ПРОУЧВАНЕ ВЪРХУ ПЛОДОВИТОСТТА И МЛЕКОДОБИВА НА ЕДНОГОДИШНИ ОВЦЕ МАЙКИ ОТ ПОРОДАТА БЯЛА МАРИШКА
STUDY ON PROLIFICACY AND MILK YIELD OF YEARLING EWES OF WHITE MARITZA SHEEP

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Резюме

Заплождането на шилета е важен метод за интензификация на производството на овцевъдна продукция. За целите на това изследване са използвани 314 записа за плодовитостта и 178 записа за млекодобива на едногодишни овце майки от породата Бяла Маришка. Данните се отнасят за периода 1995-2011 г. Плодовитостта е установена в 13 стада, а млекодобивът – в 7 стада, собственост на овцевъди от равнинната част на Пловдивска област. Установено е, че при условията на естествено проявен еструс и естествено запложданe 36,45% от оставените агнета за разплод се заплождат като шилета. Коефициентът на плодовитост е 1,17, а млекодобивът е 60,26 L, което представлява съответно 76,92% и 54,49% от потенциала на възрастните овце майки за производство на агнета и мляко. С изключение на стопанската година, факторите месец на заплождане и стадо нямат доказано влияние върху плодовитостта. Върху продължителността на дойния период и млекодибива на едногодишни овце майки от породата Бяла Маришка статистически доказано влияние имат факторите стадо, стопанска година и месец на агнене.

Abstract

Early mating of ewe lambs is an important method for intensification of sheep production. For the purposes of this study were used 314 prolificacy records and 178 milk yield records of yearling ewes of White Maritza sheep. Data refer to the period 1995-2011 year. Prolificacy was collected in 13 herds and milk yield data was collected in 7 herds owned by sheep breeders from lowland region of Plovdiv. It was found that under conditions of naturally manifested estrus and natural service, 36.45% of the breeding lambs were mated. The prolificacy was 1.17, and milk yield 60.26 L, representing respectively 76.92% and 54.49% of the potential of adult ewes to produce lambs and milk. With the exception of the year, the month of mating and the herd are no significant effect on prolificacy. The length of the milking period and milk yield of White Maritza sheep are significantly influenced by the factors herd, year and month of lambing.

Ключови думи: едногодишни овце майки, млекодобив, плодовитост.
Key words: yearling ewes, milk yield, prolificacy.

INTRDUCTION

Early breeding of female lambs is an important method of intensifying sheep production. This breeding practice has its advantages and disadvantages.

On one hand, in the self-replacing flocks it can increase the annual flock output, reduce the unproductive phase and thus overhead costs, facilitate selection programmes and also increase total lifetime productivity. Early breeding of well managed and adequately nourished ewe lambs has no detrimental effects on their subsequent performance and reproductive efficiency (Economides, 1983).

On the other hand, early breeding of female lambs in very early age increases the risk of culling and can have a negative effect on lifetime production. Under intensive rearing conditions the early breeding may have a negative effect on the length of productive life of sheep and their lifetime production. So Abdelqader et al. (2012) recommended in intensive conditions of sheep breeds Awassi and Nazhdi first mating take place after 17 months of age in order to reduce the risk of culling. The early pregnancy has a negative impact on body condition of sheep and annual productive characteristics. It was found higher

mortality of lambs born to ewes lambing in the first compared with adult sheep (Sawalha et al., 2007; Maria and Ascaso, 1999).

In the autumn of 2009 about 30% of the retained ewe lambs in England are mated (ADAS, 2010).
In the same report it is estimated that up to about 55% of English lowland flock replacement females could give birth at one year of age. The extent to which retained ewe lambs can be mated depends on the body weight and the age. These two limiting factors can be influenced by the level of nutrition and the husbandry conditions.

The fertility and prolificacy of yearling ewes was lower than that of adult sheep (Turner et al., 1968). This is because ewe lambs have a lower degree of ovulation and higher embryo mortality (Diskin and Screenan, 1985).Other older studies however show that, ewes bred as lambs have a higher lifetime production compared with those bred as yearlings (Bowstead, 1930; Hulet et al., 1969).

The breed and the type of crossing influence ewe lambs fertility and the number of lambs born and weaned from the annual ewe (Hullet et al., 1969).

In the present study, data on milk yield and litter size of yearling ewes of the breed White Maritsa were analyzed. The fertility of ewe lambs and influence of some environmental factors on milk yield and prolificacy also were investigated.

MATERIALS AND METHODS

The data used in this study were collected from 1995 to 2011 at the Breeding association of Maritza sheep of Plovdiv in the framework of the recording scheme for production and reproduction traits. Milk yield was calculated using the centering principle, i.e. centering the results for any test day on a period for which the test day is the mid point. Test day records were taken at 30-days interval and AC-method for milk recording in sheep was applied according ICAR regulations. Prolificacy (litter size) was defined as the number of lambs born per yearling ewe (alive and not alive). The final data set included 314 records for prolificacy in 13 herds and 178 records for milk yield of yearling ewes. The herds are owned by farmers from Plovdiv region. The data set includes all yearling ewes who have least one test-day record.

They are not taken targeted measures to mate ewe lambs in the herds. The ewe lambs have been mated freely depending on the naturally manifested estrus.

Fixed linear model was used to be estimated fixed effects of the herd, farming year and month of lambing on the traits milking period, milk yield and prolificacy. The overall means, standard deviations and variation coefficients of the analyzed traits also were discussed.

The model was: $Y_{ij} = \mu + x_i + e_{ijn}$. Where: Y_{ij} = variable; μ = LS – mean; x_i = fixed effect of herd (7), year (15); month of mating (5); e_{ijn} = residual error.

RESULTS AND DISCUSSION

In the light of the future development as ewe mothers, the breeder's opinion is that it is better ewe lambs haven't be mated. Due to joint grazing of ewe lambs and ewes in the herds there is no way to prevent their mating. Since the end of the mating campaign the rams run in the herds and then become mating of some ewe lambs that manifest naturally estrus. Database analysis of the Breeding Association of Maritsa sheep for the period 2006 to 2011 shows that the proportion of mated ewe lambs was 36.45% with a variation between 26.66% and 70.37% (Table 1).

The prolificacy of yearling ewes was 1.17 (tables 2), representing 76.92 % of the prolificacy potential of the breed White Maritza - 1.521 (Dimov, 1999). The duration of the milking period was 76.85 days with a very wide variation from 30 to 180 days.

The milk yield of White Maritsa yearling ewes was 60.26 L with relatively high coefficient of variation (49.37%), which is typical for this traite in sheep. Variation of milk yield lasts from 10.23 L to 182,10 L. The milk yield of 27 yearling ewes from database was more than 100 L. At an overview of the database shows a significant variation in milk yield of yearling ewes. Raycheva and Ivanova (2011) in an experiment with 10 yearling ewes of synthetic population of "Bulgarian dairy" milk yield find out milk yield 85.74 liters in the 120-day milking period without giving the variation of the trait.

With regard to a number of born lambs (prolificacy) Table 3 shows that the herd and month of mating does not affect significantly the number of the born lambs from yearling ewes, but farming year influences significantly prolificacy ($p < 0.01$).

The analysis of the sources of variation in the length of the milking period seems otherwise. It can be seen that the herd effect is significant, but with a very small probability ($p < 0.05$). The farming year and month of lambing have significant influence on the duration of milking period with high probability ($p < 0.001$). The resulted LS-mean for the entire database was 87.21 days, indicates significant interference by organized factors that explain 55.60% of the total variation (R2 = 0,556). It was found a very clear trend how yearling ewes with lambing in January and February have a longer period of milking respectively 123.95 and 110.15 days (Table 5). The yearling ewes with lambing in March, April and May have a shorter period of milking respectively 89.55, 68.87 and 42.91 days.

The milk yield of ewes is influenced by the herd and the month of lambing. Depending on herd milk yield ranged from 44.03 to 129.59 L, which is a very wide range. The herd is a complex factor reflects both the levels of nutrition and selection that has provided by the sheep breeders, and its ability to provide adequate good farming practices to achieve a certain level of milk yield.

Таблица 1. Относителен дял на заплодените шилета от породата Бяла Маришка овца
Table 1. Proportion of early mated ewe lambs from the breed White Maritza sheep breed

Година на раждане Year of birth	Брой шилета, оставени за разплод Number of ewe lambs for breeding purposes	Брой заплодени шилета Number of mated ewe lambs	Относителен дял, % Proportion, %
2011	46	21	45.65
2010	63	17	26.98
2009	70	20	28.57
2008	75	20	26.66
2007	87	28	32.18
2006	54	38	70.37
Общо Total	**395**	**144**	**36.45**

Таблица 2. Общи средни и стандартни отклонения за млекодобива и плодовитостта на шилета от Бели Маришки овце
Table 2. Overall means and standard deviation of milk yield and prolificacy of yearling ewes from White Maritza sheep breed

Показатели Characters	n	x±Sx	SD	VC	min - max
Плодовитост Prolificacy	314	1.17±0.02	0.38	31.25	1 – 2
Доен период, дни Milking period, days	178	76.85±2.65	34.92	32.58	30 – 180
Млекодобив, л Milk yield, L	178	60.26±2.88	38.47	49.37	10.23 – 182.10

Легенда: x - средно аритметично; SD - стандартно отклонение; VC - вариационен коефициент.
Legend: x - average value; SD – standard deviation; VC – coefficient of variation.

Таблица 3. Анализ на източниците на вариране за плодовитостта на едногодишни овце майки от породата Бели Маришки овце
Table 3. Analysis of sources of variation of prolificacy of yearling ewes from White Maritza sheep breed

Източници на вариране Sources of variation	Df	SS	MS	F	P
Стадо Herd	12	2.82	0.23	1.74	
Стопанска година Farming year	16	4.53	0.28	2.10	**
Месец на заплождане Month of mating	4	0.26	0.06	0.478	
Остатък Resudual	281	37.84	0.13		
Обща сума Total sum	314	45.37			

Df - степен на свобода; SS - сума на квадратите; MS - средни квадрати; F – критерий на Фишер, P - степен на вероятност (*** - p<0.001; ** - p<0.01; *- p 0.05)
Df – degree of freedom; SS - sum of squares; MS – mean squares; F - Fisher criterion; P - probability

Таблица 4. Анализ на източниците на вариране върху дойния период при Бели Маришки овце
Table 4. Analysis of the sources of variation on the milking period and milk yield at yearling ewes at White Maritsa sheep

		Доен период Milking period		Млекодобив Milk yield	
Източници на вариране Sources of variation	Df	F	P	F	P
Стадо Heard	6	1.93	*	8.04	***
Стопанска година Farming year	14	3.77	***	2.36	*
Месец на агнене Month of lambing	4	23.62	***	9.30	***
Остатък Resudual	153				
Обща сума Total sum	178				

Df - степен на свобода; SS - сума на квадратите; MS - средни квадрати; F – критерий на Фишер, P - степен на вероятност (*** - p<0.001; ** - p<0.01; *- p 0.05)
Df – degree of freedom; SS - sum of squares; MS – mean squares; F - Fisher criterion; P - probability

Таблица 5. Доен период (в дни) на шилета от Бели Маришки овце в зависимост от месеца на агнене
Table 5. Milking period (days) of yearling ewes of White Maritza sheep breed depending of month of lambing

Източници на вариране Sources of variation	n	LS - средни LS - means	SE
Януари / January	10	123.95	8.92
Февруари / February	27	110.15	6.05
Март / March	56	89.55	4.30
Април / April	65	68.87	4.03
Май / May	20	42.91	7.40
Общо / Total	**178**	**87.21**	**3.57**

Таблица 6. Млекодобив (литри) на шилета от Бели Маришки овце в зависимост от стадото
Table 6. Milk yield (litres) of yearling ewes of White Maritza sheep breed depending of the herd

Източници на вариране Sources of variation	n	LS - средни LS - means	SE
Стадо 7* / Heard 7	9	44.03	24.82
Стадо 14 / Herd 14	30	51.91	10.50
Стадо 25 / Herd 25	53	89.54	8.32
Стадо 26 / Herd 26	12	129.59	12.35
Стадо 35 / Herd 35	44	75.16	10.23
Стадо 39 / Herd 39	7	115.18	16.48
Стадо 56 / Herd 39	23	83.36	21.36
Общо /Total	**178**	**76.45**	**4.23**

*Код на стадото / *Cod of the herd

Таблица 7. Млекодобив (литри) на шилета от Бели Маришки овце в зависимост от месеца на агнене
Table 7. Milk yield (litres) of yearling ewes of White Maritza sheep breed depending of month of lambing

Източници на вариране Sources of variation	n	LS - средни LS - means	SE
Януари / January	10	92.92	10.60
Февруари / February	27	102.27	7.19
Март / March	56	76.32	5.11
Април / April	65	60.87	4.79
Май / May	20	49.86	8.79
Общо / Total	178	76.45	4.23

Earlier lambed ewe lambs able to develop a higher milk yield, and ewe lambs lambed in May had the lowest milk yield.

The milk yield of yearling ewes of White Maritza sheep breed 60.26 L for milking period of 75.85 days represents 54.49% of the milk yield of adult ewes of the same breed - 110.57 L (Dimov, 2011). The fact that some of ewe lambs are bred and enter in productive cycle in early age 13-15 months without provocation artificially their estrus allows intensification of mating process. This is also indicator of precocity ability of the White Maritsa sheep breed.

CONCLUSIONS

Based on this research it can be concludes:

The prolificacy yearling ewes of White Maritsa sheep breed is 1.17, which represents 76.92% of the potential of older ewes. The milk yield of yearling ewes of White Maritsa sheep 60.26 L, which represents 54.49% of the magnitude of the trait in adult ewes. Inter herd variation in milk yield from 44.03 L to 129.59 L discover the potential for increasing average yield of yearling ewes. The presence of yearling ewes with more than 100 L of milk yield disclose reserves for intra herd selection and early evaluation of milk yield in sheep.

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