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EFFECTS OF LAMBING ON THE QUANTITATIVE AND QUALITATIVE TRAITS OF MILK OF NATIVE SHEEP ON THE NATURAL PASTURE IN A SUBMONTANE REGION

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Abstract

The study investigated the effects of the number of lambs, month of lambing and parity on the milk components of Original Valachian sheep. The flock is kept in the altitude of 600 m above sea level on outside grazing in area composted of Poaceae predominantly, Plantagineaceae and Papilionaceae. Totally were evaluated 276 samples from 69 pieces ewes lambing in March (12) April (35) May (19) June (3). The mean of lambs was 1.71 and of parity 2.41. Lambs were weaned 12 hours before mechanical milking - Method ET (Animal Recording ICAR, 2012). It was found by analysis of variance the number of lambs had significant effect ($P < 0.01$) on the content of fat. Month of lambing as same as parity had significant effect ($P < 0.01$) on the milk yield, contents of fat, crude protein, casein and urea concentration in milk and not significant effect on the content of lactose and number of somatic cell count. Multiple comparison tests not determine significant differences between the number of lambs (1, 2, 3) on the content of fat. Differences in milk yield were between parity 3rd and 1st, 2nd, 4-8th, in fat, crude protein and casein content were significant ($P < 0.05$) between ewes on 4-8th and 1st, 2nd lactation.

Keywords: lambs, milk, parity, sheep, traits

Introduction

The Czech Republic is without a sheep dairying tradition. Consumers in this central European country have developed a taste for sheep cheeses. Increasingly small breeders of sheep are trying to develop domestic production of cheeses with the hope of tapping into the growing demand for sheep milk cheeses. Production and marketing is limited. The main production limitation has been low milk yields of domestic breeds. The most frequent breeds in sheep dairy flocks in the Czech Republic are Lacaune and East Friesian. The cost of breeding of these sheep breeds in conditions of central European countries are higher for farmers in comparison with the lowlands of the countries of southern Europe. Many of them are looking for alternative breeds that costs are minimized and the produce to be the most profitable. In the Czech Republic the breeding of native breeds of sheep is supported through subsidies which turn out to be a very good source of income. The breed Original Valachian sheep is included in the genetic resources of sheep in our country. Valachian sheep is a hard resistant very well to adverse weather conditions with good walkability, accustomed to mountain conditions, appreciating well pasture. Valachian sheep is possible to breed for milk, meat and wool. Traits of milk production are



affected by the complex genetic factors through nutrition and breeding technology to climatic influences.

The effect of the parity and stage of lactation on milk composition in different sheep breeds were studied by *Sevi et al.* (2000), *Aganga et al.* (2002), *Nuda et al.* (2003), *Oravcová et al.* (2007), *Kuchtik et al.* (2011).

The aim of study was investigation the effects of the number of lambs, month of lambing and parity on the milk components of Original Valachian sheep.

Material and Methods

The flock is kept in the altitude of 600 m above sea level on outside grazing in area of Novohradske Mountains composted of Poaceae predominantly, Plantagineae and Papilionaceae.

The sampling was realized in April, May, June, July and August (throughly from the 2nd third of lactation). The control of milk production of Original Valachian sheep was conducted once month during lactation, at 4-5 weeks interval. The lambs were weaned 12 hours before milking (ET method) (*Animal Recording ICAR*, 2012). Animal were machined-milked. Sheep milk yield of less than 0.1 litre was not included in the statistical evaluation.

The average number of dairy ewes was 69 pieces ewes lambed in March (12) April (35) May (19) June (3). The mean of labms was 1.71 and of parity 2.41. Assessment of the fat content, crude protein, casein, lactose, dry matter was carried out by method infrared spectrometry (Combifoss FT 6000-Milkoscan FT 6000). The somatic cell count were analyzed on the apparatus Fossomatic 5000. The direct specific enzymatic method UREAQVANT was used for the routine determination of the urea in milk (UM) (by Central Laboratory in České Budějovice).

The obtained results were analyzed by statistical methods in Statistica 10. Cz. The effect of number of lambs, month of lambing and parity on the milk production, on the content of basic components and on the quality traits was tested single-factor analysis of variance. Statistical significance was tested using the F-test. A more detailed evaluation of results of analysis of variance (method of multiple comparisons) was used the Schéffe test to determine the significant differences between group means in an analysis of variance setting.

Results and Discussion

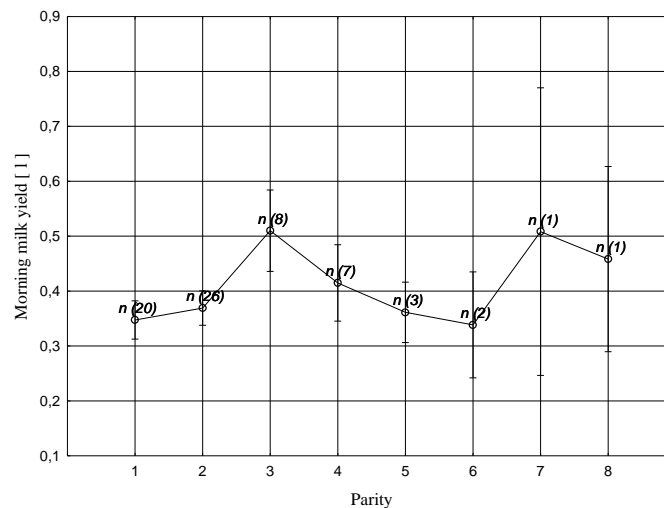
Parity tested by analysis of variance had significant effect ($P < 0.05$) on the milk yield, contents of fat, crude protein, casein and urea concentration in milk and not significant effect on the content of lactose and number of somatic cell count (*Table 1*) in Original Valachian sheep. The parity influenced almost all the variables considered significantly, except casein/total protein, α -lactoglobulin, immunoglobulin, somatic cell count. Total protein, casein and whey protein tended to increase with parity (*Nudda et al.* 2003). An increase of these protein with age has been reported for the Churra breed (*Fuertes et al.* 1998). In Original Valachian sheep the content of crude protein, of casein and of fat indicated increase in ewes till the second lactation and than decline, while the lactose content showed decreased trend. The highest yields were for ewes on the third lactation (*Table 1, Figure 1*) *Fuertes et al.* (1997) found the highest milk yield for ewes aged 2.5 yr. The highest values for fat, protein, casein and lactose contents were obtained coinciding with smaller yields and lower lactose concentrations in Churra ewes.

Table 1: Milk yield, milk composition and somatic cell count classified according the parity in Original Valachian sheep

Parameter	Parity				MS	SEM	SS	F-value
	1	2	3	4-8				
	Means							
Morning milk yield [l]	0.35	0.37	0.51	0,40	0.22	0.010	0.7	8.051***
Fat [g.100g ⁻¹]	6.48	6.65	6.27	5.90	7.03	1.202	21.1	5.085**
Crude protein [g.100g ⁻¹]	5.83	6.07	5.67	5.40	5.52	0.064	16.6	5.057**
Casein [g.100g ⁻¹]	4.33	4.49	4.22	4.01	2.88	0.615	8.6	8.214 ***
Lactose [g.100g ⁻¹]	5.21	5.18	5.13	5.16	0.06	0.031	0.2	0.221
Somatic cell count [1000.ml ⁻¹]	232	226	286	199	48058	18.68	144175	0.535
Urea concentration [mmol.l-1]	7.66	7.12	7.95	8.20	16.52	0.094	49.6	7.244***
SC 10 ³ [log ₁₀]	2.18	2.18	2.14	2.09	0.10	0.024	0.3	0.669

Mean= average arithmetic value, MS = Means squares, SEM= Standard error of the mean, SS= Sum of Square, significancy *P<0.1, **P<0.05; ***P<0.01.

Figure 1: Morning milk yield in Original Valachian sheep affected by parity (number of lactation)



n = number of recorded ewes

Somatic cell count per 1ml was not effected by parity (P>0.05), ranging from 199 to 286.10³ in Original Valachian sheep. Parity age was highly significant (P<0.001) for urea concentration in milk. *Sevi et al.* (2000) published average values were acceptably low, ranging from 249 to 321.10³ the somatic cell count in milk per 1ml of milk in parities 3 and 1, respectively.

Month of lambing was observed to have a significant (P<0.01) effect on all milk constituents, except lactose (*Table 2*).

**Table 2: Milk yield, milk composition and somatic cell count classified according the month of lambing in Original Valachian sheep**

Parameter	Month of Lambing				MS	SEM	SS	F-value
	March	April	May	June				
	Means							
Morning milk yield [l]	0.34	0.36	0.44	0.45	0.16	0.17	0.5	5.704***
Fat [g.100g ⁻¹]	6.90	6.56	5.90	5.60	13.16	1.20	39.5	10.004***
Crude protein [g.100g ⁻¹]	6.02	6.00	5.44	4.98	8.03	1.07	24.1	7.548***
Casein [g.100g ⁻¹]	4.46	4.45	4.02	3.74	4.48	0.61	13.5	13.485***
Lactose [g.100g ⁻¹]	5.17	5.18	5.16	5.40	0.17	0.52	0.5	0.614
Somatic cell count [1000.ml ⁻¹]	232	222	257	145	38201	298	114603	0.425
SCC 10 ³ [log ₁₀]	2.21	2.14	2.17	2.07	0.07	0.38	0.2	0.483
Urea concentration [mmol.l ⁻¹]	7.16	7.43	8.17	7.88	12.83	1.56	38.5	5.530**

Mean= average arithmetic value, MS = Means squares, SEM= Standard error of the mean, SS= Sum of Square, significance *P<0.1, **P<0.05; ***P<0.01.

The trend of month of lambing for milk components were mainly determined by both pasture availability and its quality and also be a correlative of stage of lactation. Nevertheless, temperature and photoperiod could have had an important influence because ewes grazed pasture for many hours per day (*Carta et al. 1995*). Day length before lambing was found to have a significant effect on milk production in which prepartum short days had a positive effect on milk production in the following lactation (*Pollott and Gootwine, 2004*). A similar positive effect of short days on milk production was found in dairy cattle (*Aharoni et al. 2000*).

The urea concentration was affected by month of lambing i Original Valachian sheep. In the study of *Ramin et al. (2010)* mean of UM concentration increased inconstantly from 6.1 to 17.7 mmol.l⁻¹ within 135 days of lactation. Count of somatic cell contained in milk was the lowes in in last month of our study probably by low number of ewes lambed in June (3). An increase in SCC values in late-lactation has been documented in both individual and mass milk). When it is not caused by mammary infections, a high milk SCC may be the result of a reduced milk yield or of a functional alteration of the mammary gland tissue caused by the shorter survival of epithelial cells that are supplied with fewer nutrients at the end of lactation (*Sevi et al. 2004*).

Our study showed that analysis of variance of factor the number of lambs had significant effect (P<0.05) on the content of fat. Litter size for Original Valachian sheep in the present study was average of 1.71 lambs born per ewe lambing. Consistent differences in milk composition associated with the number of lambs were observed, but the differences were not statistically significant (P>0.05) (*Snowder and Glimp, 1991*).

The contents of fat crude protein and casein was higher in ewes with singles. Lactose content and concentration urea in milk was higher in Original Valachian ewes with multiple birth (*Table 3*).



Table 3: Milk yield, milk composition and somatic cell count classified according the number of lambs in Original Valachian sheep

Parameter	Number of lambs			MS	SEM	SS	F-value
	1	2	3				
	Means						
Morning milk yield [l]	0.37	0.39	0.36	0.01	0.010	8	0.395
Fat [g.100g ⁻¹]	6.64	6.31	5.88	4.79	0.072	388	3.372**
Crude protein [g.100g ⁻¹]	5.99	5.74	5.59	1.97	0.064	309	1.739
Casein [g.100g ⁻¹]	4.41	4.27	4.18	0.70	0.037	103	1.861
Lactose [g.100g ⁻¹]	5.14	5.19	5.29	0.16	0.031	73	0.586
Somatic cell count[1000.ml ⁻¹]	241	220	304	43.10 ³	18.676	227.10 ⁵	0.479
Urea concentration [mmol.l ⁻¹]	7.52	7.61	8.02	1.25	0.094	667	0.511
SC 10 ³ [log ₁₀]	2.19	2.13	2.23	0.10	0.024	37	0.704

Mean= average arithmetic value, MS = Means squares, SEM= Standard error of the mean, SS= Sum of Square, significance *P<0.01, **P<0.05, ***P<0.01.

Fat content was found lower in ewes giving birth to multiples, probably as a result of dilution effect (Othmane et al. 2002). Oravcová et al. (2007) published in contrast, protein content was found lower in ewes giving birth to singles (Tsigai and Improved Valachian sheep). Multiple comparison tests not determined significant differences between the number of lambs (1, 2, 3) on the content of fat. Morning milk yield tended to vary more in dependence on litter size (1, 2). In triplets was the mean of morning milk yield the lowest. It is reasonably affected by low pieces of ewes with triplets. The effect of number of lambs on the count of somatic cell and urea concentrations in milk was not significant in Original Valchian sheep.

Conclusion

The effect of number of lambs was significant only on the content of fat in milk in Original Valchian sheep. Month of lambing as same as parity affected the milk yield, contents of fat, crude protein, casein and urea concentration in milk and not significant effect on the content of lactose and number of somatic cell count. From the results of our study we conclude that the highest yield were for ewes on the third lactation. Ewes in their first and second lactation had the smallest total milk yield, whereas during the third and later lactation, they had their greatest lifetime milk yield. These findings can be recommended for breeders to carry out selection up to 4 years of age. Ewes on the third lactation also to begin with milking for efficient dayring production to obtain an economical level of viable sheep breeding.



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