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Effect of the Parity and the Production Year on the Longevity of the Kids in Saneen Dairy Goats

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Abstract

The basic objective of the dairy goat farmers is to produce healthy and fertile animals at appropriate age, with maximum genetic expression and long productive duration. Longevity is an important economical parameter in the breeding program of the dairy goats. There are various factors which directly influence the production and longevity of the newborns such as age at birth, season, herds flock and breed. The present study aimed to study the effect of the parity and the production year on the kids' longevity in Saanen dairy goats. The 5 year data (2012 to 2016) of total 222 Saanen female goats collected from the Research and Applied Center at the Faculty of Veterinary Medicine, Bursa Uludag University. The effect of parity on the kids' longevity was found non-significant (P>0.05). Non-significant (P>0.05) difference was observed while comparing the data of kids from primiparous and multiparous within the production year. However, a significant (P<0.05) difference among the mean values was found while making comparison between the production years. The litter size in the present study ranged from 1.57 to 1.75 and non-significant (P>0.05) difference was found in the kids born over the evaluated years. The present study did not investigate the voluntary and involuntary culling reasons and the management practices at the farm are more standardized than a normal commercial farm. Hence, further research is required at the commercial farms having large number of the animals and herds in order to use the parity and longevity in the present genetic evaluation programs.

Key words: Parity, longevity, dairy goats, Saanen, production life

Introduction

Longevity is a significant economic parameter in dairy animal production. Higher longevity increases the number of lactations, number of kids, animals available for culling and increases economic return.[1] Herd longevity is also important when production cost is higher or the product prices are low.[2] In term of selection, longevity is an important parameter for increasing the generation interval and its efficacy as well as the intensity.[3,4]

In dairy goats breeding program, longevity is a prominent economic indicator. Recent trend in the breeding programs emphasized on the improvement of the milk fat and protein in the dairy goats.[5] However, improvement of only production traits affected the other reproductive traits and longevity negatively.[6]

In addition, longevity is also directly associated with the parity of the animals. With the increasing parity the culling risk of the goats from the herds decreases. Goats at the first and second parity show the highest culling rate as compared to the higher parities (sixth parity). After a certain parity number the culling risk again starts to increase Abdelqader et al. (2012)[22]. The higher culling risk in the higher parities might be due to voluntary or involuntary culling

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due to decreased production, reproduction, the chances of higher mortality of offspring's due to chromosomal abnormalities or the mitochondrial DNA damage in the oocytes, as a cumulative effect of the maternal age on offspring.[7] However, higher culling rates in the first parity is due to the poor adoption of the animal to the managmental conditions and intensify kidding system and higher mortality of the progeny Casellas et al. (2007).[20] Similar results was shown by Kern et al. (2010)[21], where higher culling risk was observed at first parity and was higher to the third parity and decreased in the later parities. However, after seventh parity again the culling risk started to rise. In the line, dairy cows also presented the similar pattern of culling hazard Vukasinovic (1999)[19]. Delany 2017 in the study reported that the selection of the animals for the replacement purpose should be made from the aged animals with the advanced parity because they become adapted to the management system and show the higher productive life. With the increasing parity, the exposure of the animal to the various pathogens results in the improved quality of the colostrum and the immune system. Thus advanced parities may increase the productive life of the offspring. Abdelqader et al. (2012)[22] also reported the effect of the breed and litter size on the longevity of the small ruminants. He founded that, the higher litter size results in the higher risk of removal from the herd. Hence, parity, age, litter size, management and environmental conditions influence the longevity of the goats. However, little information is available on parity, litter size and the production year on the longevity of the offspring's in saneen dairy goats. Therefore, a study was required to in saneen dairy goats for enhancing the profitability of farmers through changing the longevity of breeding herd , and making decision on the addition of the parity in the breeding program.

The objective of the present study was to determine the effect of parity, litter size and production year on the longevity of the offspring to understand and enhance the longevity in the Saanen breed of dairy goats.

Material and Method

Animals' Management: This study was conducted at the experimental station of Bursa Uludag University, Faculty of Veterinary Medicine presented at 40° North and 29° East at elevation of 120m within the north-west area of Turkey. Animals had zero grazing and were kept under the same management plan. The Animals were provided with ad libitum feeding comprised of oats, alfalfa hay, vetch and 1.5kg concentrate (containing 16% Crude Protein and 2.54 Mcal/kg Metabolic Energy) ration. All the goats were kept at the semi-open stall and had free access to the fresh and clean water.

Data Collection: Total, 222 Saanen dairy breed goats were taken into assessment. The 5 year data of throughout life for all the female kids born at the farm from 2012 to 2016 was collected. Removal of the animals from the herd was based on the health condition, production, reproduction, selling, lower predicted performance in future and death. Male kid, sold kids or the kids died before the weaning age were not part of the study. The breeding stock of goats was classified into primiparous and multiparous groups. The number of kids per birth within the study periods was also calculated. The longevity of the offspring falling in both groups was analysed on month bases. Longevity was calculated as period of time for each goat stayed in the herd for production.

Statistical Analysis:

The difference among the years was analyzed by using One-way ANOVA test. Homogenity of variances were tested and Tukey HSD test was choosed as post hoc multiple comparison test. Parity groups (primiparous and multiparous) were compared by Independent Sample t- test. Differences were considered significant at a probability level of $P<0.05$ in all analyses. All the data was subjected to the statistical analysis using SPSS (version 23) statistical application.

Results

Effect of the mother's parity on the longevity of the kids according to their year of production is shown in table 1, figure 1 and figure 2. Non-significant ($P>0.05$) effect of the primiparous goats on the longevity of the kids within the herd was observed. However, the multiparous goats showed a significant ($P<0.05$) effect on the longevity of the newborn kids within the evaluated years. Highest and the lowest mean duration for the kids born from the primiparous goats was 38. 25 (14-75) months and 33 (24-36) months respectively. The duration of longevity for kid of multiparous goats were calculated from 38.65±10.43 months to 30.65 ±7.23 months.

The number of born kids per goat in every year within the study period ranged from 1.57 to 1.75 and non-significant difference was observed among the number of kids born over the evaluation duration (Table 2).

The survival time of the kids according to the parity groups within the production year are shown in the Table 3. Among the primiparous and multiparous goats no significant ($P>0.05$) difference in survival period was observed within the production year. However, significant difference ($P<0.05$) among the mean values of survival periods of the kid was found while comparing the data among the years as shown in table 4 & Figure 3. Higher survival time of the kids was found in the 2013 among the evaluation year and

the lowest time was observed in 2014.

Table 1: Effect of the parity on the longevity of the kids according to the evaluated years

DOE	Year	n	Mean ± S.E. (month)
Primipar	2012	17	36,12 ± 1,33
	2013	16	38,25 ± 3,07
	2014	14	34,79 ± 2,84
	2015	5	35,80 ± 0,20
	2016	8	33,00 ± 1,96
	Total	60	35,93 ± 1,14
Multipar	2012	47	37,23 ± 1,26 [a]
	2013	40	38,65 ± 1,65 [a]
	2014	37	30,65 ± 1,19 [b]
	2015	18	33,33 ± 1,11 [ab]
	2016	20	32,55 ± 1,29 [ab]
	Total	162	35,07 ± 0,68

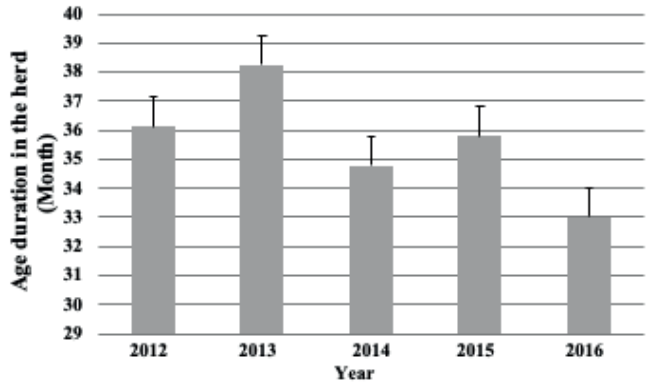

Figure 1: The longevity of the kids from primiparous mothers in the herd by years

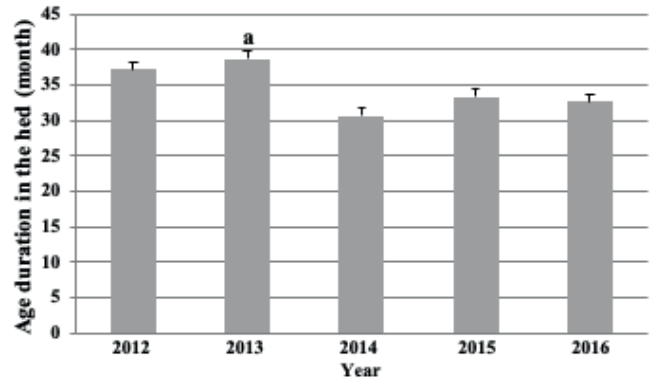

Figure 2: The longevity of the kids from multiparous mothers in the herd by years

Table 2: The number of kids per born of the mother

Year	2012	2013	2014	2015	2016
Number of kids	1,75	1,69	1,57	1,62	1,73

Table 3: Comparison of the parities within the production year

Year	Doe	n	Mean ± S.E. (Month)	P
2012	Primiparous	17	36,12 ± 1,33	0,62
	Multiparous	47	37,23 ± 1,26	
2013	Primiparous	16	38,25 ± 3,07	0,90
	Multiparous	40	38,65 ± 1,65	
2014	Primiparous	14	34,79 ± 2,84	0,12
	Multiparous	37	30,65 ± 1,19	
2015	Primiparous	5	35,80 ± 0,20	0,22
	Multiparous	18	33,33 ± 1,11	
2016	Primiparous	8	33,00 ± 1,96	0,85
	Multiparous	20	32,55 ± 1,29	

Table 4: Comparison of the production years on the longevity (Primiparous + Multiparous)

Year	n	Mean ± S.E. (Month)
2012	64	36,94 ± 0,99 [ac]
2013	56	38,54 ± 1,45 [a]
2014	51	31,78 ± 1,17 [b]
2015	23	33,91 ± 0,89 [ab]
2016	28	32,68 ± 1,06 [bc]
Total	222	35,31 ± 0,59

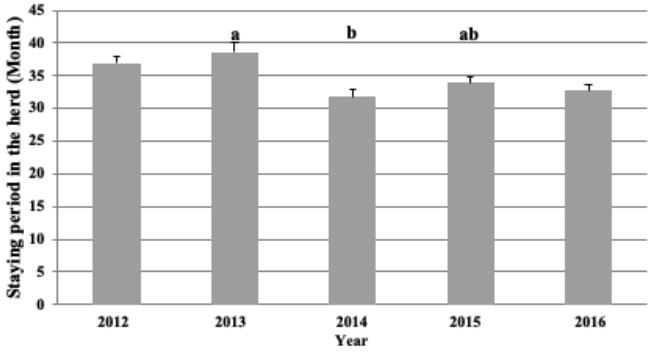

Figure 3: Staying period in the herd according to production year

Discussion

The results of the present study are similar to the Scholtensa et al., (2018)[11] who reported non-significant effect of the dam age on the longevity of the offspring. Anas et al. (2012)[12] demonstrated that longevity of the offspring decreases from first parity to onward. However, in the dairy cattle the risk for culling of offspring from the oldest dams was less and founded highest in the early lactation. Similarly, in does and ewes the highest culling rates are reported at early life stage.[13,14] In ewes the risk of culling was highest in the first parity and decreased to the third parity according

to Anas et al. (2012).[12] This might be due to enhanced repairing mechanism in older animals or improved defensive approach to the DNA damage in the nucleus or mitochondria.[15]

The number of kids in each giving birth time in groups over the evaluated period has changed between 1.57 and 1.75 and non-significant difference was observed among the years. Pettigrew et al., (2019)[14] studied the effect of litter size and dam age on the production performance of sheep and reported that the twins produced from the older ewes have the lower birth weight compared to the single birth. Similarly the twins from the females, born as twin from the older ewes have the lower birth weight than the singles produced from the single borns of the older ewes. The mortality was also high in the twins produced from the females born as twin from the older ewes but the weaning weight remained the similar for all the new progeny. Repeatability of the single along with double born is 0.15 ± 0.01 and for triples is 0.14 ± 0.01. However, the phenotypic and genetic correlation for stability traits and kids per birth traits is non-significant.

In the present study the survival length of kids from the primiparous and the multiparous goats were not significantly influenced by the parity during the evaluated period. When comparison was made among the production years there was a significant difference between the production years. However, there was no trend in the survival length difference among the production year. The highest survival length was observed in the 2013 followed by 2012, 2015, 2016 and 2014 respectively and the highest difference was among 2013 and 2014. This difference in the results might be due to environmental and management conditions at the farm. Culling of the goats from the herd was based on the commercial reasons and rates of culling were variable among the years. Nevertheless, similar to the Wheeler et al. (2013)[13] no analysis was performed to identify the reasons for culling goats from the herd. Generally, the involuntary culling was higher in the 2014 which might be the reason for higher difference among these two years. Palhiere et al. (2018)[17] studied the longevity of the saneen dairy goats and found a decrease in the longevity of the new born at proceeding years of study. Similarly, in this study there was a small decrease in survival length at the proceeding years of study. In the line, Scholtensa et al., (2018)[11] studied the production year as a random effect. Later the author reported that, when herd production year was taken under evaluation as a random effect, it resulted in 35% total variation. In contrast, Zsuppan et al. (2016)[18] reported no effect of the season and year on the longevity of the goats. On the whole, our results showed a little difference among the production years which might be due tomanagmental and environmental conditions of the farm.

Valencia-Posadas et al. (2017)[5] suggested the addition of the functional stability into the breeding programs at early ages (24 and 36 months) because it results in more genetic variation. Genetic improvement program for the herd is more effective when the influence of voluntary culling is taken into consideration.[16] During the first lactation of offspring, somatic cell count within the milk is significantly affected by maternal age. However, in the succeeding lactations no influence of maternal age was observed on the somatic cell count which leads to fact that after first lactation somatic cell count in the milk are influenced by the environment of animal and animal condition instead of maternal age.[14] Therefore, for designing early age correction factors of dairy lactations, parity is required to be added with season and age.

Conclusion

According to the present study the parity has no effect on the longevity of the kids over the evaluated period. Since this farm is an experimental unit and the management practices are more standardized than a commercial farm. Productive life of an animal is also influenced by the management and the environmental factors. A proper understanding of the different risk factors can increase the longevity of dairy goats. Therefore, a more conclusive comparison can be made in commercial farms having more number of animals and herds.

Additionally, more work is required to find the relationship of the longevity with other recorded traits, and to assess the phenotypic and genetic correlations between the other economically important traits in order to use the longevity in the present genetic evaluation programs.

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