Lucrări ştiinţifice **Zootehnie şi Biotehnologii**, vol. **42 (2),** (**2009**), Timişoara.

VALUES OF SOME PHENOTYPIC, GENOTYPIC AND ENVIRONMENTAL CORRELATIONS BETWEEN MILK QUANTITY AND SOME UDDER CHARACTERISTICS, IN COWS

VALORILE UNOR CORELAŢII FENOTIPICE, GENOTIPICE ŞI DE MEDIU, DINTRE CANTITATEA DE LAPTE ŞI UNELE ÎNSUŞIRI ALE UGERULUI LA VACI

ANGELA STOICA, PAULA POŞAN, ELENA SORCA

USAMV – Bucharest, Faculty of Animal Science, pauladragut@yahoo.com

There were done measurements of mammary gland (body and teats) and there were calculated some indices and correlation coefficients. The results show that the phenotypic correlations for milk quantity and udder shape, udder length and for milking speed and distance between posterior teats and distance between anterior and posterior teats, were positives. For milk quantity and udder depth and for milking speed and mammary index the phenotypic correlations were negatives. Genotypic correlations were generally negatives for milk quantity and udder characteristics, excepting the udder width correlation which was positive. The milking speed was negatively correlated with udder shape and positively with mammary index. Environmental correlations of milk quantity with udder characteristics were all positive. Environmental correlations of milking speed with udder shape and distance between posterior teats were positives and negative for distance between anterior and posterior teats and mammary index.
Keywords: correlations, udder, cows

Introduction

Applying mechanical milking in cows is necessary to know the udder morphological and functional characteristics in order to obtain higher quantities of milk.

These characteristics can be appreciated directly (by measurements, weightings and timing) and indirectly (with specific indices as: mammary index or udder index).

The purpose of this paper was to calculate some phonotypical, genotypic and environmental correlations between milk quantity at milking and some udder characteristics in cows.

Materials and Methods

The researches were done on 120 adult Frisian cows in the second month of lactation.

There were done udder measurements to estimate some morphologic characteristics like: average depth, average width, length, big and small circumference. Helped by these values there was estimated the udder shape *(small circumference / big circumference x 100)* and the udder size *(length x average width x average depth)*. Also there were measured the distances between teats and their perimeters.

To appreciate the physiologic characteristics, which confirm the mechanic milking aptitude there were determined: total milk quantity and milk quantity for each quarter and the average milking speed *(milk quantity / milking duration)*. Than, there were calculated the mammary index *(milk quantity from anterior quarters / total milk quantity x 100)* and udder index (*(average milking speed x 20) + mammary index))*.

Helped by known formulas there were calculated: phenotypic correlations between milk quantity and some udder characteristics, phenotypic correlations milking speed and some udder characteristics, genotypic correlations between milk quantity, milking speed and some udder characteristics, environmental correlation between milk quantity and some udder characteristics and environmental correlation between milking speed and some udder characteristics.

Results and Discussion

The coefficients values of phenotypic correlation between milk quantity and some udder characteristics are presented in Table 1.

Table 1

Phenotypic correlation between milk quantity and some udder characteristics

Specification	$r_F \pm s_{rF}$
Average milking speed	+0.158±0.037
Mammary index	+0.451±0.033
Udder index	+0.243±0.036
Average udder depth	-0.177±0.037
Average udder width	+0.551±0.031
Average udder length	+0.557±0.030
Udder shape	+0.044±0.037
Udder size	+0.058±0.037

There is observed that the most correlations are positive, with values between +0.044±0.037 and +0.557±0.030. The highest correlation was registered between milk quantity and udder length (determined with compass) +0.557, and the lowest correlation was between milk quantity and udder shape (+0.044).

Exceptions is correlation between milk quantity and average udder depth (-0.177±0.037). A high positive value had correlations between milk quantity and average udder width (+0.551±0.031) and mammary index (+0.451±0.033).

In Table 2 there are the values of phenotypic correlation coefficients between average milking speed and some udder characteristics.

Most of the values are positive, but with small levels, from +0.012±0.037 (between average milking speed and distance between posterior teats) to +0.098±0.037 (between average milking speed and distance between anterior-posterior teats). Exception is the phenotypic correlation between average milking speed and mammary index, which was negative (-0.004±0.037).

Table 2

Phenotypic correlation between average milking speed and some udder characteristics

Specification	$r_F \pm s_{rF}$
Mammary index	-0.004±0.037
Distance between anterior teats	+0.035±0.037
Distance between posterior teats	+0.012±0.037
Distance between anterior-posterior teats	+0.098±0.037
Perimeter of anterior teats	+0.052±0.037
Perimeter of posterior teats	+0.018±0.037
Udder shape	+0.058±0.030
Udder size	+0.084±0.037

Referring to genotypic correlation between milk quantity, milking speed and some udder characteristics, it can be seen that the values are negative and also positive (Table 3)

Table 3

Genotypic correlation between milk quantity, average milking speed and some udder characteristics

Specification	Milk quantity	Average milking speed
	$r_G \pm s_{rG}$	
Average milking speed	+0.022±0.846	-
Udder index	-0.131±0.844	-
Average udder depth	-0.965±0.049	-
Average udder width	+0.812±0.029	-
Average udder length	-0.294±0.627	-
Udder shape	-0.238±0.644	-0.257±0.668
Udder size	-0.276±0.356	-
Mammary index	-	+0.579±0.469

The correlations between milk quantity and average milking speed and milk quantity and average udder width were positive (+0.022±0.846 and +0.812±0.029).

The other correlations were negative, with values between -0.131±0.844 (with udder index) and -0.965±0.049 (with average udder depth).

Milking speed correlated with mammary index was positive (+0.579±0.469) and negative with udder shape (-0.257±0.668).

In table 4 there are the environmental correlation coefficients between milk quantity and some udder characteristics. All values are positive, but very erratic, from +0.062 (with udder size) to +0.631 (with udder length).

Table 4

Environmental correlation coefficients between milk quantity and some udder characteristics

Specification	r_M
Average milking speed	+0.156
Udder index	+0.262
Average udder depth	+0.280
Average udder width	+0.539
Average udder length	+0.631
Udder shape	+0.072
Udder size	+0.062

Variable values as measurement and also as sign (positive or negative) registered the environment correlation coefficients between milking speed and some udder characteristics (Table 5).

Table 5

Environmental correlation coefficients between milking speed and some udder characteristics

Specification	r_M
Mammary index	-0.061
Distance between anterior teats	+0.133
Distance between posterior teats	+0.659
Distance between anterior-posterior teats	-0.020
Perimeter of anterior teats	+0.015
Perimeter of posterior teats	-0.052
Udder shape	+0.087
Udder size	+0.106

Positive correlations are observed between milking speed and distance between anterior teats, distance between posterior teats, perimeter of anterior teats, udder shape and udder size. There are negative correlations between milking speed and mammary index, distance between anterior-posterior teats and perimeter of posterior teats, but with very low values (-0.061, -0.020, -0.052).

Conclusions

1.Phenotypic correlation between milk quantity and some udder characteristics were most of them positive, with values from +0.044 (udder shape) to +0.557 (udder length). Phenotypic correlation between milking speed and some udder characteristics had also most positive values (+0.012 – distance between posterior teats; +0.098 – distance between anterior-posterior teats). Negative values had phenotypic correlation between milk quantity and udder depth (-0.177) and between milking speed and mammary index (-0.004)

2.Genetic correlation coefficients between milk quantity and udder characteristics were most negative with values from -0.131 (mammary index) to -0.965 (udder depth). Positive was the correlation with udder width (+0.812). Milking speed was negatively correlated with udder shape (-0.257) and positively with mammary index (+0.579).

3.Environmental correlation coefficients of milk quantity and udder characteristics were all positive, with values between +0.062 (udder size) and +0.631 (udder length), while the milking speed was positively correlated with udder shape (+0.087) and distance between posterior teats (+0.659) and also negatively correlated with distance between anterior-posterior teats (-0.020) and mammary index (-0.061)

References

1.Andreae, U., 1963, Schimbările mărimilor ugerului şi mameloanelor la vaci, cauzate de vârstă. *Tierzuchter* **78,** 4

2.Dietrich, K., 1966, Cercetări privind posibilităţile tehnice de apreciere rapidă a uşurinţei mulsului mecanic la vaci. *Arch*, **80,** 1

3.Labressiere, J. şi col., 1965, Mulsul mecanic. Aspecte anatomice, fiziologice şi tehnologice. *Ann. Zoot*. **14**

4.Sorca Elena, 1981, Parametrii genetici ai principalelor însuşiri ale ugerului la rasa Friză şi posibilităţi de folosire a unui indice de selecţie pentru ameliorarea acestuia. *Teză de doctorat.* IANB, Bucureşti

5.Tănase Dana, 1996, Cercetări privind posibilitatea de apreciere indirectă a structurii glandei mamare la vaci. *Teză de disertaţie*. USAMV, Fac. de Zoot, Bucureşti