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Effect of Sex of Birth and Stage of Lactation on Milk Production and Its Components in the Holstein-Friesian Cows.

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Abstract
This study was conducted on data which collected from the filed Cattle in the college of Agriculture / University of Baghdad for the period from 1/7/2013 to 1/10/2013, which included 28 cows of Holstein Friesian to show the effect of sex of birth and the stage of lactation on Milk production and the main components. Our results showed The highest average milk production for female foster cows recorded in the first week with a value of 233L . The results show that had no significant effect of sex of birth on milk production and the main components. The results showed that the highest values of milk fat, lactose and minerals in the seventh week of lactation, which values were (3.559, 4.337and 0.638%) respectively, while the highest protein value was recorded in the third week (2.821%). There was no significant interaction among chemical components and stage of lactation , despite the superiority of the milk of female foster cows on the milk of male foster cows in some traits.

Introduction

Milk is a natural nutrient complex and integrated in terms of nutritional value, as it contains most of the essential nutrients needed by the body in a balanced and sufficient quantities, so knowledge of the chemical composition and physiotherapy of milk and changes in the proportions of its main components such as protein, fat and lactose contribute significantly to Determination of the nutritional value of the milk and its acceptance by the consumer (1) .

Many factors influence in the components of milk, the major components of which are water, fat, protein, lactose and minerals. Nutrition or dietary influences readily alter fat and milk protein concentration, Fat concentration is the most sensitive to dietary changes and can vary over a range of 3.0. Milk components can be affected by genetics and environment, level of milk production, stage of lactation, disease (mastitis), season, and age of cow(2) . In a study conducted in the United States of America, a group of data from 1.49 million Holstein cows indicated a link between the sex of birth and milk production found milk yield to be increased when they had given birth to a heifer calf, or were gestating a heifer calf when compared to a bull calf (3) , In contrast(4) found that bull calves conferred a milk yield advantage in a dataset from 578 Danish Holstein herds.

There was a considerable significant relationship observed between the first and second lactation and milk production, whereas the maximum milk production was obtained in the fourth lactation; it was not significantly different from the third lactation of dairy cows in conventional systems, stage of lactation also may have the significant effect on the milk production. But, there is no well described scientific report on how changes in stage of lactation (5) .

The aim of this study is to determine the effect of sex of birth and the stage of lactation on milk production and the main components of milk of the Holstein-Friesian cows .

Materials and methods

This study was carried on data collected from the filed Cattle in the college of Agriculture / University of Baghdad for the period from 1/7/2013 to 1/10/2013. The weekly milk

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production was recorded for Twenty eight Holstein Friesian cows were used to show the effect of sex of birth and the stage of lactation on milk production and its components.

statistical analysis

The data was statistically analyzed using SPSS program (6) . LSD method was used to compare the significant differences among the means .

Results and discussion

Table (1) shows the effect of sex of birth on milk production and its components ±standard error

Sex	weekly milk production/L	Fat%	Protein%	Lactose%	Minerals%
male	146.322±8.448	2.983±0.147	2.736±0.035	4.106±0.047	0.608±0.007
female	167.590±8.868	3.199±0.154	2.789±0.037	4.204±0.049	0.630±0.007
mean	159.961±6.124	3.091±0.106	2.762±0.026	4.155±0.034	0.619±0.005

Table (1) appears there is no significant effect to the sex of birth on milk production and the chemical components , but in general, the milk of Females foster cows is observed to be superior to those of males foster cows in all the studied traits. The highest values were recorded for female foster cows in milk production as well as in the chemical components . This result is agreement to the results (7,8) Who did not find any significant effect of sex on milk components.

Table (2) shows the effect of the stage of lactation(L) on the Milk production and Milk Components (%) ±standard error

stage of lactation	milk production	Fat	Protein	lactose	minerals
First week	$213.292±13.185_{a}$	$2.489±0.229_{a}$	$2.746±0.055_{ab}$	$4.098±0.073_{abc}$	$0.618±0.001_{ab}$
third week	$169.854±11.863_{bc}$	$3.103±0.206_{abc}$	$2.821±0.050_{a}$	$4.204±0.065_{bc}$	$0.627±0.009_{a}$
Seventh week	$144.237±11.581_{c}$	$3.559±0.201_{bc}$	$2.812±0.048_{a}$	$4.337±0.064_{c}$	$0.638±0.009_{a}$
tenth week	$100.460±12.304_{b}$	$3.213±0.214_{c}$	$2.670±0.051_{b}$	$3.979±0.068_{d}$	$0.593±0.010_{b}$

Small letters indicate significant differences ($P<0.05$).

Table (2) explains that the stage of lactation had a significant effect on the studied traits . The results showed that the highest percentage of milk fat in the seventh week was 3.559% and the lowest was in the first week 2.489%. The highest milk protein was recorded in the third week 2.821% and the lowest in the tenth week 2.670%. . For lactose, the seventh and tenth weeks recorded the highest and lowest values of 4.337% and 3. 979%, respectively. Similarly, minerals recorded the highest and lowest value for the seventh and tenth weeks, 0.638% and 0.593%, respectively. As for the milk production, it is noted that the superiority of the first week, where the production 213.292/ L , While the lowest recorded milk production in the tenth week 100.460 /L . The reason for the decline in the values of most milk components in the tenth week of production may be due to the effect of the season of the year, since the milk components usually decrease in hot seasons compared to cold seasons (9) , Which is due to thermal stress on milk production rates (10) . This may be due to the changes of hormones causing deterioration of the mammary gland, nutrient requirements of the fetus and insufficient nutrition for milk production. Our study results agreed with(11) who has reported that cow's milk yield decreases gradually as the lactation stages increase .The current study agreed with (12) results, who reported that milk yield increasing gradually from the date of calving and highest yield was observed in the 2nd stage of lactation, thereafter milk yield decreased up to the end of lactation .

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Table (3) shows interaction among components and stage of lactation .

traits	male				female			
	First week	third week	Seventh week	tenth week	First week	third week	Seventh week	tenth week
weekly milk production	193.250± 17.263	147.333± 16.276	144.600± 15.441	100.143± 18.455	233.333± 19.934	192.375± 17.263	143.875± 17.263	100.778± 16.276
fat	2.288± 0.300	3.067± 0.283	3.596± 0.268	2.981± 0.321	2.690± 0.346	3.140± 0.300	3.523± 0.300	3.444± 0.283
Protein	2.736± 0.072	2.769± 0.068	2.850± 0.065	2.587± 0.077	2.757± 0.083	2.873± 0.072	2.775± 0.072	2753± 0.068
lactose	4.085± 0.095	4.130± 0.090	4.350± 0.085	3.857± 0.102	4.112± 0.110	4.279± 0.095	4.324± 0.095	4.101± 0.090
minerals	0.610± 0.014	0.614± 0.013	0.633± 0.012	0.574± 0.015	0.627± 0.016	0.639± 0.014	0.644± 0.014	0.611± 0.013

Table (3) shows no significant interaction among the chemical components and stage of lactation , although the milk of female foster cows exceeds the milk of male foster cows in some studied traits .The highest milk production of milk for female foster cows was recorded in the first week (233) L . Our study results disagreement with (13) Who recorded an increase in protein, fat and milk minerals in the second 200 days of production . These results may be attributed to other factors (14) that the greatest interaction was among the amount of energy consumed and milk production. Our study are in agreement with the results showed by indicating negative correlation between Stage of lactation and Milk production in the Friesians(15).

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تأثير جنس الولادة ومرحلة الإنتاج في إنتاج الحليب ومكوناته في أبقار الهولشتاين فريزيان

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الخلاصة

أجريت هذه الدراسة اعتماداً على بيانات تم جمعها من حقل الأبقار التابع الى كلية الزراعة / جامعة بغداد للمدة ما بين 2013/7/1 ولغاية 2013/10/1 حيث شملت 28 بقرة هولشتاين فريزيان وذلك لمعرفة تأثير جنس الولادة ومرحلة الإنتاج على إنتاج الحليب والمكونات الرئيسية. أظهرت نتائجنا أن أعلى متوسط إنتاج حليب للأبقار الوالدة أناث في الأسبوع الأول حيث بلغت القيمة 233 لتر . كما أظهرت النتائج عدم وجود تأثير معنوي لجنس المولود على إنتاج الحليب والمكونات الرئيسية. في حين أثرت مرحلة الإنتاج على الصفات المدروسة حيث سجلت أعلى قيم لدهن الحليب واللاكتوز والمعادن في الأسبوع السابع من الإنتاج وكانت القيم (3.559% و 4.337% و 0.638 %) على التوالي ، في حين سجل أعلى قيمة للبروتين في الأسبوع الثالث (2.821 %) . ولم يكن هنالك تداخل معنوي بين التركيب الكيمياوي ومرحلة الإنتاج على الرغم من تفوق حليب الأبقار المرضعة لإناث على حليب الأبقار المرضعة لذكور في بعض الصفات.

الكلمات المفتاحية : (إنتاج الحليب ، مكونات الحليب ، هولشتاين فريزيان)