

## PERFORMANCE OF HOLSTEIN MALE AND FEMALE CALVES GROWN UNDER MEDITERRANEAN WINTER CLIMATE CONDITIONS

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The aim of the present study was to compare the performance of 12 Holstein female and 11 male calves (23 in total) grown under Mediterranean winter climate conditions. In this experiment, 4–6 months old animals were used with initial weight of 148 and 123 kg Holstein males and females respectively. The experiment lasted for 4 months and the mean final weights of males and females were 270 and 230 kg; mean total weight gains 121 and 106 kg and finally daily liveweight gains of 1.011 and 0.885 kg, respectively. The differences in final weights, total weight gains and daily liveweight gains between Holstein male and female calves were statistically significant ( $P < 0.05$ ). In conclusion, Holstein male calves performed better than the females of the same breed in indoor production systems grown under the Mediterranean climate conditions.

**Key words:** Holstein; indoor breeding; performance; Mediterranean

## ПЕРФОМАНСИ НА МАШКИ И ЖЕНСКИ ТЕЛИЊА ОД РАСАТА ХОЛШТАЈН ОДГЛЕДУВАНИ ВО МЕДИТЕРАНСКИТЕ ЗИМСКИ КЛИМАТСКИ УСЛОВИ

Целта на оваа студија беше да се споредат перформансите на 12 женски и 11 машки телиња од расата холштајн (вкупно 23) кои растат во медитерански зимски климатски услови. Во експериментот беа користени машки и женски телиња на возраст од 4 до 6 месеци, со почетна тежина од 148 и 123 kg. Експериментот траеше 4 месеци и просечната тежина на машките и женските телиња изнесуваше 270 и 230 kg, вкупниот прираст 121 и 106 kg и дневниот прираст изнесуваше 1,011 и 0,885 kg, соодветно. Разликите во финалната тежина, вкупниот прираст и дневниот прираст на жива маса помеѓу машките и женските телиња беа статистички значајни ( $p < 0,05$ ). Како заклучок, машките телиња од расата холштајн имаат подобри перформанси отколку женските од истата раса, одгледувани во затворен систем на производство и растени во медитерански климатски услови.

**Клучни зборови:** холштајн; шталско одгледување; перформанси; Медитеран

## INTRODUCTION

Beef production constitutes an important sector of the agricultural industry of many countries. The type of beef industry which develops in any country depends largely on climatic conditions and land types. It also depends on the size of agricultural holdings and the overall structure of the cattle industry especially the relationship between beef and dairy production (Allen and Kilkenny, 1984).

In Turkey, where there is a much smaller range of farming environments divided mainly into smaller farms, beef is produced primarily as a by-product of milk production and the cattle are mainly kept for dual purposes for milk and beef. Holstein breed cattle are also kept for mainly dual purposes not only in many parts of the country but also in the Mediterranean region as well (Bozkurt and Kaya, 2008).

During the last decade, the meat and dairy sector in Turkey has gone through major setbacks

which requires urgent measures to be taken for increased milk and beef production to ensure the country's self-sufficiency in meat and dairy products. Therefore, some numerous measures have been taken in favour of the sector aiming mainly at the development of the meat industry especially based on the national production. These measures were particularly related to the price policy and investment loans for the purchase of imported pure breed beef cattle. Therefore, dairy and beef producers in Turkey have been facing a big challenge in meeting the great demand for red meat consumption not only of its population but also of the tourism sector in the Mediterranean part of the country. Therefore, the search for the efficient animal husbandry systems has gained a big interest (Ecevit, 1999).

There is little or no information on the performance of Holstein breed calves especially under the Mediterranean climatic conditions. Therefore, this study was aimed to provide some information on the performance of Holstein breed male and female calves grown under the Mediterranean climatic conditions in order to determine better management strategies to increase the animal production in the region.

## MATERIALS AND METHODS

### *Animals*

This study was carried out at the Suleyman Demirel University Research Farm in Isparta, (37°45'N, 30°33'E, elevation 1035 m) located in the Mediterranean region of Turkey during the 2011 and 2012. The present study involved a total of 23 Holstein breed animals and included 12 females and 11 males with a mean initial weight of 123 kg and 148 kg respectively. All specimens were approximately 4–6 months old and were born at the University farm. The experiment was conducted during the winter months from December to March in 2011–2012 and lasted for 4 months (approximately 120 days).

### *Animal management and climate*

During the winter period, both groups of animals were confined in an uninsulated barn in two pens provided with a pen size of 20×15 m<sup>2</sup> and bedded with straw as bedding materials. Animals

were initially weighed at the beginning of the experiment and each group was weighed and monitored on a fortnightly basis, using an electronic weighing scale (True-Test2000 SmartUnit). The free access of the experimental animals to water was available throughout the experimental period.

In general, it is dry and hot in summer and wet and snowy in winter in the region. The total precipitation was 400 mm in 2011. The long-term average was 493 mm. The average temperature was 14.1 °C in 2010 and 12.1 °C in 2011. The long-term average temperature was 12.3 °C for the region.

### *Diets*

For both groups, barley straw and grass haylage were offered as roughages to the animals *ad libitum* during the entire winter period. The pelleted calf augmentation feed was also offered as 2.5 kg/head as concentrates and increased according to the increases in the liveweight during the experiment.

The animals in both groups were group-fed, twice a day in the morning and the evening. Since the amount of feed offered was known and there were no refusals, the feed intake for both groups was not recorded.

### *Statistical analysis*

The data were analyzed by GLM (General Linear Model) procedure (Minitab v.16), using the following model:

$$Y_{ijk} = \mu + \alpha_i + \beta_j + \varepsilon_{ijk}$$

where

$Y_{ijk}$  is the  $ijk$  observation of animal weight,

$\mu$  is the overall mean,

$\alpha_i$  is the effect of sex the type,

$\beta_j$  is the effect of the initial weight and,

$\varepsilon_{ijk}$  is the residual effect or random error associated with the individual animal.

The sex type factor was fitted as a fixed effect, and initial weight was included in the model as a covariate (135 kg approximately) to eliminate the initial weight differences that existed at the beginning of the experiment.

## RESULTS AND DISCUSSION

The chemical composition and feed values of the experimental feeds are presented in Table 1.

Table 1

*Chemical composition of the feedstuffs used in the experiment (%)*

Nutrients	Feedstuffs		
	Barley straw	Haylage	Pelleted feeds
Dry matter	87.9	94.3	88
Crude protein	4.4	6.1	17
Crude fibre	43.7	41	12
Crude ash	8.7	11.2	10
Metabolic energy (kcal/kg)	1400	1860	2600

It was observed that there were no major health problems in both groups of animals except a few cases of pneumonia in female groups which were treated immediately without having an adverse effect on group performances.

The least-square means and standard errors for liveweights for the sex types are shown in Table 2.

Table 2

*Over all performance comparisons of sex types\**

Sex type	N	IW	s.e.	FW	s.e.	TWG	s.e.	DLWG	s.e.
		(kg)		(kg)		(kg)		(kg)	
Males	12	148 <sup>a</sup>	13.9	270 <sup>a</sup>	3.303	122 <sup>a</sup>	3.303	1.011 <sup>a</sup>	0.027
Females	11	123 <sup>b</sup>	10.5	230 <sup>b</sup>	3.154	107 <sup>b</sup>	3.154	0.885 <sup>b</sup>	0.026

\*The means with the different superscripts within the same columns are statistically significant ( $P < 0.05$ ).

IW = Initial weight, FW = Final weight, TWG = Total weight gain, DLWG = Daily liveweight gain

The differences in the final weights, total weight gains and daily liveweight gains between Holstein males and female calves were statistically significant ( $P < 0.05$ ). Holstein males performed better than females in all parameters observed. The mean daily liveweight gains for males and females were 1.011 and 0.885 kg respectively.

The results obtained in this study were in line with the statement that generally males perform better than the females of the same breeds and the males show distinctive differences in size, growth

rate and calf birth weight (Bozkurt and Ap Dewi, 1996; Bozkurt (2006 and 2007).

Although, there are certainly differences between males and females in the growth rate, the liveweight gain which can be achieved from a given quantity of feed is similar for both types of animals, provided that each sex is fed and managed according to its own particular requirements (Wilkinson, 1985; Manninen et al., 2004 and 2006; Bozkurt and Kaya, 2008).

As Keane *et al.* (1989) and Keane and More O'Ferrall (1992) pointed out the results of these comparisons, including those reported in this study are not necessarily applicable outside the countries where the experiments were carried out due to the differences in factors such as production systems, housing systems, climate and management conditions.

## CONCLUSION

In conclusion, Holstein male calves performed better than the females of the same breed in indoor production systems grown under the Mediterranean climate conditions. However, such comparison results obtained in this study were based merely on the liveweight. In order to have comprehensive comparisons, other measures such as growth rate, FCE, seasonal variation of climate, and different management practices are important.

Indeed, under such certain local conditions, productive and reproductive performances of Holstein animals remain low, although it is known that the productive efficiency is a major contributor to the profitability of cattle herds. It is also important to address current management practices and environmental factors that affect this efficiency and to suggest alternatives that have potential to improve the productive efficiency of both males and females since they constitute the base for the next generations of herds for the region.

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