

Malya Tarım İşletmesi'nde Yetiştirilen Esmer Irkı İneklerin Süt Verim Özellikleri ve Bunlar Üzerine Bazı Çevre Faktörlerinin Etkileri

Süleyman ÇİLEK*  Galip BAKIR **

* University of Kırıkkale, Faculty of Veterinary Medicine, Department of Animal Breeding, 71451 Yahsihan, Kırıkkale - TURKEY

** University of Yüzüncü Yıl, Faculty of Agriculture, Department of Animal Breeding, 65080 Van -TURKEY

Makale Kodu (Article Code): KVFD-2009-943

Özet

Bu çalışma, Malya Tarım İşletmesi'nde yetiştirilen Esmer ırkı ineklerin süt verim özellikleri ve bu verimlere bazı çevresel faktörlerin (buzağılama yılı, buzağılama mevsimi ve buzağılama yaşı) etkilerini incelemek amacıyla yapılmıştır. Laktasyon süresi, laktasyon süt verimi, 305 günlük süt verimi ve kuru döneme ait en küçük kareler ortalamaları sırasıyla 312.02 ± 0.98 gün, 5811.28 ± 26.31 kg, 5525.92 ± 22.35 kg ve 76.82 ± 0.63 gün olarak bulunmuştur. Laktasyon ve 305 günlük süt verimleri üzerine tüm çevresel faktörlerin etkisi istatistiksel olarak önemli bulunmuştur ($P < 0.001$). Benzer şekilde, laktasyon süresi üzerine buzağılama mevsimi, buzağılama yaşı ve buzağılama yılının etkisi ($P < 0.001$ - $P < 0.05$) ve kuru dönem üzerine buzağılama yılı ve yaşının etkisi önemli bulunmuştur ($P < 0.001$). Bu çalışmada sonunda, Türkiye'nin karasal iklim şartlarına sahip bölgesinde bulunan Malya Tarım İşletmesi'ndeki Esmer ırkı ineklerin, başarılı şekilde yetiştirildikleri ve süt verim özellikleri bakımından oldukça iyi seviyede oldukları kanaatine varılmıştır.

Anahtar sözcükler: *Esmer ırk, Süt verimi, Kuru dönem, Laktasyon süresi, Çevresel faktörler*

Milk Yield Traits of Brown Cows Reared at Malya State Farm and Effects of Some Environmental Factors on These Traits

Summary

This study was done to investigate some environmental factors (calving year, calving season and calving age) affecting milk yield traits and milk yield traits of Brown cows raised at the Malya state farm. The least square means of lactation duration, lactation milk yield, 305-day milk yield and dry period were estimated as 312.02 ± 0.98 days, 5811.28 ± 26.31 kg, 5525.92 ± 22.35 kg and 76.82 ± 0.63 days, respectively. Effects of all environmental factors on lactation milk yield (actual milk yield) and 305-day milk yield were found statistically significant ($P < 0.001$). Similarly, effects of calving season, calving year and calving age on lactation duration were found statistically significant ($P < 0.001$ - $P < 0.05$). Effects of calving year, and calving age on dry period were statistically significant ($P < 0.001$). According to result in this study, it can be said that Brown cattle are raised successfully at Malya state farm in region under steppe climate conditions of Turkish and yield levels of Brown cows were very good.


Keywords: *Brown, Milk yield, Dry period, Lactation duration, Environmental factors*

INTRODUCTION

A lot of factors affect on milk yield of Brown cattle, for example genotypic structure of cows, lactation duration, calving season, dry period, body weight, feeding, calving age, environmental temperature, environmental humidity, gestation, estrus, and diseases ¹.

As heritability of milk yield traits is at lower level than 0.30, effect of environmental factors on milk yield traits is higher than genotypic effects ^{2,3}. Therefore, effects of environmental factors on milk yield should be known well. Environmental factors can be classified as

 **İletişim (Correspondence)**

 +90 3183573304

 scilek@kku.edu.tr

factors with measurable effects (calving age, year, season, milking frequency, etc.) and factors with unmeasurable effects (infectious diseases, parasitic infestations, etc.). The measurable effects can be determined and used increase to yield level and to plan management of the farm ⁴.

A lot of study on milk yield of Brown cows was done at farms in different regions of Turkey ⁵⁻⁸. Milk yield of Brown cows was found as 3297.70 kg at Malya State Farm by Özbeyaz and Küçük ⁵, 5953.30 kg at Altınova State farm in Konya province by Çakıllı and Güneş ⁶, 4527.00 kg at Ulaş State Farm in Sivas province by Çilek and Tekin ⁷, 4002.44 kg at Alpaslan State Farm in Muş province by Şeker et al.⁸. Lactation durations of Brown cattle were found as 324.80 days at Malya State Farm by Özbeyaz and Küçük ⁵, 320 days at Altınova State Farm in Konya province by Çakıllı and Güneş ⁶, 308 days at Ulaş State Farm in Sivas province by Çilek and Tekin ⁷, 300.51 days at Alpaslan State Farm in Muş province by Şeker et al.⁸. It was reported correlation between milk yield and service period was 0.13 and fertility decreased with increasing of milk yield level ⁹. Dry period of Brown cattle was found as 69.10 days at Malya State Farm by Özbeyaz and Küçük ⁵, 66.57 days at Altınova State Farm in Konya province by Çakıllı and Güneş ⁶, and 102.00 days at Ulaş State Farm in Sivas province by Çilek and Tekin ⁷. In different studies in Switzerland ¹⁰ and German Federal Republic ¹¹, milk yields of Brown cows were 5525 kg and 5645 kg, respectively.

Effects of calving age or parity on milk yield have been varyingly reported as significant in some studies ^{7,8}. Effect of calving season on milk yield was reported significant and higher for cows calving in autumn and winter in previous researches ^{5,6}. Effect of calving year on milk yield was reported significant ⁷. Although the effect of season on dry period was reported as non-significant ⁷, Erdem et al.¹² reported effects of calving year and age on dry period were non-significant.

In this study, effects of some environmental factors on milk yield traits of Brown cows reared at Malya State Farm in Kırşehir province with steppe climate conditions in Turkey were investigated.

MATERIAL and METHODS

In this study, monthly test day milk yield records of Brown cows reared in Malya State Farm between 1993 and 2007 years were used. A total of 3258 records for lactation duration, lactation milk yield, and 305-day milk yield and 3105 records for dry period were used in calculations. The lactation duration, lactation milk yield

and 305-days milk yield were estimated from test milk yields collected once a month using the Holland method ^{2,13}. In this study, seven calving groups were formed beginning from 2 years and ending at 8 years old and older. Four season groups were formed for calving season as winter, spring, summer and autumn. Fifteen groups for calving year were formed between 1993 and 2007. Interaction between calving year and calving season was used in calculations. Lactations less than 180 days were not used in the calculations of this study.

To determine effects of age of cow, calving years, and calving season on milk yield traits, general linear model was done by using SAS program ¹⁴. Duncan's multiple range tests was used for multiple comparisons in important subgroups ¹⁵. The model of $Y_{ijkl} = \mu + a_i + b_j + c_k + e_{ijkl}$ was used to analyze effective factors on milk yield. In model at above;

μ = mean milk yield of brown cow population, a_i = calving years ($i = 1993, 1994, \dots, 2007$), b_j = calving season ($j = \text{winter, spring, summer, autumn}$), c_k = effect of calving age ($k = 2, 3, 4, \dots, 8$), e_{ijkl} = the error term ($0, \sigma^2$).

RESULTS

Least square means for milk yield traits were presented in [Table 1](#). Effects of calving year on all milk yield traits (lactation duration, lactation milk yield, 305-day milk yield and dry period) were found statistically significant ($P < 0.001$). Effect of calving season on all milk yield traits (except for dry period) was significant ($P < 0.001$ - $P < 0.05$). Average lactation duration was determined as 312.02 days. Lactation duration was shortest in 2001 (297.62±3.43 days) and longest in 1999 (338.07±3.66 days). Mean lactation milk yield was found as 5811.28±26.31 kg. 305-day milk yield was lowest in 1993 (4201.33±93.79 kg) and highest in 2006 (6198.65±88.28 kg). The lactation milk yield of cattle calving in spring was the highest (6102.31±53.29 kg), but it was the lowest (5702.76±48.80 kg) in cattle calving in summer. Average dry period was determined as 76.82±0.63 days. Although effect of calving season on dry period was non-significant ($P > 0.05$), effects of calving age and calving year on dry period were found statistically significant ($P < 0.001$). The dry period was lowest (53.67±462.50 days) in 1997, and highest (92.11±582.34) in 2001. The effect of interaction between calving year and season were found significant ($P < 0.01$, $P < 0.001$) for milk yield traits. Interaction of year and season showed that calving year and calving season affected at various level on milk yield. Level of milk yield differs in seasons of different years.

Tablo 1. Süt verimi özelliklerine ait en küçük kareler ortalamaları ve standart hataları**Table 1.** Least square means and standard error means values for milk yield traits

Factor	Lactation Duration (Days)		Lactation Milk Yield (kg)	305- Day Milk Yield (kg)	Dry Period (Days)	
	n	X±Sx	X±Sx	X±Sx	n	X±Sx
Calving Year		***	***	***		***
1993	190	310.32±3.99 ^{cde}	4403.67±110.60 ^g	4201.33±93.79 ^h	180	65.06±212.69 ^f
1994	199	318.52±3.88 ^{bc}	5704.27±107.61 ^{def}	5409.84±91.26 ^{fg}	188	71.91±462.62 ^{ef}
1995	213	318.78±3.74 ^{bc}	5658.92±103.90 ^{ef}	5385.68±88.10 ^{fg}	200	71.66±582.53 ^{ef}
1996	212	316.32±3.75 ^{bc}	5747.58±104.10 ^{def}	5494.25±88.72 ^{efg}	199	67.99±562.54 ^f
1997	212	323.03±3.76 ^b	6247.84±104.40 ^{bc}	5997.63±88.53 ^{bc}	206	53.67±462.50 ^g
1998	194	313.98±3.95 ^{bc}	6326.91±109.53 ^{abc}	6062.29±92.88 ^{abc}	185	78.66±722.65 ^{de}
1999	227	338.07±3.66 ^a	6056.04±101.57 ^{dc}	5542.27±86.13 ^{efg}	204	84.19±662.53 ^{bcd}
2000	246	316.95±3.51 ^{bc}	6162.48± 97.33 ^{bc}	5760.45±82.54 ^{cde}	226	87.31±772.40 ^{ab}
2001	254	297.62±3.43 ^{ef}	6388.40± 95.06 ^{ab}	6185.94±80.61 ^{ab}	235	92.11±582.34 ^a
2002	259	301.17±3.38 ^{def}	6120.95± 93.84 ^{bc}	5829.44±79.58 ^{cd}	245	87.50±732.28 ^{ab}
2003	255	298.14±3.40 ^{ef}	5551.54± 94.36 ^{ef}	5353.16±80.16 ^{fg}	238	86.36±462.31 ^{ab}
2004	231	301.73±3.59 ^{def}	5548.64± 99.71 ^f	5291.53±84.56 ^g	216	86.88±392.43 ^{ab}
2005	256	311.88±3.45 ^{bcd}	6003.93± 95.77 ^{cde}	5710.30±81.22 ^{def}	258	76.28±232.25 ^e
2006	217	319.00±3.75 ^{bc}	6555.44±104.10 ^a	6198.65±88.28 ^a	232	86.52±692.38 ^{abc}
2007	93	317.35±5.68 ^{bc}	6292.08±157.62 ^{bc}	6016.24±133.67 ^{bc}	93	80.05±273.72 ^{cde}
Calving Age		*	***	***		***
2	831	316.38±1.91 ^{ab}	5405.76±53.09 ^d	5085.68±45.02 ^d	815	70.21±1.27 ^d
3	661	311.16±2.14 ^{abc}	5760.96±59.38 ^c	5479.46±50.40 ^c	652	76.23±1.41 ^c
4	534	308.84±2.37 ^c	5902.25±65.86 ^{bc}	5658.96±55.85 ^{bc}	501	78.27±1.59 ^{bc}
5	426	310.37±2.65 ^{bc}	6152.90±73.63 ^a	5899.10±62.51 ^a	397	77.97±1.80 ^{bc}
6	321	314.21±3.06 ^{abc}	6195.83±84.80 ^a	5899.85±71.91 ^a	305	78.39±2.05 ^{bc}
7	232	319.77±3.59 ^a	6127.83±99.68 ^{ab}	5778.57±84.71 ^{ab}	214	82.93±2.45 ^{ab}
8>	257	313.94±3.44 ^{abc}	5879.85±95.36 ^{bc}	5603.24±80.86 ^{bc}	221	84.87±2.42 ^a
Calving Season		*	***	***		NS
Winter	650	318.48±2.19 ^a	6074.21±60.71 ^a	5741.88±51.51 ^a	603	80.78±1.49 ^a
Spring	882	312.65±1.92 ^{ab}	6102.31±53.29 ^a	5824.40±45.19 ^a	857	78.76±1.28 ^{ab}
Summer	1042	310.23±1.76 ^b	5702.76±48.80 ^b	5431.85±41.41 ^b	989	76.36±1.19 ^b
Autumn	684	312.73±2.15 ^{ab}	5792.36±59.60 ^b	5518.94±50.58 ^b	656	77.73±1.44 ^b
Year x Season		***	***	**		***
Overall Mean	3258	312.02±0.98	5811.28±26.31	5525.92±22.35	3105	76.82±0.63

NS: non-significant, * P<0.05, ** P<0.01, *** P<0.001, X: mean, Sx: standard error means, Means with different letter within the same column are statistically different (P<0.05)

^{a,b,c,d,e,f,g,h} differences between groups with same letter in subgroups of a factor is non-significant, differences between groups with different letter are significant (P<0.01 or P<0.05)

DISCUSSION

In dairy cattle breeding, it is wanted a cow is milked ten months and dried two month. In this study, the means of lactation duration was found as 312.02±0.98 days and higher than wanted value (305-day). Lactation duration should be planned as 305-day by manager and veterinary medicine of this farm. It can be said that veterinary medicine of farm was not willing to dry cows. Also, the longer service period can be a reason of longer lactation duration. Value estimated for lactation duration in this study is similar to results of previous investigations⁵⁻⁸.

As it was shown in [Table 1](#), lactation duration was longer than ideal value between 1993 and 2000 years. Lactation duration was very long (338.07±3.66 days) in 1999 year and lactation duration decreased until 2003 year in which is at nearly ideal value. This decreasing in lactation duration can be reason of doing of artificial insemination at the right time and convenient manner by operators. However, after 2003 year, lactation duration has increased again. Reason of this increasing may be long service period and veterinary medicine's unwilling to dry cows. Veterinary medicine of farm should be willing to dry cows, inseminate cows at the right time and detect accurately estrus. Lactation duration decreased with age up to 4 years old and

increased thereafter. The lowest lactation duration at 4 years old cows, may be reason of the highest level of all yields and shorter service period at mature age. Lactation duration of younger and older cows than 4 years old cows was longer. Longer lactation duration for old cows can be reason for reproductive problems. However; shorter lactation duration in cows older than 8, may result from keeping old animals with good fertility in the herd. Lactation duration of cows calving in winter was longer than other seasons because of increasing of milk yield with good feeding in the first 3 or 4 months of lactation when milk yield begins to decrease. Thus, cows calving in winter may be dried lately by veterinary medicine in this farm.

It has been known milk yields of Brown cows are quite different in different countries, and even in different districts in the same country. In this study, average 305-days milk yield was 5525.92 ± 22.35 kg. This yield was similar to values estimated in Switzerland¹⁰ and German Federal Republic¹¹. This value was higher than values reported for Turkey except for Çakıllı and Güneş⁶. It was shown milk yield had increased rapidly between 1993 and 2006 years in this state farm. Average milk yield was found higher than value reported in this farm by Özbeyaz and Küçük⁵. Reasons of rapid increasing of milk yield level may be specially improvement in management and feeding conditions, preventing from mastitis, using of sperm of bulls with high genetic capacity. True selection and culling of cows and heifers for milk yield can be reason increasing of milk yield.

As reported previously⁴, the effect of calving season on lactation milk yield was significant, milk yield was high in cows calving in spring and winter, low in cows calving in summer. Cows calving in winter and spring may have high milk yields, due to good feeding levels in the first 3 or 4 months of lactation, and increase milk yield due to feed containing alfalfa and green grass being given during the period when milk yield begins to decrease. On the other hand, cows calving in summer may have low milk yields due to their being subject to high environmental temperatures in the first 3 or 4 months of lactation. The lowest 305-day and actual milk yield was obtained from cows calving at 2 years of age, and the highest from those calving at 6 years of age. Milk yield decreases slowly after 6 years of age. As reported in the literature^{1,4}, this confirms that milk yield increases with age up to maturity, and decreases thereafter.

The average dry period was 76.82 ± 0.63 days and dry period increased with age of cow in this study. Dry period may be longer as a result of shorter lactation duration or longer calving intervals. In this study, as lactation duration was near to ideal value and was not

short, dry period may be at longer value because of longer calving interval. In order to make animals more profitable, it is essential they be made pregnant as soon as possible during the service period in order to shorten the dry period.

In conclusion, it can be said that Brown cows were raised successfully in Malya state farm and under steppe climate conditions of Turkish. To increase yield level, feeding and care should be done appropriately and selection should be done more true. As heritability of milk yield traits is low, one or more of selection methods as selection according to pedigree, paternal sib, family selection and combine selection should be used to improvement in milk yield in this farm.

REFERENCES

1. **Alpan O, Aksoy AR:** Sığır Yetiştiriciliği ve Besiciliği. Zafer ofset matbaacılık, Erzurum, Türkiye, 2009.
2. **Çilek S, Tekin ME:** Calculation of adjustment factors for standardizing lactations to mature age and 305-day and estimation of heritability and repeatability of standardized milk yield of Simmental cattle reared on Kazova state farm. *Turk J Vet Anim Sci*, 30, 283-289, 2006.
3. **Bakır G, Kaygısız A, Ülker H:** Estimates of genetic parameters of milk yield in Brown Swiss and Holstein Friesian cattle. *Pakistan J Biol Sci*, 7, 1198-1201, 2004.
4. **Çilek S, Tekin ME:** The environmental factors affecting milk yield and fertility traits of Simmental cattle raised at the Kazova state farm and phenotypic correlations between these traits. *Turk J Vet Anim Sci*, 29, 987-993, 2005.
5. **Özbeyaz C, Küçük M:** Milk yield traits in Brown Swiss herd at Malya State Farm. *Lalahan Hay Araş Enst Derg*, 39 (2): 7-16, 1999.
6. **Çakıllı F, Güneş H:** Studies on the milk production traits of Brown Swiss cattle. *İstanbul Univ Vet Fak Derg*, 33 (3): 43-58, 2007.
7. **Çilek S, Tekin ME:** Environmental factors affecting milk yield traits of Brown Swiss cows raised at Ulaş state farm and phenotypic correlations between milk yield and fertility traits. *Indian J Anim Sci*, 77 (2): 154-157, 2007.
8. **Şeker I, Tasalı H, Bayraktar M, Saatçi M, Tilki M:** Environmental effects on milk yield traits in Brown Swiss herd raised at Muş-Alparslan state farm in Turkey. *Kafkas Univ Vet Fak Derg*, 15 (2): 297-300, 2009.
9. **Özçelik M, Doğan İ:** The genetic and phenotypic correlations between milk and reproductive traits in Holstein cows environmental factors affecting fertility in cows. *Turk J Vet Anim Sci*, 23 (2): 249-255, 1999.
10. **Grüter:** Evaluation of milk recording results in 1988/89. *Anim Breed Abstr*, 58 (7): 599, 1990.
11. **Tierzüchter:** Results of milk recording in 1989. *Anim Breed Abstr*, 58 (9): 826, 1990.
12. **Erdem H, Atasever S, Kul E:** Milk yield and fertility traits of Holstein cows Raised at Gökhöyük state farm, 1. Milk yield traits. *Öndokuz Mayıs Univ Zir Fak Derg*, 22 (1): 41-46, 2007.
13. **Akman N, Eliçin E:** Süt sığırlarında kayıt tutma ve değerlendirme, hayvancılıkta ileri teknikler seminer tebliği, Tahirova-Gönen. Ankara Üniv Zir Fak Yayınları, Ofset Ünitesi, Ankara, 1984.
14. **SAS:** SAS Users Guide: Statistics., Inc., 1998.
15. **Duncan WR:** Multiple range and multiple F tests. *Biometrics*, 11, 1-42, 1955.