

CHANGES OF COMFORT PARAMETERS AND TEST DAY MILK YIELD IN HOLSTEIN COWS

Coskun AKSU, Savas ATASEVER

University of Ondokuz Mayıs, Faculty of Agriculture, Department of Animal Husbandry,
55139, Samsun, Turkey

Corresponding author email: satasev@omu.edu.tr

Abstract

The objective of this investigation was to reveal the changes of comfort parameters and test day milk (TDMY) according to environmental factors in Holstein cows. In total, 99 clinically healthy cows reared at a private farm in the Black Sea region of Turkey were examined. Flank hygiene (FH), rear legs hygiene (RLH), body condition score (BCS) and rumen fill (RF) were selected as comfort parameters and tested in two seasons (spring and summer), parity (first and second) and stage of lactation (<200 d and ≥200 d) groups by t-test. While season affected all comfort parameters and TDMY ($P<0.001$), stage of lactation only affected BCS ($P<0.001$) and RF ($P<0.05$). The cows with second parity had higher milk production ($P<0.05$). Moderate correlation coefficients were determined between FH and RLH ($r=0.557$; $P<0.01$) or between BCS and RF ($r=0.525$; $P<0.01$).

Key words: comfort, cow, hygiene, milk production.

INTRODUCTION

One of the main goals of the world's dairy sector is achieving high quality and quantity raw milk from milking animals. As well known, genotype and environment are two principal factors affecting success for more milk production. In other words, in addition to high genetic merit, optimum environmental conditions should be ensured for dairy animals in the farms. To measure comfort conditions, some indirect parameters may be used. For instance, hygienic status of animals is highly related to raw milk amount and quality. Besides, rumen fill score (RFS) may be used to determine whether a dairy animal intake sufficient feed or not. At this point, fat-energy storing ability of animal is kept in many farms via body condition score (BCS) observations.

Many studies have been conducted to reveal the changes of comfort parameters in dairy cattle (Busato et al., 2000; Haskell et al., 2006; Atasever and Erdem, 2009). However, studies on the associations of these parameters with milk yield are still limited. Determination of this relation may be seen as a leader approach for dairy owners to boost productivity in their herds.

The aims of the present study were to reveal the changes of comfort parameters and test day

milk yield (TDMY) according to environmental factors and to estimate correlations among investigated traits.

MATERIALS AND METHODS

This study was carried out at a private dairy farm which is located in Samsun province in the Black Sea region of Turkey. In total, 194 Holstein cows were used to be experiment material.

To assess hygienic status of cows, flank hygiene scores (FHS) and rear legs hygiene scores (RHS) were recorded. For both evaluation, a 1 to 4 scale (1: too clean and 4: too dirty) was used. To collect RFS, a similar scale (1: empty and 4: very full) was applied. In BCS evaluation, scores between 1 and 5 (1: emaciated and 5: obese) were performed (Wildman et al., 1982). All cows were clinically healthy and were kept similar feeding or barning conditions during the study period. Test day milk yield (TDMY) data were obtained from computer records of the farm.

In statistical work, independent t-test was applied to determine the effects of factors on the traits in two seasons (spring and summer), parity (parity 1 and 2) and stage of lactation (SL; up to 220 d and higher than 220 d) groups. Correlation coefficients among the traits were

estimated according to Kendall's Tau. All statistical works were performed using SPSS 17 for windows at 0.05 significance level.

RESULTS AND DISCUSSIONS

Means (\pm SD) of the investigated features according to season are given in Table 1. As seen, all items were significantly ($P<0.001$) affected by season factor. FHS and RHS of the examined cows were higher in summer. It seems that feeding regime of the investigated farm had better conditions in the summer due to relatively higher BCS and RFS values. As related to this finding, TDMY achieved to higher level in the summer.

Comfort parameters were also evaluated by parity in this work (Table 1). As seen, parity was not an effective factor on the parameters. However, primiparous cows had lower ($P<0.05$) milk production when compared to the cows with second lactation rank. This case could be assessed to be an expected result (Erdem et al., 2010).

In addition to season and parity, all traits were evaluated by stage of lactation (SL) in two different groups (Table 1). As seen, BCS and RFS affected by SL, significantly ($P<0.001$ and

$P<0.05$). This case may be commented with eradication of adverse effect of negative energy balance (NEB) in cows up to 200d.

The general means for FHS (2.34) and RHS (2.67) were found as relatively high. Also, BCS, RFS and TDMY of experimental cows can be assumed to be moderate. At this point, revising managerial conditions of the farm may suggest as urgent process (Nalubwama et al., 2016).

Table 2. Correlation coefficients of the traits

Parameters	RHS	BCS	RFS	TDMY
FHS	0.557**	-0.048	0.044	0.174**
RHS		-0.034	0.021	0.107*
BCS			0.525**	0.111*
RFS				0.101

FHS: flank hygiene score, RHS: rear legs hygiene score, RFS: rumen filling score, TDMY: test day milk yield

Correlation coefficients between investigated traits according to Kendall's Tau are given in Table 2.

As expected, positive and moderate ($P<0.01$) correlations were calculated between FHS and RHS, or BCS and RFS. This result clearly points out that keeping dairy cows in comfort conditions is an interrelated topic.

Table 1. Means (\pm SD) of the parameters by environmental factors

Factors	n	FHS	RHS	BCS	RFS	TDMY
Season						
<i>Spring</i>	99	2.16 \pm 0.86	2.48 \pm 0.74	2.73 \pm 0.27	2.22 \pm 0.58	22.02 \pm 3.30
<i>Summer</i>	95	2.53 \pm 0.66 ***	2.86 \pm 0.70 ***	3.04 \pm 0.32 ***	2.68 \pm 0.36 ***	24.57 \pm 1.88 ***
Parity						
1	97	2.28 \pm 0.83	2.67 \pm 0.73	2.89 \pm 0.35	2.47 \pm 0.59	22.78 \pm 3.10
2	97	2.41 \pm 0.74 ns	2.67 \pm 0.76 ns	2.87 \pm 0.32 ns	2.42 \pm 0.47 ns	23.75 \pm 2.80 *
Stage of lactation						
1 (<220d)	104	2.28 \pm 0.83	2.67 \pm 0.73	2.81 \pm 0.33	2.38 \pm 0.57	22.96 \pm 3.44
2 (\geq 220d)	90	2.41 \pm 0.74 ns	2.67 \pm 0.76 ns	2.96 \pm 0.32 ***	2.52 \pm 0.47 *	23.61 \pm 2.31 ns
Overall	194	2.34 \pm 0.79	2.67 \pm 0.74	2.88 \pm 0.33	2.44 \pm 0.53	23.27 \pm 2.98

ns: non-significant, *: $P<0.05$, ***: $P<0.001$

FHS: flank hygiene score, RHS: rear legs hygiene score, RFS: rumen filling score, TDMY: test day milk yield

CONCLUSIONS

This investigation revealed that multiple non-genetic factors play an important role on both comfort traits and milk production level.

That's why, keeping dairy cows clean and feeding with balanced rations throughout the lactation period should be regarded as gold steps. However, further studies including all

seasons are needed to confirm obtained findings here.

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