

THE EFFECT OF THE AGE AT CONCEIVING ON THE PRODUCTIVITY TRAITS AT DAIRY EWES IN BULGARIA

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Original scientific paper

Abstract: The aim of the research was to study the effect of the age at conceiving on the productivity traits of sheep from Synthetic population Bulgarian milk in Bulgaria. The experiment was conducted with 20 ewes traditionally conceived at the age of 18 months and 20 ewes conceived as ewe lambs at the age of 11 months on first lactation and their lambs (47) reared in IAS – Kostinbrod, Bulgaria. The 120 days milking milk production and that after 120 days until the end of lactation were determined by the AC method of ICAR. The days after the standard period until the end of lactation were registered. The milk composition was measured by milk analyzer Ekomilk, Bultech Company, Bulgaria. The live weights were measured. The fecundity was determined. With the exception of the fecundity and the standard 120 days milking milk production the age at conceiving influences significantly the live weigh before conceiving, birth live weight of lambs, the duration of the milking period and the milking milk yield ($P<0.01$; $P<0.001$). The traditionally conceived ewes had significantly higher live weight before conceiving (52.31 kg), of newborn lambs (5.05 kg), the duration of milking period (187 days) and milking milk yield (130 L) than the early conceived (40.53 kg; 4.16 kg; 120 days; 80.24 L) ($P<0.01$; $P<0.001$). For the fecundity and the standard 120 days milking milk production no significant differences were found between the groups (1.08% and 1.25%; 92.27 L and 80.24 L). Significant difference in the milk composition of the ewes conceived at 18 month age compared to the conceived at the age of 11 months ($P<0.05$; $P<0.001$) was found. The obtained results provide useful information for the implementation of suitable management decisions for early conceiving of the ewes from Synthetic population Bulgarian milk for production of lambs and milk at the farm practice.

Key words: dairy ewes, age of conceived, milk production

Introduction

The sheep milk production depends on many factors – breed, number of lactation, stage of lactation, nutrition, environmental factors (Petrović *et al.*, 2006), age at first lambing (Barillet *et al.*, 1992; Pollott and Gootwine, 2004).

In our country many research related to the problems of milk production were conducted (Stankov, 2006; Nedelchev *et al.*, 2003). Various factors affecting the increase of milk production were studied and it was done an analysis of the type of lactation, lactation curves and persistence of the lactation (Dimov, 1995; Dimov, 1996; Slavov and Mihailova, 2006; Ivanova and Raicheva, 2007; Hinkovski *et al.*, 2008). The effects of the breed, the period of lactation, feeding, health status of sheep on the milk composition were studied (Djorbineva *et al.*, 1995; Stancheva *et al.*, 1997, Petrova and Nedelchev, 2000, Raicheva *et al.*, 2004).

The increase of milk yield is a result of the realization of genetic potential as well as the use of different technological systems. In this aspect the applying of the early conceiving of sheep is limitedly studied.

The aim was to study the effect of the age at conceiving on the productivity traits of sheep from Synthetic population Bulgarian milk in Bulgaria.

Materials and Methods

The study was carried out with 40 ewes (20 traditionally conceived at the age of 18 months and 20 early conceived at 11 months of age) on the first lactation from Synthetic population Bulgarian milk (SPBM) and their lambs (47) reared in the experimental base in IAS – Kostinbrod, Bulgaria. During the experimental period the traditionally conceived sheep (group I) were raised indoors (March, April) and grazed on native pastures (May, June, July, and August) while the early conceived (group II) were only grazed (June, July, August, September, and October).

The milk production for a standard 120 days milking period was estimated by the AC method of ICAR – every month an individual test day was done for each ewe (*Instruction for control of productive traits of sheep*, 2003). The milk quantity was measured in volume units (ml). The milk yield of each ewe for the test day was calculated by multiplying the quantity of the milked milk at the individual test in the morning by the coefficient for the herd, which was determined for the test day by the ratio between the quantity of the morning and evening milk toward morning milk.

The sheep milk yield for a standard 120 days milking period was calculated by the sum of the milk production from the individual control periods of each ewe. The milk production for the control period is the test day milk multiplied by the number of days in the control period. The milking milk production after a 120 days milking period until the end of the lactation was calculated in the same way. The

days after a 120 days milking period until the end of the lactation were registered. The milking milk production was calculated by the sum of the standard 120 days milking milk production and that after 120 days.

The milk composition – fat, protein and dry matter – was determined by a milk analyzer “Ecomilk” (Bultech Company, Bulgaria). Milk samples were taken monthly during the test day individually of each ewe for 4 mo. A total of 160 milk samples were analyzed.

The live weight of the ewe lambs, the ewes before conceiving and the lambs at birth was measured (*Instruction for control of productive traits of sheep, 2003*).

The fecundity (%) was determined on the base of the ratio between the number of born alive, born dead and aborted lambs to the number of lambing ewes (*Instruction for control of productive traits of sheep, 2003*).

The data was calculated by the methods of variation statistic and analysis of variance ANOVA, using the computer program EXCEL, (2003). The significance of the effect of the age of conceiving was estimated by F-creation of Fisher and the significance of differences was estimated by Student's t- test.

Results and Discussion

The obtained values of F-criterion showed that the variation of the live weight before conceiving, the lambs' live weight at birth, the duration of milking period and milking milk production were significantly determined by the age at conceiving ($P < 0.01$; $P < 0.001$) (Table 1).

The live weight of the traditionally conceived sheep was significantly higher compared to the early conceived ones ($P < 0.001$) (Table 1). In the particular study this index for the traditionally conceived sheep corresponded to the breed limits (50 kg) (*Instruction for control of productive traits of sheep, 2003*), while the conceived as ewe lambs had more than 70 % higher live weight than that of the mature ones (55 kg). Similar results were observed for the live weight at the birth of the lambs ($P < 0.01$). The fecundity of the two studied groups did not show significant differences but only a tendency for higher value at the early conceived ewes (Table 1).

For a standard 120 days milking milk production no significant differences were found between groups. The milk yield of the early conceived ewes tended to be lower. According to *Pollott and Gootwine (2004)* ewe lambs that were older at first lambing produced more milk than younger ewes. The results agree with results reported for Latxa (*Gabina et al., 1993*) and for Awassi (*Gootwine and Pollott, 2000*) breeds.

The duration of milking period of the early conceived ewes includes only the standard 120 days. The traditionally conceived ewes were milked 68 more days

until the end of the lactation and realized additionally 37.5 L (Table 1). The duration of the milking period of the traditionally conceived ewes significantly exceed that of the early conceived sheep ($P<0.001$) and significantly more milk per sheep was milked (the average with about 50 L) ($P<0.01$) (Table 1). Our results for a standard 120 days milking milk production at the both groups were similar to those reported from *Morrissey et al. (2007)*, *Othmane et al. (2002)* and *Thomas et al. (1999)* at East Friesian crossbreeds on first lactation (82.7 -109.1 L).

Table 1. Live weight, fecundity, milking yield and duration of milking period

Indexes	N	Traditionally conceived (I group, N=20)	Early conceived (II group, N=20)	F-stat.	t-stat.
		X±SE	X±SE		
Live weight of the ewes before conceiving, kg	40	52.31±1.338	40.53±0.936	52.09***	***
Fecundity, %	40	1.08±0.065	1.25±0.170	NS	NS
Live weight of the lambs at birth, kg	47	5.05±0.211	4.16±0.148	12.76**	**
120 days milking yield, L	40	92.27±11.683	80.24±5.111	NS	NS
Days after 120 days	40	67.50±4.244	-	-	-
Milk yield after 120 days	40	37.48±4.102	-	-	-
Milking period, days	40	187.50±4.244	120	252.92***	***
Milk yield for milking period, L	40	129.72±15.276	80.24±5.111	10.27**	**

Note: Significant - ** $P<0.01$; *** $P<0.001$

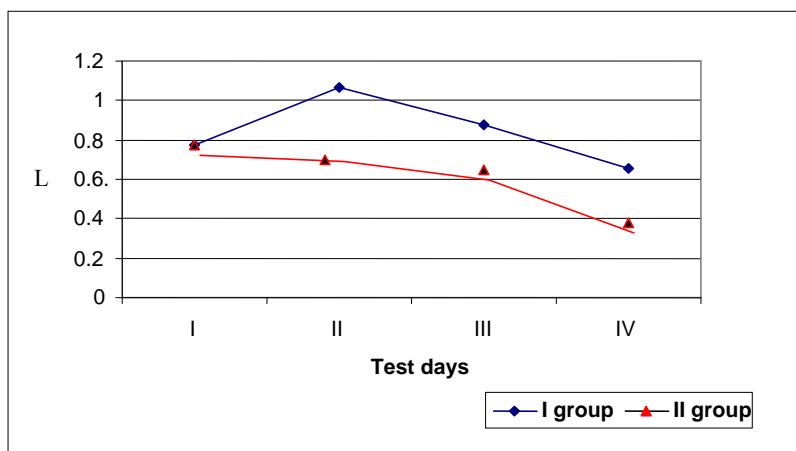


Figure 1. Lactation curves of ewes traditionally (I group) and early conceived (II group), n=40

The shape of the lactation curves of the ewes from the studied groups corresponded to the milk yield changes during the different lactation periods (Figure. 1). In the group of the traditionally conceived ewes the test day milk on the second control (1.066 L) was significantly higher ($P<0.05$; $P<0.01$) than that on the first (0.733 L) and fourth (0.653 L) controls. For the early conceived sheep the test day milk on the fourth control (0.381 L) was significantly lower than that on the first (0.775 L), second (0.745 L) and third (0.645 L) controls ($P<0.001$).

Significantly higher was the test day milk on the second, third and fourth controls of the traditionally conceived in comparison to the early conceived sheep ($P<0.05$; $P<0.001$). The higher test day milk of the traditionally conceived sheep is probably due not only to the age but to the environmental factors – the feeding and the optimal season (spring) when the production is obtained. In the other group the milk yield was realized in the summer when the main feeding was on pasture (Figure 1).

Generally for the control period, the content of dry matter in the milk of traditionally conceived ewes decreased and that of the early conceived increased (Figure 2). In the first group, significantly highest ($P<0.05$; $P<0.001$) was the dry matter on the first control (19.31%), and significantly lowest ($P<0.001$) was that on the third control (17.49%). In the second group significantly highest ($P<0.01$; $P<0.001$) was the dry matter on the fourth control (20.44%), and significantly lowest ($P<0.001$) - on the first control (17.38%).

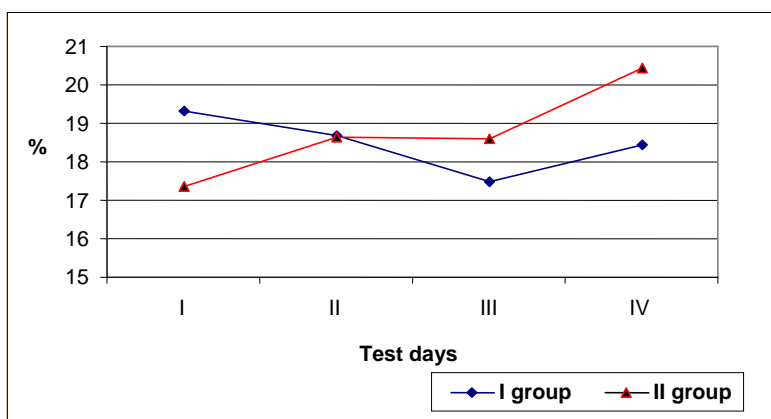


Figure 2. Content of dry matter, % in milk of ewes traditionally (I group) and early conceived (II group), n=40

Similar to the dry matter change, through the studied period, the fat content in the milk of the traditionally conceived ewes decreased while that of the early conceived increased (Figure 3). In the first group the fats on the third control (6.2%) were significantly lower compared to the first, second and third controls (7.9%, 7.2%, 7.4%) ($P<0.01$; $P<0.001$). In the second group significantly lowest

was the fat content on the first control (6.78%) ($P<0.05$; $P<0.01$; $P<0.001$). The differences in the milk fat between the second and third, third and fourth controls were small and insignificant.

The content of the milk proteins in the ewes conceived traditionally decreased. This index on the first (6.05%) and second (6.1%) controls had significantly higher value than on the fourth control (5.67%) ($P<0.05$; $P<0.01$). In the early conceived ewes the variations of the protein content was in different direction. There were significant differences between each of the controls ($P<0.01$; $P<0.001$). On the third control the value was significantly lowest (4.17%), and on the fourth – significantly highest (6.40%) (Figure 4).

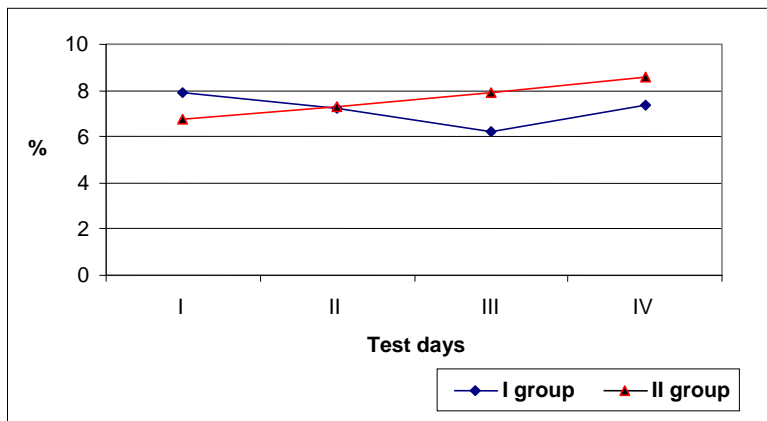


Figure 3. Content of fats, % in milk of ewes traditionally (I group) and early conceived (II group), $n=40$

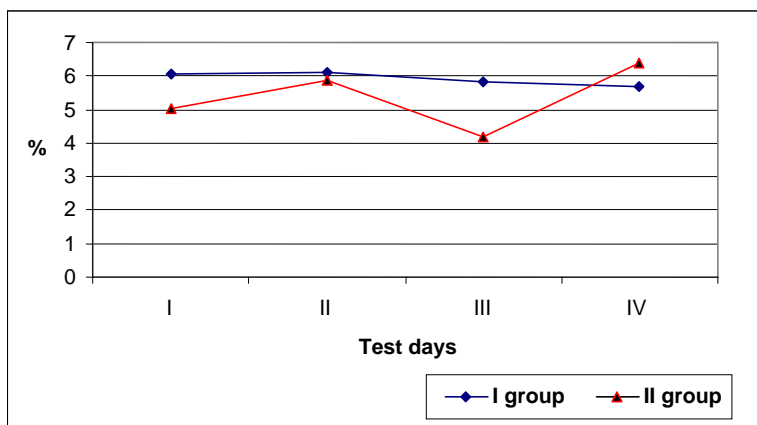


Figure 4. Content of protein, % in milk of ewes traditionally (I group) and early conceived (II group), $n=40$

The results for the dynamic of the variation of the dry matter and fat contents of milk of the traditionally conceived ewes did not correspond to those reported by *Djorbineva et al. (1995)*, *Stancheva et al. (1997)*, *Petrova and Nedelchev (2000)* and *Raicheva et al. (2004)*. These authors indicated the increase of the values of the dry matter and fats with the progress of the lactation, while in our study this tendency was observed only in the group of the early conceived ewes. According to us, the different direction of the results for the milk content of the sheep from the first group was due to effect of the changes in the feeding during the indoor and pasture period. The season of the lactation of the early conceived ewes included only the pasture period of rearing. The milk composition of both studied groups showed significant differences ($P < 0.05$; $P < 0.001$) in the content of dry matter, fats and proteins on the first, third and fourth controls (Figures 2,3,4).

Conclusion

The age at conceiving influences significantly the live weigh before conceiving, birth live weight of lambs, the duration of the milking period and the milking milk yield ($P < 0.01$; $P < 0.001$) and insignificantly on the fecundity and the standard 120 days milking milk production.

The traditionally conceived ewes at 18 months of age had significantly higher live weight before conceiving (52.31 kg), of newborn lambs (5.05 kg), the duration of milking period (187 days) and milking milk yield (130 L) than the early conceived at the age of 11 months (40.53 kg; 4.16 kg; 120 days; 80.24 L) ($P < 0.01$; $P < 0.001$). For the fecundity and the standard 120 days milking milk production no significant differences were found between the groups (1.08% and 1.25%; 92.27 L and 80.24 L).

In the milk composition of the ewes conceived at 18 month age compared to the conceived at the age of 11 months was found significant difference ($P < 0.05$; $P < 0.001$).

The obtained results provide useful information for the implementation of suitable management decisions for early conceiving of the ewes from Synthetic population Bulgarian milk for production of lambs and milk at the farm practice.

Uticaj uzrasta pri oplodnji na proizvodne osobine mlečnih ovaca u Bugarskoj

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Rezime

Cilj istraživanja bio je da se ispita uticaj uzrasta pri priplodavanju na produktivne osobine ovaca iz sintetičke populacije-Bugarsko mleko u Bugarskoj. Oglad je sproveden sa 20 ovaca tradicionalno priplodjenih u uzrastu od 18 meseci i sa 20 ovaca priplodjenih kao dviske u uzrastu od 11 meseci u prvoj laktaciji i njihove jagnjadi (47) odgojenih u IAS – Kostinbrod, Bugarska. Proizvodnja mleka u standardnoj laktaciji od 120 dana i nakon 120 dana do kraja cele laktacije utvrđene su ICAR-ovom AC metodom. Registrovani su dani nakon standardnog perioda do kraja laktacije. Sastav mleka utvrđen je mlekomerom Ekomilk, Bultech Company, Bugarska. Izmerena je živa težina. Utvrđen je fekunditet. Sa izuzetkom fekunditeta i proizvodnje mleka u standardnoj (120 dana) laktaciji, uzrast pri priplodavanju signifikantno je uticao na živu masu pre priplodavanja, težinu jagnjadi na rođenju, trajanje laktacije i prinos mleka u laktaciji ($P<0,01$; $P<0,001$). Tradicionalno priplodjenje ovce imale su značajno veću masu pre priplodavanja (52,31 kg), novorođene jagnjadi (5,05 kg), trajanje laktacije (187 dana) i prinos mleka (130 L) u odnosu na ranopriplodjene (40,53 kg; 4,16 kg; 120 days; 80,24 L) ($P<0,01$; $P<0,001$). U fekunditetu i proizvodnji mleka u standardnoj laktaciji od 120 dana nisu utvrđene značajne razlike između grupa (1,08% i 1,25%; 92,27 L i 80,24 L). Utvrđene su značajne razlike u sastavu mleka između ovaca priplodjenih u uzrastu od 18 meseci i ovaca priplodjenih u uzrastu od 11 meseci ($P<0,05$; $P<0,001$). Dobijeni rezultati pružaju značajnu informaciju za odluku o primeni odgovarajućeg menadžmenta za rano priplodavanje ovaca sintetičke populacije-Bugarsko mleko u proizvodnji jagnjadi i mleka na farmama.

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Received 30 June 2011; accepted for publication 15 August 2011