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A COMPARATIVE STUDY OF THE PRODUCTIVE PERFORMANCE BETWEEN HOLSTEIN FRIESIAN AND SIMMENTAL COWS IN THE FIRST PRODUCTION SEASON, WHICH RAISED AT TAJ AL-NAHRAIN STATION IN AL-QADISIYAH GOVERNORATE

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Abstract:

This research was conducted in the Iraqi province of Al-Qadisiyah, in the Al-Diwaniyah District and in the Taj Al-Nahrain Dairy Cow Breeding Station between August 1, 2023 and June 1, 2024 in order to assess the productive capabilities of Holstein Friesians and Simmental in the first season of milk production. In this research, 26 dairy cows were employed at the start of their lactation and during their first season of production, 15 Holstein Friesian cows and 11 Simmental cows were employed. The results demonstrated a significant influence (P<0.05) of the breed on both daily and total milk production, Holstein Friesian cows were significantly more productive than Simmental cows (P<0.05) in both daily and total milk production, their averages were (1.12±0.15, 506.45±0.67650) kg, (1.8±0.10, 90±3474) kg, respectively. Simmental cows were significantly more superior (P<0.05) than Holstein cows in the percentage of total solids in milk and the percentage of fat in milk, while Holstein cows were significantly more superior (P<0.05) than Simmental cows in the percentage of water in milk, the average of these values was (0.09±12.5, 0.03±4.11, 0.09±87.43) (0.01±11.44, 0.09±3.17, and 0.01±88.55) respectively. No significant differences (P<0.05) existed between the two species in the percentage of protein, lactose, ash, percentage of solids not containing fat and milk density. The results demonstrated a significant advantage for Holstein cows (P<0.05) in terms of fat and protein in milk over the course of the trial, compared to Simmental cows, the averages were (16.887±215, 16.507±206.986) kg (13.555±142.865, 10.221±108.83) kg, respectively. Also, Simmental cows had a significantly higher (P<0.05) caloric value than Holstein cows (1 kg of milk), the averages were (0.038±285.322) kilocalories, (0.050±284.322) kilocalories, and (0.006) kilocalories, respectively..

Keywords: Simmental in Iraq; Holstein; the amount of fat

INTERACTION

Cows contribute 90% of global milk production]1[. The contribution of cows to milk production in Iraq is 67.22%, followed by sheep at 15.66%, buffalo at 11.31%, goats at 5.75%, and camels at 0.05%]2[. The total milk production in Iraq for the year 2021 amounted to 3486 (100 tons), and the total number of cows in 2008 amounted to 2552 thousand heads]3[. As a result of the low production efficiency of local Iraqi cow breeds in milk and meat production and the increased demand for animal protein with the increase in population, Iraq imported large numbers of foreign cows. The beginning was in the 1940s, when small numbers of Friesian and Ayrshire cows were imported. Imports increased significantly in the 1960s and 1970s, when limited numbers of Ayrshire, Guernsey, Jersey, Brown Swiss, Charolais, and Hereford cows were imported, as well as large numbers of Friesians and Holstein Friesians. Their numbers reached 35,000 cows, with the aim of increasing milk and meat production and improving the productivity of local cows]4; 5[. As for Simmental cows, their numbers increased after 2003 and they are present in the governorates of the Kurdistan Region, Diyala, Baghdad, and some Iraqi governorates in limited numbers. Simmental cattle are dual-purpose cattle, and one of the oldest cattle breeds in the world. Their original home is the Simm region of Switzerland. This breed has spread to all countries of the world, and their number ranges from 40-60 million cows, more than half of which are in European countries]6[. European cattle farmers prefer Simmental cows over Holstein

cows despite their lower milk production compared to Holstein cows, due to their lower replacement rate, i.e. their longer productive life, as well as their resistance to diseases and the high percentage of fat in their milk]7[.

Milk production and composition are affected by genetic and non-genetic factors, and the difference in breeds affects the amount of milk produced and the components of milk, and these differences are most severe in the percentage of fat]8[.]9[indicated that the total milk production of Friesian cows reached 3514.64 kg per season and for Normandy cows it reached 2859 kg per season.]10[indicated that the total milk production of Holstein cows reached 3825 kg per season and the average total milk production in Brown Swiss cows reached 3564 kg per season.]11[stated that the difference in cow breeds affects the components of milk, as the percentage of fat and protein in Holstein reached 3.6%, 3.16%, and in Jersey, the percentages of fat and protein in milk reached 5.2%, 3.7%.]5[reported that the total milk production of Holstein cows ranged between 8000-1000 kg per season and the percentage of fat in milk ranged from 3.3-3.7%, while the average total milk production of Simmental cows ranged from 3950-4000 kg per season and the average percentage of fat ranged from 4-5%.]12[reported that the average total milk production of Simmental cows ranged between 4459-6907 kg per season and the average percentage of fat ranged from 3.91-4.18% and the average percentage of protein ranged from 3.25-3.48%. Due to the lack of published studies and research on the productive performance of Simmental cows in Iraq, this study aims to evaluate their productive performance and compare their production with that of Holstein Friesian cows in the first milk production season.

MATERIALS AND METHODS

This research was conducted in the Iraqi province of Al-Qadisiyah, in the Al-Diwaniyah District and in the Taj Al-Nahrain Dairy Cow Breeding Station between August 1, 2023 and June 1,2024 in order to assess the productive capabilities of Holstein Friesians and Simmental in the first season of milk production. 26 dairy cows were involved in this research at the start of their lactation and during their first season of production, 15 Holstein Friesian cows and 11 Simmental cows participated.. The cows are fed concentrated feed consisting of barley, wheat bran, wheat flour, rice flour, yellow corn, rice husk, and soybean meal, in addition to salts, vitamins and minerals. The feed content is not less than 15% crude protein and the percentage of total digestible nutrients (TDN) ranges between 70-75%. The green fodder consists of barley, clover, hay and white corn according to their availability. In winter, hay, hay, concentrated fodder and green fodder are provided. Concentrated fodder is given according to the cow's productivity at a rate of 1 concentrated fodder for every 2 kg of milk produced. Green and dry fodder are given according to body weight, and water is available 24 hours a day. The station animals are subject to a health and preventive program under the supervision of veterinarians.

The daily amount of milk produced (kg) was calculated by following up on the production records of each cow, which were 26 records. Milk samples were collected twice per month to assess the percentage of milk components, with a volume of 100 ml for each sample. The samples were stored in a container filled with ice that preserved the samples from deterioration until they could be laboratoryed. The milk constituents were estimated with the German-made Lacto Flash Funke Gerber device. The amount of heat required to raise 1 kg of raw milk was determined by]13[. The amount of fat and protein in the milk was determined by]5[. The information was evaluated using a pre-developed statistical program called]14[.

RESULTS AND DISCUSSION

It is evident from Table (1) that the breed has a significant effect on daily and total milk production ($P<0.05$), the Holstein Friesian breed produced more daily and total milk than the Simmental breed, their average daily production was (1.2±15, 506.45±6750) kg, and their average total production was (1.8±10.53, 90±3474) kg, respectively. The typical daily amount of milk produced by Holstein cows was similar to what was achieved by]15[and]16[and]17[. The typical total amount of milk produced by Holstein cows was similar to what was achieved by]18; 19; 20[.

This outcome was in line with]21; 22; 23; 24; 25[.

The reason for this large variation may be due to the difference in genetic compositions between breeds as well as between individuals within the same breed]26[.

Table (1) Average (±standard error) effect of breed on daily and total milk production

Breed	Daily milk production (kg)	Total milk production (kg)
Holstein	15±1.12a	6750±506.45a
Simmental	10.53±1.8b	3474±90b

Different letters within a column indicate significant differences at the $P<0.05$ level.

Table (2) shows a significant effect of the breed on some milk components, as Simmental cows significantly outperformed Holstein cows ($P<0.05$) in the percentage of total solids and fat percentage, while Holstein cows significantly outperformed Simmental cows ($P<0.05$) in the percentage of water in milk, and the averages were

(0.09±12.56, 0.13±4.11, 0.09±87.43) (0.01±11.44, 0.04±3.17, 0.01±88.55) respectively. There were no significant differences (P<0.05) between the two breeds in the percentage of protein, lactose, percentage of non-fat solids, percentage of ash, and milk density. In the percentage of fat, the results agreed with]27; 28; 22; 29;25[. In the percentage of fat and protein, they agreed with]23[. In all milk components, these results agreed with]24[.

Table (2) Average (±standard error) effect of breed on milk components

Breed	TS%	F%	SNF%	P%	L%	Ash%	W%	D
Holstein	11.44±0.10 b	3.17±0.04 b	8.26±0.08 a	3.1±0.03 a	4.65±0.04 a	0.58±0.09 a	88.55±0.01 a	30.84±0.18 a
Simmental	12.56±0.09 a	4.11±0.03 a	8.46±0.06 a	3.13±0.02 a	4.75±0.03 a	0.60±0.01 a	87.43±0.09 b	±0.38 30.87a

Different letters within a column indicate significant differences at the P<0.05 level.
Ts%: Total solids, F%: Fat percentage, SNF%: Non-fat solids, P%: Protein percentage, L%: Lactose percentage, Ash%: Ash percentage, W%: Water percentage, D: Milk density.

It is noted from Table (3) that there is a significant effect of the breed on the caloric value of 1 kg of raw milk, as Simmental cows significantly outperformed Holstein cows (P<0.05) in the caloric value of 1 kg of milk, as its value in Simmental cows reached (0.03 ± 285.322) kilocalories, while its value in Holstein cows reached (0.05 ± 284.260) kilocalories, respectively. This may be due to the high percentage of fat in Simmental cows' milk compared to the percentage of fat in Holstein cows. This result is consistent with]6[.

From Table (3), it is also noted that there is a significant effect of the breed on the amount of fat and the amount of protein in the milk produced, as Holstein cows were significantly superior (P<0.05) in the amount of fat and the amount of protein compared to Simmental cows. The average amount of fat and the amount of protein in Holstein and Simmental were (16.887±215, 16.507±206.986) kg, (13.555±142.865, 10.221±108.831) kg, respectively. In the amount of fat, this result agreed with]22[, and in the amount of protein, the result was close to what was mentioned by]12[, and in the amount of fat and the amount of protein, the result agreed with]16[and]6[, as they indicated that the amount of fat and the amount of protein in milk increases with the increase in the amount of milk production.

Table (3) Average (±standard error) effect of breed on energy value, fat content and protein content in milk

Breed	Energy value of 1 kg of milk (kilocalories)	Amount of fat (kg)	Protein Amount (kg)
Holstein	284.260 ±0.050b	215 ±16.887a	206.986±16.507a
Simmental	285.322±0.038a	142.86±13.555b	108.83±10.221b

Different letters within a column indicate significant differences at the P<0.05 level.

CONCLUSIONS

It is concluded from this study that the breed had a significant on the daily and total milk production, some of its components, the fat and protein yield, and the caloric value of 1kg of raw milk.

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