheep and goats. *Lucrări Științifice, Universitatea de Științe Agricole și Medicină Veterinară "Ion Ionescu de la Brad Iași"*, seria *Medicină Veterinară*, 57 (16): 266-278.
18. Singh R. & Beigh S.A. (2013). Diseases of thyroid in animals and their management. *Insights from Veterinary Medicine*, 9 233-239.
19. Tudose A., Turcu D., Perianu T., Mariana Oporanu, Grigorescu P., Condur D., Petruț T., (2010) Studies concerning the humoral immune response at goats after vaccination against gangrenous mastitis. *Lucrări Științifice - Medicină Veterinară, Universitatea de Științe Agricole și Medicină Veterinară "Ion Ionescu de la Brad" Iași*, 53, 12(4): 1224-1231.
20. Velescu E., Savuta G., Tanase O. I., Pavli C., Aniță A., Aniță D., Plesca R., Bejenaru A., Strugaru O.R., Radu P.G. (2009). Case study: mastitis gangrenous at goat. *Lucrări Științifice - Medicină Veterinară, Universitatea de Științe Agricole și Medicină Veterinară "Ion Ionescu de la Brad" Iași*, 52, 11(2): 1209-1212.
21. Velescu Elena, 1996. The importance of geoclimatic and food factors in the emergence and evolution of infectious sheep subermatitis, *Annual Scientific Session, May 17-18, Veterinary Medicine Iași*.
22. Vijlder D. (2003). Primary congenital hypothyroidism: defect in iodine pathways. *European Journal of Endocrinology*, 149(4) 247-256.