

THE ANALYSIS OF CORRELATIONS BETWEEN THE MAIN TRAITS OF WOOL PRODUCTION ON MILK BREED - PALAS

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Abstract

The aim of this paper was to analyze the coefficient of correlation and regression between main wool production traits for the sheep belonging to the Milk Breed Palas. The study was performed on a 10 years interval, the phenotypic correlation and the regression being determined for age groups and body weight classes for the following traits: raw wool production, the staple length, wool diameter and body weight at shearing. The obtained results are showing that similar to the known sheep breeds the efficiency of wool production is also higher for the sheep with moderate body weights (50-60 kg) but in the case of specialized sheep types the selection for body weight will be done based on the morph-productive parameters specific to the purpose of exploitation (milk production, meat production or high prolificacy). Regarding the correlation coefficients between the wool production and fiber diameter of Milk Breed Palas the greatest values were for the ewes at the fourth shearing season $r = 0,361 \pm 0,071$ (***) and at the fifth shearing season in the case of correlation between wool production and staple length of fibers $r = 0,438 \pm 0,074$ (***)

Key words: wool production, wool diameter, staple length, body weight at shearing, correlation

INTRODUCTION

In the breeding activity, the assessment of the correlations between different characters is of great importance, being able to show the way in which the selection for a certain morph-productive character may influence other parameters. The existence of a phenotypic correlation shows that the organism has a certain balance, meaning that the evolution of one trait can influence either the evolution or the regression of another. A correct understanding of the direction and intensity of these correlations is important for the selection plans, for the prediction of the evolution of one trait based upon another associated trait and for designing the synthetic selection indexes [1, 2]. Having as target the improvement of the wool production the selection by fleece weight must not be detrimental to the wool quality. For that reason an estimate of the correlations between the level of wool production and the main physical-mechanical wool fiber traits

becomes necessary in order to improve the selection criteria.

MATERIAL AND METHODS

The study was performed for the period 2000-2010 and was focused on the quantity and the quality traits of the wool on the sheep effectives of the Palas Milk Line (homologated as Milk Breed – Palas in 2010). The production of wool was determined by individual weighing of fleece for all the sheep effectives during the shearing season. To evaluate the quality of the wool, randomized samples for each category of sheep were collected. On these samples the fiber diameter (fineness), sample (relative) length were measured according to the standardized methods and the values were processed through statistical methods. The researches made on a 10 years interval on the specialized sheep lines effectives, displayed a great variation of the wool production level (especially for males). For that reason, the analysis of the age of sheep on the main production traits was done for the years when the differences of the average wool production were statistically not significant.

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For each year taken into account the statistical parameters, the phenotypic correlation and the regression were determined for age groups regarding the following traits: raw wool production, the staple length, wool diameter and body weight at shearing [3].

RESULTS AND DISCUSSIONS

The research made to study the influence of age upon the level of the wool production evidenced the evolution of mean wool quantity related to shearing season (clip) presented in figure 1.

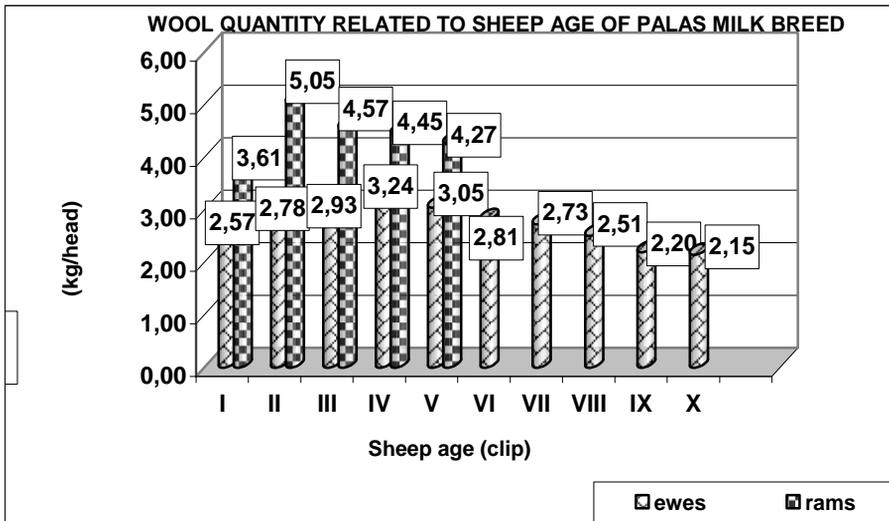


Fig. 1 The influence of sheep age on wool production of Milk Breed -Palas

The sheep belonging to the Milk Breed – Palas registered an increase of $8.17 \div 26.07\%$ of the productive level from the 1st clip (2.57 kg/head – recalculated) to 3.24 kg/head at the 4th shearing season, then from the 5th to the 10th clip the production of wool is decreased to 2.15 kg/head (with 33.65% besides the maximum level of the 4th shearing season). Regarding the wool production of rams, it increased from the 1st clip - 3.61 kg/head (recalculated) to 5.05 kg/head at the 2nd clip (with 71.49%) then following a progressive decrease with $9.50 \div 15.45\%$ to 4.27 kg/head – the last clip (the 5th). Regarding the relative length of the wool fibres of Milk Breed - Palas it was maintained between $8.7 \div 8.9$ cm between the 1st – the 5th clip and then it progressively decreased with $3.37 \div 11.35\%$ to 7.89 cm (at the 10th clip).

For the Palas Milk Breed that make the object of this study, the calculated values for the correlation and regression coefficients

between wool production and fiber fineness (diameter) related to the sheep age are presented in Table no 1. For the adults, the upper and lower limits of the two analyzed coefficients are mentioned.

These values obtained for the Palas Milk Breed are leading to the following conclusions:

- The female yearlings have very significant values of phenotypic correlation and regression between the wool production and fiber diameter, $r = 0.187 \pm 0.055$ (***) , $b = 0.117 \pm 0.022$ (***) . The values determined for these coefficients were similar to those reported by other authors for Palas Merino female yearlings $r = 0.187$ (***) , $b = 0.211$ (211g/micron) (***) [5], and lower to those reported for other sheep breeds such as Corriedale female yearlings $r = 0.37 \pm 0.02$, Coopworth breed $r = 0.34 \pm 0.03$, other Merino breeds $r = 0.13 \div 0.32 \pm 0.02$ [4].

Table 1 Correlation and regression coefficients between wool production and fiber diameter related to the age of the sheep (shearing season)

Sheep category	Breed	Shearing season (age)	$r \pm sr$	$b \pm sb$
Female yearlings	Milk Breed Palas	1	0.187±0.055(***)	0.117±0.022 (***)
Male yearlings	Milk Breed Palas	1	0.204±0.109 (ns)	0.185±0.098 (*)
Ewes	Milk Breed Palas	2 - 10	-0.043±0.218(ns) 0.361±0.071 (***)	-0.035±0.099(ns) 0.125±0.025 (***)
Rams	Milk Breed Palas	2 - 4	0.081±0.442(ns) 0.257±0.176 (ns)	0.065±0.028 (ns) 0.196±0.113 (ns)

Notes: ns – not significant ($P > 0,05$) * - significant ($P < 0,05$) ** - distinctly significant ($P < 0,01$)
*** - very significant ($P < 0,001$)

- The ewes have very significant values of correlations and regressions only for clips II-IV, the greatest values for these coefficients being found for the fourth clip $r = 0.361 \pm 0.071$ (***) . The data presented are higher than those calculate by various authors for the ewes of different breeds, Palas Merino (3-5 age) $r = 0.233$ (***) , $b = 0.273$ (***) , Merinolandschaf $r = 0.25$, Australian Merino $r = 0.13$ [5], Stavropol Merino $r = 0.14$ (*) , $b = 0.099$, other Merino breeds $r = 0.13 \dots 0.29$ [1]. The negative values of the correlation and regression ($r = - 0.043 \pm 0.218$ (ns) $b = - 0.035 \pm 0.301$ (ns)) found at the last shearing season show an 35 microns increase of the fiber diameter associated with one kilo decrease of the wool production.

- The male yearlings showed no statistically significant value for correlation $r = 0.204 \pm 0.089$ (ns), and distinct significant for regression $b = 0.185 \pm 0.098$ (*) .

- The rams have positive but not significant values of the correlation between wool production and fiber fineness, the greatest values of the correlation coefficients being at the second clip (shearing season) $r = 0.257 \pm 0.176$ (ns).

For the Palas Milk Breed the calculated values for the correlation and regression coefficients between staple length related to the age of the sheep (shearing season, clip) are presented in Table no 2. For the adults, the upper and lower limits of the two

analyzed coefficients are mentioned. The resulting values are revealing the following aspects:

- For the female yearling the calculated values for phenotypic correlation and regression between the wool production and staple length are very significant statistically, $r = 0.224 \pm 0.054$ (***) and $b = 0.087 \pm 0.016$ (***) . The correlation coefficient between the two traits was lower compared with the presented values for the Palas Merinos female by Ursescu Al. [5] $r = 0.262$ (***) and by Safari A. [4] for other Merinos female yearling breeds $r = 0.24 \div 0.27 \pm 0.02$. The regression coefficient was lower than the values calculate by the above mentioned authors for Palas Merino female yearlings ($b = 0.617$ (***) [5], $b = 0.275$ (ns) [3]).

- For ewes of the Palas Milk Breed the wool production has a positive and very significant correlation with wool staple until the fifth clip. After these ages these two traits have a positive but not significant correlation. The greatest values of the correlation coefficients are for the Palas Milk Breed at the fifth clip $r = 0.438 \pm 0.074$ (***) . For other breeds, the phenotypic correlations and the regressions calculate by other authors were: $r = 0.221$ (***) , $b = 0.116 - 0.175$ (***) for Palas Merino ewes, $r = 0.25 - 0.30$ for Australian Merino ewes [5], for Stavropol Merino ewes $r = 0.52$ (***) , $b = 0.529$, other Merino ewes $r = 0.25 \dots 0.60$ [1].

Table 2 Correlation and regression coefficients between wool production and staple length related to the age of the sheep (shearing season)

Sheep category	Breed	Shearing season (age)	$r \pm sr$	$b \pm sb$
Female yearlings	Milk Breed Palas	1	0.224±0.054 (***)	0.087±0.016 (***)
Male yearlings	Milk Breed Palas	1	0.257±0.106 (*)	0.182±0.036 (**)
Ewes	Milk Breed Palas	2 - 10	0.073±0.217 (ns) 0.438±0.074(***)	0.047±0.086(ns) 0.167±0.029 (***)
Rams	Milk Breed Palas	2 - 4	0.042±0.446 (ns) 0.162±0.184 (ns)	-0.053± 0.024 (ns) 0.122±0.109 (ns)

Notes: ns – not significant ($P > 0,05$) * - significant ($P < 0,05$) ** - distinctly significant ($P < 0,01$)
 *** - very significant ($P < 0,001$)

- The males of have significant positive values of phenotypic correlations between wool production and staple length only for the first clip (male yearlings) 0.257±0.106 (*). For other shearing seasons this is statistically not significant. The negative values of the regression found for the last clip for the rams show that the wool production decreases with the increase of the relative staple length, after a certain age the two parameters tend to become independent.

The increase of the body weight in order to achieve a higher wool, meat and milk production represented a goal of the local sheep breed selection. Under these circumstances the question is to what extent the increase of body weight is justified in order to obtain the greatest sheep production level.

Because the relative wool production, reported to the unit of body weight does not increase proportionally with the body weight it is not recommended the indirect selection based on body weight in order to increase the wool production without knowing the level at which the two parameters correlate significantly. For the sheep belonging to the Palas Milk Breed, the analysis was done for the years when the differences of the average wool productions were not significant. For each category of sheep that made the object of this study a grouping by body weight class at shearing was done. For each class the average values of the analyzed traits were calculated together with the phenotypic correlation, regressions and their statistic significance. The values are presented in Table no. 3.

Table 3 Correlation and regression coefficients between body weight and wool production

Sheep category	Weight class	Breed	$r \pm sr$	$b \pm sb$
Ewes	31-40	Palas Milk	0.089 ±0.105 (ns)	0.016± 0.0087 (ns)
	41-50	Palas Milk	0.107±0.052 (*)	0.013± 0.012 (ns)
	51-60	Palas Milk	0.245± 0.050 (***)	0.029±0.011 (**)
	61-70	Palas Milk	0.052±0.106 (ns)	0.0089±0.018 (ns)
Rams	61-70	Palas Milk	0.171±0.280(ns)	0.014±0.008 (ns)
	71-80	Palas Milk	0.366±0.289 (ns)	0.048±0.027 (ns)
	81-90	Palas Milk	0.227± 0.245(ns)	0.072±0.048 (ns)
	91-100	Palas Milk	-0.118±0.329 (ns)	-0.039 ± 0.015 (ns)

Notes: ns – not significant ($P > 0,05$) * - significant ($P < 0,05$) ** - distinctly significant ($P < 0,01$)
 *** - very significant ($P < 0,001$)

Based on the analysis of the value in Table no. 3, the following conclusions are resulting:

- The ewes with weights between 41-50 kg showed the phenotypic correlation statistically

significant $r = 0.107 \pm 0.052$ (*) and very significant $r = 0.245 \pm 0.050$ (***) of ewes between 51-60 kg. The regression coefficient were also distinctly significant for the ewes weighing between 50 and 60 kg, $b = 0.029 \pm 0.011$ (**). In comparison the Palas Merino ewes of 51- 60 kg had a value of the regression of $b = 0.069$ (***) [5], superior to the ewes of the same body weight class belonging to the Milk Breed -Palas. For all the specialized sheep population, the efficiency of wool production is higher for the ewes weighing below 60 kg, thus the ewes belonging to the Palas Milk Breed are producing $51.910 \div 70.083$ g wool/body kilo.

- For the rams the greatest correlation coefficients were obtained for the weight classes 71-80 kg $r = 0.366 \pm 0.289$ (ns). The regression coefficients for the rams between 60-90 kg ranged between $b = 0.014 \pm 0.008$ (ns) $\div 0.072 \pm 0.048$ (ns). For body weights exceeding 90 kg the rams show negative values of correlations and regressions as a result of the decrease in wool production with 39 g for every 1 kg increase in body weight at shearing. The efficiency of wool production measured as wool quantity per unit of body weight is also superior for the rams weighing less than 90 kg ($57.414 \div 63.211$ g wool/body kilo)

CONCLUSIONS

➤ The greatest values of the correlation coefficients between the wool production and fiber diameter of Milk Breed Palas were for the ewes at the fourth shearing season and at the second clip for the rams.

➤ Regarding the correlations between wool production and staple length the greatest

values were obtain for the ewes at the fifth shearing season.

➤ The analysis of the average values of the wool production per 1 kg of live body weight obtained for the Milk Breed Palas showed that the rams are producing with 7.95 g wool per kilo of body weight (5.52%) more than the ewes.

➤ The obtained results are showing that for the specialized sheep types the efficiency of wool production is also higher for the sheep with moderate body weights, but the selection for body weight will be done based on the morph-productive parameters specific to the purpose of exploitation (milk production, meat production or high prolificacy).

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