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Original scientific paper

TRICHOPHYTOSIS IN BEEF CATTLE[1*]

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Abstract: Trichophytosis is one of the most common skin diseases in cattle. Trichophytosis is a transmissible infectious skin disease caused most often by *Trichophyton verrucosum* with spores which can remain alive for years in a dry environment. This is a zoonotic disease, as it can equally infect people and animals. The infection spreads rapidly, and this fungal disease leads to certain economic losses. Direct contact with infected animals is the most common method of spreading the infection. During this research, beef cattle aged 4 months were transported from southern Serbia to the part of Vojvodina - Mačva. One month after the transportation, the characteristic gray-white round changes occured on the skin of beef cattle. Affected animals from five individual farms did not receive any treatment, while animals from other five farms were treated with Decanol® solution. As a conclusion, application of therapy or vaccination along with a high quality diet is the best way to to suppress triphophytosis.

Keywords: Trichophytosis, beef cattle, zoonosis

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INTRODUCTION

Fungal diseases of the skin are very common in humans and animals and are zoonotic in general. One of these diseases is trichophytosis of cattle, which leads to a decrease in the quality of milk, meat and skin, and causes great economic damage. On the other hand, since it can be transmitted to humans, it is also a major threat to human public health (Agnetti et al., 2014; El-Tras et al., 2015). In recent years, in the world and in Serbia (Rogožarski i sar., 2012), more and more cases of this disease have been reported. It is estimated that on average 30% of the total number of cattle at some point was infected with this fungus, but variations are great depending on the region. The most endangered are the regions of South Europe and the Middle East. A large number of infected herds were reported in Italy, the province of Umbria, where there are farms where 100% of the animals are infected (Papini et al., 2009; Agnetti et al., 2014).

Trichophytosis is most commonly recognized in cattle, although donkeys, dogs, goats, sheep and horses can also suffer from it. It is particularly present in the conditions of conventional intensive dairy farming, where high-producing cattle breeds are cultivated, such as the Holstein-Friesian cows.The incidence of this disease is higher in late autumn and winter, which is understandable if the conditions of keeping animals are observed. In winter the animals are kept in the stables, where conditions of accommodation and hygiene are often unsatisfactory. Also, in winter, animal nutrition is inadequate and weaker, and cattle immunity decreases (Papini et al., 2009).

The causative agent of trichophytosis is trichophyton verrucosum, which has the ability to infect humans. This fungus creates very resistant spores that transmit infections. In dry matter the spores remain capable of multiplication for several years. Changed parts of the skin are resistant to ultraviolet light (Seebacher et al., 2008). Trichophyton germinates in the epidermis, grows into hair follicles and root , and the hair breaks and falls out. Fungus lives on the surface of the skin, with its proteolytic and keratolytic enzymes and exotoxins causing parakeratosis and inflammatory changes (Summerbell, 2000; Boykovsky et al., 2013). The fungus Trichophyton verrucosumse is considered to be a facultative pathogen, and it favors moist climate, warm weather and unhygienic conditions of keeping (Morrell et Stratman, 2011).

In large herds it retains for years, so bringing younger heads of cattle to the herd allows spreading, because they are not sufficiently resistant. The lack of vitamin A is presumed to be conducive to the onset and spread of the disease, which is also contributed by inadequate nutrition, chronic skin and parasitic diseases. Antibodies were found in the blood serum of the animals which had

this disease (Šamanc i Stamatović, 1999; Radojčić et al., 2017).

On the body of infected animals, there are gray and white changes, locally, most often on the neck and head (forehead region and around the eyes), but they can occur on the forelimbs, chest and croup. These changes are 10-50 mm in size, oval in shape, slightly protruding, with hard-to-reach scabs, and very often hair falls out in these areas. Also, constant dandruff is present. On average, the number of changes on one animal is between 10 and 30, but it can go up to 50 (Sayfarth et al., 2011). The most prone to this disease are female herds, especially heifers and calves younger than 12 months, although it often occur in cows as well. Infection and transmission of the disease is caused by direct contact between diseased and healthy animals, but also indirectly, from the infected environment, since the spores can remain vital up to four years (Papini et al., 2009; O'Gorman et al., 2015, Bojkovski et al., 2007).

Since this disease is zoonotic, the most endangered are people who are in direct contact with affected animals, such as milkers, veterinarians, support staff in the stables, people working in leather processing and others (Agnetti et al., 2014; El- Tras et al., 2015). In humans, these changes appear mainly on the head, the chin area, but often also on the exposed parts of the body, such as nails, fists, and hands. Symptoms are similar to those of infected animals, most often with hairless seals if the disease is on the head, and circumscribed erythematous can occur in the forearm region (Agnetti et al., 2014; El-Tras et al., 2015). The aim of this paper is to notice the extent to which skin changes occur in beef cattle after transportation, placed in facilities with inadequate hygienic conditions.

MATERIAL AND METHODS

In July 2017, trichophytosis occured among beef cattle kept on ten rural farms in the village of Bogatić in Mačva district. Based on the anamnestic data, beef cattle originated from southern Serbia (Pirot, Leskovac, Vranje) and were brought to Mačva by road transport. The whole herd was of 4 months old Simmental breed cattle. Within thirty days, the owners noticed round gray-white seals on the animals' head, neck and back. The total number of females with changes in the skin, on all ten farms, was 180. From all heads of cattle, scarified skin was taken from altered skin spots to isolate the causative agent and set up a correct diagnosis. The scrapings were sent to a laboratory in a 10% KOH solution, where the causitive agent of trichophytosis was detected under a light microscope. Since microscopic examination is sometimes insufficient, the next step was inoculation into medium in which the colonies in the form of beads characteristic for the fungus Trichophyton verrucosum, have grown.

After the isolation of the pathogens and the confirmation of trichophytosis

in beef cattle from all ten individual farms, on five of them affected animals were treated with Dekanol® preparation by spraying it twice in 15 days or by rubbing the preparation with soft cloth around the eyes. Prior to the therapy, scabs were carefully cleaned with a soft cotton cloth. All cotton cloths were burned after the use. Affected animals on the other 5 farms were exposed to the sun and they were given vitamin-mineral supplements in the diet. In all ten individual farms, diseased herds were separated from healthy ones and the facilities were disinfected. All obtained results were processed with standard statistical methods using Microsoft Office Excel 2007.

RESULTS

Trichophyton verrucosum fungus was isolated from all 180 heads of cattle that had a clear clinical picture of trichophytosis such as gray-white circumscribed lesions with or without hair on the skin of the head, face, neck, body and croup (Figures 1 and 2).

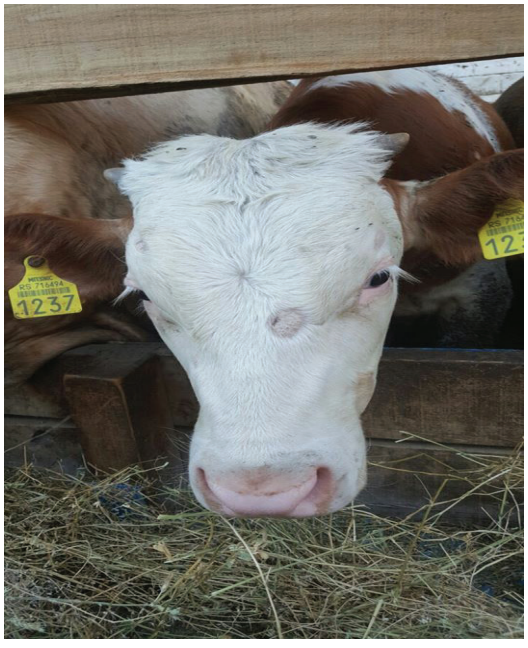

Figure 1. Findings of characteristic gray-white changes in the skin of beef cattle

Figure 2. Gray-white circumscribed lesions on the body

Before the application of the therapy or the exposure of beef cattle to the sun and the addition of vitamin and mineral supplements in food, skin lesions were examined and their localities and numbers were recorded. Of the total number of beef cattle (n = 180), lesions on the skin had a different appearance regardless of the localization of the change.

Table 1 shows the results with the localization and type of skin lesions from five farms where no therapy was applied, but the animals were exposed to the sun and were being given vitamin and mineral supplements for 30 days. The total number of beef cattle from these five farms was 80.

Location of skin lesions	Types of skin lesions and number of animals with changes								Σ beef cattle		% without recovery
	Lesions with hair		Lesions without hair		Scabs		Keratinization				
	Before	After	Before	After	Before	After	Before	After	Before	After	
Face	19	12	11	8	0	0	7	5	37	25	67,57%
Head	1	0	21	17	5	0	15	11	42	28	66,67%
Neck	0	0	15	12	9	5	7	6	31	23	74,19%
Body	0	0	13	9	14	11	14	12	41	32	78,05%
Croup	3	1	23	19	18	13	9	9	53	42	79,24%

Out of 80 examined exemined animals, lesions on the skin were localized on the face, head, neck, body and croup. These changes are not equally distributed by regions, there were also herds that had skin lesions in multiple locations. Thirty days after diagnosing trichophytosis, disinfection of the facility, exposure of the animals to the sun along with the vitamin-mineral supplements in the diet, 73.14% of the animals still had skin lesions characteristic for trichophytosis.

However, in the case of beef cattle from the other five farms with 100 animals (n = 100), the effect of the therapy was noticeable. The therapy consisted of the application of Decanol® by spraying the skin twice in 15 days. After administration of the last therapeutic dose, the effect of therapy was observed after 15 days, which means that the experiment lasted for 30 days.

Table 2 shows the results with the localization and classification of skin lesions from five farms where therapy was applied and the total number of animals was 100.

Table 2. Collective results of localization and classification of skin lesions after diagnosis and 15 days after the last treatment

Location of skin lesions	Classification of skin lesions and number of animals with changes								Σ beef cattle		% without recovery
	Lesions with hair		Lesions without hair		Scabs		Keratinization				
	Before	After	Before	After	Before	After	Before	After	Before	After	
Face	5	0	16	1	7	0	24	1	52	2	3,85%
Head	36	0	29	1	13	0	35	4	113	5	4,42%
Neck	32	1	2	0	19	0	17	1	70	2	2,86%
Body	19	0	4	0	25	0	3	0	51	0	0%
Croup	22	0	19	1	31	0	22	1	94	2	2,13%

In a total of 100 examined animals, lesions on the skin were found on the face, head, neck, body and croup. These changes are not equally distributed by regions, but there were also animals with skin lesions in multiple locations. Thirty days after the diagnosis of trichophytosis in beef cattle, disinfection of the facility, and 15 days after the last therapy, only 2.65% of the animals was detected with skin lesions characteristic for trihophytosis.

DISSCUSION

Trihofitosis is a major problem for veterinarians, but also for people who work with animals due to its zoonotic character. The most common cause of trihophytosis is fungi Trichophyton verrucosum, which has a zoonotic character and spreads rapidly both to animals and humans.

On the body of affected animals, gray-white changes occur locally, most often on the neck and head, but they may also occur on the front limbs, the chest and the croup. These changes are 10-50 mm in size, oval in shape, slightly protruding, with hard-to-reach scabs, and very often hair falls out in these

areas. Also, constant dandruff is present. On average, the number of changes on one animal is between 10 and 30, but it can go up to 50 (Sayfarth et al., 2011). During this study, dandruff was not observed on the lesions caused by the fungus Trichophyton verrucosum. The greatest number of skin lesions in all ten individual farms was on the head and croup. Scabs were mostly found on croups while keratinization was present mostly on head.

The treatment varies considerably among countries, as the use of certain active compounds in isnt't everywhere regulated in the same way. Worldwide, baths or sprays are used with 4% calcium sulfate solution, 0.5% sodium hypochlorite or 1% povidone- iodine solution. Individual changes can be treated with lotions and ointments based on myconazole or clotrimazole (Šamanc and Stamatović, 1999). In Serbia, decanol and imanverol preparations are used, and the vaccine is increasingly being used (Radojčić et al., 2017). The application of the decanol during this study has shown a positive effect in the treatment of trichophytosis in beef cattle. Vaccination prevents the onset of the disease, the infection of other animals and humans, as well as the infection of the environment, and the vaccine is a very useful way of suppressing this disease. Fourteen days after vaccination, revaccination is performed. By examining the effect of attenuated vaccine on cattle suffering from triphochytosis, Arslan et al. (2007) have come to the conclusion that vaccination of diseased cattle leads to rapid healing without disturbing the function of vital organs such as the liver and kidneys.

When it comes to this disease, special attention should be paid to hygiene of the objects and animals. It is very important that animals always have a clean and dry rug, that objects are regularly disinfected, that the animals are clean and that there is a constant supply of fresh air. Also, in the winter period, attention must be paid to optimal balancing of the meals with the addition of vitamins and minerals. When the disease is suspected, the affected animal should automatically be quarantined, the object and equipment should be disinfected and the therapy should be applied as soon as possible as this research shows the absence of the effect of curing by exposing cattle to the sun and adding vitamins and minerals in the food with a previous disinfection of the facility.

CONCLUSION

Based on the results of the research it can be concluded that the appearance of trichophytosis is influenced by the stressogenic factors such as transport, as well as inadequate hygienic conditions of the beef cattle handling facilities.

Also, in order to achieve a rapid effect on the suppression of trichophytosis, it is best to apply therapy or an even better option is to implement vaccination along with a high quality diet.

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