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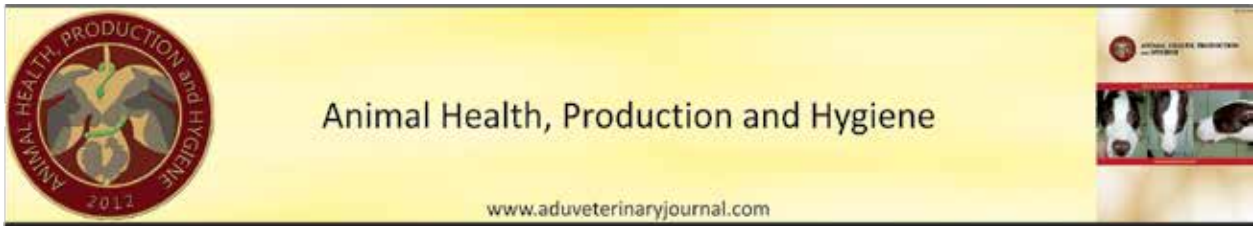

Analysis of Relations Between the Type Traits and Milk Yield in Holstein-Friesian Cows in Aydın

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A B S T R A C T

In the present study, the relations between type traits and milk yield in Holstein-Friesian cows were evaluated. A total of 105 head Holstein-Friesian cows raised between 2010 May and 2011 April at two private dairy farms in Ziyaretli Village located in Bozdogan province, Aydin were enrolled in the present study. Seventeen linear type traits on a scale of 1 to 9, and 4 general traits on a scale of 65 to 100 were scored. The mean total score values of Holstein-Friesian cows that were grown up in two private dairy farms were ranged between 75 to 82 in farm A and 72 to 85 in farm B. The relations between traits and 305-day milk yield were investigated by Spearman rank correlation. The positive and significant phenotypic correlations were found between some type traits and 305-day milk yield (P<0.01).

Key words: Type Traits, Milk Yield, Holstein-Friesian

Aydın İlinde Siyah Alaca İneklerin Dış Yapı Özellikleri ile Süt Verimi Arasındaki İlişkiler

Ö Z E T

Bu çalışmada, Siyah Alaca ineklerde dış yapı özellikleri ve süt verimi arasındaki ilişkiler incelenmiştir. Çalışmanın materyalini Aydın'ın Bozdoğan ilçesinde bulunan Ziyaretli Köyü'nde iki özel süt sığırcılığı işletmesinde 2010 Mayıs ile 2011 Nisan tarihleri arasında yetiştirilen 105 baş Siyah Alaca inek oluşturmuştur. Çalışmada, toplam 105 baş Siyah Alaca inekte 17 doğrusal özellik 1-9 puanlık skalada ve 4 genel özellik ise 65-100 puanlık bir skalada puanlanmıştır. Siyah Alaca ineklere ait toplam puan ortalamaları A ve B işletmelerinde sırasıyla; 75-82 ile 72-85 arasında değişmektedir. Özellikler ile 305 günlük süt verimi arasındaki ilişkiler Sperman sıralama korelâsyonuyla incelenmiştir. Her iki işletmede 305 günlük süt verimi ile bazı dış yapı özellikleri arasında pozitif ve önemli fenotipik korelâsyonlar tespit edilmiştir (P<0.01).

Anahtar sözcükler: Dış Yapı Özellikleri, Süt Verimi, Siyah Alaca

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Introduction

The longevity, some mammary and body characteristics and high milk yield are significant factors as selection criteria in dairy cattle breeding (Perez-Cabal and Alenda, 2002). The relationships between the type traits and milk yield, especially a suitable choice of the type traits, are quite important for both selection and management decisions relevant to dairy cattle populations and moreover to evaluate the phenotypic effect of type traits on culling (Larrogue and Ducrocq, 2001, Zavadilová and Štípková, 2012).

Previous researches concluded that there are relationships between milk yield and type traits. Genetic correlations among milk yield and some type traits were found positive and negative (fore udder attachment, udder depth, and front teat placement) by Mistzal et al. (1992). Short and Lawlor (1992) were determined that genetic correlations of linear type traits with first lactation milk yield changing from 0.48 for udder depth to 0.54 for dairy character. Genetic correlations between milk production and type traits were found generally positive (except udder depth and teat length) by Berry et al. (2004). Guliński et al. (2005) were estimated low and positive phenotypic correlations among milk yield and some type traits. Alic Ural and Yener (2009) were found phenotypic correlations that changed from -0,12 (between 305-day milk yield and central ligament) to 0,26 (between 305-day milk yield and stature) among 305-day milk yield and linear type traits. Genetic correlations between milk yield and some type traits (rump angle and teat length) were found positive and high, whereas negative correlations were found milk yield with udder depth and rear leg set by Jadoa (2010). Duru et al. (2012) were found genetic correlations among milk yield and some type traits ranged from –0.13 for udder depth to 1.00 for udder and feet and legs. Same researchers were found ranged from –0.19 for udder depth to 0.31 for knee structure as to phenotypic correlations among milk yield and type traits.

Linear type traits were determined as biological extremes for a range of visual properties of dairy cattle (Berry et al., 2004, Guliński et al., 2005, Yaylak, 2007). According to International Committee for Animal Recording Guidelines (ICAR) Guidelines, a complete linear scoring system valuable for a given breed may frequently involve further items such as skeletal traits, udder, and legs etc. Linear scoring may be conducted on dairy cattle. Linear scoring has the Linear Type Traits, may be classified on a scale of 1 to 9 points. One to 15 point scales are recommended in such conditions (Anonymous, 2006). The latter points are stature (S), chest width (CW), body depth (BD), dairy character (DC), rump angle (RA), rump width (RW), rear leg set (RLS), rear leg angle (RLA), foot diagonal (FD), fore udder attachment (FUA), rear udder height (RUH), central ligament (CL), udder depth (UD), rear udder teat placement (RUTP) and udder teat length (UTL). Additionally, knee structure (KS) and fore udder teat placements (FUTP) are frequently used in Turkey (Anonymous, 2000, Cerci and Koc, 2006).

The other characters that are outside of linear type traits were called as 'General Traits'. It was suggested that points from 50 to 97 given to cows that were evaluated in terms of this characters by ICAR. Herein other than Linear scoring, desirable circumstances are predicated on rather than actual circumstances. Therefore, cows were given points for body structure (BS), dairy type (DT), foot-leg structure (FLS) and udder structure

Table 1. The means and minimum and maximum value of linear scoring of Linear Type Traits for Holstein –Friesian cows.

Tablo 1. Siyah Alaca ırkı için doğrusal tanımlamada ele alınan her bir özellikte en düşük ve en yüksek puanların anlamı ile ideal sayılan puanlar.

Linear Type Traits	Min (1)	Max (9)	Ideal
Stature, cm	Very low (130 cm)	Very high (154 cm)	145
Dairy Character	Very rough, wide	Very narrow, sharp	7-9
Body Depth	Very short	Very deep	7
Chest Width	Very narrow	Very wide.	9
Rump Width	Very narrow	Very wide.	7-9
Rump Angle	Elevating	Very lowering	5
Rear Leg Angle	Very plumb	Very narrow	5
Foot Diagonal	Very low	Very high	9
Knee Structure	Very rough	Very dry	9
Rear Leg Set	Closed knees	Parallel	5-9
Fore Udder Attachment	Very weak	Very strong	7-9
Rear Udder Height	Very low	Very high	9
Central Ligament	Very weak	Very strong	9
Udder Depth	Very low	Very high	5
Fore Udder Teat Placement	External lob	Internal lob	6
Fore Udder Teat Length	Very short	Very long	5
Rear Udder Teat Placement	Very open	Very adjacent	5

Table 2. The mean values of 305-day milk yields of cows in farms A and B.
Tablo 2. A ve B işletmelerindeki ineklerin 305-günlük süt verimlerine ait ortalama değerler.

Farms	Farm A				Farm B			
Lactation period	N	$\bar{X} \pm S_{\bar{X}}$	Min	Max	N	$\bar{X} \pm S_{\bar{X}}$	Min	Max
1	15	5790 ± 600	2949	9344	12	5946 ± 632	2153	9511
2	20	6180 ± 408	2293	8936	9	6579 ± 571	4456	8990
3	6	6120 ± 904	3171	8756	9	5670 ± 486	4083	8088
4	6	5342 ± 505	2939	6424	28	6691 ± 435	2354	11409

(US). The means of points were determined as follows; 90-97 perfect, 85-89 very good, 80-84 good, 75-79 intermediate and 50-74 adequate (ICAR, 2002).

The purpose of the present study was to investigate relationship between type traits and milk yield Holstein-Friesian cows in Bozdogan province in Aydin.

Material and Methods

Seventeen linear type traits on a scale of 1 to 9, and 4 general traits on a scale of 65 to 100 were scored for a total of 105 head Holstein-Friesian cows. Stature was measured by a measuring cane. The relations between traits were investigated by Spearman rank correlation (SPSS, 2008).

The every farm's classification data were collected between 2010 May and 2011 April and were investigated within cows were determined at 1st-5th months of lactation. Cow's identification numbers, lactation numbers and late calving date were recorded from farm's recognizing. Firstly cows were carried out within Linear Scoring for 17 characters and then body structure, dairy type, foot-leg structure and udder structure on a scale of 65 to 100 were scored for all cows. The means and minimum and maximum values of linear scoring of linear type traits for Holstein -Friesian cows were given in Table 1 (Anonymous, 2002).

In an attempt to perform analysis, determination of the effects of the factors on 305-day milk yield in the models were carried out using a General Linear Model (GLM) procedure of the Minitab package program (Anonymous, 2010). According to evaluation predicated on points for 4 general traits (BS, DT, FLS, US), it was stated that those characters had effect on milk yield. The model of this purpose was shown below (Model 1). In addition, a separate model was composed for total score value (TS) that was calculated from general traits effects on 305-day milk yields (Model 2).

Model 1 : $Yijkl = \mu + s_i + bm_j + ls_k + b_{yx}. X_{ijkl} + b_{yz}. Z_{ijkl} + b_{yg}. G_{ijkl} + b_{yh}. H_{ijkl} + e_{ijkl}$

Model 2 : $Yijkl = \mu + s_i + bm_j + ls_k + b_{yo} O_{ijkl} + e_{ijkl}$

where;

Y_{ijklm}: i. farm, j. calving month, k. lactation number, l. cow's 305-day lactation milk yield,

μ : population mean,

s_i : i. farm's effect (i: 1, 2),

bm_j : j. calving month's effect (j: 1 (April, May, June), 2 (July, August, September), 3 (October, November, December,) 4 (January, February, March)),

ls_k: k. lactation number's effect (k: 1, 2, 3, 4),

X_{ijkl} : i. farm, j. calving month, k. lactation number, l. cow's dairy type score,

Z_{ijkl} : i. farm, j. calving month, k. lactation number, l. cow's body structure score,

G_{ijkl}: i. farm, j. calving month, k. lactation number, l. cow's foot and leg structure score, H_{ijkl} : i. farm, j. calving month, k. lactation number, l. cow's udder structure score,

O_{ijkl}: i. farm, j. calving month, k. lactation number, l. cow's total score,

b : partial regression coefficient

e_{ijkl}: residual error.

According to the evaluation predicated on points for linear type traits (LTT) (17 characters), it was mentioned that those characters effect on 305-day milk yield. The model of this aim was shown below (Model 3 and Model 4)

Model 3: $Y_{ijklm} = \mu + s_i + bm_j + ls_k + LTT1n + b_{ny} N_{ijklm} + e_{ijklm}$

Model 4: $Y_{ijklm} = \mu + s_i + b_{mj} + ls_k + LTT16n + b_{ny} N_{ijklm} + + e_{ijklm}$

where;

Y_{ijklm}: i. farm, j. calving month, k. lactation number, l. classified in linear type traits, m. cow's 305-day lactation milk yield,

μ : Population mean,

si : i. farm's effect (i: 1, 2),

bmj : j. calving month's effect (j: 1, 2, 3, 4),

ls_k: k. lactation number's effect (k: 1, 2, 3, 4),

Nijklm : i. farm, j. calving month, k. lactation number, l. classified in linear type traits, m. cow's stature,

bny : partial regression coefficient with S of milk yield,

Table 3. The mean values of all linear type traits for farms A and B according to lactation number.
Tablo 3. Laktasyon sırasına göre A ve B işletmesi için bütün doğrusal özelliklerin ortalama değerleri.

Traits	*Farm A*				*Farm B*			
	Lactation number							
	1.(N= 15)	2. (N= 20)	3.(N= 6)	4. (N= 6)	1.(N= 12)	2. (N= 9)	3.(N= 9)	4. (N= 28)
S	140.3 ± 1.45	137.1 ± 1.15	140.8 ± 2.43	142.6 ± 2.56	138.3^{b} ± 1.63	143.5^{a} ± 1.04	138.1^{b} ± 1.63	140.2^{ab} ± 0.81
DC	4.1^{b} ± 0.52	3.9^{b} ± 0.47	4.6^{ab} ± 0.98	6.6^{a} ± 0.66	4.6 ± 0.52	5.8 ± 0.53	4.8 ± 0.42	4.7 ± 0.37
BD	6.2^{b} ± 0.24	5.5^{b} ± 0.25	5.5^{b} ± 0.50	7.8^{a} ± 0.40	6.2^{b} ± 0.37	7.7^{a} ± 0.40	6.3^{b} ± 0.40	6.2^{b} ± 0.24
CW	5.8 ± 0.41	5.6 ± 0.33	5.3 ± 0.84	6.8 ± 1.25	6.9^{a} ± 0.51	3.7^{b} ± 0.77	6.1^{a} ± 0.63	6.3^{a} ± 0.35
RW	5.7 ± 0.31	5.2 ± 0.16	5.1 ± 0.16	5.1 ± 0.30	5.8 ± 0.29	6.7 ± 0.59	5.8 ± 0.45	5.5 ± 0.18
RA	5.1 ± 0.19	4.5 ± 0.19	5.0 ± 0.44	4.5 ± 0.42	5.08 ± 0.26	4.8 ± 0.20	5.0 ± 0.16	4.9 ± 0.15
RLA	5.2 ± 0.36	4.8 ± 0.20	5.6 ± 0.80	5.6 ± 0.33	5.4 ± 0.31	5.8 ± 0.77	5.7 ± 0.22	5.1 ± 0.19
FD	4.9^{b} ± 0.11	5.3^{ab} ± 0.14	5.5^{a} ± 0.22	5.6^{a} ± 0.21	5.0 ± 0.27	5.1 ± 0.30	5.4 ± 0.29	5.2 ± 0.15
KS	5.06^{a} ± 0.34	4.9^{ab} ± 0.24	3.6^{c} ± 0.66	4.0^{bc} ± 0.25	4.5 ± 0.43	5.8 ± 0.45	4.6 ± 0.33	5.2 ± 0.27
RLS	4.0 ± 0.33	4.3 ± 0.29	4.1 ± 0.54	3.3 ± 0.70	4.0 ± 0.49	5.3 ± 0.66	4.3 ± 0.57	3.8 ± 0.25
FUA	5.8 ± 0.40	5.9 ± 0.43	5.1 ± 0.83	3.8 ± 0.70	5.6^{ab} ± 0.62	6.0^{a} ± 0.81	4.8^{ab} ± 0.63	4.7^{b} ± 0.45
RUH	6.4^{a} ± 0.29	6.5^{a} ± 0.19	5.6^{a} ± 0.33	4.0^{b} ± 0.57	5.9 ± 0.54	5.7 ± 0.72	5.7 ± 0.52	5.9 ± 0.24
CL	5.1 ± 0.71	5.3 ± 0.40	6.1 ± 0.83	6.6 ± 0.66	5.2 ± 0.59	6.1 ± 0.84	5.1 ± 0.79	4.9 ± 0.43
UD	4.9 ± 0.53	5.1 ± 0.44	5.6 ± 0.88	5.8 ± 0.91	5.2^{ab} ± 0.60	4.4^{ab} ± 0.53	5.5^{a} ± 0.55	3.9^{b} ± 0.38
FUTP	4.0 ± 0.48	4.0 ± 0.26	4.5 ± 0.22	4.8 ± 0.87	4.7 ± 0.30	4.7 ± 0.52	4.6 ± 0.33	4.4 ± 0.31
FUTL	6.1 ± 0.41	5.7 ± 0.26	6.8 ± 0.60	6.1 ± 0.40	5.3 ± 0.18	5.5 ± 0.29	4.7 ± 0.22	6.1 ± 0.30
RUTP	5.1 ± 0.69	5.4 ± 0.39	6.1 ± 0.79	6.5 ± 0.71	5.4 ± 0.52	6.2 ± 0.84	5.0 ± 0.72	4.7 ± 0.41

a,b,c,d: Means with different superscripts in each line are different, **S**: Stature, **DC**: Dairy character, **BD**: Body depth, **CW**: Chest width, **RW:** Rump width, **RA:** Rump angle, **FD**: Food diagonal, **RLA**: Rear leg angle**, KS**: Knee structure, **RLS**: Rear leg set, **FUA**: Fore udder attachment, **RUH**: Rear udder height, **CL**: Central ligament, **UD**: Udder depth, **FUTP**: Fore udder teat placement, **FUTL:** Fore udder teat length, **RUTP**: Rear udder teat placement.

LTT1n…..LTT16n : effect of DC class, (n: 1, 2,..,5), BD class (n: 1, 2, 3, 4), CW class (n: 1, 2, 3, 4), RW class (n: 1, 2, 3, 4), RA class (n: 1, 2, 3, 4), RLA class (n: 1, 2, 3), FD class (n: 1, 2, 3, 4), KS class (n: 1, 2, 3, 4, 5), RLS class (n: 1, 2, 3,….8), FUA class (n: 1, 2, 3, 4), RUH class (n: 1, 2, 3, 4, 5), CL class (n: 1, 2, 3, 4, 5, 6), UD class (n: 1, 2, 3, 4, 5), FUTP class (n: 1, 2, 3, 4), FUTL class (n: 1, 2, 3, 4, 5), RUTP class (n: 1, 2, 3,….9),

e_{ijklm}: residual error.

Results

The mean values of 305-day milk yield were ranged from 2293 to 9344 kg in farm A and from 2153 and 11409 kg in farm B. According to analyses, the differences between mean value of 305-day milk yield for farms and lactation numbers were non-significant in each farm (P > 0.05).

The descriptive statistics of all type traits according to lactation number for farms A and B were calculated and were shown in Table 2. The means of the type traits ranged from 3.3 and 7.8 at farm A and ranged from 3.7 and 7.7 in farm B. The means of stature varied between 137.1 and 142.6 at farm A and varied between 138.1 and 143.5 at farm B. It was determined that lactation number had significant effect on some type traits ((DC, BD, FD, KS (P<0.05)) and RUH (P<0.01)) at farm A and ((S, BD, (P<0.01)) and (CW, FUA, UD (P<0.05)) at farm B.

The mean values of general traits were changed from 75 to 82 in farm A and from 72 to 85 in farm B. The mean Total score valued (for general traits) were found as 73.7 ± 3.06 and 78.1 ± 3.48 for farms A and B, respectively. According to the results, cow grown in farm A was classified in the adequate class and farm B was classified in the middle class.

The effects of general traits on 305-day milk yield were found non-significant (P> 0.01). The effects of RLS-CL-FUTL (P<0.01) and RUH-BD (P<0.05) on 305-day milk yield were found significant, when the effects of type traits on 305-day milk yield were analyzed.

The relationships between traits and 305-day milk yield for farms A and B were presented in Table 3. The correlations were changed from -0.38 (between 305-day milk yield and DC-BD) to 0.49 (between 305-day milk yield and RUH) were found significant at farm A (P>0.01). The correlations were changed from -0.27 (between 305-day milk yield and TS) (P<0.05) to 0.93 (between 305-day milk yield and US) and were found significant at farm B (P<0.01).

The correlations between type traits and general traits at farms A and B were presented in Table 4 and 5. The highest correlations were found between RUTP-CL, CL-DC, RUTP-DC and BD-S at farm A (0.93, 0.63, 0.63 and 0.59, respectively) and were found RUTP-CL, RUTP-FUTP and FUTP-RW (0.82, 0.51 and 0.48, respectively) at farm B and was found significant (P<0.01). The lowest correlations were found -0.45 at farm A (between RUH and BD), were found -0.33 at farm B (between RUH and CW) (Table 4 and Table 5).

The correlations were found elevated among DT, US and TS were found significant at farm A (P<0.05), while correlations between DT, BS and TS were found significant at farm B (P<0.01**)** (Table 4 and Table 5).

Discussion

In the present study, the mean values of 305-day milk yield were ranged from 2293 to 9344 kg in farm A and from 2153 to 11409 kg in farm B. The highest 305-day milk yields of cows were reached at 2nd and 3th lactation at farm A, while the highest 305-day milk yields of cows were reached at 2nd and 4th lactation at farm B. In a prior study, the highest 305-day milk yields of cows were reached at 5th and 6th lactation (Yaylak and

Table 4. The correlations between traits and 305-day milk yield for farm A and B.
Tablo 4. A ve B işletmesinde 305 günlük süt verimi ile özellikler arasındaki korelasyonlar.

Farms	farm A	farm B
Traits	**Correlations**	**Correlations**
S	-0.26	0.61**
DC	-0.38**	0.50**
BD	-0.38**	0.32*
CW	-0.19	-0.10
RW	-0.05	0.18
RA	0.04	0.13
RLA	-0.10	0.10
FD	-0.08	0.33*
KS	0.09	0.12
RLS	0.26	0.12
FUA	0.03	0.40**
RUH	0.49**	0.34
CL	-0.41**	0.70**
UD	0.34*	0.15
FUTP	-0.05	0.51**
FUTL	0.09	0.21
RUTP	-0.33*	0.67**
DT	-0.33*	0.60**
BS	-0.15	0.70**
FLS	0.07	0.63**
US	-0.40**	0.93**
TS	-0.38**	-0.27*

*: p<0.05, ** p<0.001, **TS**: Total score, **S**: Stature, **DC**: Dairy character, **BD**: Body depth, **CW**: Chest width, **RW:** Rump width, **RA:** Rump angle, **FD**: Food diagonal, **RLA**: Rear leg angle**, KS**: Knee structure, **RLS**: Rear leg set, **FUA**: Fore udder attachment, **RUH**: Rear udder height, **CL**: Central ligament, **UD**: Udder depth, **FUTP**: Fore udder teat placement, **FUTL:** Fore udder teat length, **RUTP**: Rear udder teat placement, **DT**: Dairy type, **BS**: Body structure, **FLS:** Food-leg structure, **US**: Udder structur

Kumlu, 2005), on the other hand another research presented 3th or 4th lactation (Alic Ural and Yener, 2009).

It was determined that lactation number had significant effect on some type traits [(DC, BD, FD, KS (P<0.05)] and RUH (P<0.01)) at farm A and [(S, BD, (P<0.01)) and (CW, FUA, UD (P<0.05)] at farm B. These results were similar to what has been elucidated elsewhere (Cerci and Koc, 2006).

The means of type traits, except DC, BD, RLS and CL, generally determined in the present study are in accordance within the results reported in prior studies (Perez-Cabal and Alenda, 2002, Berry et al., 2004, Guliński et al., 2005, Cerci and Koc, 2006, Duru et al., 2012, Zavadilová and Štípková, 2012).

These results of related of classification of general traits in farms A and B [73.7 ± 3.06 and 78.1 ± 3.48, respectively] were found similar to those reported previously (Alic Ural and Yener, 2009).

The effects of general traits on 305-day milk yield were found non-significant (P> 0.01) and the effects of some linear type traits [(RLS-CL-FUTL (P<0.01) and RUH-BD (P<0.05)] on 305-day milk yield were found significant. These results showed disperancy to a previous research (Alic Ural and Yener, 2009).

The correlations between milk yield and some type traits reported in this study at farm B were similar to the findings of some of the other reports (Misztal et al., 1992, Short and Lawlor, 1992), whereas there was an elevation in contrast to those

Table 5. The correlations between linear type traits and general traits at farm A.
Table 5. A işletmesinde puanlama özellikleri ile doğrusal özellikler arasındaki korelasyonlar.

Traits	S	DC	BD	CW	RW	RA	RLA	FD	KS	RLS	FUA	RUH	CL	UD	FUTP	FUTL	RUTP	DT	BS	FLS	US
S																					
DC	0.51**																				
BD	0.59**	0.47**																			
CW	-0.07	0.02	0.32*																		
RW	0.32*	0.12	0.25	-0.02																	
RA	0.36*	0.12	0.12	0.14	0.14																
RLA	0.12	0.14	0.19	0.11	-0.01	-0.24															
FD	-0.01	0.17	0.03	-0.21	-0.12	-0.13	-0.01														
KS	-0.06	0.07	0.004	-0.20	0.15	0.06	-0.13	-0.18													
RLS	-0.43**	-0.39**	-0.30*	-0.05	0.01	-0.17	-0.26	-0.11	0.26												
FUA	-0.24	-0.13	-0.28*	-0.15	-0.36*	-0.18	0.08	-0.19	0.22	0.13											
RUH	-0.37**	0.44**	-0.45**	-0.20	-0.12	0.07	-0.18	-0.19	0.15	0.33*	0.13										
CL	0.44**	0.63**	0.37*	-0.25	-0.03	-0.03	0.20	0.15	0.03	-0.34*	0.08	-0.12**	-0.19								
UD	-0.22	-0.37**	-0.25	0.004	-0.28	-0.13	0.01	0.03	-0.12	0.10	0.27		0.43**	0.01							
FUTP	0.16	0.15	0.05	-0.22	-0.46**	-0.03	0.15	-0.01	-0.11	-0.23	0.12	-0.08		0.20	-0.18						
FUTL	0.007	0.14	0.14	0.20	-0.03	0.06	0.03	0.22	-0.32*	0.04	-0.06	-0.21	-0.18		0.45**	-0.16					
RUTP	0.43**	0.63**	0.30	-0.29*	-0.08	0.06	0.25	0.15	0.02	-0.43**	0.08	-0.34*	0.93**	-0.20			0.59**				
DT	0.49**	0.98**	0.43**	0.06	0.12	0.14	0.13	0.14	0.07	-0.36**	-0.13	-0.41**	0.59**	-0.38**	0.12	-0.14					
BS	0.65**	0.49**	0.45**	0.01	0.24	0.53**	0.14	0.07	-0.01	-0.28	-0.10	-0.27	0.38**	-0.16	0.11	0.12	0.40**	0.51**			
FLS	-0.10	0.02	0.13	-0.12	0.10	0.04	0.001	0.56**	0.05	0.34	-0.30*	-0.07	0.04	-0.02	-0.18	0.35*	0.07	0.001	0.11		
US	0.35*	0.43**	0.24	-0.18	-0.06	0.08	0.18	0.08	-0.16	-0.35**	0.19	-0.25	0.77**	-0.03	0.38**	0.06	0.81**	0.40**	0.37**	-0.01	
TS	0.48**	0.69**	0.39**	-0.09	0.04	0.22	0.20	0.21	-0.06	-0.35**	0.06	-0.36*	0.78**	-0.15	0.26	0.05	0.81**	-0.33*	-0.15	0.07	-0.40*

*: p<0.05, ** p<0.01, **TS**: Total score, **S**: Stature, **DC**: Dairy character, **BD**: Body depth, **CW**: Chest width, **RW:** Rump width, **RA:** Rump angle, **FD**: Food diagonal, **RLA**: Rear leg angle, **KS**: Knee structure, **RLS**: Rear leg set, **FUA**: Fore udder attachment, **RUH**: Rear udder height, **CL**: Central ligament, **UD**: Udder depth, **FUTP**: Fore udder teat placement, **FUTL:** Fore udder teat length, **RUTP**: Rear udder teat placement, **DT**: Dairy type, **BS**: Body structure, **FLS:** Food-leg structure, **US**: Udder structure

Table 6. The correlations between linear type traits and general traits at farm B.
Table 6. B işletmesinde puanlama özellikleri ile doğrusal özellikler arasındaki korelasyonlar.

Traits	S	DC	BD	CW	RW	RA	RLA	FD	KS	RLS	FUA	RUH	CL	UD	FUTP	FUTL	RUTP	DT	BS	FLS	US
S																					
DC	0.38**																				
BD	0.47**	0.20																			
CW	-0.15	-0.15	0.01																		
RW	0.09	-0.07	0.52**	0.22																	
RA	0.18	0.21	0.04	-0.26*	-0.18																
RLA	0.27*	0.32*	0.29*	0.05	0.20	0.10															
FD	0.30*	0.20	0.40**	0.01	0.14	0.14	0.18														
KS	0.02	0.23	0.09	-0.09	0.06	-0.02	0.18	0.08													
RLS	-0.04	-0.10	0.07	-0.19	-0.06	-0.04	-0.20	0.02	0.19												
FUA	0.20	0.03	0.10	0.09	0.03	0.09	-0.01	0.002	-0.04	0.17											
RUH	-0.10	-0.32*	-0.32*	-0.33*	-0.12	-0.02	-0.13	-0.12	0.04	0.06	-0.03										
CL	0.41**	0.41**	0.23	0.02	0.15	0.05	0.04	0.07	-0.09	0.01	0.37**	-0.10									
UD	-0.05	0.02	-0.10	0.13	-0.02	0.001	0.11	-0.16	-0.01	0.19	0.42**	-0.04	0.17								
FUTP	0.25	-0.001	0.28*	0.10	0.48**	-0.11	0.02	0.14	-0.03	0.14	0.37**	0.05	0.39**	0.32*							
FUTL	0.06	-0.09	0.12	-0.17	-0.07	-0.004	-0.37**	-0.07	0.11	0.14	-0.03	0.16	-0.02	-0.23*	0.07						
RUTP	0.38**	0.37**	0.31*	0.07	0.32*	0.06	0.11	0.20	-0.07	-0.08	0.41**	-0.01	0.82**	0.20	0.51**	-0.13					
DT	0.48**	0.88**	0.24	-0.15	0.01	0.10	0.26*	0.23	0.18	-0.14	0.05	-0.19	0.41**	-0.04	0.08	-0.05	0.36**				
BS	0.73**	0.38**	0.65**	-0.11	0.24	0.21	0.37**	0.46**	0.09	0.01	0.23	-0.04	0.41**	-0.10	0.34**	0.12	0.44**	0.51**			
FLS	0.51**	0.24	0.31*	-0.11	0.04	-0.03	0.21	0.53**	0.16	0.31*	0.13	-0.03	0.30*	-0.06	0.25	0.27*	0.20	0.33*	0.58**		
US	0.46**	0.33**	0.23	-0.05	0.20	0.05	-0.004	0.17	0.05	0.07	0.48**	0.09	0.73**	0.27*	0.58**	0.22	0.73**	0.40**	0.53**	0.45**	
TS	-0.45**	-0.44**	-0.53**	-0.07	-0.23	-0.06	-0.41**	-0.31*	-0.06	0.18	-0.28*	0.33*	-0.25	0.06	-0.09	0.29*	-0.33**	-0.42**	-0.53**	-0.17	-0.17

*: p<0.05, ** p<0.001, **TS**: Total score, **S**: Stature, **DC**: Dairy character, **BD**: Body depth, **CW**: Chest width, **RW:** Rump width, **RA:** Rump angle, **FD**: Food diagonal, **RLA**: Rear leg angle**, KS**: Knee structure, **RLS**: Rear leg set, **FUA**: Fore udder attachment, **RUH**: Rear udder height, **CL**: Central ligament, **UD**: Udder depth, **FUTP**: Fore udder teat placement, **FUTL:** Fore udder teat length, **RUTP**: Rear udder teat placement, **DT**: Dairy type, **BS**: Body structure, **FLS:** Food-leg structure, **US**: Udder structure

determined by some researchers (Duru et al., 2012).

The correlations between some general traits determined in the present study were found in accordance with previously described by some authors (Perez-Cabal and Alenda, 2002) albeit were found generally lower than some of the prior surveys (Jadoa, 2010), in contrast higher than reported in a previous study (Yaylak, 2007).

Conclusion

The present research was conducted to establish of relations between the type traits and milk yield in Holstein-Friesian cows. The mean values of type traits and general traits were similar to findings of some researchers. Similarly, the correlations between 305-milk yield and type traits were found close to the findings of researchers. In practice, especially the correlations coefficients among type traits and 305-day milk yield are low in farm A. The traits related to udder teat had a negative relationship with milk yield at farm A, whereas udder capacity traits had a low positive relationship with milk yield. However, traits related to udder had a positive relationship with milk yield at farm B. Particularly, the correlations coefficients between CL and US with 305-day milk yield are high in farm B (0.70 and 0.93, respectively). The differences between results can be attributed to the management conditions, such as milking practices, in the farms in which the study was carried out.

Lately, by usage of genetic and phenotypic correlations between type traits and milk yield, selection studies were conducted in an attempt to cause elevation in milk yield. The obtained phenotypic correlations possess importance related to evaluate cause-result relations among two traits detected in the present study.

In the present study, it may be suggested that udder ca-

pacity should be taken into consideration among selection studies relevant to milk yield for farms A and B. As the consequence, investigation of genetic associations between the above-mentioned type traits and milk yield is necessary and the above-mentioned type traits will be more affect associated with genetic evaluation in selection studies for milk yield in dairy cattle breeding in future.

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