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Application of linear scoring method of the udder in sheep

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Abstract

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The aim of the present study is application of a new for the country scoring method of the udder in sheep. It was carried out with 28 ewes form the experimental flock of the Institute of Animal Science – Kostinbrod. The scores of the teats position, degree of separation of the udder halves, degree of suspension and the depth of the udder were determined through a new method with a nine point scale at first and second control. The type of the udder was also determined using the traditional 5 point scale. A total of 140 scores were done. In order to compare the results of both methods the scores of the teats position were conferred too the udder type as follows: type 1 – no correspondence; type 2 – corresponds to scores 8 and 9; type 3 – corresponding to scores 6 and 7; type 4 – to scores 2 to 5 and type 5 –corresponding to score 1. The amount of milk for the control day was measured according to the AC method of ICAR. The data were evaluated by the statistical package Data Analysis, Excel 2007, Microsoft. One way ANOVA and regression analysis were applied and the coefficient of determination (R^2) was determined. The significance of the effect of the factors and the regression equation was determined by the values of the F-criterion. A new for Bulgaria linear scoring method for the udder morphology was applied and compared to the traditionally used one. The effect of the teats position and the degree of separation of the udder halves on the milk of the control day was significant ($P < 0.001$). No significance was observed in regard of the relation between the depth of the udder and the degree of suspension ($R^2 = 0.0653$).

*Keywords***:** sheep; udder; score; udder type

Introduction

In recent years the interest towards the udder of the dairy sheep increased again in regard to the selection for their adaptability for machine milking and obtaining of high quality milk.

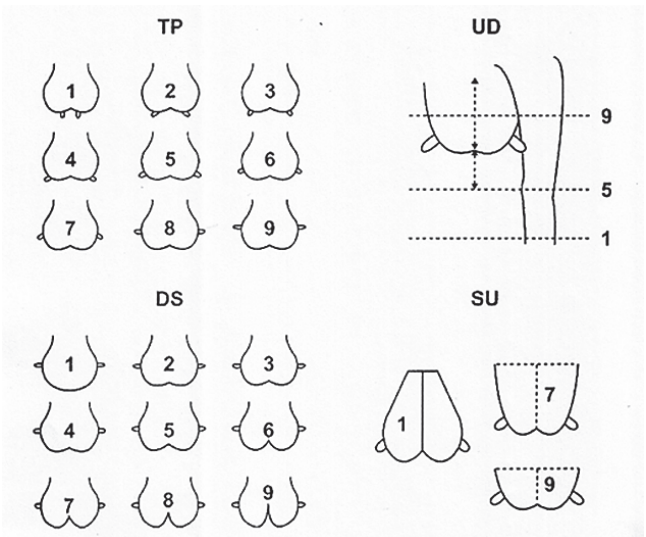
There are studies in our and foreign literature about the relation between the type of udder and milk production. Djorbineva et al. (2001) found a trend of increase of the score of the type of udder and milk yield in three Bulgarian sheep breeds. Similar results were reported by Raicheva &Ivanova (2011), who found significant rise of the milk yield with increase of the score of the udder type from 3 (udder with asymmetrical teats) to 5 (udder with vertical teats). These authors previously did research on the udder morphology and found that 70% of the studied sheep of Bulgarian Dairy Synthetic Population had the desired type 4 with low lateral teats and defined halves of the udder, whereas the rest 30% had type 3 with high lateral teats and defined udder halves (Ivanova & Raicheva, 2008). Kukovics et al. (2006) while studying the effect of the udder traits on the milk yield in Tsigay sheep found dependence of the milk yield and udder type. They commented on the udders type 2 (high teats), type 3 (high lateral teats), type 4 (low lateral teats) and type 5 (vertical teats), excluding the type 1 (asymmetrical) from the experiment and did not find significant effect of the udder type on the milk yield of the ewes. According to Legarra & Ugarte (2005) the traits characterizing the type of the udder and milk yield provide the information necessary for the estimation in selection of the Latxa breed. The authors used 5 point scale.

The aim of the present study is application of a new for the country scoring method of the udder in sheep.

Materials and Methods

The study was carried out with 28 ewes in first lactation of Bulgarian Dairy Synthetic Population from the experimental flock of IAS – Kostinbrod.

The position of the teats, the degree of separation of the udder, the degree of suspension and depth of the udder were determined at first and second control applying a new method for our country described by Casu et al. (2006). According to this method, the udder is scored using 9-point scale. The position of the teats is determined by eye depending on the distance between them as score 1 is given to the teats positioned on the lowest part of the udder and score 9 – to teats positioned at 180º and more. The degree of separation of the udder halves is also determined by eye depending on the depth of hollow, as score 1 get the udders without defined halves while 9 get the udders with strongly defined halves. The degree of suspension is the ratio between the width and the depth of the udder as suspended is the udder that is less wide but deeper (score 1), and shallow is the udder that is wider. Most desired are the "square" udders where the width is equal to the depth. The depth of the udder is the distance from the belly to the "cleft" of the udder as the scores are given in relation to the line of the hock joint. The udders that have depth to the hock joint get score 5, the shallower tend to score 9, while the deep (approaching the ground) tend to have score 1 (Scheme 1).



Scheme 1. Scores for position of the teats (*TP*), degree of separation of the udder halves (*DS*), degree of suspension (*SU*) and depth of the udder (*UD*) according to Casu et al. (2006)

The type of the udder at first and second control was determined according to the applied 5 score method in the dairy sheep breeding (Instruction for control of performance traits, 2003). According to this method the type of the udder depends on the position of the teats and gets scores 1 to 5 (Scheme 2).

Scheme 2. Udder types according to the position of the teats (*1* – asymmetrical; *2* – high; *3* – high lateral with defined udder halves; *4* – low lateral; *5* – well shaped udder with low teats)

A total of 140 scores were done. In order to compare the results of the two methods applied we conferred the scores for the position of the teats to the udder type as follows: type 1 – no correspondence; type 2 – corresponds to score 8 and 9; type 3 – corresponding to score 6 and 7; type 4 – corresponding to score 2 and 5 and type 5 – to score 1.

The milk for the control day was measured according to the AC method of ICAR as volume units (ml) (Instruction for control of performance traits, 2003). The milk yield of each sheep for the control day was calculated through multiplying of the amount of the milk obtained in the individual control in the morning by flock coefficient determined for the control day by in terms of the amount of the morning and evening milk to the morning milk in double milking.

The data were statistically evaluated through Data Analysis, Excel 2007, Microsoft. One way ANOVA was applied as the significance of the effect of the factors was determined by the values of F-criterion. Regression analysis with the following equation was applied:

$$y = a + bx,$$

where y – degree of suspension;

a – constant, b – regression coefficient

x – udder depth.

Coefficient of determination (R^2) was determined. The significance of the regression equation was evaluated through F-criterion.

Results and Discussion

While scoring of the udder morphology for the position of the teats we found that the udders with scores 7, 4 and 6 presented the highest percentage, while the lowest part was formed by the udder of score 2 (Fig. 1).

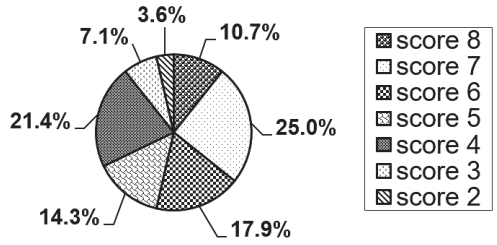


Fig. 1. Position of the teats

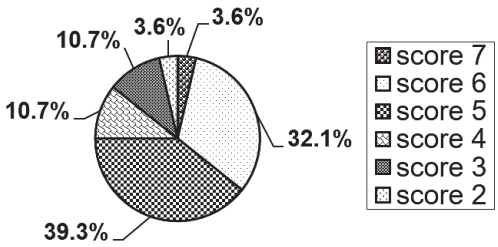


Fig. 2. Degree of separation of the udder halves

According to the degree of separation of the udder halves the highest percentage was observed in the sheep that got scores 5 and 6, while insignificant percentage was found in those scored 2 and 7 (Fig. 2).

The degree of suspension differed to a certain extent only in the sheep with score 3 which formed 1/4 of the studied group (Fig. 3).

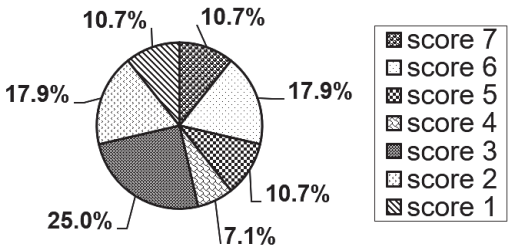


Fig. 3. Degree of suspension

A tendency of balance in the sheep was observed in regard of the depth of udder as all the experimental animals had either score 7 or 8 (Fig. 4).

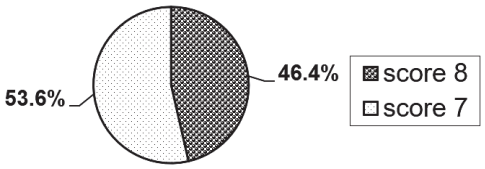


Fig. 4. Depth of the udder

According to the traditionally used method for determination of the udder type (Fig. 5) 60.7% of the udders belong to type 4, 35.7% – are type 3 and 3.6% – are type 2.

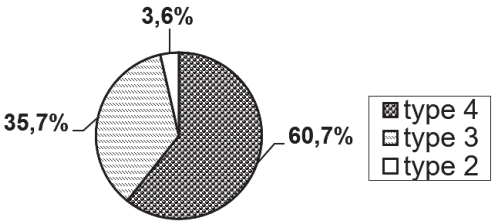


Fig. 5. Udder type according the traditional method

Djorbineva et al. (2001) in a study of the types of the udder in local Ztara Zagora sheep, East-Frezean sheep and dairy crossbreeds from the Institute of Karnobat reported that the percentage of the udders fitted to machine milking were respectively 67.6%, 67.7% and 74.6%. In a research on udder morphology Ivanova & Raicheva (2008) found that significant part (70%) of the studied sheep of Bulgarian Dairy Synthetic Population (type 4 – with low lateral teats) and 84.5% of the Black Head Pleven sheep (type 5 – low teats and type 4 – low lateral teats) had udders fitted to machine milking.

In comparison to the method applied in our country for determination of the udder type according to the teats position (Fig. 5), when conferring the scores of both scales we obtained the following results (Fig. 6):

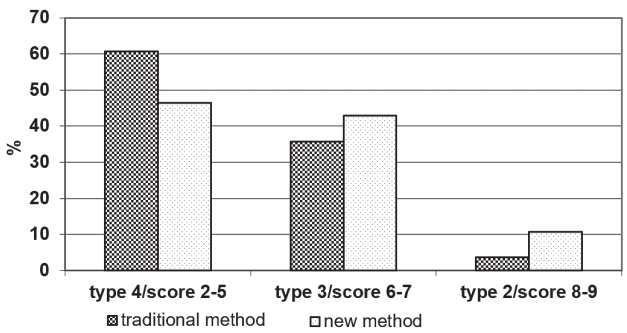


Fig. 6. Distribution of the animals according to both methods

Table 1. Effect of the teats position and the degree of separation of the udder halves on the milk for the control day

Source of variation	Teats position , n = 56			Degree of separation of the udder halves, n = 56		
	df	MS	F	df	MS	F
Between groups	1	336.037	**239.767*** **	1	262.221	**375.776*** **
Residual	54	1.402		54	0.698	
Total	55			55		

Note: Significance level: *** – P < 0.001

To type 4 with 60.7% correspond 46.4 % according to the newly applied method for the position of the teats scored 2 to 5;

To type 3 with 35.7%-42.9% scored 6 and 7;

To type 2 with 3.6%-10.7% scored 8 and 9.

The observed differences in the percentage of the animals in both methods of scoring could be explained with the more detailed 9 point scale applied in the new method, which is more precise. From this point of view, this scale is more suitable for the selection although the application of the traditional one for Bulgaria is simpler.

Table 1 presents the effect of the teats position and the degree of separation of the udder halves on the milk of the control day. The effect of the factors was highly significant (P < 0.001).

The effect on the milk yield when applying the new linear scoring again showed that it is more suitable for the selection, because according to the existing research in the area so far the application of the traditional method does not show significant values of the F – criterion (Ivanova & Raicheva, 2008; Ivanova, 2013; Djorbineva et al., 2001; Kukovics et al., 2006).

After regression analysis, the following equation revealing the relation between the degree of suspension and the udder depth was worked out:

$y = 0.9846x - 3.4923$

The coefficient of determination was low and insignificant ($R^2 = 0.0653$).

Conclusions

A new for Bulgaria linear scoring method for the udder morphology was applied and compared to the traditional one.

The effect of the teats position and the degree of separation of the udder halves on the milk of the control day was significant (P<0.001).

No significance was observed in regard of the relation between the depth of the udder and the degree of suspension.

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