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EFFECT OF PARITY AND SEX OF BIRTH ON SOME PHYSICAL PROPERTIES OF MILK OF FRIESIAN COWS RAISED IN SOUTHERN IRAQ

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Abstract:

This study was conducted in Thi Qar Governorate, Shatrah District during the period from 4/1/2023 to 5/1/2024. For the purpose of evaluating the effect of parity and sex of birth on some physical properties (density, freezing point, pH) of the milk of Friesian cows raised in southern Iraq. The study included 165 samples of raw milk taken from 30 Friesian cows of different production seasons that were nursing young of different sexes. The results of the study showed a significant effect (P<0.05) of the birth sequence on milk density, as cows with the first birth sequence significantly outperformed cows with the second, third, fourth and above birth sequences, and the averages were (0.0877±24.76, 1.660±23.74, 1.131±23.55, 1.211±21.27) respectively. The birth sequence also had a significant effect (P<0.05) on the degree of milk freezing, as cows with the first birth sequence were significantly superior (P<0.05) to cows with the fourth birth sequence or above. There were no significant differences (P<0.05) between cows with the first, second and third birth sequences, as well as between cows with the second, third and fourth birth sequence or above. The averages were (0.0193± 0.538-, 0.0334± 0.533-, 0.0197± 0.524-, 0.0185± 0.482-) respectively. The results of the study also showed that there was no significant effect (P<0.05) of the birth sequence on the pH, and the averages were (0.0396±6.53, 0.0542±6.47, 0.0351±6.52, 0.0543±6.56), respectively. The study also showed that there was no significant effect (P<0.05) of the newborn's sex on the milk density, milk freezing point, and pH value, and the averages were (1.281±24.67, 0.670±23.39), (0.0272±0.544-, 0.0125±0.519-), (0.0564±6.57, 0.0232±6.52), respectively. The results showed a strong significant negative correlation (P<0.05) between milk density and milk freezing point, with a correlation coefficient of (-0.9267), while the correlation between milk density and pH value was negative and insignificant, with a correlation coefficient of (-0.03075), while the correlation between milk freezing point and pH was negative and insignificant (P<0.05) with a correlation coefficient of (-0.03062).

Keywords: Parity; Physical Characteristics Of Milk; Friesian.

INTERACTION

Natural milk is defined as the fresh milk secretion after a complete milking of one or more cows from healthy cows, with the exception of the secretion that occurs fifteen days before parturition and five days after parturition, whereby the milk is free of colostrum (Al-Shabibi et al., 1988). Milk and its derivatives are among the most consumed foods in the world because they contain nutrients necessary for growth, such as proteins, saturated fatty acids, and calcium (Al-Aboudi et al., 1991). Milk is also an important source of protein and fat, which contains a high percentage of saturated fatty acids and cholesterol (Strzalkowska et al., 2009).

Cows are the main source of milk in the world as well as in Iraq, and as a result of the low production efficiency of local Iraqi cows, many breeds of purebred international cows were imported, especially in the sixties and seventies of the last century. Among the breeds that were introduced in large numbers to Iraq is the Friesian cow breed. Friesian cows are characterized by their high milk production, as well as their continuity in production throughout the milking

season and their rapid adaptation to the new environment, as well as their use in improving the production characteristics of local cows through crossbreeding (Saleh et al., 1989). The importance of studying the physical and chemical properties of milk gives a clear idea of what solids milk contains and its suitability for processing and its ability to retain its properties. It also gives an idea about milk adulteration and an approximate estimate of the percentage of adulteration in it, as well as determining the price of milk (Al-Qudsi and Elia, 2010).

Milk production and its components are affected by many factors such as the breed Hadad, (2020), the season Al-Fayad (2023), nutrition Hassooni and Abboud, (2014), the number of births and the sex of the newborn (Pawar et al., (2012) and other factors. While AL-Fayad (2015) indicated that there is no significant effect of the birth sequence and the sex of the newborn on some milk components.

The study aims to know the effect of the birth sequence and the sex of the newborn on some physical properties of the milk of Friesian cows raised in southern Iraq.

MATERIAL AND METHODS

This study was conducted in Thi Qar Governorate/Shatrah District during the period from 1/4/2023 to 1/5/2024. For the purpose of evaluating the effect of birth sequence and sex of the newborn on some physical properties (density, freezing point, pH) of the milk of Friesian cows raised in southern Iraq. The study included 165 samples of raw milk taken from 30 healthy Friesian cows of different production seasons, suckling young of different sexes raised in one of the private fields in Shatrah city.

Herd feeding: Herd feeding depends on the available fodder and according to the season, as roughage and green fodder are given according to body weight, while concentrated fodder is fed according to milk production.

Veterinary care: The animals underwent a preventive health program that included vaccinating the animals against internal and external parasites, as well as vaccinating the animals against diseases such as foot-and-mouth disease, contagious abortion, rinderpest, anthrax, and hemorrhagic septicemia. The animals also undergo periodic examinations against various diseases.

Milk samples collection and measurement of its components: 165 raw milk samples were collected from 30 cows, 100 ml each. The samples were stored in a box containing crushed ice after collection to prevent spoilage. They were then transferred to the laboratory for analysis using the Lacto Flash Funk Gerber device, where the percentage of fat, protein, lactose, non-fat solids, density, freezing point, and percentage of added water were measured. The pH was estimated using a PH-meter model 9717 supplied by the Thai company Hanna.

Statistical analysis: The data were analyzed statistically using the ready-made statistical program SPSS (2006) and the significance of the averages was tested using the LSD test.

RESULTS AND DISCUSSION

It is noted from Table (1) that there is a significant effect ($P<0.05$) of the birth sequence on milk density, as cows with the first birth sequence outperformed cows with the second, third, fourth and above birth sequences. No significant differences ($P<0.05$) were observed between cows with the second, third and fourth birth sequences and above, and the averages were (0.0877±24.76, 1.660±23.74, 1.131±23.55, 1.211±21.27) respectively. This may be due to the high milk components in young animals compared to milk components in older animals (Khosroshahi et al., 2011; Pawar et al., 2012; Hassan, 2013; Al-Khauzai et al., 2020; Al-Zarkani et al., 2020).

The results of this study agreed with Taher et al., (2011) and did not agree with Al-Fayad and Shareef (2022) who indicated that there was no significant effect of the birth sequence on milk density. Table (1) shows a significant effect ($P<0.05$) of the birth sequence on the degree of milk freezing, as cows with the first birth sequence significantly outperformed cows with the fourth birth sequence or above, while there were no significant differences ($P<0.05$) between the first, second and third birth sequences, and there were also no significant differences ($P<0.05$) between cows with the second, third and fourth birth sequences or above, and the averages were (0.0193± 0.538-, 0.0334± 0.533-, 0.0197±0.524-, 0.0185± 0.482-) respectively.

The results of this study agreed with Sala et al., (2010) and Kedzier-Matysek et al., (2011) who indicated that the freezing point increases with the increase in the sequence of births or with the increase in the number of productive seasons of the cow. They also added that the age of the cow and the level of production are associated with the increase in the freezing point of milk. They also agreed with Otwinoska-Mindur et al., (2017) who confirmed the existence of a significant effect of the sequence of births on the freezing point of milk and explained that milk production increases with the increase in the number of productive seasons and as a result the amount of water increases with the increase in the amount of milk production with the increase in the number of productive cycles, noting that there are slight changes in the soluble components in milk water, so the milk freezes faster. While

Brzozwski and Zdziarski (2006) indicated the existence of fluctuations and fluctuations in the effect of the cow's age on the freezing point of milk. While Henno et al., (2008) and Taher et al., (2011) confirmed that there was no significant effect of the sequence of birth on the degree of milk freezing.

It is noted from Table (1) that the pH values were within the normal range for fresh milk, which ranges between 6.4-6.8 (Al-Shabibi et al., 1988). And less than what was reached by (Kanawal et al., 2004; Mahmoud and Usman, 2010), Jassim et al. (2013), and Abdullah (2018). From Table (1), it was found that there was no significant effect (P<0.05)) of the birth sequence on the pH values, and the averages were (0.0396±6.53, 0.0542±6.47, 0.0351±6.52, 0.0543±6.56), respectively. The results of this study agreed with Taher et al., 2011).

Table (1) Mean (±standard error) effect of parity on some physical properties of milk

parity	Density	Freezing point (-°C)	pH
1	a24.76±0.877	a0.538±0.0193	a6.53±0.0396
2	b23.74±1.660	ab0.533±0.0336	a6.47±0.0542
3	b23.55±1.131	ab0.524±0.0197	a6.52±0.0351
and above 4	b21.27± 1.211	b0.482±0.0185	a6.56±0.0543

Different letters vertically mean significant differences at the probability level (p<0.05)

From Table (2), it is noted that there is no significant effect (p<0.05) of the newborn's gender on milk density, but there is a non-significant arithmetic increase in favor of mothers with male births in milk density, and the averages reached (1.281±24.67, 0.670±23.39) respectively. The results of this study agreed with (Taher et al., 2011; Al-Fartosi and Al-Moussawi, 2017). It did not agree with Al-Fayad and Shareef (2022), who indicated that there is a significant effect of the newborn's gender (male) on milk density.

Table (2) shows that there are no significant differences (P<0.05) between the milk of mothers with male births and the milk of mothers with female births in the freezing point of milk, but it is noted that there is a non-significant arithmetic increase in the freezing point in the milk of mothers with female births compared to the milk of mothers with female births. This may be due to the fact that the milk of mothers with female births is lighter in consistency than the milk of mothers with male births, as the purity of the milk increases, the freezing point of the milk decreases, and the lighter its consistency, the freezing point of the milk increases, approaching zero degrees Celsius (Al-Hasnawi, 2012). The averages were (0.0272± 0.544-, 0.0125± 0.519-) respectively.

These results agree with Taher et al., (2011) and do not agree with (Park et al., 2007; Al-Fartosi and Al-Mousswi, 2017). Who indicated that there is a significant effect of the sex of the newborn on the degree of milk freezing. It is also noted that there is no significant effect (P<0.05) of the sex of the newborn on the pH values, and the averages were (0.0564±6.57, 0.0232±6.52) respectively. The results of this study agree with (Taher et al., 2011).

Table (1) Mean (±standard error) effect of calf gender on some physical properties of milk

Gender	Density	Freezing point (-°C)	pH
Male	a24.67±1.281	a0.544 ±0.0272	a6.57±0.0564
Female	a23.39±0.670	a0.519±0.0125	a6.52±0.0232

Different letters vertically mean significant differences at the probability level (p<0.05)

Table (3) shows the relationship between milk density, milk freezing point and pH, where it is noted that there is a strong negative significant correlation (P<0.05) between milk density and milk freezing point, and the correlation coefficient reached (-0.9267). The higher the milk density, the lower the milk freezing point, and the lower the milk density, the higher the milk freezing point towards zero degrees Celsius. This is what Ship (1959) indicated, who confirmed that milk freezing point is an accurate indicator of the amount of water added to milk. This study agreed with Dehinenet and Mekonnen (2013), who confirmed that adulterating milk with water reduces the specific gravity of milk with an increase in the freezing point. It does not agree with Rai and Adhikari (2022), who found a strong positive significant correlation between milk density and milk freezing point.

Table (3) also shows a negative insignificant correlation (P<0.05) between milk density and pH, with a correlation coefficient of (-0.0307). This result is partially consistent with Rai and Adhikari (2022), who found a negative significant correlation between milk density and pH values. The correlation between milk freezing point and pH values was negative insignificant (P<0.05), with a correlation coefficient of (-0.03062). This result is partially consistent with Rai and Adhikari (2022), who found a negative significant correlation between milk freezing point and pH.

Table (3) The relationship between density, freezing point of milk and pH

Attribute	Density	Freezing point (-°C)	PH

Density			
Correlation coefficient	1	-0.9267	-0.0307
Significance level		*	NS
Freezing point			
Correlation coefficient	---------	1	-0.03062
Significance level	----------		NS
PH			
Correlation coefficient	----------	----------	1
Significance level	----------	----------	

(P<0.01)** ;(P<0.05)* ; NS: not significant

CONCLUSIONS

Can conclude from this study that there is a significant effect of the birth sequence on milk density and milk freezing point, as the freezing point increases with the increase in the number of productive seasons of the cow, and there is no significant effect of the birth sequence on PH values. Also, no significant effect of the sex of the newborn on milk density, freezing point and PH values was observed. Also, there is a strong significant negative correlation between milk density and milk freezing point, while the correlation between milk density and PH values was negative and insignificant, and the correlation between milk freezing point and PH values was negative and insignificant.

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