

Article

Calf Gender with Milk Traits Relationship on Buffaloes

Ahmed Raisan Alkhateeb¹

1. Department of Animal production, College of Agriculture, University of Al-Muthanna, Iraq

* Correspondence: ahmed.raisan@mu.edu.iq

Abstract: The study investigates the relationship between calf gender and milk traits in buffaloes (*Bubalis bubalis*) in Iraq during the 2018/2019 lactating season. Despite extensive research on buffalo milk production, the specific impact of calf gender on milk traits remains underexplored. Using a sample of 700 milk analyses from 72 buffaloes, fat, protein, and lactose percentages were measured alongside daily milk yield. Results showed a significant effect ($P \leq 0.05$) of calf gender on daily milk yield, with higher yields for cows birthing male calves (7.77 ± 0.48 liters) compared to female calves (6.22 ± 0.51 liters). However, calf gender did not significantly influence the percentages of protein, fat, lactose, and solid-not-fat (SNF) components. These findings suggest that while calf gender impacts overall milk yield, it does not affect milk composition, highlighting the potential for targeted breeding strategies using sexed semen to optimize milk production and economic outcomes for dairy farmers. Further research with larger samples over multiple seasons is recommended to confirm these findings.

Keywords: *Bubalis bubalis*, calf gender, milk yield and component

1. Introduction

The remarkable ability of the Iraqi buffalo to adapt to a wide range of environmental conditions, its remarkable longevity (it can produce for up to ten seasons), and its exceptional ability to use low-quality feed sources, such as cane and sedge, readily available in its regions, set it apart. These characteristics contribute to the buffalo's ability to withstand the risk of extinction in Iraq. In the event that they are available, buffaloes can consume high-protein foods [1-3].

The care of water buffalo does not necessitate a large financial outlay because the animals do not require extensive housing or feeding. Buffaloes are suitable for international breeding because of their resilience to disease and their ability to efficiently utilize nutrients. Buffaloes could be a good option for those who own wetlands but do not want domestic cattle in the area [4, 5].

The total number of water buffaloes in Iraq was 285,537, according to data analyzed by Alsaedy (2014) from the 2008 Ministry of Agriculture Census. In Thi-Qar Province, 29,270 female buffalo out of 49,283 total heads were counted, and nearly half of the buffalo populations have congregated in the marshes of southern Mesopotamia [6].

In the context of dairy farms, herders typically aim to maximize profits through increased milk production by increasing the number of female births. Additionally, they seek to ensure that the finest heifers are utilized for replacement purposes, thereby enhancing the genetic foundation of the breeding stock [7]. To achieve the desired milk quality and increase milk yield, it is crucial to analyze lactation curves and identify the milk production capacity of dairy animals [8].

Citation: Alkhateeb, A. R. Calf Gender with Milk Traits Relationship on Buffaloes. International Journal of Biological Engineering and Agriculture 2024, 3(3), 255-258.

Received: 8th June 2024

Revised: 15th June 2024

Accepted: 22nd June 2024

Published: 29th June 2024



Copyright: © 2024 by the authors. Submitted for open access publication under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>)

A higher milk output is the end goal of every dairy business. Knowing the different chemical components of milk and their health-related characteristics is vital because milk quality determines the price of milk, which in turn determines the quality of dairy products that consumers can buy [9]. In terms of the majority of milk-forming nutrients, buffalo milk outshines cow milk. Lots of people have looked into buffalo milk and its processing, characteristics, and composition [10].

In order to create breeding strategies that alter milk substance, it is necessary to understand the variables that influence milk contents. Dairy cows' lactation characteristics are influenced by several variables, both hereditary and environmental. Differences in milk production between male and female buffalo calves at different points in the lactation process are a strong indicator of the importance of calf gender [11-14]. In buffalo cows, (DMP) and (TMP) were affected by the calf's sex and the mother's nursing behavior; daily milk output, total solids, and milk density were all significantly influenced by the calf gender [15-17].

2. Materials and Methods

The methodology employed in this study to investigate the relationship between calf gender and milk traits in Iraqi buffaloes (*Bubalis bubalis*) involved the collection and analysis of 700 milk samples from 72 buffaloes across two regions in Iraq during the 2018/2019 lactating season. Daily milk yield was meticulously recorded by measuring the milk quantity in the milking pail after each milking session. For compositional analysis, ten milliliters of milk from each sample were evaluated using an ultrasonic milk analyzer to determine the percentages of fat, protein, and lactose.

The data were statistically analyzed using the Statistical Analysis System (SAS) software, version 9.1, with least square analyses applied to discern the impact of calf gender on milk yield and its components. The analysis focused on comparing the daily milk yield between cows birthing male and female calves, along with assessing the non-significant variations in milk composition traits such as protein, fat, lactose, and solid-not-fat (SNF) percentages. The statistical significance was set at $P \leq 0.05$ to ensure the robustness of the findings. The study's design considered regional and management differences, ensuring a comprehensive analysis of the influencing factors. By leveraging advanced statistical tools and a substantial sample size, the methodology provided a reliable framework for understanding the intricate dynamics between calf gender and milk production traits in buffaloes, thereby offering actionable insights for breeding strategies aimed at optimizing milk yield and quality [18].

3. Results and Discussion

It's obviously shown that calf gender had a significant effect ($P \leq 0.05$) on daily milk yield (Table 1) with 7.77 ± 0.48 liter for cows had a male birth and 6.22 ± 0.51 liter for female births. These findings are supporting the previous results of [17, 19]. On the other hand, there is non-significant influence of calf sex on Protein, Fat, Lactose, and SNF percentage (Table 1), confirming the outcomes of [11] but disagree with [20]. Various data analysis methods, as well as regional and farm-specific differences in management procedures, may account for these contradictory findings [21]. In accordance with the Trivers Willard theory, cows will provide extra milk for bull newborns if their systems tend to be healthy. Furthermore, they propose that unwell cows or those of a different genetic line produce more milk for female births. In addition, the exact mechanisms by which other variables, including animal husbandry, influence the calf gender milk yield bias remain unclear [22, 23].

Table 1. Effect of sex in parameters study of Iraqi buffaloes

Parameters	Mean \pm SE		Level of Sig.
	Male (No=31)	Female (No=41)	
DMY (kg)	7.77 \pm 0.48	6.22 \pm 0.51	*
Protein (%)	3.83 \pm 0.09	3.82 \pm 0.08	NS
Fat (%)	6.19 \pm 0.16	6.14 \pm 0.14	NS
Lactose (%)	4.95 \pm 0.06	4.93 \pm 0.04	NS
SNF (%)	9.14 \pm 0.18	9.16 \pm 0.17	NS

* ($P \leq 0.05$), NS: Non-Significant.

4. Conclusion

The study highlights the significant impact of calf gender on daily milk yield in Iraqi buffaloes, with male calves leading to higher yields compared to female calves. However, calf gender did not significantly influence the percentages of protein, fat, lactose, and solid-not-fat in the milk. These findings suggest that while calf gender is a critical factor in determining overall milk production, it does not affect the milk's nutritional composition. The implications of this study are substantial for dairy farmers, as utilizing sexed semen to produce male calves could optimize milk yield and enhance economic outcomes. This strategy could be particularly beneficial in improving management and ecological conditions in dairy farms. Nevertheless, the study also points to the need for further research involving larger sample sizes and multiple lactation seasons to validate these results and provide more comprehensive insights into the relationship between calf gender and milk traits in buffaloes.

REFERENCES

- [1] H. Abid and N. Fazaa, *Water Buffalo in the Iraqi Marshes. Thi Qar and Missan Governorates*. Nature Iraq Status Report, 2007.
- [2] H. N. Pawar, G. R. Kumar, and R. Narang, "Effect of Year, Season and Parity on Milk Production Traits in Murrah Buffaloes," *Journal of Buffalo Science*, vol. 1, no. 1, pp. 122-125, 2012.
- [3] S. Eidan and T. Abdulkareem, *Buffalo Breeding in Iraq: An Analytical Study of Reality and Ambition*, 2017.
- [4] E. Czerniawska, E. Chociłowicz, and M. Szewczuk, "Biology of Bubalus Bubalis," *Annals of Animal Science*, vol. 10, no. 2, pp. 107-115, 2010.
- [5] A. Alkhateeb, W. Ibrahim, and A. J. J. Taha, "Correlation Between Udder Conformation With Daily Milk Yield of Buffaloes," *Journal of Life Science and Applied*, vol. 2, pp. 61-65, 2021.
- [6] J. K. M. Alsaedy, "Mesopotamian Buffaloes (The Origin)," *Journal of Buffalo Science*, vol. 3, no. 1, pp. 30-33, 2014.
- [7] S. K. Genena, "Genetic and Non-Genetic Features of Female Gender Determination in Friesian Calves as Replacements Under Egyptian Farm Conditions," *Journal of Advanced Veterinary Research*, vol. 14, no. 2, pp. 238-244, 2024.

- [8] A. R. Alkhateeb, W. I. Ibrahim, and N. N. Al-Anbari, "The Effect of Location and Parity in The Body, Udder Conformation and Milk Production Traits in Buffaloes," *IOP Conference Series: Earth and Environmental Science*, 2021.
- [9] P. Boro et al., "Milk Composition and Factors Affecting It in Dairy Buffaloes: A Review," *Journal of Entomology and Zoology Studies*, vol. 6, no. 3, pp. 340-343, 2018.
- [10] A. Alkhateeb et al., "Body Conformation With Daily Milk Yield Relationship on Buffaloes," *Journal of Life Science and Applied*, vol. 3, no. 1, pp. 1-3, 2022.
- [11] M. Hamad, M. J. J. El-Moghazy, and V. Sciences, "Influence of Sex and Calf Weight on Milk Yield and Some Chemical Composition in The Egyptian Buffalo's," *Journal of Animal and Veterinary Sciences*, vol. 2, no. 3, pp. 22-27, 2015.
- [12] P. Ratwan et al., "Influence of Genetic and Non-Genetic Factors on Lactation Traits in Dairy Cattle: A Review," *Journal of Dairy Science and Technology*, vol. 5, no. 3, pp. 7-22, 2016.
- [13] A. Sahin, A. Yildirim, and Z. Ulutas, "Changes in Some Physico-Chemical Content of Anatolian Buffalo Milk According to Some Environmental Factors," *Buffalo Bulletin*, vol. 35, no. 4, pp. 573-585, 2016.
- [14] S. K. Genena and S. Z. Ebrahim, "Impact of Calves Gender Birth Weights on Predicting the Future Performance of Friesian Cattle Under Farm Conditions," *Journal of Advanced Veterinary Research*, vol. 13, no. 10, 2023.
- [15] A. d. F. Oliveira, C. R. Quirino, and R. J. R. C. d. C. P. Bastos, "Effect of Nursing Behavior, Sex of the Calf, and Parity Order on Milk Production of Buffaloes," *Revista Colombiana de Ciencias Pecuarias*, vol. 30, no. 1, pp. 30-38, 2017.
- [16] M. A. J. Al-Fayad and H. M. J. I. J. of A. B. Shareef, "Effect of Parity and Calf Gender on Milk Yield and Composition of Buffalo, *Bubalus Bubalis* Inhabiting Southern Iraqi Wetlands," *International Journal of Aquatic Biology*, vol. 10, no. 1, pp. 74-77, 2022.
- [17] A. L. D. Al-Khauzai et al., "The Effect of Sex of Calve and Parity on Milk Production and Its Components in Iraqi Buffaloes," *IOP Conference Series: Earth and Environmental Science*, 2020.
- [18] SAS. *Statistical Analysis System, User's Guide. Statistical. Version 9.1th ed.* SAS. Inst. Inc. Cary. N.C. USA, 2012.
- [19] A. I. Hoka, M. Gicheru, and S. J. E. A. Otieno, "Effect of Cow Parity and Calf Characteristics on Milk Production and Reproduction of Friesian Dairy Cows," *Journal of Natural Sciences Research*, vol. 9, no. 10, pp. 41-46, 2019.
- [20] M. S. E.-D. Ali et al., "Impact of Offspring Sex and Dam's Pre-Partum Vaccination on Colostrum Composition and Blood Hormones in Egyptian Buffaloes," *World Veterinary Journal*, vol. 11, no. 1, pp. 51-59, 2021.
- [21] M. Quaresma et al., "Calf-Sex Bias in Holstein Dairy Milk Production Under Extensive Management," *Livestock Science*, vol. 235, p. 104016, 2020.
- [22] R. L. Trivers and D. E. Willard, "Natural Selection of Parental Ability to Vary the Sex Ratio of Offspring," *Science*, vol. 179, no. 4068, pp. 90-92, 1973.
- [23] C. Veller, D. Haig, and M. A. Nowak, "The Trivers-Willard Hypothesis: Sex Ratio or Investment?" *Proceedings of the Biological Sciences*, vol. 283, no. 1830, 2016.