

## **EFFECT OF LITTER TREATMENT ON THE OCCURRENCE OF FOOT PAD LESIONS**

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### **Abstract**

Pododermatitis (foot pad lesions) is one of the main welfare problems in modern broiler production in countries with developed poultry farming. Factors contributing to the occurrence of these lesions are nutrition, stocking density and material used for litter. There are a number of different procedures that can be applied in order to prevent and reduce the number of lesions with the most pronounced defects. The experiment was conducted on broiler chickens grown in 10 buildings of 240 m<sup>2</sup> each. The stocking density was 35 kg/m<sup>2</sup>. The experiment was set up in five treatments with two replicates. Treatment one (T1) - control with a straw litter, treatment two (T2) - litter treated with microbial preparation Micropan®, treatment three (T3) – litter with addition of lignin, treatment four (T4) – litter with addition of lignin and Micropan® and treatment five (T5) - chopped straw without supplements. At the end of the experiment, on day 42 the intensity of the lesions was scored on the slaughter line. The presence of lesions was scored using scale from 0 (no lesions) to 3 (plantar pads with more than 50% damage). Based on the results of the trial it can be concluded that litter has a significant impact on the presence and the degree of foot pad lesions. The lowest score of foot pad lesions was observed in the treatment T5 (chopped straw). Different treatments of litters may also contribute to the solution of the problem of pododermatitis since the results in all treated groups (T2, T3, T4 and T5) were better when compared to the control.

**Key words:** *broiler, litter treatment, pododermatitis*

### **Introduction**

Foot pad lesions are a type of contact dermatitis affecting the plantar region of the feet in poultry and other birds. At an early stage, discoloration of the skin is seen. Hyperkeratosis and necrosis of the epidermis can develop, and in severe cases, these changes are followed by ulcerations with inflammatory reactions of the subcutaneous tissue (Ekstrand et al., 1997). The lesions are commonly named “ammonia burns” and are thought to be caused by a combination of moisture, high ammonia content, and other not yet specified chemical factors in the litter (Berg, 2004). By definition, the chicken paw is the portion below the spur, while chicken feet include the lower leg as well as the foot. The terms paw and foot are interchangeable and both terms will be used in this paper. Due to the market value of this product and increasing welfare

issues, it is in the best interest of the poultry industry to reduce paw down grades and condemnations. Therefore, factors associated with increased incidence of foot pad lesions and methods to reduce it need to be evaluated. Revenue from chicken paws in 2008 alone was worth \$280 million. Harvesting large, unblemished paws has become a priority to poultry companies all over the world. Research on this subject has been ongoing since the 1940s and has looked into many different areas including nutrition, environment, and genetics (Shepherd and Fairchild, 2010). The FPD condition is an important aspect of poultry welfare that in severe cases can cause pain (Berg, 1998) resulting in unsteady walk (Harms and Simpson, 1975; Hester, 1994). Selection for rapid growth rate in broilers is accompanied by a decrease in walking ability, and there is a high unfavorable phenotypic correlation (0.8) found between BW and overall walking ability (Kestinet al., 2001). The FPD condition is a part of a general walking ability problem, but specific knowledge of genetic effects on FPD is very scarce.

Litter serves several functions that include thermal insulation, moisture absorption, protective barrier from the ground, and it allows for natural scratching behavior. Bedding material must not only be a good absorber of moisture but also to have a reasonable drying time (Grimes et al., 2002; Bilgili et al., 2009). Although litter refers to the mixture of bedding material, fecal droppings and moisture, the term is used interchangeably with bedding materials. The most commonly used litter material in Europe is straw (Grimes et al., 2002). The best-performing material was pine shavings followed by: rice hulls, ground corncobs, stump chips, pine sawdust, bark and chips, pine bark, and clay (Grimes et al., 2002). Differences in particle size of straw were suggested to be the most important factor. The emergence of the foot pad lesions is multifactorial problem influenced by a large number of factors among which the most significant are ventilation, feeding, watering, microclimate and health status of animals. Consequences of the development are significant both in terms of animal welfare and in terms of economic feasibility of production (Bjedov et al., 2013). Differences in particle size of these materials were proposed to be the most important factor. The aim of this study was to determine the effect of litter on the occurrence of foot pad lesions.

## **Material and methods**

The experiment was conducted on broiler chickens grown in 10 buildings of 240 m<sup>2</sup> each. The stocking density was 35 kg/m<sup>2</sup>. The experiment was set up in five treatments with two replicates. Treatment one (T1) - control with a straw litter, treatment two (T2) - litter treated with microbial preparation Micropan®, treatment three (T3) – litter with addition of lignin, treatment four (T4) – litter with addition of lignin and Micropan® and treatment five (T5) - chopped straw without supplements. Lighting program provided 23 hours of light + 1 hour of dark. Birds were vaccinated against Newcastle disease (NCD) and infectious bursal disease (IBD) as per commercial recommendations. Feed and water supply were *ad libitum*. At the end of the experiment, on day 42 the intensity of the lesions was scored on the slaughter line. These labeled birds were examined weekly for the presence of foot dermatitis and given a lesion score using the methodology described by Martrenchar et al. (2002). Briefly, the scores were 0: no lesion; 1: lesion on <25% of the pads; 2: lesion on 25 to 50% of the pads; 3: lesion on >50% of the pads. Data were analyzed by ANOVA using the GLM procedure and the means separated by Duncan *post hoc* test using StatSoft computer package (STATISTICA 11, 2012).

## Results and discussion

The results indicate that different litter treatments have an impact on the occurrence of foot pad lesions. Table 1 shows the results of the experiment. The best results were obtained by using a chopped straw litter as compared to the other treatments that were used in the experiment. The results reached by De Baere et al. (2009) show that the use of large quantities of chopped straw of 1.5 kg/m<sup>2</sup> produced a significant increase in the intensity of the FPD in broiler chickens. In their work, they state that the use of chopped straw at a rate of 2.0 kg/m<sup>2</sup> leads to an increase in the number of lesions with the highest degree of damage.

**Table 1.** The number of scored broiler (No) and values (%) of foot pad damage by applying different treatments

Treatments	T1		T2		T3		T4		T5	
	No	%	No	%	No	%	No	%	No	%
0	1	0.06	24	0.88	6	0.27	30	1.13	39	1.59
1	3	0.18	128	4.71	22	0.97	238	8.98	212	8.62
2	547	32.54	924	34.02	945	41.76	1042	39.32	1002	40.76
3	1130	67.22	1640	60.38	1290	57.00	1340	50.57	1205	49.02
Total/Average	1681	2.66 <sup>a</sup>	2716	2.53 <sup>b</sup>	2263	2.55 <sup>bc</sup>	2650	2.39 <sup>d</sup>	2458	2.37 <sup>d</sup>

(<sup>a,b,c,d</sup>), Means in the same row with different letters are significantly different (P<0.05)

The results in this experiment are consistent with previous studies (Grimes et al., 2002; Bilgili et al., 2009) in which the use of different litter materials caused a reduction in the occurrence and intensity of foot pad damage. There was a statistically significant difference between the chopped straw and a straw litter, litter treated with microbial preparation Micropan®, and litter with addition of lignin. No statistically significant difference on the occurrence of foot pad lesions between litter with addition of lignin and Micropan® and chopped straw without supplements was observed.

## Conclusion

The emergence of the FPD is a multifactorial problem that is influenced by a large number of factors among which the most significant are ventilation, feeding, watering, microclimate and health status of animals. Consequences of the development are significant both in terms of animal welfare and in terms of economic feasibility of production. It is possible that different litter treatments significantly prevented the occurrence and reduced the intensity of foot pad lesions. Good knowledge of all factors of the occurrence of FPD significantly contribute to the prevention of these types of dermatitis and reduce intensity damage in flocks where the disease has occurred.

## Acknowledgements

This work has been funded by the Ministry of Education, Science and Technology Development of the Republic of Serbia as a part of the Project No. TR 31033.

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