

COMPARATIVE STUDY ON THE MILK PRODUCTION AND THE DURATION OF LACTATION IN EWES OF SYNTHETIC POPULATION BULGARIAN MILK

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Abstract

The aim of this work was to carry a comparative study on the milk production and the duration of the lactation in ewes of Synthetic population Bulgarian milk. The investigation was carried out with 84 ewes on first and second lactation raised in the Institute of Animal Science – Kostinbrod and Vrana LTD. The milk production was controlled and calculated by AC method of ICAR. The obtained information was analysed by the statistical package of EXCEL 2003. We found significant effect of the flock on the milk production during suckling and the lactation period on first lactation ($P<0,05$, $P<0,01$), on the suckling and standard 120 days milking milk production on second lactation ($P<0,05$, $P<0,01$) and on the duration of suckling, milking and lactation period on first and second lactation ($P<0,001$) as well. Significantly higher values of the duration and the milk production during the different periods of lactation in the flock of the Institute of Animal Science – Kostinbrod were determined. Only the 120 days milking milk production and the average daily milk production on second lactation were significantly higher in the flock of Vrana LTD.

Key words: dairy sheep, duration of lactation, milk production

The Synthetic population Bulgarian milk is a new sheep breed created in the year 2005. Therefore in our specialized literature studies are mainly focused on the traits linked to milk production and composition. (Nedelchev, Raicheva & Petrova 2003; Stancheva 2003; Ivanova & Raicheva 2007; Ivanova & Raicheva 2008; Ivanova & Raicheva 2010; Hinkovski, Raicheva & Metodiev 2008; Boikovski, Stefanova & Stancheva 2006; Nedelchev & Raicheva 2000).

When creating the breed, various schemes were applied in the different areas of the country leading to a certain phenotype variety. The dairy sheep form the major part in Bulgaria (according to Agricultural statistics of MAF on 1.11.2010 the number of the dairy ewes is 1 011 999) and are very much in demand.

The most important thing in dairy sheep breeding is the quantity of commercial milk that depends on the duration of lactation and the level of the milk production. The studies on the duration of lactation, the relative share of milk production in the different periods of lactation as well as the effect of different factors on their variation were limited in this sheep breed (Stancheva 2003; Raicheva & Ivanova 2010). The results from the experiments aiming to augment the milking milk production through selection increase the economic effectiveness from dairy ewes (Stoyanov, Paliev & Dochevski 1976; Tanev & Raichev 1976; Hinkovski, Donchev & Dochevski 1979; Donchev, Tzochet & Hristov 1982; McKusick, Thomas & Berger 2001).

The aim of this work was to conduct a comparative study on the milk production, the duration of the different lactation periods and the effect of the flock on them in ewes of Synthetic population Bulgarian milk.

MATERIAL AND METHODS

The study was carried out with 51 ewes raised in the Experimental base of the Institute of Animal Science – Kostinbrod and 33 ewes - raised in Vrana LTD from Synthetic population Bulgarian milk (SPBM) in the same economic year, fed according to the standards for lactating ewes. The milk for control day was controled and calculated according to the Instruction for control of productive traits of sheep during the suckling and the milking period.

The suckling milk production was determined as in the evening before control day the lambs were separated from the ewes that were milked. The control milking was done after 12 hours individually for each ewe and the recieved milk was multiplied by two.

The individual quantity of milk of each milking control was controlled by the AC method of ICAR and measured in volume units (ml). The milk production of each ewe for the control day was calculated by multiplying the quantity of the milk obtained in the morning of the individual control by the flock coefficient, established for the control day as a 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 milk production for one control period is the product of the milk for the control day and the number of the days in the control period. The days of the suckling period, the days of the milking period and total days of lactation were registered. The lactation milk production was calculated as a sum of the suckling and milking milk production.

The data obtained were calculated by the methods of variation statistics and analysed by the statistical package of EXCEL 2003. The effect of flock was established by one-way ANOVA. The significance of the influence of the studied factor was established by F-criterion of Fisher. The significance of the differences between means of the studied traits was evaluated by t-criterion of Student.

RESULTS AND DISCUSSION

The values of the F-criterion for the ewes on first lactation showed significant influence of the flock on the milk production during the suckling and lactation period ($P < 0,05$, $P < 0,01$). The effect of the flock on the duration of the different periods of lactation (suckling, milking and lactation) is highly significant too ($P < 0,001$) (table 1).

Table 1. Values of the F-criterion for the effect of the flock on the studied traits in the ewes on I lactation, n=36

	F- criterion
Suckling period, d	18,08***
Milk for suckling period, l	8,78**
Milk for 120 days milking period, l	NS
Milking period, d	100,56***
Milk for milking period, l	NS
Lactation period, d	182,44***
Milk for lactation period, l	6,18*

Note: Significant at: * - $P < 0,05$; ** - $P < 0,01$; *** - $P < 0,001$

Analogically, highly significant values of the F-criterion for the influence of the flock on the duration of suckling, milking and lactation period were obtained in the ewes on second lactation too ($P < 0,001$) (table 2). When studying the effect of the flock on the milk production we found significant influence of the investigated factor on the variability of the suckling and standard 120 days milking milk production ($P < 0,05$, $P < 0,01$) (table 2).

Table 2. Values of the F-criterion for the effect of the flock on the studied traits at the ewes on II lactation, $n=48$

	F- criterion
Suckling period, d	37,72***
Milk for suckling period, l	7,55**
Milk for 120 days milking period, l	6,86*
Milking period, d	312,45***
Milk for milking period, l	NS
Lactation period, d	363,85***
Milk for lactation period, l	NS

Note: Significant at: * - $P < 0,05$; ** - $P < 0,01$; *** - $P < 0,001$

The duration of the suckling period of the ewes raised in the Institute of Animal Science – Kostinbrod was significantly higher in comparison to that of the ewes from Vrana on the first (72,11 d and 58,94 d) as well as on the second lactation (76,73 d and 57,33 d) ($P < 0,001$) (table 3) at 60 days required duration of the suckling period (Ministry of Agriculture and Forestry 2003). This affects the results for the suckling milk production of both flocks where the milk for the suckling period in the Institute of Animal Science – Kostinbrod was significantly more in the studied groups (first and second lactation) (61,72 l and 69,50 l) ($P < 0,01$) when compared to Vrana LTD (44,78 l and 51,07 l). The different duration of the suckling period can be explained with arising technological problems.

Hinkovski, Raicheva and Metodiev (2008) found average milk production during the suckling period (60 days) of ewes from Synthetic population Bulgarian milk in the flock of the Institute of Animal Science – Kostinbrod which was higher than the obtained in the present study. Ivanova and Raicheva (2010) reported 59,02 l suckling milk production in early conceived ewes from Synthetic population Bulgarian milk on first lactation which is in the range of the that, reported here.

A longer suckling period (74 days) in Awassi ewes has been reported by Pacinovski (2011). The results for the duration of the suckling period obtained in this study showed that in the flock of the Institute of Animal Science – Kostinbrod the duration was higher than the required (Ministry of Agriculture and Forestry 2003) while in Vrana – it responded to the requirements.

The standard 120 days milking milk production obtained from the ewes on second lactation in Vrana (112,55 l) was significantly higher ($P < 0,05$) than this in the Institute of Animal Science – Kostinbrod (84,50 l) (table 3) at a requirement of 95 l for first class (Ministry of Agriculture and Forestry 2003). This can be explained with the significantly longer suckling period in the Institute of Animal Science –

Kostinbrod (with 20 days) as a result of unfavourable nongenetics factors during the year and because of that, a part of the milk obtained in a top of lactation as milking was not realized.

Hinkovski, Raicheva and Metodiev (2008) studying the standard 120 days milking milk production on first and second lactation in the ewes from Synthetic population Bulgarian milk reported higher values than the obtained in this investigation (110,69 l and 116,5 l). Similar result for the average value of the standard 120 days milking milk production determined Ivanova & Raicheva (2008) too in the ewes on second lactation (115,512 l) and lower – on first lactation (68,139 l). In ewes on first lactation the milking milk production for 120 days milking period had close value (90,75 l) (Ivanova & Raicheva 2010) and (104,39 l) (Ivanova et al. 2010).

Table 3. Duration and milk production of the different periods of lactation

	I lactation		II lactation		Signif.
	IAS, n=18	Vrana, n=18	IAS, n=33	Vrana, n=15	
	1	2	3	4	
	$\bar{x} \pm SE$	$\bar{x} \pm SE$	$\bar{x} \pm SE$	$\bar{x} \pm SE$	
Suckling period, d	72,11 $\pm$ 2,489	58,94 $\pm$ 1,843	76,73 $\pm$ 1,887	57,33 $\pm$ 2,151	1>2*** 3>4***
Suckling period, l	61,72 $\pm$ 4,754	44,78 $\pm$ 3,177	69,50 $\pm$ 3,653	51,07 $\pm$ 5,799	1>2** 3>4**
120 days milking period, l	92,27 $\pm$ 11,683	103,33 $\pm$ 10,311	84,50 $\pm$ 4,795	112,55 $\pm$ 11,855	4>3*
Milking period, d	187,5 $\pm$ 4,244	125,33 $\pm$ 4,519	191,82 $\pm$ 2,238	120,73 $\pm$ 3,367	1>2*** 3>4***
Milking period, l	129,72 $\pm$ 15,277	99,33 $\pm$ 9,207	122,55 $\pm$ 7,704	106,73 $\pm$ 10,568	NS
Lactation period, d	259,72 $\pm$ 4,795	177,89 $\pm$ 3,761	268,55 $\pm$ 2,923	178,07 $\pm$ 2,804	1>2*** 3>4***
Lactation period, l	191,45 $\pm$ 18,488	139,63 $\pm$ 10,245	190,87 $\pm$ 8,963	157,8 $\pm$ 15,617	1>2*

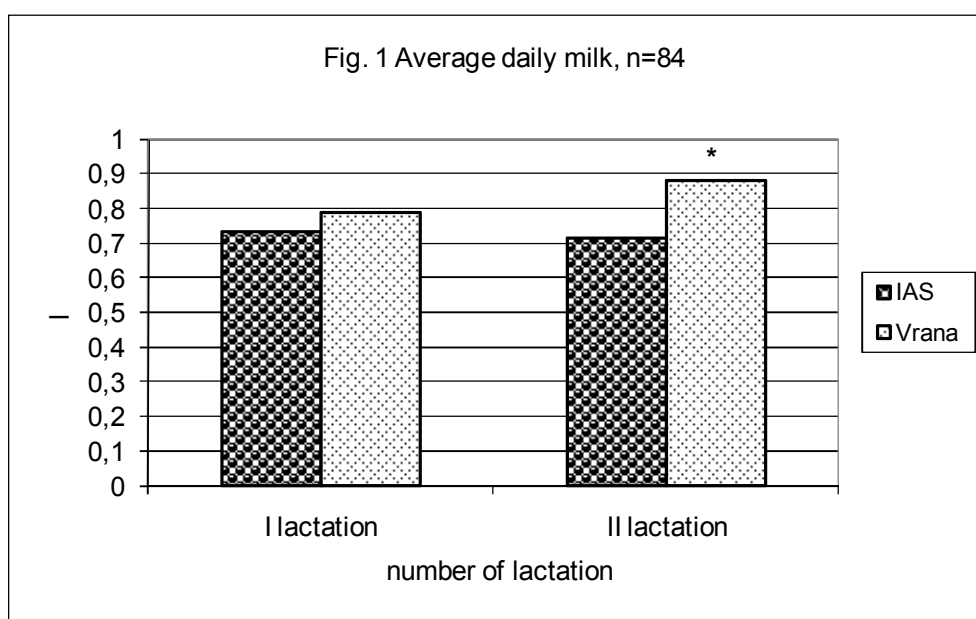
Note: Significant at: * - $P < 0,05$; ** - $P < 0,01$; *** - $P < 0,001$

The milking and lactation period of the ewes raised in the Institute of Animal Science – Kostinbrod significantly exceeds this in Vrana in ewes on first as well as in ewes on second lactation ($P < 0,001$) (table 3). As a result of this, the lactation milk production on first lactation was significantly higher in the flock of the Institute of Animal Science – Kostinbrod ($P < 0,05$), and on second – analogical tendency was observed.

When studying the lactation milk production of ewes from Synthetic population Bulgarian milk Stancheva (2003) reported higher values (194,5 l for the ewes on first lactation and 199,9 l – on second lactation), and for milking milk production - lower (on first lactation 99,178 l, on second – 101,957 l). The same author reports duration of the lactation in the range of the values obtained here

(207 days for first lactation and 210 days – for second) – lower than the duration in the Institute of Animal Science – Kostinbrod and higher than the duration in Vrana.

The duration of lactation was studied in other dairy breeds too – in purebred East Friesian sheep McKusick, Berger and Thomas (1999) reported duration of the lactation 169,4 - 177,7 days; in crosses of East Friesian breed - 126,2 days (Thomas, Berger & McKusick 1999), 91,7 – 105,5 days (Thomas et al. 2000), 137,8 days on first and 160,3 days on second lactation (Thomas et al. 2010), 181,5 days (McKusick et al. 2000), 130,2 – 131,8 days on first lactation and 160,1 days on second lactation (Morrissey et al. 2007); in Sardinian sheep - 250 days (Saadoun et al. 2004), in Awassi and Assaf – respectively 173 and 214 days (Pollott & Gootwine 2004) and 234 days in Awassi (Pacinovski 2011).



Note: Significant at: * - $P < 0,05$

Figure 1 resents the average daily milk production of the ewes for the lactation period. The average daily milk production of the ewes on second lactation from the flock in Vrana (0,882 l) was significantly higher than this in the Institute of Animal Science – Kostinbrod (0,790 l) ($P < 0,05$) and on first lactation the differencies were non significant but the tendency was preserved (0,733 l and 0,712 l). This can be explained with the fact that East Friesian breed took the major part at the creation of the flock of Vrana LTD and higher blood relation from this breed in comparison to the ewes raised in the Institute of Animal Science – Kostinbrod is maintained.

CONCLUSION

The following conclusions could be made from the concrete study:

There is significant effect of the flock on the milk production during the suckling and lactation period ($P < 0,05$, $P < 0,01$) in the ewes on first lactation, on the suckling and standart 120 days milking milk production ($P < 0,05$, $P < 0,01$) in the ewes on second lactation. The milk production during the different

periods of lactation was established, as with exception of the standart 120 days milking milk production it was significantly higher in the flock of the Institute of Animal Science – Kostinbrod (suckling - 62-70 l, milking - 123-130 l, lactation – 191 l). The standart 120 days milking milk production (103-113 l) and average daily milk production of ewes on second lactation (0,882 l) were determined and were significantly higher in the flock of Vrana LTD.

Highly significant values of F-criterion for the effect of the flock on the duration of suckling, milking and lactation period in the ewes on first and second lactation ($P < 0,001$) were obtained. The values for the duration of the different periods of lactation in the flock of the Institute of Animal Science – Kostinbrod (suckling - 72-77 days, milking - 188-192 days, lactation - 260-269 days) were significantly higher than the obtained for Vrana (suckling - 57-59 days, milking - 121-125 days, lactation – 178 days).

ACKNOWLEDGMENT

Research was financed by Project BG051PO001-3.3.06-0033 "Support for the development of doctoral graduate students and young researchers" OP "Human resourses development" Ministry of Labour and social policy European Social Fund (ESF)



European Union

Project BG051PO001-3.3.06-0033

***"Support for the development of doctoral graduate students
and young researchers"***

Funded by: Operational Program "Human resourses development"

Ministry of Labour and social policy



European Social Fund

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