



Some Progeny and Milk Yield Characteristics of Kilis and Holstein Friesian x Kilis Crossbred Cattle

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Abstract: This study was carried out to determine some growth, milk and progeny yield characteristics of Southern Anatolian Red (Kilis), Holstein and Kilis cattle first crossbred generation (HFxKilis, F1) and backcross to the paternal breed (HFxF1, B1) crossbred in the GAP International Agricultural Research and Training Center in Diyarbakır. In this study, milk yield of lactation in Kilis, F1 and B1 cattle were determined as 2001.88 kg, 2686.31 and 3901.59 kg; respectively ($P<0.001$). Also, the lactation period of Kilis cattle and crossbreds were 222.55, 244.5 and 278.17 days, respectively. The lactation period of Kilis cattle was significantly shorter than that of crossbred cattle ($P<0.05$). Additionally, the birth and the weaning weights of the offspring were found at least in the Kilis calves and the highest value in the B1 crossbred calves ($P<0.05$). As a result of this study, crossbreeding between Holstein and Kilis cattle, birth weight, weaning weight of calves, milk yield and lactation duration were increased in crossbred cows.

Keywords: Crossbreeding, Holstein Friesian, Kilis cattle, milk yield, reproductive characteristics

Kilis ve Siyah Alaca Kilis Melezi Sığırların Bazı Döl ve Süt Verim Özellikleri

Öz: Bu çalışma, Güney Anadolu Kırmızısı (Kilis), Siyah Alaca ile Kilis sığırı F1 (SAXKilis) ve G1 (SAXF1) melezlerinin bazı büyüme, süt ve döl verim özelliklerini tespit etmek amacıyla GAP Uluslararası Araştırma ve Eğitim Merkezi Müdürlüğü'nde yürütüldü. Bu çalışmada, Kilis, F1 ve G1 sığırlarda süt verimleri sırasıyla 2001,88 kg, 2686,31 ve 3901,59 kg olarak tespit edilmiştir ($P<0.001$). Ayrıca Kilis sığırı ve melezlerinin laktasyon süreleri sırasıyla 222.55, 244.5 ve 278.17 gün olduğu ve bu sonuçlar ile Kilis ırkı sığırların laktasyon süresi, melez sığırlardan önemli derecede daha kısa olduğunu gözlenmiştir ($P<0.05$). Kilis sığırlarında buzağı doğum ağırlıklarının melez genotiplere göre en az olduğu tespit edilmiştir ($P<0.05$). Bu çalışmanın sonucu olarak Kilis sığırları, Siyah-Alaca sığırları ile melezlendiğinde, melez hayvanlarda buzağı doğum ağırlığı, laktasyon süresi ve süt veriminin arttığı tespit edilmiştir.

Anahtar sözcükler: Melezleme, Siyah Alaca, Kilis Sığırı, süt verimi, döl verimi özellikleri

1. Introduction

Kilis cattle is one of Turkey's indigenous cattle breeds of cattle in the country of South and Southeastern Anatolia Region that is the Taurus mountain, in particular, in the provinces of Gaziantep, Diyarbakır, Şanlıurfa and Adana are grown. The body color in these cattle ranges from light yellow to dark orange or even red. Kilis cattle are long-legged, high-structured milk cattle breed (FAO 2010). It is reported that this

breed is resistant to hot and arid climatic conditions. Kilis cattle is a primitive variant of the cattle of Damascus and Aleppo (Yarkin et al. 1971). Also, Kilis is the highest milk yield among domestic cattle breeds in Turkey (Alpan 1993, FAO 2010). Lactation yield of Kilis cattle has been reported to be between 503 kg and 3054 kg and lactation duration between 198.35 and 279.9 days (Eker 1956, Aytuğ 1959, Yarkin et al. 1971, Yeniçeri and Özcan 1982, Ertuğrul

2001, Koçak and Özbeyaz 2005). Due to conditions of high temperatures are uncomfortable for purebred Holstein cattle and will affect their performance. Therefore, In order to increase the milk yield of domestic animals, it is necessary to cross-breed with cattle breeds such as Holstein, which has high milk yield (Molee et al. 2011). Ertuğrul (1993) reported that the calf birth weight in Kilis cattle was 21.1 kg in males and 21.5 kg in females however, cross-breeding continues to be an attractive option for livestock breeding and due to the rapid results that can be achieved, the country has improved its potential and potential benefits for farmers (Singh, 2016). Also, Hizli et al. (2017) reported that the calving birth weight as 23.5 kg. Additionally, some reproductive characteristics and milk yield could be improved by crossing between native cattle and cultivated cattle breeds. The effect of crossbreeding on lactation milk yield has been examined by several researchers. Fahmy et al. (1976) reported that using Shorthorn and Egyptian native cattle and their crossbreds milk yield were 2112 kg, 2083 kg and 1120 kg per lactation for 1/2 and 3/4 dairy Shorthorn inheritance and pure Egyptian native cattle respectively. Additionally, Asker et al. (1965) reflected that the first birth age; 35.7 months in F1 genotype, 38.5 months in B1 genotypes, 305 days corrected milk yield; 2192 kg in the F1 genotype, 1839 kg in the B1 genotype, lactation duration; 319 days in F1 genotypes, 498 days in B1 genotypes and service periods; 179 days in F1 genotypes, 224 days in B1 genotypes were found crossbreeding between Holstein Friesian and Kilis cattle. Furthermore, Kassir et al. (1969) found that in the Holstein Friesian and native cattle crossbreds B1 genotypes grown in Iraq, the lactation yields were 2316.3 kg and the lactation yields were 2475.2 kg in their later breed crossbreds. Kumlu et al. (1991), 305 days lactation milk yield was determined to be 2767.6 ± 7.6 for Kilis cattle and Holstein Friesian crossbreds F1 and $3089,6 \pm 128,3$ kg for Holstein Friesian. Tropical and subtropical regions; By crossbreeding between Holstein and native cattle; crossbreds can withstand the high

temperature of the subtropical and tropical regions in the humid climate (Tadesse and Dessie 2003 and Milazzotto et al. 2008). The aim of this study, was to improve progeny and lactation yield performance of Kilis cattle with crossing Holstein Friesian.

2. Methodology

2.1. Location characteristics and management

The research was carried out in the semi-arid area of the Diyarbakir region. An altitude of experimental area was 500 m above sea level. Average annual rainfall, temperature and relative humidity of experimental area were 481.6 mm 15.8 °C and 53.8%, respectively. Average temperature can reach 30 °C in summer months. The animal material of this study were F1 and B1 crossbreds cattle obtained from the Kilis cattle with the Holstein Friesian bull the breeding in the GAP International Research and Training Center. In this study, the calves were weighed in the immediately after birth, colostrum was given for the first 3 days following birth, after the third day the calves were separated from their mothers and placed in their own calf divisions, calves were given milk by sucking own mothers for throughout 75 days during the milking. Weaning weights were taken the end of 75th day. Fresh water, concentrated feed and alfalfa hay were given to the calves. In their compartments. In the first 3 months of calving, the calf starter feed (2.80 Mcal kg⁻¹ metabolizable energy (ME), at least 18% crude protein (CP) and for the calves of 4-6 months, alfalfa hay and concentrate feed (2.70 Mcal kg⁻¹ ME and 17% CP) were given. The heifers and cows were kept on the natural pasture during spring and summer months. In addition to pasture, animals were given alfalfa hay and corn silage. In other months, animals were given corn silage, sorghum silage and alfalfa hay and mineral mixtures were given.

2.2. Milk yield and progeny characteristics

Dairy control in cattle was done every 15 days at start on the 15th day after birth. Cows with less than 130 days of the lactation duration

were not evaluated. In addition, the birth weight of the calf, the age of first birth, the live weight of the calf, and various body measurements were taken for progeny performance characteristics.

2.3. Statistics analysis

The effect of macro environmental factors (genotype and sex) on birth weight, were estimated using the least squares method. The model used for the analysis was: $Y_{ijk} = \mu + a_i + b_j + e_{ijk}$ mathematical model and differences between groups by using TUKEY statistical test. It was assumed that there was no significant interaction between the studied factors in the used model. In the model; $Y_{ijk} = i.$ sex, $j.$ genotype, $k.$ the live weight of the calve (measured in the period of measurement), μ = the population average in terms of live weight, $a_i = i.$ ($i=1,2$) the share of sex influence, $b_j = j.$ ($j=1,2,3$) the share of the effect of the genotype, $e_{ijk} = i.$ sex, $j.$ genotype born $k.$ refers to the impact of the incidental environmental factor affecting on calve or the random error.

In addition, the effect of macro environmental factors (genotype and lactation)

on milk yield was estimated using the least squares method. Variance analysis with $Y_{ijk} = \mu + a_i + b_j + e_{ijk}$ mathematical model and differences between groups were estimated by TUKEY statistical test. It was assumed that there is no significant interaction between the factors studied in the model used. This mathematical model was; $Y_{ijk} = i.$ genotype, $j.$ number lactation, $k.$ the lactation milk yield of the cow (measured in the period of measurement), μ = the population average in terms of milk yield, $a_i = i.$ the share of the effect of the genotype, ($i=1,2,3$), $b_j = j.$ ($j=1,2$) the share of the effect of the number lactation, $e_{ijk} = i.$ genotipte, $j.$ number lactation $k.$ refers to the impact of the incidental environmental factor affecting the cow or the random error.

3. Results and Discussion

3.1. Birth and weaning weights

The birth weight and the weaning weight of the Kilis cattle, F1 and B1 genotypes were shown in Table 1. In B1 genotypes, the birth weight and weaning weight were highest in calves with G1 genotype, followed by F1 and Kilis calves.

Table 1. Calf birth weight and weaning weight of Kilis and Holstein friesian x Kilis crossbreed calves

Çizelge 1. Kilis ve Holstein Friesian x Kilis melezi buzağularının doğum ve süttten kesim ağırlıkları

Triats/ Genotyps	Sex of calf	N	Calf birth weight (kg)	Lower Bound	Upper Bound	Weaning weight (kg)	Lower Bound	Upper Bound
Kilis	Male	10	26,4	23,0	30,0	60,16	56,3	67,2
	Female	6	23,5	15,0	27,0	54,10	50,0	60,0
Mean		16	24,95 b	19,0	28,5	57,13 b	56,2	63,6
F ₁	Male	6	30,0	29,0	32,0	59,2	44,5	69,4
	Female	16	28,3	23,0	32,0	52,3	43,2	65,8
Mean		22	29,20 ab	26,0	32,0	55,75 ab	43,9	67,6
B ₁	Male	21	30,95	24,0	36,0	65,3	56,0	75,3
	Female	31	30,63	26,0	36,0	62,7	52,3	73,4
Mean		52	30,79 a	25,0	36,0	64,0 a	54,2	74,4
Significance			*			*		

(*) Means within column by different letters differ ($P < 0.05$)

Differences the birth weight and the weaning weight between genotypes were statistically significant ($P < 0.05$). The birth weight of Kilis calves results in agreement with reflected by Ünalın and Işık (2007). Also, the effects of macro environment factors such as sex and genotype on calf birth weight, expected average,

sex and genotypes calculated according to $Y_{ijk} = M + b_j + c_i + e_{ijk}$ model. The average expected calf birth weight was found to be $M = 27.65$ kg, $b_1 = -2.790$ kg (The effect of genotype, Kilis), $b_2 = + 0.491$ kg (The effect of genotype, F1), $b_3 = + 2.479$ kg (The effect of genotype, B1), $c_1 = 0.628$ kg (The effect of

male sex) and $c_2 = -0.628$ kg (The effect of female sex), Male calves were 0.628 kg heavier than females. Also, the birth weight of Kilis calves was 2.790 kg lower than crossbred genotypes.

3.2. First calving age and calving interval

The calving age and calving interval of Kilis and crossbred genotypes were shown in Table 2. It was determined that the F1 crossbred

genotype was found to be the earliest calving. But the Kilis cattle was latest calving in the genotypes. Differences at the first calving age between genotypes were statistically significant ($P < 0.05$). Although the first calving age was similar to the findings of Sezgin (1976) for F1 crossbred genotype, it was observed that it was higher than reported by Koçak and Özbeyaz (2005).

Table 2. Some fertility characteristics of Kilis and Holstein Friesian x Kilis crossbred

Çizelge 2. Kilis ve Siyah-Alaca x Kilis sığırtı melezlerinin bazı döl verim özellikleri

Triats/ Genotyps	N	Calving age (day)	Lower Bound	Upper Bound
Kilis	16	1141,50 b	1101	1359
F1	37	885,80 a	720	1275
B1	24	1047,53 ab	940	1239
Significance	77	*		
Calving interval (day)				
Kilis	6	362,5 ab	317	424
F1	10	352,1 a	312	440
B1	4	376,0 b	346	404
Significance	20	*		

(*) Means within column by different letters differ ($P < 0.05$)

In this study, B1 crossbred genotypes were found to be greater than the results of Ertuğrul et al. (2001) and Koçak and Özbeyaz (2005), but the data on the age of first birth were similar to those of Sezgin (1976). The calving interval of Kilis cattle were found less than the results of Koçak and Özbeyaz (2005). It has been observed that the F1 genotype has a lower calving interval than Ertuğrul et al. (2001) and Koçak and Özbeyaz (2005) 's findings. The calving intervals of B1 genotypes was

determined in accordance with the values of Ertuğrul et al. (2001) and Koçak and Özbeyaz (2005). Additionally, Sing (2016) reported that The Friesian crossbreds were slightly older at first calving and had slightly longer calving intervals than Jersey crosses.

3.3. Milk yield and lactation duration

The milk yield and the lactation duration of Kilis and Holstein Friesian x Kilis crossbreds were shown in Table 3.

Table 3. Milk yield and lactation times of Kilis and Holstein Friesian x Kilis crossbred

Çizelge 3. Kilis ve Siyah-Alaca x Kilis melezlerinin süt verimi ve laktasyon süreleri

Triats/ Genotyps	N	Milk yield (kg)	Lower bound	Upper bound	Lactation time (day)	Lower Bound	Upper Bound
Kilis	16	2001,88 ^c	484.8	2725.5	222,6 ^c	154	291
F1	33	2686,31 ^b	1441.5	3670,0	244,5 ^b	161	296
B1	24	3901,59 ^a	2377.5	6435,0	278,2 ^a	225	335
Significance	73	**			**		

(**) Means within column by different letters differ ($P < 0.01$)

The highest milk yield was obtained from the B1 genotype followed by the F1 genotype cattle. The lowest milk yield obtained from Kilis cattle. Differences in the milk yield among Kilis cattle, F1 and B1 crossbreds were statistically

significant ($P < 0.05$). Although the real milk yield data obtained from Kilis cattle were higher than reflected by Koçak and Özbeyaz (2005).

In Ceylanpınar, actual milk yield was found to be lower than the findings of Şekerden and

Peker (1982) and Yençeri and Özcan (1982). Findings of the milk yield of F1 genotype were higher than results of Şekerden and Peker (1982), Ertugrul (1993) and Koçak and Özbeyaz (2005). But lower than the results reported by Yeniceri and Özcan (1982). The actual milk of B1 genotypes were higher than the findings of Koçak and Özbeyaz (2005), Ertugrul (1993) and Şekerden and Peker (1982) but lower than the results of reflected by Yençeri and Özcan (1982). These results show that milk yield was increased in parallel with the increase in the number of Holstein Friesian blood grade by crossbreeding. It is thought that the differences between the same genotypes may be caused by different environmental conditions. In the crossbreds genotypes, the lactation durations were also found that, the lactation time increase with the increasing of Holstein Friesian blood grade. These results were found to be lower than those found by Eker and Tuncel (1971) and Sezgin (1976). The mean lactation duration of Kilis cattle were found higher than those of Koçak and Özbeyaz (2005). The lactation time in this study were similar to the results of Koçak and Özbeyaz (2005) for F1 and B1 genotypes. But The lactation time of B1 genotype was higher than the results of Ertuğrul (1993). The effects of lactation and genotype on milk yield were estimated using the least squares method according to $Y_{ijk} = M + ci + bj + e_{ijk}$ model. The average expected milk yield was found to be M: 2613.22 kg. Also, the effects of lactation and genotypes on milk yield were given as; a1: 899.20 kg (The effect of genotype, Kilis), a2: -220.76 kg (The effect of genotype, F1), a3: 1119.96 kg. (The effect of genotype, G1), b1: 118.13 kg (The effect of 1. Lactation), b2: 98.28 kg, (The effect of 2. Lactation) and b3: 157.0 kg, (The effect of 3. Lactation).

4. Conclusions and Recommendations

Crossbreeding between Holstein and Kilis cattle, birth weight and weaning weight of calves were increased. Also, it was observed that milk yield and lactation duration increased in crossbred cows. It is seen as an economic route that Kilis cattle crossbreeding with the

Holstein Friesian bulls increased some progeny characteristics and milk yield in South Anatolian region conditions. It is thought that crossbreeding may be necessary in order to maintain production in the dairy cattle industry by thinking that we may be facing a crisis in climate change in the future in.

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