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Comparison of The Growth Characteristics of Alpine X Damascus Crossbred and Damascus Kids

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ABSTRACT
Alpine and Damascus goats were crossbred in a private goat farm established in Adana that engaged in raising Damascus goat in order to develop a goat genotype that will give more milk in the hot and humid climate in summer of Çukurova region. In this study, the growth characteristics between birth and weaning of the crossbred kids were compared with Damascus kids. The animal material for the study consisted of 136 head of pure Damascus goats and 32 head of Damascus goats crossbred with Alpine goat as well as their kids. The kids were fed with their dams' milk (average 0.70 litre / head / day) for the first 15 days after birth. After this period, a mixture containing 60% goat milk and 40% kid food was used in the feeding of the kids. Kids that given kid rearing concentrate and alfalfa hay after 10th days age were weaned at the age of 60 days. At the end of the study, birth weights, weaning weights and survival rate at weaning of the crossbred and Damascus kids were determined as 2.5 ± 0.07 kg and 2.7 ± 0.05 kg (P <0.05), 10.3 ± 0.11 kg and 9.5 ± 0.06 kg (P <0.01), 75.6% and %86.3, respectively. In conclusion; Damascus goats had more live weight at birth, but this difference was reversed at weaning. On the other hand, the average survival rate was lower in the crossbreeds.

Research Article

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ÖZET
Adana ilinde kurulu bulunan ve Şam keçisi yetiştiriciliği yapan özel bir işletmede Çukurova'nın yaz mevsimindeki sıcak ve nemli ikliminde fazla süt verecek keçi genotipi geliştirmek amacı ile Alpin x Şam keçisi melezlemesi yapılmıştır. Bu çalışmada doğum ve sütten kesim arası dönemde melez oğlakların büyüme özellikleri Şam keçisi oğlakları ile karşılaştırılmıştır. Çalışmanın hayvan materyalini 136 baş saf Şam keçisi ile 36 baş Şam ve Alpin keçisi melezleri ve onların oğlakları oluşturmuştur. Oğlaklar ilk 15 gün annelerinin sütü ile (0.70 litre / baş / gün) beslenmişlerdir. Bu dönemden sonra % 60 anne sütü ve %40 oğlak mamasından oluşan karışım oğlakların beslenmesinde kullanılmıştır. On günlük yaştan itibaren oğlak büyütme yemi ve yonca kuru otu verilen oğlaklar 60 günlük yaşta sütten kesilmişlerdir. Çalışma sonunda melez ve Şam keçisi oğlaklarında sırası ile doğum ağırlıkları 2.5 ± 0.07 kg ve 2.7 ± 0.05 kg (P<0.05), sütten kesim ağırlıkları 10.3 ± 0.11 kg ve 9.5 ± 0.06 kg (P<0.01), sütten kesimde yaşama güçleri %75.6 ve %86.3 olarak belirlenmiştir. Sonuç olarak; Şam keçileri doğumda daha fazla canlı ağırlığa sahip olmuşlar ancak bu farklılık sütten kesimde tersine dönmüştür. Diğer taraftan melezlerde yaşama gücü daha düşük seviyede olmuştur.

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INTRODUCTION

Although Turkey has sufficient protein consumption per person, the lack of animal protein consumption is concerning. While the milk production per capita availability in the country is at a similar level with the European Union countries with approximately 270 litres, the insufficiency of red meat production, which is around 14 kg per capita (Anonymous, 2020a; Anonymous 2020b), draws attention. This situation demonstrates itself in the recent increase in meat prices and with the importation of live animals or red meat in order to balance the price. The share of both cow's milk and beef production in Turkey's milk and red meat production is approximately 90%. The share of goats in the production of these products is approximately 3% (Anonymous, 2020b). As stated by Kosum et al. (2019), goat meat has a fat content with 50-65% lower than beef, while similar proteins content. It also has 42-59% less fat than lamb meat. Moreover, saturated fats in goat meat are less than poultry (except skin), pork and lamb meats. Regardless of breed, age or region, the goat is an important source of high quality proteins, healthy fats (based on the ratio of unsaturated fats to saturated fat) and low cholesterol intake. Calcium and sodium in goat meat is low but contains high levels of iron, potassium and essential amino acids. In other words, goat meat is in the category of quality meats.

Goat milk is known to have special features and it contributes insufficient ratio in total milk production in Turkey, so its production level is needed to increase. Since goat milk is preferred for the production of cheese, ice cream and baby food, this can be assumed that there will be no marketing problem when the production amount is increased. On the other hand, goat meat is preferred by people living in certain regions, especially mountainous regions, in Turkey. Although there is perception in society that goat meat can cause diarrhea but, this has nothing to do with the truth. Because there is no literature on goat meat causing diarrhea. Especially, goat meat produced from young and castrated male individuals is a product that can be consumed by all parts of society in terms of its muscle: fat ratio and other quality characteristics.

Goat breeding should be discussed separately to solve the lack of goat milk and particularly the red meat supply problem in Turkey. In this context, how many goats are needed in the country and which breeds they should consist of on regional or even province and district basis are the issues that need to be carefully planned.

Besides the planning deficiency, the other important problem goat production in Turkey is the inability to provide quality breeding stock. In the country, Hair goat and Kilis goat rearing should be continued in different regions under extensive or semi intensive conditions. However, intensive rearing with dairy goat breeds could be preferred in areas close to large centres. Unfortunately, it is not always possible to meet the quality breeding stock required for such a policy from within the country. On the other hand, when dairy goats are preferred in dairy farms, improving environmental conditions becomes even more important.

Damascus goats, an important genetic material for Turkey, is a goat breed whose breeding has become widespread in recent years, particularly in Hatay, Kilis and Gaziantep provinces. The lactation milk yield of these goats, which are raised in lowland regions with hot and dry climates during the summer months, is 300-600 liters and the lactation length is 250-280 days. Live weight is 60-90 kg in males and 50-60 kg in females and litter size is 150-200% (Keskin et al., 2004; Keskin et al., 2016; Gül et al., 2016).

Alpine goat, known for its very good lactation properties, is a dairy goat breed that has spread to almost every region of the world. The lactation milk yield and lactation period of this breed are 700-800 litres and 240-280 days, respectively (Özcan, 1989; Dickson-Urdanetaa et al., 2000; Klir et al., 2015).

The increasing interest in goat milk leads the breeders to seek breeding stocks with high milk yield in hot climatic conditions. This crossbreeding study was carried out by a goat breeder who evaluates that crossbreeding of Damascus goats, which have a wide variation in terms of milk yield despite being a warm climate animal (Keskin et al., 2004; Keskin et al., 2016; Gül et al., 2016), with Alpine goat would give good results. The study in which F_1 crosses were currently obtained will be continued until B_1 crossbreeding, if necessary, according to the yield levels of the goats.

Growth performance of born animals for the period until weaning as well as reproductive efficiency are important issues in crossbreeding studies aiming to increase meat or milk yield. Because these features are important both in terms of showing the adaptation of the new developed genotype and in terms of sustainability and profitability. This study was carried out with the aim of evaluating the obtained crossbred genotype (F1) and Damascus goat kids in terms of growth and survival characteristics.

MATERIALS and METHODS

All experimental procedures were carried out according to the permission given by Mustafa Kemal University Local Ethics Committee numbered 2019/07-08.

The animal material for the study consisted of 136

head of pure Damascus goats and 32 head of Damascus goats crossbred with Alpine goat as well as their kids. In Turkey, Alpine x Damascus crossbreeding was carried out for the first time in this study and all of the kids born were included in the trial. For this reason, sampling and power analysis were not performed in the study. The study was carried out in a dairy goat breeding farm established in the village of Salbaş in Adana province.

The goats that gave birth were fed with concentrate feed containing 15-16% crude protein and 2700 kcal metabolizable energy per kg dry matter and alfalfa hay. They were given an average of 1 kg / day concentrate (Table 1) and 1 kg / day alfalfa hay per animal.

Table 1. The nutrient content of cancentrate feed for goat used in the study

Çizelge 1. Çalışmada kullanılan keçi kesif süt yeminin besin madde içeriği

Main components	Amount (%)	Additives	Amount
Crude protein	16	Vitamin A	13.000 IU
Crude fat	5.1	Vitamin D3	4.000 IU
Ash	8.5	Vitamin E	50 mg
Crude fibber	13.2		
Sodium	0.36		
Calcium	0.95		

Since there was no oestrus synchronization application in the trial flock, the births continued for approximately 3 months (January - March period). It was ensured that each kid could suck their mother after birth. The kids were fed with their dams' milk (average 0.70 litre / head) for the first 15 days after birth. For the profitability of the dairy production enterprise, after this period, a mixture containing 60% goat milk and 40% kid food (Table 2) was used in the feeding of the kids. This mixture was given to the kids as 0.95, 1.2 and 1.0 litres per animal between 15th and 30th days, 31st and 45th days, 46th and 60th days, respectively. Each kid who reached the age of 60 days was weaned individually.

Table 2. Nutritional composition of kid food (Sprayfo ®) used in the study

Çizelge 2. Çalışmada kullanılan oğlak mamasının (Sprayfo ®) besin madde içeriği

Main components	Amount (%)	Additives	Amount
Crude protein	22	Vitamin A	40.000 IU
Crude fat	2.2	Vitamin D3	2.000 IU
Ash	9.0	Vitamin E	300 mg
Crude fibber	0.0		
Sodium	0.70		
Calcium	0.95		

Kid rearing feed (Table 3) containing 18% crude protein and 2800 kcal metabolizable energy per kg dry matter and alfalfa hay were given to kids ad libitum from the age of 10 days to the weaning time. Body weight for each kid was determined by an electronic scale with an accuracy of 10 g and with 15 days interval during the period from birth to weaning.

Table 3. Nutritional composition of kid rearing feed used in the study

Çizelge 3. Çalışmada kullanılan oğlak büyütme yeminin besin madde içeriği

Main components	Amount (%)	Additives	Amount
Crude protein	20	Vitamin A	10.000 IU
Crude fat	2.8	Vitamin D3	1.200 IU
Ash	8	Vitamin E	30 mg
Crude fibber	9.5		
Sodium	5.0		
Calcium	13.0		

As birth characteristics in the experiment; the number of goats giving birth as single, twins and triplets, the number of kids born and the number of weaned kids were calculated. By using this data, pregnancy rate, kidding rate, birth type rate, kid yield at birth and survival rate were calculated using the formulas given below (Özcan, 1989).

Litter size (%) = (number of kid at birth/ number of goat giving birth) x 100

Survival rate (%) = (number of kids at weaning / number of kid at birth) x 100

Single kidding rate (%) = (number of goats with single kid / number of goat giving birth) x 100

Twin birth rate (%) = (number of goat with twin kids / number of goat giving birth) x 100

Triplet birth rate (%) = (number of goats with triplet kids / number of goat giving birth) x 100

The data were analysed using SPSS (23) GLM UNIVARIATE and MEANS were used for evaluating basic statistical parameters. GLM was used for the evaluation of kids' growth performance. The Duncan post hoc test was used to identify significant differences between least square means (Efe et al., 2000). The model used for the evaluation was:

$Y_{ijklm} = \mu + \alpha_i + \beta_j + \gamma_k + \lambda_l + e_{ijklm}$

Y_{ijklm}, recorded value of the mth animal in the ith year, jthsex, kth farm, and lth birth type

μ, mean of population

α_i, effect of breed/ genotype, i = 1: Damascus, 2: Alpine x Damascus crossbred

β_j, effect of sex, j = 1: Female, 2: Male

γ_k, effect of birth period, k = 1: Before February 15, 2: Between 16-28 February, 3: Between 1-15 March, 4: After March 16

λ_l, effect of birth type, l= 1: Single, 2: Twin, 3: Triple

$e_{ijkl,}$ was the random error.

Reproductive parameters were analysed by chi-square test in the SPSS (Efe et al., 2000). Significant

differences between groups were evaluated at $P<0.05$, $P<0.01$, and $P<0.001$.

RESULTS and DISCUSSION

Reproductive characteristics of the goats are given in Table 4. As it can be seen from this table, the yields of kids at birth in groups consisting of Damascus goats and crossbred goats were calculated as 138.2% and 140.6%, respectively. One head of goat in the Alpine x Damascus crossbreed goats gave birth to triplets, but two of them were born dead. Since the goats giving birth to both genotype groups are Damascus goats, these values, which are very close to each other, can be accepted as normal. However, the difference in results in this table is that although statistically insignificant, the group with pure Damascus goats has a higher survival rate (86.2% and 75.6%, respectively) compared to the crossbreeds. This may be due to the fact that the rate of domestic goat blood in crossbreeds is 50%. The twin and triplet birth rates determined in the current study (Table 4) were similar to the rates reported by Keskin et al. (2016) for Damascus goats as 41.73% and 4.08%, respectively.

The effects of genotype groups and birth types on the body weight of kids are given in Table 5. The birth weight of Damascus goats was higher than the Alpine x Damascus (AD) crossbred kids ($P<0.05$). The average birth weight value calculated for Damascus goats in the present study was similar to the birth weight reported as 2.92 kg for the same breed by Hermiz et al. (2008). On the other hand, this value is lower than the birth weight values reported by different researchers between 3.2 and 4.16 kg for the same breed (Taşkın et al., 2000; Keskin and Biçer, 2002; Tabba et al., 2005; Ahtash et al., 2008; Hermas et al., 2010; Keskin et al., 2016). Since the present study is one of the few studies in which Alpine x Damascus goat crossbreeding was conducted, any literature on this crossbreeding could not be found. On the other hand, there are different studies in which Alpine goats and local breeds raised in different parts of the world were crossbred.

Table 4. Reproductive traits of the experimental does
Çizelge 4. Deneme keçilerinin üreme özellikleri

Traits	Damascus	Alpine x Damascus	P	X^2 values
Number of does giving birth	136	32		
Number of does giving single birth	88	18		
Number of does giving twin birth	42	13		
Number of does giving triplet birth	6	1		
Number of kid at birth	188	45		
Number of kids at weaning	162	34		
Single birth rate (%)	64.7	56.3		
Twin birth rate (%)	30.9	40.6	>0.05	2.201
Triplet birth rate (%)	4.4	3.1		
Survival rate at weaning (%)	86.2	75.6	>0.05	3.249
Kid yield at birth (%)	138.2	140.6	>0.05	2.979

Table 5. Influences of genotype and birth type on the live weight of kids (kg; mean ± standard error)
Çizelge 5. Genotip ve doğum tipinin oğlakların canlı ağırlıkları (kg; ortalama ± standart hata*) üzerine etkileri*

Live weight (kg)					
	Birth	at 15th day	at 30th day	at 45th day	at 60th day
Genotype					
Alpine x Damascus	2.5±0.07 (45)	4.0±1.12 (35)	5.7±0.18 (34)	8.0±0.12 (34)	10.3±0.11 (34)
Damascus	2.7±0.05 (188)	4.5±0.06 (171)	6.1±0.06 (162)	7.7±0.06 (162)	9.5±0.06 (162)
P	<0.05	<0.01	<0.05	>0.05	<0.01
Birth type					
Single	2.8±0.07[a] (106)	4.5±0.76[a] (98)	6.3±0.09[a] (90)	8.0±0.07[a] (90)	9.9±0.08[a] (90)
Twin	2.6±0.06[ab] (109)	4.3±0.08[a] (95)	5.8±0.09[b] (93)	7.5±0.08[b] (93)	9.5±0.08[ab] (93)
Triplet	2.4±0.18[b] (18)	4.3±0.18[a] (13)	5.7±0.19[b] (13)	7.5±0.16[b] (13)	9.2±0.18[b] (13)
P	<0.05	>0.05	<0.01	<0.01	<0.01

Note: Different superscript letters in the same column show statistical difference at 5% significance level.

For example, Goonewardene et al. (1998) reported the average birth weight of kids as 1.4 kg in Alpine and Anglo Nubian goats' crossbreeds. Similarly, average birth weights were reported as 3.24 kg in Alpine x Native Balkan crossbreeds (Milevska et al., 2010), as 2.87 kg in Alpine x Boer crossbreeds (Jeeva et al., 2011), and as 3.5 kg in Alpine x Saanen x Boer crossbreeds (McManus et al., 2008). These differences may have resulted from the variability of feeding and herd management carried out in different countries and the differences of indigenous breeds in the crossbred genotypes obtained. As seen from the table, the weaning weight was 10.3 ± 0.11 kg in Alpine x Damascus goat crossbreeds and 9.5 ± 0.06 kg in Damascus goats (P <0.01). Heterosis may have contributed to crossbred kids being heavier at weaning. On the other hand, the average weaning weight calculated in the present study was lower than the weaning weights reported by different researchers for crossbreeds of Alpine goats with different breeds (McManus et al., 2008; Milevska et al., 2010). Mean weaning weight values calculated for Damascus goats were similar to the values reported by Keskin et al (2000) as 10.19 kg and by Keskin et al (2016) as 10.1 kg for the same breed. However, this value was lower than the values reported as 16.98 kg by Taşkın et al. (2000) and 17.3 kg by Tabba et al. (2005) for the same breed. These differences between the current study and the mentioned literature may be due to differences in practice in other studies, such as breed / genotype, region, management systems, and weaning time.

When the effect of birth type on the kid growth is examined (Table 5), it was seen that birth weight was higher in single born kids (P <0.05). This situation, which was in favour of single born kids, continued until weaning. We know that especially birth weight is closely related to the feeding of mothers in the prenatal period (Görgülü et al. 2009). In this study, the number of offspring in the uterus was not determined by performing an ultrasound examination during pregnancy. For this reason, since this situation was not taken into account in the feeding program of pregnant goats in the prenatal period, the pregnant goats with two or three offsprings were able to allocate less nutrients to their offspring individually. This may have affected kids birth weight. Similar to these findings in the present study, it has been stated by many researchers that the body weight of single-born kids from birth to weaning is higher than that of twin or triplet kids (Goonewardene et al., 1998; Mourad and Anous, 1998; Keskin, 2000; Tabba et al., 2005; Tatar et al., 2019).

Since oestrus synchronization was not applied in the study, the births continued for approximately three months. As can be seen from Table 6, which includes the effects of birth date on weight gain until weaning on the basis of four different periods, birth weights of kids born in the March period were higher than those born in the February period (P <0.01). In terms of weaning weight, the difference between birth date period groups has disappeared statistically. The survival rate in the same periods changed as 70.0%, 88.9%, 88.9% and 92.2%, respectively (P<0.01) with the effect of the higher birth weight in March and the

Table 6. Effects of birth period and gender on the live weights of the kids from birth to weaning (kg; mean ± standard error)

Çizelge 6. Doğum dönemi ve cinsiyetin doğumdan sütten kesime kadar oğlakların ağırlıklarına (kg; ortalama ± standart hata*) etkileri*

Live weight					
	Birth	15th day	30th day	45th day	60th day
Birth time period					
Before February 15	2.5±0.08^{a} (70)	4.1±0.10^{a} (55)	5.7±0.14^{a} (49)	7.3±0.15^{a} (49)	9.4±0.16^{a} (49)
Between 16-28 February	2.6±0.10^{a} (45)	4.2±0.15^{a} (41)	5.9±0.17^{a} (40)	7.5±0.16^{a} (40)	9.4±0.14^{a} (40)
Between 1-15 March	3.0±0.10^{b} (54)	4.4±0.10^{b} (49)	6.4±0.10^{b} (48)	8.0±0.10^{b} (48)	9.6±0.09^{a} (48)
After March 16	2.8±0.08^{ab} (64)	4.7±0.09^{b} (61)	6.3±0.09^{b} (59)	7.9±0.08^{b} (59)	9.7±0.08^{a} (59)
P	<0.01	<0.01	<0.01	<0.01	>0.05
Gender					
Male	2.8±0.06 (117)	4.5±0.07 (103)	6.2±0.08 (97)	7.9±0.07 (97)	9.7±0.07 (97)
Female	2.6±0.06 (116)	4.3±0.08 (103)	5.9±0.08 (99)	7.6±0.08 (99)	9.6±0.09 (99)
P	<0.05	<0.05	<0.01	<0.01	>0.05
Overall	2.7±0.08 (233)	4.5±0.05 (206)	6.1±0.06 (196)	7.7±0.06 (196)	9.5±0.06 (196)

Note: Different superscript letters in the same column show the statistical difference at a 5% significance level.

warmer climatic conditions for this period. When the birth periods are evaluated as February and March, the survival rates at weaning were calculated as 77.4% for those born in February and 90.7% for those born in March (P <0.01). In a similar study, Tabba et al. (2005) stated that the birth weight of Damascus goats could change in the summer and the winter periods. In the same table, when the effect of sex on the live weight of kids for the period between birth and weaning is evaluated, it was seen that the body weight differences between male and female kids continued until the 45th day from birth (P <0.01). Different researchers have also reported that the sex of the kids effect in kids causes higher birth and weaning weights in males (Mourad and Anous, 1998; Goonewardene et al., 1998; Keskin, 2000; Tatar et al., 2019).

The effects of sex, birth type and time of birth on the kid growing traits in Alpine x Damascus crossbred kids are given in Table 7. The body weight changes during the birth-weaning period were found to be statistically similar in males and females (P> 0.05) for this genotype. In different studies, it has been reported that the birth and weaning weights of male kids in Alpine crossbreeds are higher than those of female kids (Rojo-Rubio et al.2016; Lourençon et al.2016). In the present study, contrary to what is reported in the literature, the similar weight of male and female kids may be due to the low number of kids in the crossbreed group. In the same table, when the effect of birth type on the weight gain of the kids between birth and weaning period was evaluated, while birth weight was higher in single-born kids (P <0.01) this difference disappeared from the 15th day after birth (P>0.05). Both the low number of crossbred kids in the experiment and the fact that the females giving birth are from the Damascus goat breed with high milk yield may have been influenced to this situation. Thus, Keskin (2000) states that Damascus goats give 348 litres of milk with an average of 256 days of lactation. This amount of milk yield can be considered as a sufficient amount for mothers to raise their twin offsprings. In Alpin x Damascus crossbreed kids, the time of birth did not have an effect on the development of the kid (P> 0.05).

Table 7. Effects of sex, birth type and birth dates on the live weight of Alpine x Damascus F_1 crossbred kids from birth to weaning (mean ± standard error)

Çizelge 7. Cinsiyet, doğum tipi ve doğum tarihlerinin Alpin x Şam F_1 melezi oğlaklarda doğumdan sütten kesime kadarki canlı ağırlıklar üzerine etkileri (ortalama ± standart hata)

Live weight (kg)					
	Birth	15th day	30th day	45th day	60th day
Sex					
Male	2.6±0.11 (19)	4.2±0.20 (15)	5.9±0.35 (15)	8.1±0.20 (15)	10.2±0.15 (15)
Female	2.4±0.09 (26)	3.8±0.14 (20)	5.6±0.19 (20)	7.8±0.16 (20)	10.4±0.16 (19)
P	>0.05	>0.05	>0.05	>0.05	>0.05
Birth Type					
Single	2.7±0.09 (18)	4.3±0.16 (15)	5.9±0.27 (15)	8.0±0.18 (15)	10.2±0.19 (15)
Twin	2.3±0.09 (26)	3.7±0.16 (20)	5.5±0.24 (19)	7.8±0.17 (19)	10.4±0.13 (19)
P	<0.01	<0.05	>0.05	>0.05	>0.05
Birth time period					
Before February 15	2.3±0.13^{a} (15)	3.8±0.23^{a} (9)	5.8±0.43^{ab} (8)	8.0±0.20^{a} (8)	10.3±0.17^{a} (8)
Between 16-28 February	2.6±0.11^{a} (17)	3.7±0.20^{a} (15)	5.3±0.28^{a} (15)	7.8±0.21^{a} (15)	10.5±0.23^{a} (15)
Between 1-15 March	2.3±0.22^{a} (7)	4.2±0.16^{ab} (5)	5.9±0.10^{ab} (5)	7.6±0.19^{a} (5)	9.9±0.05^{a} (5)
After March 16	2.7±0.12^{a} (6)	4.6±0.16^{b} (6)	6.5±0.33^{b} (6)	8.4±0.29^{a} (6)	10.2±0.11^{a} (6)
P	>0.05	<0.05	>0.05	>0.05	>0.05

Note: Different superscript letters in the same column show statistical difference at 5% significance level. Kid born triplet has been excluded from the table because there is only one head of kid in the triplet group.

The effect of kid sex, birth type and birth period on the weight of the kids in Damascus goat from birth to 60 days of age is included in Table 8. It was detected that kids' sex had a significant effect on live weight in the period between birth and weaning for Damascus goat. Male kids were heavier than female ones at birth (P <0.05) and this difference continued until weaning. Likewise, single-born kids were heavier than those with multiple-born ones (P <0.01). These results were found to be similar to the birth and

weaning weight values reported by Keskin (2000) for male and female goats in Damascus goat. The researcher reported the birth weight of male and female Damascus kids as 3.60 kg and 3.42 kg, and weaning weight as 9.95 kg and 9.58 kg, respectively. Different researchers have also reported that male kids and also single born kids have higher birth and weaning weights than female and twin kids, respectively in Damascus kids (Taskın et al., 2000; Khalil et al., 2010; Keskin et al., 2016; Mohammed et al., 2018).

In addition, as seen in Table 8, the average birth and weaning weights of kids born in the March period were higher than those born in the February period. Similar to the current study, Khalil et al. (2010) reported that the birth season has a significant effect on the growth of Damascus kids from birth to weaning, and they stated that kids born in the spring-summer period have higher live weight and development values than those born in the autumn-winter period.

Table 8. Effects of sex, birth type and birth dates on the live weight of Damascus kids from birth to weaning (mean ± standard error)

Çizelge 8. Cinsiyet, doğum tipi ve doğum tarihinin Şam oğlaklarının doğumdan sütten kesime kadar canlı ağırlıkları üzerine etkileri (ortalama ± standart hata)

Live weight (kg)					
	Birth	15th day	30th day	45th day	60th day
Sex					
Male	2.8±0.07 (98)	4.5±0.07 (88)	6.3±0.08 (82)	7.9±0.07 (82)	9.7±0.08 (82)
Female	2.6±0.07 (90)	4.4±0.08 (83)	5.9±0.09 (80)	7.5±0.10 (80)	9.4±0.09 (80)
P	<0.05	>0.05	<0.01	<0.01	<0.05
Birth type					
Single	2.9±0.08^{a} (88)	4.5±0.16^{a} (83)	6.4±0.08^{a} (75)	8.0±0.08^{a} (75)	9.8±0.09^{a} (75)
Twin	2.7±0.07^{ab} (83)	4.4±0.16^{a} (75)	5.9±0.09^{b} (74)	7.4±0.09^{b} (74)	9.3±0.08^{b} (74)
Triplet	2.4±0.19^{b} (17)	4.3±0.18^{a} (13)	5.7±0.19^{b} (13)	7.5±0.16^{b} (13)	9.2±0.18^{b} (13)
P	<0.05	>0.05	<0.01	<0.01	<0.01
Birth period					
Before February 15	2.5±0.09^{a} (55)	4.2±0.10^{a} (46)	5.7±0.14^{a} (40)	7.3±0.15^{a} (41)	9.4±0.16^{a} (41)
Between 16-28 February	2.6±0.14^{a} (28)	4.2±0.15^{a} (26)	5.9±0.17^{a} (25)	7.5±0.16^{a} (25)	9. 0±0.14^{a} (25)
Between 1-15 March	3.0±0.10^{b} (47)	4.7±0.10^{b} (44)	6.4±0.10^{b} (43)	8.0±0.10^{b} (43)	9.6±0.10^{a} (43)
After March 16	2.8±0.09^{ab} (58)	4.7±0.09^{b} (55)	6.3±0.09^{b} (53)	7.9±0.08^{b} (53)	9.6±0.09^{a} (53)
P	<0.01	<0.01	<0.01	<0.01	>0.05

Note: Different superscript letters in the same column show statistical difference at 5% significance level.

CONCLUSIONS

In this study, it was concluded that (a) Damascus kids had more weight at birth than Alpine x Damascus crossbred kids, but this difference disappeared in the weaning age and even the crossbred kids weigh more. (b) The survival rate of the Damascus kids which are the animal of the hot and humid climate during the weaning period, was better than the crossbred ones. (c) Also kids born in March had better results in terms of body weight and survival rate than those born in February. It can be said that, in this crossbreeding study for milk production, the date planning for the birth period is an important issue in terms of kid growth performance and survival rate.

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Researchers Contribution Rate Declaration Summary

The authors declare that they have contributed equally to the article.

Conflicts of Interest Statement

The authors have declared no conflict of interest.

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