

## **EFFECT OF THE GENEALOGIC LINE ON MILK PRODUCTION AND PROLIFICACY OF THE EWES FROM SYNTHETIC POPULATION BULGARIAN MILK**

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### **Abstract**

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The aim of the present study was to establish the effect of genealogic line on milk production and fecundity of ewes. In the study were included ewes from Synthetic population Bulgarian milk (SPBM) at first (n=176), second (n=156) and third (n=115) lactation, raised in Experimental base of Institute of Animal Science –Kostinbrod during years 2006-2011. The study was conducted with three lines: № 604 (ram founder from IAS-Kostinbrod), №93 (ram founder from Experimental station –Vidin) and №3156 (ram founder from Agricultural institute – Shumen). The dairy milk production for 120 days milking period was evaluated by AC method of ICAR. It was calculated the mean maximal milk production for the standard 120 days periods. Fecundity was defined in percentage as the ratio of number of all born lambs (included all born lambs – live born, dead born and aborted) to lambed ewes. The data were calculated by the methods of variation statistics with statistical program EXCEL 2003. The effect of line on milk production and fecundity was established by one-way ANOVA. It was not established the effect of line on standard 120 days milk production and there was a lack clearly marked linear differentiation between lines on the trait milk production. It was established significant influence of the effect of line on the fecundity of ewes at second and third lactation ( $F=4.165^*$  and  $F=3.823^*$ ). A line №3156 was distinguished with higher fecundity at second and third lactation (149% and 170%).

*Key words:* dairy sheep, genealogic line, milk production, fecundity

### **Introduction**

The creation of specialized milk sheep breeding in our country was well grounded by Hinkovsky et al. (1979, 1980, 1982). Different schemes were realized to obtain breed for milk and line for milk (Hinkovsky et al., 1984, Dimitirov, 1988; Tsvetanov, 1989). As a basis for the creation of Synthetic population Bulgarian milk were used ewes from fine-fleece, crossbred and milk breeds and rams from breeds East-Friesian, Awassi, Blackhead Pleven and Stara Zagora local (Hinkovski et al., 1984). During 2005, because of long lasting scientific researches of a group of Bulgarian scientists,

the new breed - Synthetic population Bulgarian milk was acknowledged from the Patent Office of Republic Bulgaria. Depending on the schemes that were used in breed-creating process, it is observed considerable phenotypic differences between the animals from different country areas. Analyzing the structure of sheep breeding in Bulgaria, Stankov (2006) suggested that two types of Synthetic population Bulgarian milk must be differentiated: first type that includes white sheep with blood form East-Friesian breed and second type – spotted, that has blood from Blackhead Pleven and Awassi.

The improvement of the breed involves building of the genealogic structure and supporting of the lines. Up

to now, there are little studies about the effect of line on productive traits of ewes from Synthetic population Bulgarian milk. It was studied the effect of line on milk productivity of ewes of Synthetic population Bulgarian milk in the stage of creating at first and second lactation from Stancheva (2003).

The aim of the present study was to establish the effect of genealogic line on milk production and fecundity of ewes.

## Material and Methods

In the study were included ewes from Synthetic population Bulgarian milk (SPBM) at first (n=176), second (n=156) and third (n=115) lactation, raised in Experimental base of Institute of Animal Science –Kostinbrod during years 2006-2011. The study was conducted with three lines: № 604 (ram founder from IAS-Kostinbrod), №93 (ram founder from Experimental station –Vidin) and №3156 (ram founder from Agricultural institute – Shumen).

The milk production for standard 120 days milking period was evaluated by AC method of ICAR according to the Instruction for the control of productivity quality (2003). The milk quantity was measured in volume units (ml). The milk production of each ewe for the control day was calculated by multiplying the quantity of obtained milk in the morning individual control by the flock coefficient, established for the control day as ratio: morning + evening milk / morning milk. The ewes milk production for 120 days milking period was calculated as a sum of milk production from the individual control periods of each ewe. The control period had mean duration  $30 \pm 3$  days. The milk production for one control period is the product of the milk for the control day and the number of days in the control period. It

was calculated the mean maximal milk production for the standard 120 days milking periods. It was used the maximal milk production of each ewe from controlled three lactations.

Fecundity was defined in percentage as the ratio of number of all born lambs (included all born lambs – live born, dead born and aborted) to lambed ewes.

The data were calculated by the methods of variation statistics with statistical program EXCEL 2003. The effect of line on milk production and fecundity was established by one-way ANOVA. The significance of influence of the studied factor was established by F-criteria of Fisher. The significance of the differences between means of the studied traits was evaluated by t-criterion of Student.

## Results and Discussion

It was not established a significant influence of the line on milk production of the ewes from first, second and third lactation for standard 120 days period (Table 1). Stancheva (2003) reported a significant influence of the line only at first lactation and insignificant influence at second lactation in the study on phenotypic and genotypic parameters of the selection traits of ewes from SPBM in the stage of creating.

In Table 2 were presented the mean values of the milk production for standard 120 days period according to lines of the ewes at first, second and third lactations and the total for flock. The mean milk production for 120 days milking period at first lactation was with 7.3% lower to the requirements for first class (95 l) according to the Instructions for control of productive traits (2003). Only the ewes from line №93 had milk production, which responded to requirements and exceeded the mean production of the flock, as well as the other

**Table 1**  
**Effect of line for 120 days dairy milk production of ewes at first, second and third lactation**

| Source of variation | First lactation |          | Second lactation |     |         | Third lactation |    |          |    |
|---------------------|-----------------|----------|------------------|-----|---------|-----------------|----|----------|----|
|                     | df              | MS       | F                | df  | MS      | F               | df | MS       | F  |
| Between Groups      | 2               | 2120.542 | NS               | 2   | 85.728  | NS              | 2  | 383.505  | NS |
| Within Groups       | 150             | 1070.255 |                  | 112 | 1198.23 |                 | 71 | 1246.997 |    |
| Total               | 152             |          |                  | 114 |         |                 | 73 |          |    |

Note: NS – not significant

two lines with approximately 10%. At the other two lines (№604 and №3156), it was observed similar value of the milk production as the mean of the whole flock. This could be explained with that the ewes at first lactation were selected only by origin.

The standard milk production of the ewes at second lactation covered the limits of first class, as it was not observed marked linear differentiation (Table 2). The milk production at third lactation of the flock and of the ewes from line №3156 responds to the requirements of first class. The studied trait for lines №604 and №93 had similar values and exceeded over 10% (104.5 l) the limits of first class, which determined the linear animals as elite. In despite of the lack of significant differences between ewes at third lactation, there was visible differentiation between lines on the basis of classification of animals as first classes (95 l) or elite (104.5 l).

The same tendency for increasing the milk production with increasing the consecutive lactation was established by Katsarov and Tsenkov (1976) in analysis of the production of genealogic lines of Local Stara Zagora sheep, Tsvetanov (1989) at study the effect of breeds in creation of synthetic population sheep for milk, Dimov (1995) at study of applying different breeding schemes for creation of sheep of dairy direction, Stancheva (2003) and Boikovski (2006) at the stage of the creation of SPBM.

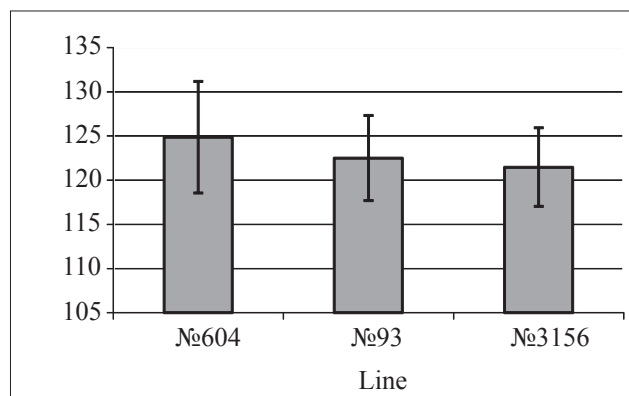
The coefficients of variation of the first, second and third lactation were high, which showed that milk production of the linear ewes was not off level.

The same high coefficients of variation were reported from Dimov (1979) and Djorbineva (1984) for Stara Zagora local sheep and from Legarra and Ugarte

(2001) for ewes from breed Latxa. The lower values for coefficients of variation than ours were reported from Stancheva (2003) in creation of SPBM, Dimov (1979) for Zlatusha sheep and East-Friesian ewes, Antonova (1976) for local Karnobat ewes, Dimitrov (1988) from Romanov sheep crosses and Slavov (2007) for fine-fleece ewes.

About the mean maximal milk production, there were not significant differences between lines and the variation was lower (CV 20-28%) (Figure 1). This milk production and the maximal individual milk production 215.64 l (line №604), 243.90 l (line №93) and 180.83 l (line №3156) showed that there were potential possibilities of the existed lines for realization of higher milk production.

The studied of the effect of line on the fecundity of ewes was showed significant influence on second ( $F=4.165$ ;  $P<0.05$ ) and third lactation ( $F=3.823$ ;  $P<0.05$ ) (Table 3).



**Fig. 1. Mean maximal milk production for standard dairy period**

**Table 2**  
**Mean milk production for standard 120 days dairy period of ewes at first, second and third lactation according to line**

| №         | Line  | n   | First lactation |       |       | n   | Second lactation |       |       | n  | Third lactation |       |       |
|-----------|-------|-----|-----------------|-------|-------|-----|------------------|-------|-------|----|-----------------|-------|-------|
|           |       |     | X               | SE    | CV%   |     | X                | SE    | CV%   |    | X               | SE    | CV%   |
| 1         | 604   | 48  | 88.05           | 4.68  | 36.82 | 35  | 95.06            | 6.471 | 40.27 | 19 | 105.32          | 7.814 | 32.34 |
| 2         | 93    | 59  | 97.46           | 4.763 | 37.54 | 46  | 97.67            | 5.14  | 35.7  | 28 | 106.77          | 7.975 | 39.53 |
| 3         | 3156  | 46  | 85.57           | 4.022 | 31.88 | 34  | 97.47            | 5.143 | 30.67 | 27 | 99.6            | 5.28  | 27.54 |
| 4         | Flock | 171 | 88.02           | 2.544 | 37.8  | 127 | 94.4             | 3.035 | 36.23 | 80 | 100.04          | 4.048 | 36.19 |
| t - stat. |       |     | NS              |       |       | NS  |                  |       | NS    |    |                 |       |       |

Note: Degree of significance of the differences : NS – not significant

At first lactation, there was not a significant difference of the fecundity between lines and with the total of the flock (Table 4). The values of mean fecundity of the linear ewes were similar and did not exceed 130%. At second lactation the lowest fecundity had line №604 (120%) and the highest - №3156 (149%), as the difference between them was significant ( $P < 0.05$ ). At third lactation the tendency for significantly lower fecundity of line №604 (136%) was maintained in comparison to line №3156 (170%) ( $P < 0.05$ ). At third lactation the fecundity for the lines and the mean of the flock (150%), was the highest in compare to the first and second lactation (Table 4).

Boikovski et al. (2003) reported that there were significant differences between fecundity at first and second lactations of some lines from the SPBM flock of Agricultural Institute-Shumen. Totally for all studied ewes, the fecundity was 133.5% for the first lactation and 141.2% for the second. Clearly marked linear differentiation between fecundity at first and second lactation was established by Dimitrov (2006) for the ewes of the breed Northeast Bulgarian fine-fleece – Shumen type.

The age influences the fecundity as with increasing the age it increases too. Notter (2000) reported, that the fecundity was significantly influenced ( $P < 0.001$ ) by the

age as it was highest at ewes between age 4-8 years. Kleemann and Walker (2005) established significantly lower fecundity to ewes at first lambing compared to mature ewes.

In Bulgaria, series of authors established the effect of the age on variation of fecundity at ewes from different breeds (Hinkovsky, 1972; Dimitrov, 1978; Djorbineva, 1984; Dimitrov and Kaleva, 1987; Laleva and Djorbineva, 1997; Dimov, 2000; Metodiev and Raicheva, 2008). Petrova and Vitkov (1996) reported the next values of fecundity at first and second lambing of dairy ewes from the flock from Vidin area: purebred Blackhead Pleven - 138.2% and 141.6%,  $F_1$  crosses Blackhead Pleven x Awassi – 119.3% and 120.4%,  $F_1$  crosses Blackhead Pleven x East-Friesian – 151.5% and 150.0%.

## Conclusions

The next conclusions could be made from the study:

- It was not established the effect of line on standard 120 days milk production and there was a lack clearly marked linear differentiation between lines on the trait milk production.

**Table 3**  
Effect of line on fecundity of ewes at first, second and third lactation

| Source of variation | First lactation |       |    | Second lactation |       |        | Third lactation |       |        |
|---------------------|-----------------|-------|----|------------------|-------|--------|-----------------|-------|--------|
|                     | df              | MS    | F  | df               | MS    | F      | df              | MS    | F      |
| Between Groups      | 2               | 0.026 | NS | 2                | 0.936 | 4.165* | 2               | 0.917 | 3.823* |
| Within Groups       | 154             | 0.205 |    | 136              | 0.225 |        | 106             | 0.24  |        |
| Total               | 156             |       |    | 138              |       |        | 108             |       |        |

Note: \* -  $P < 0.05$ ; NS – not significant

**Table 4**  
Mean fecundity of ewes at first, second and third lactation according to line

| №         | Line  | n   | First lactation |       |       | n   | Second lactation |       |       | n   | Third lactation |       |       |
|-----------|-------|-----|-----------------|-------|-------|-----|------------------|-------|-------|-----|-----------------|-------|-------|
|           |       |     | X               | SE    | CV%   |     | X                | SE    | CV%   |     | X               | SE    | CV%   |
| 1         | 604   | 50  | 1.28            | 0.064 | 35.43 | 46  | 1.2              | 0.067 | 37.9  | 33  | 1.36            | 0.085 | 35.82 |
| 2         | 93    | 60  | 1.3             | 0.06  | 35.55 | 52  | 1.31             | 0.065 | 35.64 | 46  | 1.48            | 0.074 | 34.16 |
| 3         | 3156  | 47  | 1.26            | 0.064 | 35.11 | 41  | 1.49             | 0.079 | 34.01 | 30  | 1.7             | 0.085 | 27.42 |
| 4         | Flock | 176 | 1.3             | 0.034 | 35.32 | 156 | 1.33             | 0.039 | 36.48 | 115 | 1.5             | 0.047 | 33.38 |
| t - stat. |       |     | NS              |       |       |     | 1<3**            |       |       |     | 1<3**           |       |       |

Note: \*\* -  $P < 0.01$ ; NS – not significant

- It was established significant influence of the effect of line on the fecundity of ewes at second and third lactation ( $F=4.165^*$  and  $F=3.823^*$ ).
- A line №3156 was distinguished with higher fecundity at second and third lactation (149% and 170%).

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