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Study on ewe live weight of Patch-faced Maritza sheep breed

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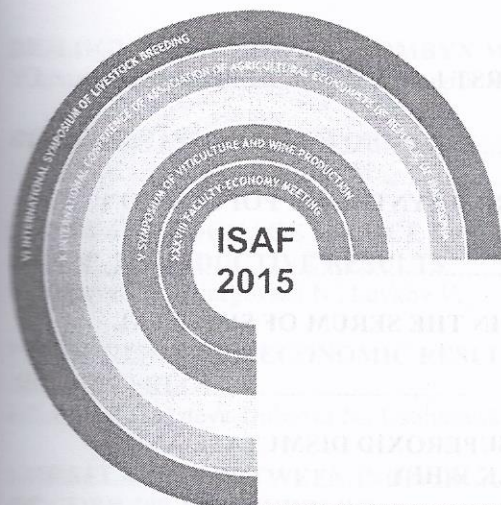
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ANIMAL BIOTECHNOLOGY

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STUDY ON EWE LIVE WEIGHT OF PATCH FACED MARITZA SHEEP BREED

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Abstract

The aim of this study was to investigate magnitude of live weight of adult ewes and rams of Patch-faced Maritza sheep breed as well as changes in ewe live weight from lambing to the end of lactation. Live weight of 296 ewes and 7 rams of Patch-faced Maritza sheep breed has been measured by a portable electronic scales FX2. The weighing was made in 6 herds in Plovdiv region (central part of South Bulgaria) with dried of ewes. In order to establish changes in ewe live weight during lactation an experiment was conducted with monthly weighing of 67 ewes in the herd of Agricultural university in Plovdiv. It was found that overall mean of ewe live weight is 74.47 kg and ram live weight in this study was 121.47 kg. In comparison with other local sheep breeds in Bulgaria and other European country this is higher live weight. ANOVA table showed a statistically proven impact of environmental factors - herd, age and body condition score of the ewe with high probability ($p < 0.001$). The changes of ewe live weight after parturition, were studied through monthly weighing after lambing to drying of the ewes. After parturition, ewe live weight decreased to 2nd month with 19.54 %, then to the end of lactation live weight is maintained at the same level with minor fluctuations.

Key words: live weight, adult ewes and rams, environmental factors, changes.

STUDY ON EWE LIVE WEIGHT OF PATCH FACED MARITZA SHEEP BREED

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SUMMARY

The aim of this study was to investigate magnitude of live weight of adult ewes and rams of Patch-faced Maritza sheep breed as well as changes in ewe live weight from lambing to the end of lactation. Live weight of 296 ewes and 7 rams of Patch-faced Maritza sheep breed has been measured by a portable electronic scales FX2. The weighing was made in 6 herds in Plovdiv region (central part of South Bulgaria) with dried of ewes. In order to establish changes in ewe live weight during lactation an experiment was conducted with monthly weighing of 67 ewes in the herd of Agricultural university in Plovdiv. It was found that overall mean of ewe live weight is 74.47 kg and ram live weight in this study was 121.47 kg. In comparison with other local sheep breeds in Bulgaria and other European country this is higher live weight. ANOVA table showed a statistically proven impact of environmental factors - herd, age and body condition score of the ewe with high probability ($p < 0.001$). The changes of ewe live weight after parturition, were studied through monthly weighing after lambing to drying of the ewes. After parturition, ewe live weight decreased to 2nd month with 19.54 %, then to the end of lactation live weight is maintained at the same level with minor fluctuations.

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INTRODUCTION

After 1990, great changes in the Bulgarian sheepbreeding have been occurred. The selection and genealogical structures of many existence sheep breeds have been changed. A lot of merino and semi-merino sheep breed lost of its relevance. Many sheepbreeders have preferences to local sheep breeds with better productivity – Pleven blackhead sheep, Stara Zagora sheep, White Maritza sheep, Patch-faced Maritza sheep, Elin-Pelin sheep. This poses serious challenges to the breeding work with these breeds. In order to survive these breeds need to be competitive to introduced sheep breeds. Developing sustainable breeding programs for local Bulgarian sheep breeds will contribute to the conservation of their competitiveness. New studies are needed for the magnitude of the productive and functional traits of local sheep breeds (milk yield, prolificacy, growing ability of the lambs, litter weight and live weight in different ages) in order to estimate better their potential to satisfy farmer's economical interest.

Milk yield and prolificacy of present population of Patch-faced Maritza sheep have been object of research in many other papers (Dimov and Djorbineva 1997, Dimov et al., 1997, Dimov 1998, Dimov 2000, Dimov and Kuzmanova 2006). Live weight of Patch-faced Maritza sheep has not been studied yet.

As a dual purpose sheep breed, live weight of Patch-faced Maritza sheep has significant contribution to meat production because of which are needed new data and research.

Visual appraisals of Patch-faced Maritza sheep characterized them as large breed (Dimov 1998, 2010). Studies on live weight of adult ewes and rams of Patch-faced Maritza sheep breed has not been done till now if it does not take into account the study of Balevska and Tanev (1958),

where the authors have measured live weight of local sheep – 40.05 kg (for period 1948 – 1955). However, these data are not relevant for today's population of Patch-faced Maritza sheep.

Breeding activities with Patch-faced Maritza sheep today pass off entirely with herds in private sector, because of which at this stage for full characteristic of the breed new data of live weight of different age categories are needed.

The aim of this study was to investigate magnitude of live weight of adult ewes and rams of Patch-faced Maritza sheep breed as well as changes in ewe live weight from lambing to the end of lactation.

MATERIAL AND METHODS

Live weight of 296 ewes and 7 rams of Patch-faced Maritza sheep breed has been measured by a portable electronic scales FX21 Electronic Weighing System produced by ICONIX. The weighing was made in 6 herds in Plovdiv region for the period 15th August – 15th September 2008. In addition an experiment was conducted with monthly weighing of 67 ewes in the flock of Agricultural university in Plovdiv in order to find changes in live weight of the ewes from lambing to the end of lactation. It was covered the period from the last month of pregnancy to the end of lactation. Body condition score was measured at every weighing through system described by Todorov (1995). To take into account environmental effects fixed linear model was used:

$$Y_{ijkmn} = \mu + a_i + b_j + c_k + d_m + e_{ijkmn}$$

where:

Y_{ijkmn} = n-th measuring of j-th ewe in i-th herd, k-th age category and m-th body condition score.

μ = LS – mean of the population

a_i = fixed effect of the herd (1.... 6)

c_k = fixed effect of age of the ewe (1.....6)

d_m = fixed effect of body condition score (1....3)

e_{ijkm} = residual error

To solve the equations of fixed linear model, statistical package of Harvey (1990) was used.

RESULTS AND DICUSION

The live weight is important functional trait in sheep, which influences meat and wool productivity, as well as milk production. In this study it was found overall mean of ewe live weight - 74.47 kg with low coefficient of variation. This is higher live weight in comparison with other local sheep breeds. Ram live weight in this study was 121.47 kg, which present 162.66 % than ewe live weight. Although comparatively low number of the rams in this study, the results can be considered informative, against the background of the live weight of the ewes.

Table 1. Overall means and standard deviation of live weight of Patch-faced Maritza ewes and rams.

Traits	n	\bar{x}	Sd	Cv
Ewe live weight, kg	296	74.47	14.87	10.01
Ram live weight, kg	7	121.14	22.26	18.36

Legend: n – number of observations; \bar{x} -overall mean; Sd – standard deviation; Cv – coefficient of variation.

It is well known that on a population level live weight as many other traits in sheep is influenced by too many environmental factors. By these reasons, many authors considered, that the overall means are not sufficiently informative for proper interpretation of the data obtained on a population level (Tzvetanov, 1990). Therefore, assessing the impact of environmental factors has become a common procedure in handling database of traits in farm animals.

ANOVA table showed a statistically proven impact of factors included in the model - herd, age and body condition score of the sheep at a relatively high probability (table 2).

Table 2. ANOVA of ewe live weight Patch-faced Maritza sheep breed.

Sources of variation	df	SS	MS	p
Herd	5	14822.35	2964.47	***
Age	5	5516.27	1103.25	***
Body condition score	2	6450.42	3225.21	***
Residual	283	15737.66	55.61	
Total	296			

Legend: df – degree of freedom; SS – sum of square; MS – mean square; p - probability *** = $p < 0.001$

Review of the literature about Bulgarian sheepbreeding shows that only Stantcheva (2003) find a higher ewe live weight on a synthetic population in the country – 83.97 kg at 2.5 years of age and 87.51 kg for ewe 3.5 years. However, it has to keep in mind that these data Stantcheva (2003) found only in one flock, that is in sheep farm in Agricultural institute in Shumen. It is logical to assume that high live weight of synthetic population found of Stantcheva (2003) is influenced by the factor herd, because as it is well known that sheep farm in Agricultural institute in Shumen is one of the best in Northern Bulgaria and high level of nutrition is provided.

Most of the studies on the live weight of different sheep breeds and crosses in the country (Venev et al., 1974, Djorbineva, 1984, Tsvetanov, 1989, Georgiev, 1990, Dimov 1995) are implemented in one herd. Although data were collected in different farming years the herd effect is not taken into account by the authors. According to us when doing breed characteristic on a given trait, it must be done at least in several herds in order to be taken into account the herd effect, which in most cases is significant. This is an occasion to look at our results presented in table 3. If we consider LS-means in different herds it can be seen that herd effect causes variation in ewe live weight of Patch-faced Maritza sheep breed from 68.21 kg to 90.82 kg. This variation can be explained by the provided level of feeding and keeping of the sheep and the level of management in the herds. It could seek other reasons for this difference, but at this stage in view of the fixed sources of variation that is the only explanation.

Table 3. LS-means и SE of live weights of adult ewes of Patch-faced Maritza sheep breed depending of the herd influence.

Names of owners of the herds and location	n	LS-means	SE
1. A. Gishin - Saedinenie	56	90.82	1.10
2. Agricultural university - Plovdiv	115	68.21	0.86
3. P. Dashev – Radinovo	36	75.29	1.32
4. R. Borisov- Manolsko Konare	54	76.34	1.05
5. J. Vitkov – Manolsko Konare	16	81.43	1.93
6. V. Rumenov	19	78.69	1.78
LS – mean	296	78.46	0.62

Legend: n – number of observations; LS – least square; SE – standard error

A number of studies on the ewe live weight of the other local sheep breeds as Black-head Plevan and Stara Zagora and some dairy crosses (Dzhorbineva , 1984, Tsvetanov , 1989, Georgiev , 1990, Dimov 1995) refer only to two age groups - 2.5 and 3.5 years. This is due to the old system of selection in the country, which was based on data for productive and functional traits only during the first two lactations (to 3.5 years of age). Former large cooperative farms from 1000 - 3000 ewes on the farm (before 1990) made it possible to form large flocks of the same age. The present situation in sheepbreeding is quite different. Our observations in a number of private farms have shown that there are many cases where the ewes in flocks of Patch-faced Maritza sheep are left for breeding purposes to 6.5 years of age and in some cases older. Our results show that the live weight of adult ewes increases to 6.5 years and reached 84.22 kg (table 4). This gives us reason to think that analysis of data on ewe live weight should be the basis of all age groups in the flocks. Otherwise, the information of the ewe live weight is not so accurate especially for older categories.

Table 4. LS-means and SE of ewe live weight at Patch-faced Maritza sheep breed depending of the age, kg

Age, year	n	LS-means,	SE
1.5	55	69.70	1.17
2.5	78	75.78	0.92
3.5	60	79.95	1.04
4.5	46	79.38	1.17
5.5	28	81.75	1.48
6.5	29	84.22	1.47
LS – mean	296	78.46	0.62

Legend: n – number of observations; LS – least square; SE – standard error

Ewe live weight was measured between 15th august and 15 september. This is a period when the ewes are dried off. Some of the ewes were pregnant, but this fact was ignored because they were in too early stages of pregnancy (1st -2nd month of pregnancy). However, the ewe live weight was influenced by body condition in this period. Ewes with a high milk yield during milking period had depleted body reserves and in worse body condition than those with a lower milk yield, which results in a lower live weight. Therefore, body condition has to take into account for a proper assessment of ewe live weight. Restoration of body reserves of high yielding ewes takes about two months, so at the end of lactation (august-september) they are not reimbursed.

Depending of body condition scores, ewe live weight vary from 70.12 до 87.85 kg, which emphasize the great importance of assessing the body condition of the ewes when live weight is measuring (table 5).

Table 5. LS-means и SE of live weight of Patch-faced Maritza sheep depending of body condition score

Body condition scores	n	LS-means	SE
to 3.0	60	70.12	1.05
from 3.0 to 3.5	185	77.42	0.69
over 3.5	51	87.85	1.24
LS – mean	296	78.46	0.62

Legend: n – number of observations; LS – least square; SE – standard error

The ewe live weight is not constant. Depending on changes in the physiological condition ewe live weight is changing. After drying off the ewes and their mating, ewe live weight gradually

increases until the end of pregnancy. After parturition, in connection with lactation and intensive use of body reserves to maintain energy balance the ewes lose a certain percentage of their live weight (table 6). It can be seen in the table 6, that after parturition ewe live weight decreased to 2nd month with 19.54 %, then to the end of lactation ewe live weight is maintained at the same level with minor fluctuations.

Table 6. Changes in ewe live weight after parturition during lactation.

Traits	Last month of pregnancy	Months of lactation					
		1st	2nd	3th	4th	5th	6th
Live weight, kg	83.95	70.38	67.55	68.32	69.44	65.58	68.08
Lost of weight, %	100	-16.16	-19.54	-18.62	-17.28	-20.69	-18.90

CONCLUSIONS

Based on this study it can be done the following conclusions:

Ewe live weight of Patch-faced Maritza sheep breed is 78.46 kg (LS-mean), which defines Patch-faced Maritza sheep breed as a large breed with a high live weight. Ram live weight of rams is 121.14 kg

Significant effect on ewe live weight have the factors - heard, age and body condition *възраст и телесно състояние*.

Live weight loss after parturition until the second month of lactation reaches 19.54% . After the second month until the end of lactation ewe live weight has a minor fluctuation.

Phenotypic characteristics of sheep breeds on the base of live weight of adult animals must be done based on measurement of the trait in several herds and possible inclusion of ewes of all ages. When live weight is measuring it should be take into account also body condition scores.

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