Black Sea Journal of Agriculture
doi: 10.47115/bsagriculture.1459275

Open Access Journal
e-ISSN: 2618 – 6578

Research Article
Volume 7 - Issue 4: 335-338 / July 2024

SOME ENVIRONMENTAL FACTORS CAUSING FIRST CALVING DIFFICULTIES IN HOLSTEIN FRIESIAN CATTLE

Arzu ÖZDEMİR[1]*

[1]*International Center for Livestock Research and Training, 06850, Ankara, Türkiye*

Abstract: Calving efficiency, an important target in cattle breeding, has been negatively affected by some environmental factors. Therefore, calving difficulty creates negative economic consequences. In this study, it was aimed to investigate the relationship between the first calving difficulty in Holstein Friesian (HF) cows in terms of management and origin factors. The material of the research consists of 1475 calving difficulty records from 5 different enterprises engaged in HF breeding, located in the Central Anatolia Region of Türkiye, covering the years from 2013 to 2019. The scoring system used to determine calving difficulty: normal without intervention (NB), normal with intervention (NBI), difficult/intervention with equipment (DB), and abnormal birth (AB). In the calving difficulty analysis, the management factor is classified as 1-2-3-4-5 and the origin of the cow is classified as 1 (foreign origin) and 2 (native origin). No findings were observed for NBI scores. Total NB, DB, and AB scores were 1250 (84.74%), 192 (13.01), and 33 (2.25%), respectively. *Chi-square* test was performed to test the differences among farms. Among the enterprises, the highest NB rate was observed in the 5th enterprise with 90.07%, the minimum DB rate was observed in the 5th enterprise with 8.45%, and the AB rate was at least 0.66% in the 1st enterprise. The difference between farms was significant for calving difficulty ($P<0.01$). Cow origin was not significant on the calving difficulty score. While the NB rates in foreign-origin and native-origin animals were 86.36% and 84.64%, and the DB rates were 13.64% and 12.97%, respectively. The AB score was not seen in foreign-originated cows, but the AB rate was 2.39% in native-origin cows. To reduce the calving difficulties in enterprises, it may be recommended to determine management procedures appropriate to the region and enterprise and to determine semen suitable for the breed, age, and size of the heifer.

Keywords: Calving difficulty, First calving, Animal origin, Holstein Friesian

***Corresponding author:** International Center for Livestock Research and Training, 06850, Ankara, Türkiye
E mail: arzuozdem22@gmail.com (A. ÖZDEMİR)
Arzu ÖZDEMİR https://orcid.org/0000-0002-6765-7029

Received: March 26, 2024
Accepted: May 18, 2024
Published: July 15, 2024

Cite as: Özdemir A. 2024. Some environmental factors causing first calving difficulties in Holstein Friesian cattle. BSJ Agri, 7(4): 335-338.

1. Introduction

In cattle breeding, one of the important targets for dairy cattle farms' business profit is calf productivity, a feature determined by the hereditary structure of the cow and aimed to provide maximum benefit (Kaymakçı, 1987). However, calving difficulty (dystocia birth) is the main reason among the many factors that negatively affect calf productivity. Difficulty in calving is a condition that is frequently encountered in cows, especially at the birth of the first calf, and causes economically important reproductive problems. While losses due to calving difficulties bring about effects such as the death of the calf, birth defects, and anatomical deformations as a result of it remaining in the birth canal, it also causes decreases in productivity characteristics of economic value for the cow, such as maternal deaths, birth canal deformations, reproductive problems, increase in the service period, delay in estrus. Although calving difficulties in cows cause a great economic loss to the producer due to losses due to injury or death, treatment costs, and permanent damage to the mother's fertility, calving difficulties cannot be eliminated from a herd; However, incidents can be greatly reduced with correct management decisions taken before the breeding season and during pregnancy (Erdoğan, 2023).

Reasons for calving difficulties include factors such as the birth weight and gender of the calf, the live weight and age of the mother at birth, the structure of the birth anatomy, and the prolongation of the gestation period (Meijering, 1984). These factors can prevent the normal progress of the cow's birth process. The incidence of difficult births and the proportion of stillborn calves was higher in primiparous cows than in multiparous cows (Strapáková et al., 2023). Calving difficulty can be a serious financial burden for cattle producers, and this is important for both the health of the animal and the profitability of the business. Additionally, Sakar et al. (2022) suggested that the first calving time of cows should be determined according to the climate and breeding needs of the country and that the first calving age of cows should occur at approximately 23-24 months of age to reduce costs. The economic costs of calving difficulties include factors such as calf loss, veterinary fees, farmer labour costs, and increased risk of health and fertility problems (Meijering, 1984). In addition to the environmental factors of calving difficulty, researchers have examined the effect of direct and maternal genetic components on the ease of calving and have obtained

This work is licensed (CC BY-NC 4.0) under Creative Commons Attribution 4.0 International License

important findings on this subject (Meijering, 1984; Dekkers, 1994). Therefore, appropriate management procedures and selection strategies are important in reducing calving difficulty. The main purpose of this study is to investigate the relationship between calving difficulty with farm management and cows' origin.

2. Materials and Methods

2.1. Materials

The study consisted of records covering the years 2013-2019 in 5 different Holstein dairy cattle enterprises in the Central Anatolia Region of Türkiye. The records were obtained from enterprises with automatic milking and herd management systems. Some of the animal material in the enterprises consists of cows that were born abroad and then imported to Türkiye as pregnant heifers, while the other part consists of cows that were born and raised in Türkiye.

2.2. Phenotype Data

In the study, calving records of a total of 1475 cows from 5 farms were collected from herds' software programs available in enterprises. All records were then transformed into an Excel program and made ready for analysis. The scoring system used to determine the calving difficulty (Gevrekçi and Akbaş, 2014) is as follows:

1. Normal without intervention; (NB)
2. Normal with intervention; (NBI)
3. Difficult/equipment-involved; (DB)
4. It is an abnormal birth (AB).

In the study, calving difficulty records numbered 1 (n=1250), 3 (n=192), and 4 (n=33) were observed, but calving difficulty records numbered 2 were not observed.

2.3. Statistical Analysis

Descriptive statistics and the *Chi-square* test used in the analysis of the calving difficulty of the first parity cows in the study were carried out in the SPSS 10.0 package program (SPSS Inc., Chicago, USA). Farm (1, 2, 3, 4, and 5) and origin (1 = imported, 2 = domestic) were included in the analysis as independent variables.

3. Results

In general, the frequency of NB, DB, and AB were 84.74%, 13.01% and 2.25%, respectively. The distribution of birth difficulties by enterprises and the *Chi-square* test results are given in Table 1. Differences in birth difficulty scores according to enterprises were found to be statistically significant (P<0.01). When the distribution of calf difficulties within the enterprises was examined, it was found that NB was at the highest rate in all enterprises, while AB was at the lowest rate. Among the enterprises, the highest NB rate was seen in the 5th enterprise with 90.07%. While the minimum DB rate was observed in the 5th enterprise with 8.45%, the highest rate was observed in the 4th enterprise with 17.64%. The AB rate was at least 0.66% in the 1st enterprise, and the highest was 2.95% in the 4th enterprise.

Data regarding calving difficulties in terms of origin are given in Table 2. When we examined Table 2, it was observed that there was no statistical difference in the frequency rates of NB, DB, and AB in terms of origin. NB rates in imported and domestic animals were 86.36% and 84.64%, respectively. No cases of AB have been observed in animals of imported origin. It was observed that the DB frequency in imported animals was proportionally higher than in domestic animals.

Table 1. Distribution of calving difficulties according to farms and Chi-square test results

Score	1. farm n (%)	2. farm n (%)	3. farm n (%)	4. farm n (%)	5. farm n (%)	Total n
NB[1]	253 (%83.77)^{ab}	234 (%86.35)^{bc}	329 (%83.92)^{ab}	189 (%79.41)^{a}	245 (%90.07)^{c}	1250
DB[2]	44 (%15.57)^{ab}	30 (%11.07)^{bc}	53 (%13.52)^{ab}	42 (%17.64)^{a}	23 (%8.45)^{c}	192
AB[3]	5 (%0.66)^{a}	7 (%2.58)^{a}	10 (%2.56)^{a}	7 (%2.95)^{a}	4 (%1.48)^{a}	33
Total	302	271	392	238	272	1475

[1]Normal without intervention, [2]Difficult/equipment-involved, [3]Abnormal birth. The differences between farms in terms of calving difficulty were found to be significant (P<0.01). $^{a, b, c}$Horizontal differences between groups are indicated by the letters.

Table 2. Distribution of calving difficulties according to origins and Chi-square test results

Score	1 (Import) n (%)	2 (Türkiye) n (%)	Total n
NB[1]	76 (%86.36)	1174 (%84.64)	1250
DB[2]	12 (%13.64)	180 (%12.97)	192
AB[3]	-	33 (%2.39)	33
Total	88	1387	1475

[1]Normal without intervention, [2]Difficult/equipment-involved, [3]Abnormal birth. The difference between origin in terms of calving difficulty was found to be insignificant.

4. Discussion

In this study, inter-enterprise calving difficulty scores were examined and it was determined that the rate of NB without intervention was 84.74%, and the proportional value of the sum of DB and AB was 15.26%. While some studies in the literature report that the rate of difficult birth in first parity Holstein breed in the USA is up to 28.7% (Meyer et al., 2001; Lombard et al., 2007), this study results was lower. Similarly, Bayram et al. (2015) reported that the total rate of DB and AB cases in the HF was 9.1%. In this study, the differences observed in the calving scores between enterprises in terms of calving difficulty can be attributed to management differences between enterprises. In terms of origin, it is noteworthy that no cases of AB have been found in animals of imported origin, and this result indicates that there is no significant difference in the difficulty of calf birth between farms.

Calving difficulty is an increasingly important problem in dairy cattle, especially in cows in first parity of the HF breed (Meyer et al., 2001; Lombard et al., 2007). Difficult birth negatively affects the health and viability of the born calf, as well as causing a decrease in the cow's milk and fertility in the following lactation, and even cause mortality risk (Dematawewa and Berger, 1997). Difficulty in calving is a very complex traits and is under the influence of many factors. When the studies in the literature on the subject are examined, it has been stated that factors such as parity, body weight, breed, birth anatomy, calf's birth weight and gender are important as the main effect of birth difficulty (Mee, 2008; Kräusslich, 1981). Calving difficulties can be reduced with appropriate management procedures and selection strategies, and the results of studies on this subject show a positive trend in this direction (Meijering, 1984; Philipsson et al., 1979).

5. Conclusion

This study presents the findings obtained by examining the calving records of the first of 1475 cows of the Holstein Friesian breed raised in 5 different enterprises in the Central Anatolia Region. In general, it was observed that birth difficulty scores showed significant differences between enterprises, while these differences were found to be statistically insignificant in terms of origin. In this study, the effect of environmental factors such as farm and origin, as well as maternal factors, on birth difficulties is emphasized, and further research on this subject may be recommended.

Conflict of Interest: The author declared that there is no conflict of interest.

Ethical Consideration: Ethics committee approval was not required for this study because there was no study on animals or humans.

Acknowledgments

We thank the farm owners for their assistance in collecting this data.

Author Contributions

The percentage of the author(s) contributions is presented below. The author reviewed and approved the final version of the manuscript.

	A.Ö.
C	100
D	100
S	100
DCP	100
DAI	100
L	100
W	100
CR	100
SR	100
PM	100
FA	100

C=Concept, D= design, S= supervision, DCP= data collection and/or processing, DAI= data analysis and/or interpretation, L= literature search, W= writing, CR= critical review, SR= submission and revision, PM= project management, FA= funding acquisition.

Conflict of Interest

The author declared that there is no conflict of interest.

Ethical Consideration

Ethics committee approval was not required for this study because of there was no study on animals or humans. Livestock enterprises' own data was taken and there was no experiment conducted at the farm. Also, a signed consent form was also obtained from the owners of the farms.

Acknowledgments

We thank the farm owners for their assistance in collecting this data.

References

Bayram B, Topal M, Aksakal V, Önk K. 2015. Investigate the effects of non-genetic factors on calving difficulty and stillbirth rate in Holstein Friesian cattle using the CHAID analysis. Kafkas Univ Fac Vet Med, 21(5): 645-652.

Dekkers JC. 1994. Optimal breeding strategies for calving ease. J Dairy Sci, 77(11): 3441-3453.

Dematawewa CMB, Berger PJ. 1997. Effect of dystocia on yield, fertility, and cow losses and an economic evaluation of dystocia scores for Holsteins. J Dairy Sci, 80: 754-761.

Erdoğan G. 2023. İneklerde güç doğumlara elle müdahale ve fetotomi. Sabuncu A, editör. Ruminantlarda Güç Doğumlar ve

Doğuma Müdahaleler. 1. Baskı. Ankara: Türkiye Klinikleri, ss: 51-56.

Gevrekçi Y, Akbaş Y. 2014. Bir eşikli özellik olarak buzağılama güçlüğünün analizi. Ege Üniv Zir Fak Derg, 51(3): 237-241.

Kaymakçı M. 1987. Sığırlarda buzağılama zorluğu. Hayv. Ür, 24(1): 7-12.

Kräusslich H. 1981. Rinderzucht (6. Aufl.). Verlag Eugen Ulmer, Stuttgart, pp: 145.

Lombard JE, Garry FB, Tomlinson SM, Garber LP. 2007. Impacts of dystocia on health and survival of dairy calves. J Dairy Sci, 90: 1751-1760.

Mee JF. 2008. Prevalence and risk factors for dystocia in dairy cattle: A review. Vet J, 176: 93-101.

Meijering A. 1984. Dystocia and stillbirth in cattle - A review of causes, relations and implications. Livest Prod Sci, 11(2): 143-177.

Meyer CL, Berger PJ, Koehler KJ, Thompson JR, Sattler CG. 2001. Phenotypic trends in incidence of stillbirth for Holsteins in the United States. J Dairy Sci, 84: 515-523.

Philipsson J, Foulley JL, Lederer J, Liboriussen T, Osinga A. 1979. Sire evaluation standards and breeding strategies for limiting dystocia and stillbirth. Report of an EEC/EAAP working group. Livest Prod Sci, 6(2): 111-127.

Sakar ÇM, Ünal İ, Yılmaz MA, Çökülgen T, Yıldırır ZT. 2022. Comparison of some herd life and reproductive parameters of Anatolian Black and culture breed cows. Large Anim Rev, 28(6): 299-305.

SPSS. 1999. SPSS base 10.0 user's guide. SPSS inc., Chicago, IL, USA.

Strapáková, E., Candrák, J., Strapák, P. 2023. Analysis of calving ease and stillbirth and their impact on the length of functional productive life in Slovak Holstein Cattle. Animals, 13(9), 1496.