

*The future research will be focused of the effect of the chelate trace elements on the quality of chicken broilers meat under production conditions.*

**Keywords:** *chicken-broilers, chelate compounds, organoleptic evaluation, bacteriological indices.*

#### REFERENCES

1. Sakhatskyi, M.I. et al. (2006). *Tekhnolohiya vyrobnytstva produktsiyi ptakhivnytstva [Technology of Poultry Production]*. Vinnitsa: The New Book [in Ukrainian].
2. Kravtsov, R.J. (2005). *Khelatni spoluky mikroelementiv z aminokyslotamy – novi komponenty premiksiv dlya tvaryn i ptytsi [Chelate compounds of micronutrients with amino acids – new components of premixes for animals and poultry]*. *Naukovyy visnyk Akademyy nauk vyshchoyi shkoly Ukrayiny – Scientific Bulletin of the Academy of Sciences of the Higher School of Ukraine*, 3 (29), 106-115 [in Ukrainian].
3. Ibatullin, I.I. (2007). *Hodivlya silskohospodarskykh tvaryn [Feeding of Farm Animals]*. Vinnitsa: The New Book [in Ukrainian].
4. Yakubchak, O.M., Kravchuk, V.V., & Khomenko, V.I. (2003). *Metody vyznachennya yakosti myasa [Methods for determining the quality of meat]*. *Veterynarna medytsyna Ukrayiny – Veterinary Medicine of Ukraine*, 12, 27-29 [in Ukrainian].
5. *Produkty pyshchevye. Metody vyyavlenyya y opredelenyya kolychestva Staphylococcus aureus [Food products. Methods for detecting and determining the amount of Staphylococcus aureus]*. (1994) *HOST 10444.2 – 94 from 1<sup>th</sup> January 1996*. Moscow: Gosstandart Rossii [in Russian].
6. *Myaso ptytsy. Metody khymycheskoho y mykroskopycheskoho analyza svezhesty myasa [Bird meat. Methods of chemical and microscopic analysis of freshness of meat]*. (1974). *HOST 7702.1 - 74 from 10<sup>th</sup> February 1996*. Moscow: Gosstandart Rossii [in Russian].

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### **INCIDENCE, DIAGNOSIS AND TREATMENT OF SOME ACROPODIUM LESIONS IN DAIRY COWS IN THE CONDITIONS OF FARMS OF THE REPUBLIC OF MOLDOVA**

*The paper presents the results of studies on the incidence of acropodium lesions in dairy cows in the conditions of farms in the Republic of Moldova. It has been established that about 23.6% of 2070 investigated dairy cows were affected by various diseases of claws. The highest intensity of painful changes is observed in the autumn and spring. The anatomo-clinical and morphopathological researches have allowed to establish the degree of tissues destruction of acropodium in cows at different stages of disease development.*

*Taking into account the degree of destruction of fingers in cows, a scheme of treatment using the drug “Formakast” was developed, the application of which allowed curing 83% of animals in 15 days, 91% – in 25 days, and 95% – in 30 days. Based on the results obtained, we have developed specific measures for nonspecific prophylaxis of acropodium lesions of lactating cows.*

**Keywords:** *acropodium of cows, diseases of fingers, lesions of tissues of acropodium, treatment of claw diseases of cows.*

**Introduction.** The opportunity of a broader anatomic-clinical and morphopathological study focused on acropodial diseases in cattle is dictated by the theoretical and practical needs of veterinary medicine [9, 11].

In most countries with intense cattle breeding, the lameness demand from veterinarians increasingly frequent interventions. The cattle with acropodial diseases unable to move to pastures, suffering of lack of the sun and outdoor movement. For breeding cows, these diseases result in reduction of milk yield or delactation and meat production, as well as sex drive. If the cows pregnant, they give birth to nonviable calves, prone to different diseases. Breeding bulls with problems in pelvic limbs cannot or refuse mating. Acropodial diseases of the working animals lead to a considerable decrease or termination of their working capacity [5, 6].

The geographic spread and the great damage caused by the acropodial diseases in cattle attracted the scientific interest of many researchers [4, 14, 18, 20].

References with statistical data on the claws pathology in cattle show that the frequency of acropodial diseases is increasing compared to the past years [1, 12]. Veterinary hospitals in Sweden found 28-34% of cases of claw diseases in cattle [10]. In Ireland, 84% of the Frisian breed is affected by lameness, the most common reason of it is the septic pododermatitis, the sole ulcer and laminitis [2]. In Germany, the interdigital phlegmonum shows fluctuations depending on the breed: 0% – in Jersey breed, 13.3% – in the Brown breed and up to 28.2% – in the Frisian breed [3].

Decrease in the productive capacity and treatment of acropodial diseases result in increase of the products cost. The slaughtering of these animals is unprofitable because meat is most often has low quality due to the animals wasting [7, 9, 14, 17].

The UK veterinarians observed only a quarter of all cases of lameness, as the rest of it is detected and treated by farmers [27]. This data are based on the research carried out in 185 herds, in which veterinarians treated 25.2% of cases, and farmers – 74.8% ones. In Austria, the rate of interdigital hyperplasia of slaughtered cows was registered in 14.3% of animals [15]. The rate of this disease in breeding bulls was higher up to 39.9%. Also in Poland, 19.9% of interdigital hyperplasia of bulls was reported, many of them had severe cracks of claws. In Bulgaria [4], out of 158.000 cattle in research, 39% had claw ganglions, which rate had raised excessively, or deformation caused by various diseases. In Russia, according to the V.A. Lukianovsky's data, the incidence of acropodium diseases varied within 40-60% in lactating cows [18]. Studies in 18 farms in the USA shown that 11.8% of lactating cows (in summer) and 14.8% (in winter) had expressed acropodium diseases [17, 24].

The French authors mention that 90% of the lameness in cattle is localised at the level of the claws [23]. Analysis of the situation on the lameness in Canada shown that the white line disease, the sole ulcer and the erosion of the claws made up to 88.6% of all acropodial diseases [8]. In Denmark, the lameness affected 10-12% of animals. In the Netherlands about 3% of all cattle were sent to slaughterhouses due to the acropodium diseases [25].

O. Vlăduțiu, D. Gâscă found that 8-14% of all investigated animals were affected with acropodium diseases in Romania [16, 28].

In the Republic of Moldova, the acropodium diseases are not officially recorded by the health-veterinary service, but the issue of claws pathology persists, in some households they reach up to the unacceptable rate of 50% [11, 12, 19].

The cost of the lameness for English milk producers, according to researchers in Liverpool, reached the imposing number of 30 million pounds. In Bulgaria, negative economic effects were valued as 36 leva per animal, which currently represents 36 USD. Acropodial diseases result in decrease in the amount of milk yield by 4.0-4.5 L per day and 40-50 kg of bodyweight per month as well, and 2% of the sick animals end up being slaughtered.

Russian authors reported data on the fact that mild course of acropodium diseases decreases milk productivity by 5-10 %, and acute course – up to 30% [18]. In the case of cows at the peak of lactation, milk production losses can reach up to 50%. H. Enting mentioned that in the Netherlands economic losses caused by cows with claws pathology were about 230 Guilders on average [13]. The same author indicated that in the Netherlands the lameness **is ranked third after sterility and mastitis** by the level of economic losses.

Prolič I. noted that under the production of cattle meat, only a quarter of the treated animals attained the required body weight and another quarter close to it. It was profitable to keep only 30% of animals treated against interdigital necrobacillosis for fattening [22].

**The goal of the work** was to study the current complex of acropodial diseases, the morphopathogenesis of the macro- and microscopic lesions of the acropodial components, as well as the search for new means of treatment and prophylaxis of acropodial pathology in cattle.

**Materials and methods.** The research was carried out in 1999-2003 on milking cows from 7 dairy commodity farms of Moldova, which suffered from diseases of distal limbs. 2070 cows were investigated and treated under these conditions.

The final diagnosis was made on the basis of bacteriological studies conducted at the Republican Center of Veterinary Diagnostics. For detection bacteria *Dichelobacter nodosus* and *Fusobacterium necrophorum* species were cultured on the media in accordance with the traditional microbiological methods.

The study of macroscopic lesions of limbs was carried out on 168 animals. Microscopic studies were performed on samples collected from 36 cows. For the detection of finger lesions, the examinations conducted in standing-up position using various methods of limbs fixation, as well as in stationary machine for fixing cattle. It was practiced animals casting, as well as portable tables for limb surgery. Clearing, cutting of the horn and removal of necrotic tissues are contributed to better penetration of the medicines into the deep layers and increase their effectiveness. For the treatment, the drug “Formacast” and Plahotin powder were used.

**Results of research and discussion.** The symptomatology of hoof lesions in cattle is quite diverse due to the clinical polymorphism. This condition is confirmed by many authors [17, 21, 24, 26].

The results of clinical orthopedic examination presented in the table 1 show

that 489 (23.6%) of 2070 cows had the lesions of the fingers. The most common forms were: necrobacillosis – in 425 cows, the abscess of the white line – in 30 (1.44%); ulcer soles – in 10 (0.5%); interdigital hyperplasia – in 13 (0.6%); foreign bodies – 11 (0.5%). Claws of pelvic limbs were affected in 91.1% of investigated animals and 8.9% had lesions of thoracic limbs. Most of the lesions were infected with microorganisms. If there is no infection, clinical manifestation of lesions could be a simple wound that can be cured fast after the removal of the traumatic factor. When the straw was changed for sawdust, the frequency and severity of the lesions was higher.

Bacteriological studies were not conducted for each animal, but randomly, therefore only some type of bacteriosis were registered.

The interdigital dermatitis or necrobacillosis of the skin of the interdigital space was manifested morpho-clinically by inflammation of the skin without involvement of subcutaneous structures; the exudate appeared in 4-5 days covered with manure, thus not always visible. During clinical examination, it is possible to see the skin redness as an elevations on the edges of interdigital space. The chronic inflammation leads to hyperplasia of the skin and deeper tissues.

Table 1

**Average incidence of acropodial diseases in dairy cows in some farms of Moldova**

Farms	Number of animals	Types of lesions										Total Number of Sick Animals	
		Necrobacillosis		White line abscess		Sole ulcer		Interdigital hyperplasia		Foreign bodies			
		head	%	head	%	head	%	head	%	head	%	head	%
Balasinesti	407	90	22	4	0,98	3	0,73	2	0,49	-	-	99	24
Larga	621	174	28	7	1,12	2	0,32	4	0,64	2	0,32	189	30
Corjeuti	50	73	15	6	1,09	2	0,36	3	0,54	2	0,36	86	16
Marcauti	242	42	18	5	2,06	1	0,41	2	0,83	3	1,24	53	22
Pascani	78	12	15	2	2,56	2	2,56	-	-	1	1,28	17	22
Durlesti	92	19	21	3	2,17	-	-	2	2,17	2	2,17	26	28
Maximovca	80	15	19	3	3,75	-	-	-	-	1	1,25	19	24
<b>Total</b>	2070	425	20,5	30	1,44	10	0,5	13	0,6	11	0,5	489	23,6

Inflammation resulted in decrease of skin elasticity, then cracks appeared on the median line, which enhanced lameness. Interdigital dermatitis was complicated with the pathogenic microflora (*B. nodosus* and *F. necrophorum*). The presence of this microflora led to relapses and lameness became permanent.

Varicose dermatitis is an overgrowth of tissues, similar to the papilloma located in the interdigital space. Varicose formations produced lymphoid fluid.

Unsanitary conditions and the presence of microflora complicated these lesions, which spread proximally.

The interdigital phlegmon was superinfected with the mix of *F. necrophorus* and *B. melaninogenicus* and other microorganisms. In the interdigital space on the skin necrotic areas were very painful in palpation. The tissues of the area were inflamed and hot, and the fingers – apart from each other. In neglected cases, there were purulent fistulas that difficult to localize and to open during surgical intervention.

Primary septic lesions can be complicated by the presence of secondary microflora. For example, interdigital dermatitis developed into hyperplasia of interdigital tissues. In our investigations we also found the ulcer of the central part of the sole (*Rusterholz ulcer*) and mild and complicated laminitis.

The pathologic-anatomical researches allowed to establish the degree of tissues destruction in distal limbs on different stages of disease development. Based on the level of cows' claws infection with necrobacillosis, a scheme for treatment was developed using drug "Formakast", the application of which allowed to cure 83% of the sick cattle population in 15 days, 91% – in 25 days, and 95% – in 30 days. A comparative treatment with the Plakhotin powder showed the following results: 63% – in 15 days, 74% – in 25 days, and 84% – in 30 days. On the basis of the obtained results we have developed specific measures for nonspecific prevention of claws diseases in cattle.

**Conclusions and prospects for further research.** The results of the work confirmed the view that cow claw diseases are caused by multiple etiological factors, where, along with anaerobic and aerobic microorganisms, conditions of maintenance and exploitation have a significant impact on the emergence and evolution. On the basis of the conducted researches one can draw the following conclusions:

1. Clinic-orthopedic examination of 2070 cows revealed 489 cows (23,3%) with finger lesions. 425 of them (20,5%) had necrobacillosis, 30 (1,44%) – abscess of the white line; 13 (6%) – interdigital hyperplasia; 10 (0,5%) – sole ulcer, and 11 (0,5%) – foreign bodies.

2. Local treatment, conducted using the drug "Formakast", allowed to cure 83% of animals in 15 days, 91% – in 25 days, and 95% – in 30 days. The application of Plakhotin powder showed the following results: 63% – in 15 days, 74% – in 25 days, and 84% – in 30 days.

3. It is necessary to carry out an orthopedic examination every spring and autumn for prophylaxis. Foot baths are useful at intervals of 10 days with application of a 15% solution of copper sulphate or 7% formalin.

#### REFERENCES

1. Andrews, A. (1999). *Bovine lameness notes*. London: Royal Veterinary College.
2. Arkins, S. (1981). Lemeness in dairy cows. *Irish Veterinary Journal*, 35, 135-140, 163-170.
3. Blowey, R. & Done, S. (1995). Failure to demonstrate histological changes of digital and interdigital dermatitis in biopsies of slurry heel. *Veterinary Record*, 137, 379-380.
4. Bodurov, N. & Neicev, O. (1986). Actualini hirurghicini zabolevania na copitata pri promishlenoto govedovidstvo i teahnata profilactica [Relevant surgical hoof diseases in industrial

cattle breeding and their prevention]. *Seliscotopanska nauca – Agrarian Science*, 24, 3, 84-90 [in Romanian].

5. Bolte, S. & Moldovan, M. (1981). *Agresologie, anestezie și terapie intensivă în medicina veterinară [Aggressology, anesthesia and intensive care in veterinary medicine]*. Bucharest: Ceres [in Romanian].

6. Borisevich, V.B. et al. (2007). Cytomegalovirusnaya infectsia copytets u corov [Cytomegalovirus infection of cow hooves]. *Visnyk zhytomyrskoho natsionalnoho ahroekolohichnoho universytetu – Bulletin of Zhytomyr national agroecological university*, 2(19), vol. 2, 58-63 [in Russian].

7. Britt, J. & McClure, J. (1998). Field trials with antibiotic and nonantibiotic treatments for papillomatous digital dermatitis. *Bovine Practitioner*, 32, 25-28.

8. Choquette-Levy, L., Baril, J., Levy, M. & St-Pierre, H. (1985). A study of foot disease of dairy cattle in Quebec. *Canadian Veterinary Journal*, 26, 278-281.

9. Clarkson, M.J., Downham, D.Y., Faull, W.B., Hughes, J.W., Manson, F.J., Merritt, J.B. et al. (1996). Incidence and prevalence of lameness in dairy cattle. *Veterinary Record*, 138, 563-567.

10. Ekesbo, I. (1978). Bovines Digital Disease. *Rep. Sec. Sympos.* (p. 286) Skara.

11. Enciu, V. (2014). *Sistemul nervos și microcirculația sanguină a formațiunilor fibroase ale autopodiilor la bovine în normă și patologie [Nervous system and blood microcirculation of autopod fibrous formations in health and sick cattle]*. Kishinev: The editorial center of UASM [in Romanian].

12. Enciu, V. (2008). Morphologhicescaia cartina nervnogo aparata palytev u corov pri porajeniah distalinogo otdela conecinostei [Morphological picture of the nervous system of fingers of cows with lesions in the distal extremities]. *Visnyk zhytomyrskoho natsionalnoho ahroekolohichnoho universytetu – Bulletin of Zhytomyr national agroecological university*, 1(21), 96-102 [in Russian].

13. Enting, H., Kooij, D., Dijkhuizen, A.A., Huirnea, R.B.M. & Noordhuizen-Stassenb, E.N. (1997). Economic losses due to clinical lameness in dairy cattle. *Livestock Production Science*, 49, 259-267.

14. Esslemont, R. & Kossaibati, M. (1996). Incidence of production disease and other health problems in a group of dairy herds in England. *Veterinary Record*, 139, 486-490.

15. Frankena, K., van Keulen, K.A.S., Noordhuizen, J.P., Noordhuizen-Straasen, E.N., Gundelach, J., de Jong, D-J. et al. (1992). A cross-sectional study into prevalence and risk indicators of digital haemorrhages in female dairy calves. *Preventive Veterinary Medicine*, 14, 1-12.

16. Gâscă, D. (2009). Studiul anatomo-clinic al afecțiunilor podale la bovine în diferite sisteme de creștere [Anatomical & clinical study of cattle diseases in various growth systems]. *Simpozion științific internațional «35 ani de învățământ superior medical veterinar din Republica Moldova» – International Scientific Symposium «35 Years of Medical Veterinary Education of the Republic of Moldova»* (pp. 216-221). Kishinev [in Romanian].

17. Hernandez, J. (2001). Effect of lameness on the calving-to – conception interval in dairy cows. *JAVMA*, vol. 218, 10, 1611-1613.

18. Luchyanovschij, V.A. (1985). *Profilactica i lecenie zabolevanij copitets u corov [Prevention and treatment of the hooves diseases in cows]*. Moscow: Rosselzhoozizdat [in Russian].

19. Moscalic, R., Balov, S., Enciu, V. et al. (2016). Tratamentul podopatiilor la bovine cu preparatul Enoxil [Treatment of cattle bovine with Enoxil preparation]. «*Știința Zootehnică – factor important pentru agricultură de tip european*». *Simpozion științific 60-ani de la fondarea IȘPBZMV – «Animal Science – an important factor for European agriculture»*. *Scientific Symposium 60th anniversary of the IȘPBZMV foundation.* (pp.206-211). Maximovca [in Romanian].

20. Muste, A. (2003). *Ortopedia animalelor mari [Orthopedics of large animals]*. Cluj-Napoca: Risoprint [in Romanian].

21. Philton, J.M., Pluvinae, P., Cimarosti, I., Sulpice, P. & Bugnard, F. (1994). Risk factors of dairy cow lameness associated with housing conditions. *Veterinary Research*, 25, 244-248.
22. Prolič, I. (1975). The incidence of ulcerative necrobacteriosis in meat bovins. *Veterinariya*, 24, 403-410.
23. Rousseau, J. & Bochet, N. (1984). Le parage fonctionnel une intervention periodique indispensable [Functional trimming an indispensable periodic intervention]. *Elevage bovin – Cattle farming*, 139, 11-14 [in French].
24. Step, D. & Smith, R. (2006). Nonrespiratory Diseases of Stocker Cattle. *Veterinary clinics of North America*, 22(2), 425-429.
25. Van Amstel, S., van Vuuren, S. & Tutt, C. (1995). Digital dermatitis; report of lameness in dairy cattle. *Preventive Veterinary Medicine*, 15, 191-203.
26. Watson, C. (1999). Lameness in cattle. Lesions and diseases of the skin. *U.K. Veterinary*, 1, 51-60.
27. Whitaker, D., Kelly, J. & Smith, E. (1983). Incidence of lameness in dairy cow's. *Veterinary Record*, 113, 60-62.
28. Vlăduțiu, O. (1971). *Patologia și clinica chirurgicală [Pathology and surgical clinic]*. Bucharest: Didactic and Pedagogical Publishing House [in Romanian].

#### **РАСПРОСТРАНЕНИЕ, ДИАГНОСТИКА И ЛЕЧЕНИЕ НЕКОТОРЫХ ПОРАЖЕНИЙ АКРОПОДИЕВ У МОЛОЧНЫХ КОРОВ В УСЛОВИЯХ ХОЗЯЙСТВ РЕСПУБЛИКИ МОЛДОВА / Енчу В.З.**

*В работе представлены результаты исследований о распространении поражений акроподиев у молочных коров в условиях хозяйств Республики Молдова. Установлено, что около 23,6% поголовья из 2070 исследованных молочных коров поражено различными заболеваниями копытцев. Наивысшая интенсивность болезненных изменений отмечается в осенне-весенний период. Проведенные патолого-анатомические исследования позволили установить степень поражения тканей акроподиев у коров на разных этапах развития болезни.*

*Исходя из степени поражения пальцев у коров, разработана схема лечения препаратом “Формакаст”, применение которого позволило вылечить 83% за 15 дней, 91% за 25 дней и 95% за 30 дней. На основе полученных результатов мы разработали конкретные меры по неспецифической профилактике поражений акроподиев у лактирующих коров.*

**Ключевые слова:** акроподии у коров, болезни пальцев, поражения тканей акроподиев, лечение заболеваний копытцев у коров.

#### **ПОШИРЕННЯ, ДІАГНОСТИКА І ЛІКУВАННЯ ДЕЯКИХ УРАЖЕНЬ АКРОПОДІЇВ У МОЛОЧНИХ КОРІВ В УМОВАХ ГОСПОДАРСТВ РЕСПУБЛІКИ МОЛДОВА / Енчу В.З.**

**Вступ.** Величезних економічних збитків від хвороб акроподіїв у молочних корів і їх широке географічне поширення порушило інтерес дослідників багатьох країн.

**Мета роботи.** Вивчення проблеми захворюваності дистального відділу кінцівок у корів в умовах господарств Республіки Молдова.

**Матеріали і методи досліджень.** Матеріалом дослідженні послужили дійні корови з семи ферм. Остаточний діагноз був поставлений на основі бактеріологічних досліджень. Вивчення макро-мікроскопічних уражень акроподіїв проводилися у 168 тварин.

**Результати досліджень та їх обговорення.** В результаті досліджень щодо поширення уражень акроподіїв у дійних корів в умовах господарств Республіки Молдова, встановлено що близько 23,6% поголів'я з 2070 досліджених тварин уражені різними

захворюваннями. Найвища інтенсивність хворобливих змін відзначається в осінньо-весняний період. Проведення патолого-анатомічні дослідження дозволили встановити ступінь ураження тканин акроподіїв у корів на різних етапах розвитку хвороб.

Виходячи зі ступеня ураження пальців у корів, розроблено схему лікування препаратом «Формакаст», застосування якого дозволило вилікувати 83% за 15 днів, 91% за 25 днів і 95% за 30 днів. На основі отриманих результатів ми розробили конкретні заходи неспецифічної профілактики уражень акроподіїв у молочних корів.

**Висновки і перспективи подальших досліджень.** Захворювання акроподіїв у дійних корів викликані різними етіологічними факторами. Клініко-ортопедичний огляд 2070 корів виявив 489 голів (23,3%) з ураженнями пальців. З них: некробактеріозом – 425 гол. (20,5%), абсцес білої лінії – 30 гол. (1,44%); міжпальцева гіперплазія – 13 гол. (0,6%); виразка підошви – 10 гол. (0,5%); чужорідні тіла – 11 гол. (0,5%).

Місцеве медикаментозне лікування проведене препаратом «Формакаст» дозволило вилікувати за 15 днів – 83%, за 25 днів – 91% і за 30 днів – 95% хворого поголів'я. Застосування присипки за Плахотінім показало наступні результати 15 днів – 63%, 25 днів – 74%, 30 днів – 84%.

З метою профілактики обов'язково кожної весни і восени проводити ортопедичний огляд. Ванни для ніг проводити з інтервалом в 10 днів із застосуванням 15%-го розчину мідного купоросу або 7%-м формаліну.

#### СПИСОК ЛІТЕРАТУРИ

1. Andrews A. Bovine lameness notes / A. Andrews. – London: Royal Veterinary College, 1999. – 44 p.
2. Arkins S. Lemeness in dairy cows / S. Arkins // Irish Veterinary Journal. – 1989. – № 35. – P. 135–140, P. 163–170.
3. Blowey R. Failure to demonstrate histological changes of digital and interdigital dermatitis in biopsies of slurry heel / R. Blowey, S. Done // Veterinary Record. – 1995. – № 137. – P. 379–380.
4. Bodurov N. Actualini hirurghicini zbolevania na copitata pri promišlenoto govedovidstvo i teahnata profilactica / N. Bodurov, O. Neicev // Seliscotopanska nauca. – 1986. – Vol. 24, № 3. – P. 84 – 90.
5. Bolte S. Agresologie, anestezie și terapie intensivă în medicina veterinară / S. Bolte, M. Moldovan. – București: Ceres, 1981. – 268 p.
6. Борисевич В.Б. Цитомегаловирусная инфекция копытцев у коров / В.Б. Борисевич [и др.] // Вісник Житомирського національного агроекологічного університету. – 2007. – Т.2, №2 (19). – С. 58–63.
7. Britt J. Field trials with antibiotic and nonantibiotic treatments for papillomatous digital dermatitis / J. Britt, J. McClure // Bovine Practitioner. – 1998. – № 32. – P. 25–28.
8. Choquette-Levy L. A study of foot disease of dairy cattle in Quebec / L. Choquette-Levy, J. Baril, M. Levy, H. St-Pierre // Canadian Veterinary Journal. – 1985. – № 26. – P. 278–281.
9. Clarkson M.J. Incidence and prevalence of lameness in dairy cattle / M.J. Clarkson, D.Y. Downham, W.B. Faull et al. // Veterinary Record. – 1996. – № 138. – P. 563–567.
10. Ekesbo I. Bovines Digital Disease / I. Ekesbo // Rep. Sec. Sympos. – 1978. – P. 286.
11. Enciu V. Sistemul nervos și microcirculația sanguină a formațiunilor fibroase ale autopodiilor la bovine în normă și patologie / V. Enciu. – Chișinău: Centrul editorial al UASM, 2014. – 219 p.
12. Енчу В.З. Морфологическая картина нервного аппарата пальцев у коров при поражениях дистального отдела конечностей / В.З. Енчу // Вісник Житомирського національного агроекологічного університету. – 2008. – Т.1, №1 (21). – С. 96–102.
13. Enting H. Economic losses due to clinical lameness in dairy cattle / H. Enting, D. Kooij, A.A. Dijkhuizen et al. // Livestock Production Science. – 1997. – № 49. – P. 259–267.



14. Esslemont R. Incidence of production disease and other health problems in a group of dairy herds in England / R. Esslemont, M. Kossaibati // *Veterinary Record*. – 1996. – № 139. – P. 486–490.
15. Frankena K.A cross-sectional study into prevalence and risk indicators of digital haemorrhages in female dairy calves / K. Frankena, K.A.S. van Keulen, J.P. Noordhuizen et al. // *Preventive Veterinary Medicine*. – 1992. – № 14. – P. 1–12.
16. Gâscă D. Studiul anatomo-clinic al afecțiunilor podale la bovine în diferite sisteme de creștere / D. Gâscă // *Simpozion științific internațional «35 ani de învățământ superior medical veterinar din Republica Moldova»*. – Chișinău, 2009. – P. 216–221.
17. Hernandez J. Effect of lameness on the calving-to – conception interval in dairy cows / J. Hernandez // *JAVMA*. – 2001. – Vol. 218, № 10. – P. 1611–1613.
18. Лукьяновский В.А. Профилактика и лечение заболеваний копытец у коров / В.А. Лукьяновский. – Москва: Россельхозиздат, 1985. – 128 с.
19. Moscalic R. Tratatamentul podopatiilor la bovine cu preparatul Enoxil / R. Moscalic, S. Balov, V. Enciu et al. // «*Știința Zootehnică – factor important pentru agricultură de tip european*». Simpozion științific 60-ani de la fondarea IȘPBZMV. – Maximovca, 2016. – P. 206–211.
20. Muste A. Ortopedia animalelor mari / A. Muste. – Cluj-Napoca: Risoprint, 2003. – P. 205-251.
21. Philton J. M. Risk factors of dairy cow lameness associated with housing conditions / J. M. Philton, P. Pluvinage, I. Cimarosti et al. // *Veterinary Research*. – 1994. – № 25. – P. 244–248.
22. Prolič I. The incidence of ulcerative necrobacteriosis in meat bovins / I. Prolič // *Veterinariya*. – 1975. – № 24. – P. 403-410.
23. Rousseau J. Le parage fonctionnel une intervention periodique indispensable / J. Rousseau, N. Bochet // *Elevage bovin*. – 1984. – № 139. – P. 11–14.
24. Step D. Nonrespiratory Diseases of Stocker Cattle / D. Step, R. Smith // *Veterinary clinics of North America*. – 2006. – Vol. 22, № 2. – P. 425–429.
25. Van Amstel S. Digital dermatitis; report of lameness in dairy cattle / S. van Amstel, S. van Vuuren, C. Tutt // *Preventive Veterinary Medicine*. – 1995. – № 15. – P. 191–203.
26. Watson C. Lameness in cattle. Lesions and diseases of the skin / C. Watson // *U.K. Veterinary*. – 1999. – № 1. – P. 51–60.
27. Whitaker D. Incidence of lameness in dairy cow's / D. Whitaker, J. Kelly, E. Smith // *Veterinary Record*. – 1983. – № 113. – P. 60–62.
28. Vlăduțiu O. Patologia și clinica chirurgicală / O. Vlăduțiu. – București: Editura Didactică și pedagogică, 1971. – 310 p.