

## PREVALENCE OF OBSERVED FOOTROT IN SHEEP UNDER FIELD CONDITION

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**Abstract.** The aim of the study is to determine the prevalence of footrot in sheep especially in field conditions. Footrot disease is a contagious, infectious and necrotic disease that causes serious economic losses in sheep breeding both in Turkey and around the world, including the interdijial region of the foot, including the skin, corium orgulae, corium coronaria and nail capsule. In warm and humid environments, indoors with more than the capacity of animals, wet and polluted pastures grazing animals are in a predisposed state to infection and disease affects the whole herd. *Dichelobacter nodosus* and *Fusobacterium necrophorum* play an important role in the formation of the disease. The material of the study was randomly selected in the Akçakale district of Şanlıurfa province and consisted of 4331 units 3 ages and awassi race sheep (n=4331) in 30 different sheep farms. During this inspection, covering 2018 October, November, December and 2019 January, the structure of the barns and their floors and the nail problems in animals were investigated. A sample was taken for microbiological examination of suspected cases. 28,93% (n=1253) of 4331 sheep examined were observed at different degrees footrot. The prevalence of footrot in dirty soils was determined as 69% in the study. In this study, it was concluded that informing the owners of animals on subjects such as ration, barn capacity and cleaning, periodic cleaning of the animals' nails and foot baths could be effective in preventing the disease and reducing losses.

**Keywords:** Sheep, footrot, field condition.

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**Received:** 28 November 2019; **Accepted:** 23 January 2020; **Published:** 15 April 2020.

### 1. Introduction

Footrot is a disease of infectious, infectious and necrotic course of skin, corium unguulae, corium coronarium and nail capsule including interdijial area of the foot which causes serious economic loss in sheep. It can be placed on the hind legs mostly with the forefoot (Abbott & Lewis, 2005; Bennett *et al.*, 2009; Bennett & Hickford, 2011; Raadsaama & Dhungyel, 2013; Sulu & Alkan, 2018). Due to the inflammation of the interdijial skin, the area's reddening and hair loss are observed in the early period. With the progression of the disease, white grayish smelly pus and gangrene may occur due to infection in the interdijial area. Sheeps tend to lie more than healthy animals and graze on the carpal joints, and therefore, decubital wounds are formed in carpal joints (Winter, 2008; Wassink *et al.*, 2010; Duncan *et al.*, 2014; Sulu & Alkan, 2018). Initially mild but gradually aggravated lameness is observed. anorexia, stagnation and fever. A decrease in meat and milk yield is also observed. Local symptoms are rated 1 to 5 based on the score of Raadsamafootrot (Table 1) (Foddai *et al.*, 2012; Raadsama & Egerton, 2013; Webb & Kluver, 2014). Especially in the spring from April to June, and the fall from September to October, the frequency of incidence is increasing. The

average daily temperature of 10<sup>0</sup>C and monthly 100 kg / m<sup>2</sup> and more rainfall in areas where the rate of footrot is much more. In warm and humid environments, in animals with more than capacity, animals grazing in wet and dirty pastures are predisposed to infection and the disease is affecting all herds (Abbott & Egerton, 2003; Raadsama & Egerton, 2013; Sulu & Alkan, 2018). In the cold winter, the animals are often not allowed to enter the pasture, and in this case they remain in the enclosures for a long time. In this case, softening occurs on the nails which are constantly in contact with the wet floor and paves the way for the formation of the disease. The prevalence of the disease is high in sheep with wet, feces and urine. (Wassink *et al.*, 2003; Abbott & Lewis, 2005; Kennan *et al.*, 2011; Alworth, 2014; Barwell *et al.*, 2015). The footrot is mainly formed by the synergistic effects of *Dichelobacternodosus* and *Fusobacterium necrophorum*. In the studies, *Dichelobacternodosus* which is gram negative forced anaerobic bacteria was the primary factor in the disease and the same character of *Fusobacteriumnecrophorum* was included in the case. *Fusobacteriumnecrophorum* produces an exudative inflammation that is limited to interdigital skin while *Dichelobacternodosus* secretes epidermal tissue by secreting proteolytic enzymes such as protease and keratinase and increases virulence. (Moore *et al.*, 2005; Bennett *et al.*, 2009; Zhou *et al.*, 2009; Özgen *et al.*, 2015; Çelebi *et al.*, 2016; Sulu & Alkan, 2018). Bacteria such as *Staphylococcus* and *Streptococcus* are normally found at the nail area and on the skin surface, and these bacteria, which are opportunistic in character, have a secondary effect on the development of the disease (Bath *et al.*, 2011). The aim of the study is to determine the prevalence of footrot in sheep especially in field conditions.

**Table1.** Degree of footrot (Raadsama & Egerton, 2013)

Degree of Footrot	Definition
1.Degree	Normal Hoof
2.Degree	Mild Interdigital Dermatitis
3.Degree	Moderate Interdigital Dermatitis
4.Degree	Severe Interdigital Dermatitis and Hoof Degeneration
5.Degree	Hoof Exungulation and Nail Drop

## 2. Material and method

The material of the study consisted of 4331 (n = 4331) awassi race average 3 aged sheep in 30 different small cattle farm businesses which were randomly selected in the Akçakale district of Şanlıurfa province. During this inspection, which included October, November, December 2018 and January 2019, the barn structures, the floors of the barns and nail problems of the animals were examined. Information obtained from animal owners during the examination which started with anamnesis is that; the first symptoms were mild, then gradually increased laxity, and the nail was intensely wounded, and then there was a discharge from this wound. The nails of the sheep were examined one by one by cleaning them to reveal the lesions. Mouth examinations were also performed against the misalignment of foot-and-mouth disease. For the

microbiological examination, samples were taken from the suspected cases with the help of cotton-tipped plastic bar transport swab (Firatmed). Then the sample was sent to the Department of Microbiology at Firat University, Faculty of Veterinary Science.

Samples were incubated in the blood agar with 5% sheep blood at 37.5 degrees in an oxygenated environment. In the laboratories of Molecular Microbiology Department of İnönü University Faculty of Medicine, the type and genus of bacteria were determined by Matrix assisted laser desorption ionization system (MALDI-TOF MS). At the end of the procedure, staphylococcus equorum, acinetobacterlwoffi and oligellaurethralis bacteria were detected.

When the state of the grid structures were examined, it was found that 38% of the enterprises had closed system, and 62% (n = 19) of them had semi-open grid structure. It was found that 71% (n = 22) of the enterprises keep more animals than the barn capacity and 29% (n = 8) do not exceed the capacity. It was observed that 1% of the floors of the inspected barns were clean in terms of feces, mud, urine and wetness, 14% a bit dirty, 59% were very dirty and 26% were very much dirty. In addition, nearly all of the dirty barns contained a rather stuffy and urine smell. In 28,93% (n = 1253) of 4331 sheep, varying degrees of footrot were observed. Lameness at different severity and white stinking discharge that is specific to the footrot between the nails was observed in the sheeps that were detected to have footrot. In some cases, the discharge was hemorrhagic. It was learned that sheep especially the ones with the severe footrot walked on their carpal joints. This was confirmed by detection of keratinization on the anterior aspect of the carpal joints. Animal owners told that the decrease in milk yield was less compared to the past. It was determined that animal owners generally had an amateur attitude in terms of ration preparation according to the information provided from the family and they mostly drew bran, barley and hay weighted nutrition profile. The main symptom, which was treated with antibiotics, analgesics, and mostly spray-derived antiseptic drugs by the owners of animals showing mild to moderate lameness, was indicated in the anamnesis that the lethargy has been alleviated or completely disappeared. Considering that zinc and copper deficiency are in the forefront of footrot disease, it was found that the licking block which contains these cheap and easily available minerals is not found in the enterprises. According to Webb Ware footrot score, first degree (n = 508) footrot was detected in 40,54% of sheep, 2nd degree in 33,60% (n = 421), 3rd degree in 16,28% (n = 204) fourth degree (n = 81) in 6,46% and the fifth degree (n = 39) were detected in 3,12%, respectively. The ratio of the barn floor and footrot was about 0.45% for clean animal barns while this rate is 69% for very dirty barns. All findings are demonstrated in Table 2 and Table 3.

**Table 2.** Number of sick animals and degree of footrot

Degree of Footrot	Number of sick animals (n=1253)	Frequency (%)
<b>1.Degree</b>	508	% 40,54
<b>2.Degree</b>	421	% 33,60
<b>3.Degree</b>	204	% 16,28
<b>4.Degree</b>	81	% 6,46
<b>5.Degree</b>	39	% 3,12

**Table 3.** Barn floor and footrot

Barn floor condition	Number of footrot animal	Frequency (%)
Clear	5	% 0,45
Less dirty	120	% 9,57
Dirty	263	% 20,98
Very dirty	865	% 69

### 3. Discussion

Footrot is an important disease in sheep breeding both in Turkey and in the (In & Sarıtaş, 2014). This disease, first put forward in 1869, causes serious productivity losses in sheep farms (Kennan *et al.*, 2011). The study was carried out as checkup in the 30 different small cattle farms in Akçakale district of Şanlıurfa province in October, November, December and January. In addition, barns where the animals are sheltered and their physical conditions were examined in detail. Of the 4331 animals examined, 1253 (28.90%) were found to have various degrees of footrot. Our conclusion that in the region where there is heavy rainfall due to the seasons, deficiencies and wetness in the structure of the ground, urine, mud and feces accumulation could cause light laxity, and then lead to severe damage to the nail which then predispose to footrot disease is within the same direction of the research (Kennan *et al.*, 2011, Foddai *et al.*, 2012, Raadsama & Egerton, 2013) results. In a study by Korkmaz and Aslan (2008), the incidence of foot diseases was detected to be 47,60% in bad shelter conditions and 22,80% in good shelter conditions. In the study, the prevalence of footrot was found to be 69%. In the winter months, the animals do not go to the pasture area and remain stationary in the pens, and the feet remain in the wet and intense urine which cause the softening of the nail and the accumulation on the ground of the barns lead to footrot. (Kennan *et al.*, 2011, Foddai *et al.*, 2012, Sulu & Alkan, 2018). The examined animals were sheltered in the pens due to weather conditions and were not sent to the pasture areas. A study that was carried out by Sağlıyan (2003) Elazığ region shows that 79.08% of the foot lesions appear at the end of the staying in the pen period and 20.92% at the end of the pasture period and this study supports the above mentioned situation. In 1367 of 6748 sheep who were examined in the same study, foot disease was detected and in 18.95% of them had footrot. In the study conducted by Yurdakul (2018), 21.06% of the animals had foot lesions in the spring period before the pasture and 62.54% of them had nail deformities. In a study by Izci (1993), it was revealed that hard, stony and pebbly soils can cause cracking of the nails and excessive elongation of the horn nail, thus facilitating the penetration of footrot agents into live nail. The majority of the grounds we examined were mainly concrete and stone-based and the animals were found to have difficulty even during their routine walks. In some of the sheep on which footrot was not observed, nail cracks, horn nail damage and bad nail shapes were observed due to wrong growing of the nail and we think these are caused by the ground. In geographic regions, rainfall is different according to months. When the annual precipitation amount of 2018 is examined, it is stated in the 2018 climate reports of the meteorology that the

average rainfall in Southeastern Anatolia has increased 84% compared to the average and 100% compared to the average of last year's rainfall (2019). The humid environment is effective in spreading the disease (Bokko & Chauderi, 2001). In a study conducted by Sertkaya and Şındak in the region of Birecik (2004), the rate of footrot was determined as 4.4% in dry areas and 10.3% in humid regions. Another study conducted by Bokko and Chaudheri in Africa (2001) also indicates that the frequency of footrot increases in humid regions. Our study was performed in the autumn months and beginnings of winter months when there is heavy rain and the footrot rate was found to be 28.90%. In a study by Winter (2009), it was stated that animals that are especially in the chronic stage of the disease can spread the disease in the herds. In the anamnesis information we received from the animal owners, it was declared that a few animals were observed before the disease and the incidence increased during the days. On the one hand, in a research conducted in pens where there are more animals than capacity, the risk of footrot increased when regular nail care, especially the nail cut, are not made regularly (Winter, 2008). On the other hand, in another stud, it was said that regular nail cut did not have an affect to prevent the disease and even help the disease to spread (Bennett & Hickford, 2011, Karşlı & Elma, 2015). Regular nail care and nail cleaning were not observed in any of the pens visited. It is known that footrot, which is a disease caused by incorrect and incomplete maintenance, causes serious economic yield losses (Abbott & Egerton 2003, Raadsama & Egerton, 2013). In the pen structures we examined, in the ranking we made from clean to dirty, as seen in Table 2, a significant increase in the rate of footrot is observed. In addition, in the studies which shows that mistakes in the nourishment prepared the ground for the disease (Hall *et al.*, 2009, Nagalakshmi *et al.*, 2009) the rational errors we have observed and put forward confirm these studies. In the severe form of footrot disease, keratinization is formed on the joints because the animal tries to walk on the carpal joints (Sulu & Alkan, 2018). This case was encountered in some severe cases. In the pens that we did studies, the population of males was 5% and only 0.4% of these animals were used as breeder. For this reason, the prevalence of the disease is very low as the rams are mostly considered as commercial and butchery (İzci *et al.*, 1994). In the study, we encountered footrap only in 3 rams and this situation shows parallelism with the results of the studies (İzci *et al.*, 1994, Sağlıyan *et al.*, 2003, Avki *et al.*, 2004, Yurdakul, 2018). It was proven in the research that is done by Bennett et al that *Dichelobacternodosus* and *Fusobacteriumnecrophorum* bacteria have a significant role in the formation of the disease (2009), some examinations were done in the collected samples by means of *Dichelobacternodosus* and *Fusobacteriumnecrophorum* and of the samples collected from 42 sheep which show clinical symptoms, 2 were *Fusobacteriumnecrophorum*, 17 were *Dichelobacternodosus* and *Fusobacteriumnecrophorum* were found in both and 23 were not detected in both bacteria. In the study carried out by Çelebi et al. (2016) a total of 8970 sheep from 10 different flocks were examined clinically and in 1532 (17.07%) various causes of lameness were observed. 247 (2.75%) of these were identified as possible footrot and bacterial isolation was performed in 205 of them (82.99%). *Dichelobacternodosus* was detected in the isolates. These two bacteria were not found in the samples collected in our study.

#### 4. Conclusion

In this study, it was concluded that the status of ground of the animal barns plays an effective role in the formation of the footrot disease. Footrot disease causes serious financial losses in animal breeding. One of the most important factors for the formation of the footrot disease are considered to be the structures of the animal barns to be disorganized and dirty, having animals above the capacity levels, the wet floor due to too much rainfall in some regions and thus the animals have to stay inside the barns instead of being put out pasture so that their nails become eroded. In order to treat the current footrot disease in the facilities that we inspected and to prevent possible footrot risk, the animal owners were advised as to antibiotic treatment, foot bath solutions such as copper sulphate and zinc sulphate, adding copper and zinc to the nutritions of the animals and keeping their barn floors always dry and clean. With this research, it was concluded that the disease could be prevented and the losses could be decreased should animal owners be informed about ration, the capacity of the animal barn and cleaning, periodic cleaning of the nails of the animals and foot bath.

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