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THE EFFECT OF THE LACTATION SEASON ON SOME BIOCHEMICAL BLOOD PARAMETERS OF HOLSTEIN FRIESIAN COWS

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Abstract:

The experiment was conducted at Taj Al-Nahrain Research Station, north of Diwaniyah Governorate, by using 35 Holstein cows for the period between 1/3/2022 and 15/8/2022, to demonstrate the effect of the milking season on some biochemical characteristics of Holstein Friesian cows, these cows were divided into three seasons as follows: the first season (11 cows), the second season (15 cows), and the third season (9 cows) based on the station's records. The cows were placed in semi-shaded pens with a length of 140 m and a width of 60 m for each pen, these pens were provided with freely filled water basins, after that, the physiological traits were analyzed in the Physiology Laboratory of the College of Agriculture, University of Basrah. The results indicated a significant increase in potassium concentration for the first and second seasons compared to the third season, there were no significant differences in glucose, cholesterol, triglycerides, albumin, total protein, phosphorus and calcium.

Keywords: lactation season, biochemical blood parameters, Holstein Friesian cows.

Introduction:

Hormones play an important role in the serum directly in relation to the physiological state of cows (Kassim *et al*., 2019a; Kassim *et al*., 2019b). Likewise, with regard to milk production, most of the factors that affect milk production in cows are the season, which was based on differences in nutrition, management or health (Huhtanen *et al*., 2002; Kassim, 2017). The concentration of cholesterol and triglycerides in the cows in the second parity was 1.06, higher than in the cows in the fifth parity, which was 0.94 mmol/L. It was what reveals the increase in the amount of fat to provide energy to increase milk production in identical cows. The concentration of total protein and albumin in the serum was higher in dairy cows with parity 2, it decreased in valency 5 (62.5,

59.1, 57.2, 54.3) µmol/L for valency from 2 to 6, respectively (Xuehui *et al*., 2019). It was also found that there were differences in the percentage of glucose, as the coefficient of variation was 17.1%, More ammonia is metabolized to urea in the liver in the DIM stages, The total protein concentration decreased in the 150-179 DIM groups, plasma glucose concentrations during the 3 weeks before birth and 3 weeks after birth were affected by parity, PAR3 cows had higher concentrations of glucose in plasma compared to 0.03 P = (2 PAR) cows, plasma glucose concentrations during the 3 weeks after birth were affected by treatment (Khazanehei *et al*., 2015).

Regarding minerals, the results showed that the upper values for phosphorus and potassium are two to three times higher than the reference values (Kassim et al., 2020). Calcium levels were much higher in primiparous cows compared to multiparous cows (higher milk production, high calcium mobilization and osteoclast levels with high levels of parathyroid hormone, virgin cows tend to produce a smaller amount of colostrum and have a large number of bone cells, taking into account that the bone structure is still in the growth phase (Russel, 2007).

Proper management of cows during the transitional period is considered to maintain the health of the cows, their fertility, and milk production during each lactation period, also, preserving some mineral elements is one of the most difficult tasks that can be accomplished in herds of dairy cows, which is approximately 75% of diseases in cows, it usually occurs in the first month after birth in tropical regions, therefore, attention is paid to nutrition and providing rations, which contains useful mineral elements for the animal and the generally accepted nutritional guidelines during the transitional period and after birth, it is the first step in the management of postpartum diseases (Vallejo *et al*., 2017).

This study aims to determine the effect of the milking season on some biochemical blood parameters of Holstein Friesian cows.

Materials and Methods

The experiment was conducted at Taj Al-Nahrain Research Station, north of Diwaniyah Governorate, by using 35 Holstein cows for the period between 1/3/2022 and 15/8/2022, to demonstrate the effect of the milking season on some biochemical characteristics of Holstein Friesian cows, these cows were divided into three seasons as follows: the first season (11 cows), the second season (15 cows), and the third season (9 cows) based on the station's records. The cows were placed in semi-shaded pens with a length of 140 m and a width of 60 m for each pen, these pens were provided with freely filled water basins, after that, the physiological traits were analyzed in the Physiology Laboratory of the College of Agriculture, University of Basrah.

Results and discussion

Table (1) shows the effect of the lactation season on the concentration of glucose, cholesterol and triglycerides in the blood serum of Holstein Friesian cows, there was no significant effect of the lactation season on glucose concentration. The first season gave the highest concentration of

glucose, which reached 57.00 mg/100 ml, followed by the third season (56.09 mg/100 ml), the second season gave the lowest concentration (55.11 mg/100 ml), it was also noted that the lactation season did not significantly affect cholesterol concentration. The first milk production season recorded the highest rates (76.74 mg/100 ml), followed by the third season (76.60 mg/100 ml). The second season recorded the lowest rates (76.11 mg/100 ml). The results also indicate that there is no significant effect of the lactation season on the concentration of triglycerides. The first season recorded the highest concentration (25.04 mg/100 ml), compared to the third season (24.84 mg/100 ml). The second season gave the lowest value (24.45 mg/100 ml).

Table (1) Effect of lactation season on concentrations of some blood parameters (glucose, cholesterol, and triglycerides) (mean± standard error).

Lactation season	Cow no.	Glucose (mg/ 100 ml)	Cholesterol (mg/ 100 ml)	Triglycerides (mg/ 100 ml)
First	11	0.52±57.00	3.07±76.74	0.63±25.04
Second	15	0.52±55.11	2.31±76.11	0.52±24.45
Third	9	0.77±56.09	2.82±76.60	0.77±24.84
Sig.		NS	NS	NS

N.S: no significant differences between the means.

Table (2) shows the effect of the lactation season on the concentration of albumin, total protein and urea in the blood serum of Holstein Friesian cows. The results indicate that there are no significant differences between the lactation seasons in the concentration of albumin in the blood serum of Holstein Friesian cows, the third season of milk production gave the highest rates of albumin concentration (3.85 gm/100 ml blood serum), followed by the second season (3.80 gm/100 ml blood serum), while the first season gave the lowest rates (3.75 gm/ml blood serum).

The same table indicates that the lactation season has no significant effect on total protein concentration, the second season recorded the highest concentration of 5.43 gm/100 ml blood serum, followed by the third season (5.34 gm/100 ml blood serum). The first season gave the lowest values (5.30 gm/100 ml blood serum), there was no significant effect of the milking season on the urea concentration in the blood serum of Holstein Friesian cows, the first lactation season recorded the highest concentration of 17.45 mg/100 ml blood serum, then comes the third season after that, with a concentration of 16.52 mg/100 ml blood serum, the second season recorded the lowest rates (16.28 mg/100 ml blood serum).

Table (2) Effect of lactation season on concentrations of some blood parameters (albumin, total protein, and urea) (mean± standard error).

Lactation season	Cow no.	Albumin (gm/ ml)	Total protein (gm/ ml)	Urea (mg/ ml)
First	11	0.13±3.75	0.13±5.30	0.67±17.45
Second	15	0.05±3.80	0.10±5.43	0.27±16.28
Third	9	0.07±3.85	0.15±5.34	0.54±16.52
Sig.		NS	NS	NS

N.S: no significant differences between the means.

Table (3) indicates the effect of the lactation season on the concentrations of some minerals (phosphorus, potassium and calcium) in the blood serum of Holstein Friesian cows, there was no significant effect of the lactation season on the concentration of calcium in blood serum, although there was an arithmetic increase in its concentration in the second season (0.87 mmol/L), followed by the first season (0.82 mmol/L), the third season gave the lowest concentration (0.67 mmol/L), while we note that the milking season has a significant effect ($P \leq 0.05$) on the concentration of potassium in the blood serum of Holstein cows. It was shown that both the first and second seasons showed a significant increase ($P \leq 0.05$) in potassium concentration at a rate of 8.49 and 8.12 mg/100 ml, respectively, compared to the third season, in which the potassium concentration (7.22 mg/100 ml). The reason for the high concentration of minerals in the first and second seasons may be that animals of younger ages require higher amounts of minerals, because it goes through stages of growth, bone building, cell division, and metabolic processes (Kebreab and Vitti, 2005; Antunovic *et al*., 2020).

Also, phosphorus concentration was not significantly affected in the milk production season, and the third season achieved the highest rate (0.024 mg/100 ml), and in the first season it was 0.022 mg/100 ml. The second season gave the lowest concentration (0.021 mg/100 ml). The reason for the decrease in the concentration of both calcium and potassium in the third season of birth may be due to this, compared to other seasons, milk production increases during this season. The resulting increased need for higher quantities of these two elements in the formation of milk minerals, which contributes to their depletion from the bloodstream (Thilsing *et al*., 2007).

Table (3) Effect of lactation season on the concentration of some mineral elements in the blood (phosphorus, potassium, and calcium) (mean±standard error).

Lactation season	Cow no.	Phosphorus (mg/ 100 ml)	Potassium (mg/ 100 ml)	Calcium (mmol/L)
First	11	0.001±0.022	0.29±8.49	0.05±0.82

			a	
Second	15	0.0007±0.021	0.21±8.12 a	0.07±0.87
Third	9	0.003±0.024	0.25±7.22 b	0.06±0.67
Sig.		NS	*	NS

Different letters within one column indicate the presence of significant differences below the 0.05 probability level. N.S: no significant differences between the means.

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