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EFFECT OF UDDER HEALTH STATUS ON DAILY MILK PRODUCTION PARAMETERS CONSIDERING ANIMAL-RELATED FACTORS IN HOLSTEIN CATTLE

Boris Ljubojević[1], Zvonimir Steiner[2], Čedomir Radović[3], Ranko Gantner[2], Klemen Potočnik[4], Vesna Gantner[2]

[1] Josip Juraj Strossmayer University of Osijek, Croatia
[2] Josip Juraj Strossmayer University of Osijek, Faculty of Agrobiotechnical Sciences Osijek, Osijek, Croatia
[3] Institute for Animal Husbandry, Belgrade, Serbia
[4] University of Ljubljana, Biotechnical faculty, Slovenia
Corresponding author: Vesna Gantner, vgantner@fazos.hr
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Abstract: This study analysed the effect of udder health status on daily milk production parameters in Holstein cattle, considering lactation stage, parity, and production level. A total of 2,509,222 test-day records were analyzed, with somatic cell count (SCC) used as a key indicator for detecting mastitis. Cows were classified into three health categories based on SCC thresholds: healthy (<200,000 cells/ml), subclinical mastitis (200,000–400,000 cells/ml), and clinical mastitis (>400,000 cells/ml). The results showed a significant reduction in daily milk yield in cows affected by mastitis, with the most pronounced declines observed in clinical cases. Additionally, milk composition parameters were influenced by udder health status, with fat and protein content increasing, while lactose concentration decreased in mastitic cows. Across all production levels and parity classes, mastitic cows exhibited lower milk urea concentrations, suggesting potential metabolic alterations. Obtained results highlight the detrimental impact of mastitis on milk production efficiency and composition, reinforcing the need for effective disease prevention and management strategies. Precision monitoring and early mastitis detection remain crucial for optimizing milk quality, improving dairy farm sustainability, and ensuring animal welfare.

Key words: mastitis, daily milk production, somatic cell count, Holstein cattle

Introduction

Production diseases in dairy cows primarily stem from management practices, particularly inadequate feeding and handling. These include metabolic disorders, infertility, mastitis, and laminitis, where nutritional and managerial factors play a key role (Nir, 2003). While infectious diseases attract more public attention, production diseases have a far greater economic impact, significantly exceeding that of epidemic outbreaks (Hogeveen et al., 2019). Addressing these issues through improved management enhances animal health and the economic efficiency of dairy production. Mastitis is the most prevalent production disease in dairy cattle (Seegers et al., 2003), primarily caused by intramammary infections (IMI) from bacterial pathogens. It leads to physical, chemical, and bacteriological changes in milk, as well as pathological alterations in gland tissue. Mastitis occurs in clinical and subclinical forms. Clinical mastitis presents with visible symptoms such as milk abnormalities, gland inflammation, and systemic illness, while subclinical mastitis is asymptomatic and detected via elevated somatic cell count (SCC) (Adkins and Middleton, 2018). Based on severity, clinical mastitis is classified as mild (milk changes), moderate (gland inflammation), and severe (systemic symptoms) (Narváez-Semanate et al., 2022). Mild cases are most common, with severe cases being rare. Furthermore, mastitis significantly affects milk production, quality, and farm economics, emphasizing the need for early detection and treatment.

Mastitis diagnosis relies on clinical observations and inflammatory response measurements, while identifying the causative agent is crucial for diagnosing IMI. Subclinical mastitis, more prevalent than clinical forms, accounts for up to 80% of milk production losses and poses a greater long-term risk (Halasa et al., 2007). If untreated, affected udder quarters may dry out, leading to culling or death. Despite its economic impact, preventive measures are often delayed until milk yield declines. Early detection is essential, as udder tissue changes occur before visible symptoms (Argaw, 2016). Timely diagnosis reduces antibiotic use, preserves milk production, and prevents infection spread (Kamal et al., 2014). Additionally, mastitis contributes to greenhouse gas emissions, making prevention critical for both sustainability and profitability (Özkan Gülzari et al., 2018). Furthermore, effective management minimizes losses, optimizes culling rates, and reduces emissions per kilogram of milk produced.

SCC represents a key indicator of intramammary infections and milk quality, monitored at individual, herd, and population levels (Schukken et al., 2003). Tracking SCC provides insights into udder health, as elevated counts typically indicate inflammation due to pathogen invasion, which triggers an immune response and increases SCC in milk (Ivanov et al., 2016; Alhussien and Dang, 2018). An increase in SCC during successive lactations is primarily linked to polymorphonuclear leukocytes (PMN), while SCC fluctuations within lactations involve both PMN and other immune cells (Blackburn, 1966). Several factors influence SCC variability, including lactation stage, parity, season, management practices, and environmental conditions. SCC tends to increase with lactation number due to accumulated udder stress and immune system changes (Mikone et al., 2016). Elevated SCC levels in late-lactation cows are often associated with reduced milk outflow and a decline in udder immune defence mechanisms. Heat stress exacerbates SCC fluctuations, as shown in studies on Holstein cows, where SCC levels varied with temperature-humidity index, milk yield, breed, and parity (Gantner et al., 2011; Gantner et al., 2017). Furthermore, herd management plays a crucial role in SCC control. Poor milking hygiene, improper equipment maintenance, and inadequate housing conditions contribute to bacterial infections and elevated SCC (Hadrich et al., 2018). Healthy udder function is associated with SCC levels below 100,000 cells/ml, with optimal milk quality ranging between 20,000 and 100,000 SCC/ml (Mikone et al., 2016). Elevated SCC leads to significant production losses, exceeding 8% in cows with SCC levels between 50,000 and 100,000 cells/ml, and reaching 15–18% in those with SCC levels from 100,000 to 250,000 cells/ml (Pfützner and Ózsvári, 2016). The overall impact on milk yield depends on SCC distribution across cows and parity within the herd (Chen et al., 2023). Finally, managing SCC effectively through improved hygiene, nutrition, and environmental control is essential for maintaining milk production efficiency and reducing economic losses.

Considering the importance of mastitis analysis on dairy cattle farms, this study aimed to analyse the effect of udder health status (healthy, subclinical or clinical mastitis) on daily milk production parameters in Holstein cattle, considering key animal-related factors (lactation stage, parity and animal production level).

Materials and Methods

The statistical analysis in this research was based on test-day records from Holstein cows reared on dairy cattle farms in Croatia, collected over a 10-year period (January 2013–December 2022) as part of routine milk recording. The milk recording process adhered to the standards established by the International Committee for Animal Recording (ICAR, 2017) for alternative milk recording methods (AT4/BT4). Under this system, milk yield measurements and sample collection were conducted every four weeks, with samples obtained from each cow during either the morning or evening milking. Data collection for the AT4 method was carried out by trained officers from the Croatian Agency for Agriculture and Food (HAPIH), while farm employees trained in milk recording performed the BT4 method. After collection, milk samples were transported to the accredited Central Laboratory for Milk Quality Control (SLKM) of HAPIH for analysis, ensuring full compliance with ICAR (2017) protocols.

Milk composition analysis included fat, protein, lactose, total solids, solids-not-fat, urea, casein, free fatty acids, pH, ketone bodies, and freezing point. These parameters were determined using infrared spectrophotometry on MilkoScan analyzers. Additionally, somatic cell counts were measured using Fossomatic analyzers, employing the fluoro-opto-electronic method.

Before implementing logical data control procedures, the dataset obtained from HAPIH contained over 4 million test-day records. During the validation process, entries that did not meet the standards set by ICAR (2017) were excluded. Additionally, records with missing or inaccurate details regarding breed, farm identification, breeding region, lactation stage, parity, age at first calving, calving date, and milk recording date were removed to ensure data integrity and consistency. After applying these quality control measures, the final dataset comprised 2,509,222 test-day records from Holstein cows.

Somatic cell count (SCC) was used as a primary indicator for identifying subclinical and clinical mastitis. Based on SCC levels, cows were classified into three categories: healthy (<200,000 cells/ml), subclinical mastitis (200,000–400,000 cells/ml), and clinical mastitis (>400,000 cells/ml). To account for the effect of the lactation stage, cows were categorized into four days-in-milk (DIM) classes: < 100 days, 100–200 days, 200–300 days, and > 300 days. Furthermore, regarding the parity animals were classified into four groups: first (I), second (II), third (III), and fourth or higher (≥ IV). Additionally, cows were divided into four groups based on their daily production level (I. DMY < 20 kg; II. DMY in 20 – 30 kg; III. DMY in 30 – 40 kg; IV. DMY > 40 kg).

The analysis of the effect of udder health status (healthy, subclinical or clinical mastitis) on daily milk production parameters in Holstein cattle was analysed separately by the classes of lactation stage, parity and animal production level using the following statistical model:

$$y_{ijklmn} = \mu + b_1\left(\frac{d_i}{305}\right) + b_2\left(\frac{d_i}{305}\right)^2 + b_3\, ln\left(\frac{305}{d_i}\right) + b_4\, ln^2\left(\frac{305}{d_i}\right)$$

$$+A_j + R_k + H_l + S_m + M_n + e_{ijklmn}$$

where:

y_{ijklmn} = estimated milk production trait (daily milk yield, daily fat, protein, lactose and urea content, log value of somatic cell count);

μ = intercept;

b_1, b_2, b_3, b_4 = regression coefficients;

d_i = stage of lactation (i = 6 to 400 day);

A_j = fixed effect of age at first calving (j = 21 to 36 month) * only for firs parity;

R_k = fixed effect of region k (k = Central, Eastern, Mediterranean);

H_l = fixed effect of herd size (l = I, II, III, IV, V, VI);

S_m = fixed effect of season (m = spring, summer, autumn, winter);

M_n = fixed effect of udder health status M (n = healthy, subclinical mastitis, and clinical mastitis);

e_{ijklmn} = residual.
The significance of the differences between the estimated LSMeans was tested by Scheffe's method of multiple comparisons using the MIXED procedure of SAS (SAS Institute Inc., 2019).

Results and Discussion

The results in Table 1 show the effect of udder health status on daily milk production parameters across different lactation stages. Healthy cows consistently exhibited the highest daily milk yield, while cows with subclinical and clinical mastitis showed significantly lower values. This decline was statistically significant, indicating that mastitis negatively affects milk production. Milk composition also varied depending on health status. Both fat and protein content were higher in cows with clinical mastitis than in healthy cows, suggesting that inflammation-related changes influence milk synthesis. In contrast, lactose content was notably lower in cows with mastitis, particularly in clinical cases, which reflects impaired udder function and reduced milk quality. Somatic cell count, a key indicator of udder health, was significantly elevated in cows with mastitis, with the highest values recorded in the clinical group.

Table 1. LsMeans of daily milk production parameters regarding the udder health status and considering lactation stage classes (< 100 days, 100 – 200 days, 200 – 300 days, > 300 days)

Lactation stage class	Health status	DMY	DFC	DPC	DLC	SCClog	UREA
< 100 days	Healthy	25.72^{A}	3.96^{A}	3.12^{A}	4.54^{A}	5.61^{A}	21.35^{A}
	Subclinical	25.45^{B}	4.05^{B}	3.17^{B}	4.48^{B}	8.12^{B}	20.77^{B}
	Clinical	25.11^{C}	4.09^{C}	3.20^{C}	4.40^{C}	10.18^{C}	20.50^{C}
100 – 200 days	Healthy	24.93^{A}	3.97^{A}	3.33^{A}	4.53^{A}	5.81^{A}	22.65^{A}
	Subclinical	24.74^{B}	4.02^{B}	3.36^{B}	4.47^{B}	8.10^{B}	22.16^{B}
	Clinical	24.58^{C}	4.02^{B}	3.39^{C}	4.39^{C}	10.14^{C}	22.02^{C}
200 – 300 days	Healthy	24.12^{A}	4.11^{A}	3.52^{A}	4.50^{A}	6.05^{A}	22.52^{A}
	Subclinical	23.93^{B}	4.15^{B}	3.54^{B}	4.44^{B}	8.05^{B}	22.16^{Bb}
	Clinical	23.85^{C}	4.14^{B}	3.57^{C}	4.36^{C}	10.00^{C}	22.06^{Bc}
> 300 days	Healthy	23.75^{A}	4.21^{A}	3.67^{A}	4.48^{A}	6.23^{A}	22.27^{Aa}
	Subclinical	23.47^{B}	4.23^{B}	3.69^{B}	4.41^{B}	8.02^{B}	22.16^{b}
	Clinical	23.35^{C}	4.22^{B}	3.71^{C}	4.33^{C}	9.86^{C}	22.06^{Bb}

*LsMeans marked with different letter (capital or small), differ statistically highly ($p < 0.001$) significant or statistically ($p < 0.01$) significant
DMY – daily milk yield (kg), DFC – daily fat content (%), DPC – daily protein content (%), DLC – daily lactose content (%), SCClog – log value of somatic cell count, UREA – concentration of urea in milk (mg/dl)

This confirms that increased SCC is closely associated with mastitis severity and inflammation. Milk urea content showed smaller yet significant differences between health statuses. Healthy cows generally had slightly higher urea values, whereas cows with mastitis exhibited lower levels, possibly due to changes in nitrogen metabolism caused by udder inflammation. Finally, mastitis significantly impacts both milk yield and composition, reducing daily production, altering fat, protein, and lactose levels, and leading to a substantial increase in somatic cell count.

The results in Table 2 show the effect of udder health status on daily milk production parameters across different parity classes (I, II, III, and VI+). Healthy cows consistently had the highest milk production. In parity I, healthy cows produced an average of 24.13 kg of milk per day, which was significantly higher compared to subclinical (23.99 kg) and clinical cows (23.91 kg). This trend of decreasing milk yield with increasing severity of mastitis was observed across all parity classes, with clinical cows showing the lowest daily milk yields. Regarding daily fat content (DFC), there was a slight but significant increase in fat content as mastitis severity worsened. In the first parity class, healthy cows had a fat content of 4.02%, which increased to 4.12% in clinical cows. This trend was consistent across all parity classes, indicating that mastitis may slightly increase fat content in milk, though the effect was not large. The daily protein content (DPC) followed a similar pattern, where protein levels were slightly higher in cows with subclinical and clinical mastitis than in healthy cows. For instance, in the first parity class, Healthy cows had a protein content of 3.37%, while subclinical cows had 3.40%, and clinical cows had 3.43%. This suggests that mastitis severity may slightly influence protein content in milk, although the differences were not very pronounced.

Daily lactose content (DLC) showed a consistent trend, with clinical mastitis cows having lower lactose levels compared to Healthy cows. In the first parity class, Healthy cows had a lactose content of 4.58%, while clinical cows had 4.46%. This decline in lactose content with increasing mastitis severity was consistent across all parity classes, highlighting a potential negative impact of mastitis on lactose synthesis. Somatic cell count (SCClog), represented as the logarithmic value, showed a clear increase with the severity of mastitis. In the first parity class, Healthy cows had a SCClog of 5.71, which increased to 9.95 in clinical cows. This indicates that somatic cell count, a marker of inflammation and infection, rises significantly with mastitis severity. The trend was consistent across all other parity classes, where clinical cows always exhibited the highest SCClog values. Finally, urea concentration (UREA) in milk was generally lower in cows with clinical mastitis compared to Healthy cows. For example, in the first parity class, Healthy cows had a urea concentration of 22.11 mg/dl, while clinical cows had a slightly lower value of 21.86 mg/dl. This reduction in urea concentration with worsening mastitis severity was observed across all parity classes.

Table 2. LsMeans of daily milk production parameters regarding the udder health status and considering parity classes (I, II, III, and VI+)

Parity class	Mastitis class	DMY	DFC	DPC	DLC	SCClog	UREA
I	Healthy	24.13^{A}	4.02^{A}	3.37^{A}	4.58^{A}	5.71^{A}	22.11^{A}
	Subclinical	23.99^{B}	4.10^{B}	3.40^{B}	4.53^{B}	8.02^{B}	21.75^{Bb}
	Clinical	23.91^{C}	4.12^{C}	3.43^{C}	4.46^{C}	9.95^{C}	21.86^{Bc}
II	Healthy	24.06^{A}	4.08^{A}	3.42^{A}	4.52^{A}	5.83^{A}	22.21^{A}
	Subclinical	24.79^{B}	4.12^{B}	3.46^{B}	4.46^{B}	8.02^{B}	21.77^{Bb}
	Clinical	24.60^{C}	4.13^{C}	3.48^{C}	4.39^{C}	10.02^{C}	21.66^{Bc}
III	Healthy	25.24^{A}	4.09^{A}	3.38^{A}	4,49^{A}	5.96^{A}	22.14^{A}
	Subclinical	24.97^{B}	4.12^{B}	3.42^{B}	4.43^{B}	8.06^{B}	21.65^{B}
	Clinical	24.79^{C}	4.13^{B}	3.44^{C}	4.35^{C}	10.09^{C}	21.44^{C}
VI+	Healthy	25.08^{A}	4.05^{A}	3.34^{A}	4.47^{A}	6.04^{A}	22.17^{A}
	Subclinical	24.81^{B}	4.08^{B}	3.38^{B}	4,41^{B}	8.08^{B}	21.69^{B}
	Clinical	24.63^{C}	4.09^{C}	3.41^{C}	4.31^{C}	10.16^{C}	21.38^{C}

*LsMeans marked with different letter (capital or small), differ statistically highly ($p < 0.001$) significant or statistically ($p < 0.01$) significant;
DMY – daily milk yield (kg), DFC – daily fat content (%), DPC – daily protein content (%), DLC – daily lactose content (%), SCClog – log value of somatic cell count, UREA – concentration of urea in milk (mg/dl)

The results presented in Table 3 show the effect of udder health status on daily milk production parameters across different production levels (I, II, III, and VI class). In all production classes, cows classified as healthy (normal group) exhibited significantly higher daily milk yield (DMY) compared to those affected by subclinical and clinical mastitis. The greatest reduction in milk production was observed in cows with clinical mastitis, with the most pronounced difference found in the highest production class (VI.), where healthy cows produced an average of 38.21 kg per day, whereas those with clinical mastitis produced 37.47 kg.

Milk fat content (DFC) showed a slight increase with the severity of mastitis. In the first production class, healthy cows had a fat content of 4.27%, whereas those with clinical mastitis exhibited a slightly higher percentage (4.36%). This trend was consistent across all production classes, suggesting that mastitis may lead to an increase in milk fat content, likely due to changes in milk composition resulting from the inflammatory response. Milk protein content (DPC) also increased with the severity of mastitis, with cows suffering from clinical mastitis showing the highest values. For instance, in production class I., healthy cows had a protein content of 3.54%, while those with clinical mastitis had 3.64%. This pattern indicates alterations in milk protein composition in infected animals, potentially due to an increased presence of immune-related proteins in response to inflammation.

Lactose content (DLC) showed a declining trend as mastitis severity increased. Healthy cows in all production classes had significantly higher lactose concentrations compared to those with subclinical and clinical mastitis. In production class I., healthy cows exhibited an average lactose content of 4.43%, while cows with clinical mastitis had a lower concentration of 4.24%. This decline was even more pronounced in higher production classes, indicating a reduced ability to synthesize lactose in the presence of inflammation in the mammary gland. The log-transformed somatic cell count (SCClog) values significantly increased with the severity of mastitis, confirming the strong association between mastitis and elevated somatic cell counts in milk. In all production classes, healthy cows exhibited the lowest SCClog values, whereas cows with clinical mastitis had the highest values. For example, in production class VI, SCClog was 5.53 in healthy cows, whereas it reached 10.00 in cows with clinical mastitis. This increase reflects the strong inflammatory response triggered by mastitis, leading to a significant influx of somatic cells into the milk.

Milk urea concentration (UREA) was slightly lower in cows affected by mastitis compared to healthy cows, although the differences were less pronounced than for other parameters. In the first production class, healthy cows had an average urea concentration of 20.86 mg/dl, while those with clinical mastitis had a slightly lower value of 20.62 mg/dl. A similar trend was observed across higher production classes, where healthy cows consistently showed slightly higher urea concentrations compared to those with subclinical and clinical mastitis.

Table 3. LsMeans of daily milk production parameters regarding the udder health status and considering animal production level (I, II, III, and VI+)

Production class	Mastitis class	DMY	DFC	DPC	DLC	SCClog	UREA
I DMY < 16 kg	Healthy	12.44^{A}	4.27^{A}	3.54^{A}	4.43^{A}	6.26^{A}	20.86^{A}
	Subclinical	12.07^{B}	4.34^{B}	3.59^{B}	4.34^{B}	8.11^{B}	20.66^{B}
	Clinical	11.92^{C}	4.36^{C}	3.64^{C}	4.24^{C}	10.14^{C}	20.62^{B}
II DMY in 16 – 24 kg	Healthy	20.07^{A}	4.14^{A}	3.46^{A}	4.50^{A}	6.02^{A}	21.62^{A}
	Subclinical	19.91^{B}	4.18^{B}	3.49^{B}	4.44^{B}	8.08^{B}	21.32^{Bb}
	Clinical	19.86^{C}	4.18^{B}	3.52^{C}	4.36^{C}	10.11^{C}	21.22^{Bc}
III DMY in 24 – 32 kg	Healthy	27.71^{A}	3.99^{A}	3.36^{A}	4.54^{A}	5.81^{A}	22.56^{A}
	Subclinical	27.59^{B}	4.03^{Bb}	3.39^{B}	4.49^{B}	8.06^{B}	22.12^{B}
	Clinical	27.54^{C}	4.04^{Bc}	3.41^{C}	4.42^{C}	10.06^{C}	21.95^{C}
VI DMY > 32 kg	Healthy	38.21^{A}	3.84^{A}	3.21^{A}	4.58^{A}	5.53^{A}	23.31^{A}
	Subclinical	37.93^{B}	3.90^{B}	3.24^{B}	4.53^{B}	8.06^{B}	22.72^{B}
	Clinical	37.47^{C}	3.92^{C}	3.26^{C}	4.46^{A}	10.00^{C}	22.30^{C}

*LsMeans marked with different letter (capital or small), differ statistically highly ($p < 0.001$) significant or statistically ($p < 0.01$) significant;
DMY – daily milk yield (kg), DFC – daily fat content (%), DPC – daily protein content (%), DLC – daily lactose content (%), SCClog – log value of somatic cell count, UREA – concentration of urea in milk (mg/dl)

The results of this study are consistent with previous findings indicating that mastitis prevalence negatively impacts milk production and quality. Schukken et al. (2003) emphasized the importance of somatic cell count (SCC) as a diagnostic tool for assessing udder health, and our findings confirm that elevated SCC is a strong indicator of infection, particularly in clinical cases. Elevated SCC values were significantly higher in cows with mastitis, particularly in the clinical health status group, reflecting the inflammatory response to infection (Alhussien and Dang, 2018). This increase in SCC correlates with a decrease in milk yield, which is consistent with the findings of Mikone et al. (2016) and Hadrich et al. (2018), who reported that higher SCC levels are associated with reduced milk production. Moreover, the changes in milk composition observed in this study, higher fat and protein levels in cows with clinical mastitis, are in line with findings from Blackburn (1966), who noted that inflammatory processes can alter milk synthesis. The reduction in lactose content, particularly in cows with clinical mastitis, aligns with previous studies showing that mastitis often leads to decreased milk quality due to impaired lactose synthesis (Smith et al., 2001). The impact of mastitis on urea content in milk, though less pronounced, also supports findings by Mikone et al. (2016), who noted slight variations in urea levels associated with udder health status. The lower urea values in mastitic cows may reflect changes in nitrogen metabolism due to infection and inflammation (Alhussien and Dang, 2018). These findings underline the economic significance of mastitis, as cows with subclinical and clinical mastitis experience not only reduced milk yield but also changes in milk composition that affect quality. Finally, as emphasized by Pfützner and Ózsvári (2016), early detection and management of mastitis can mitigate these losses, highlighting the need for effective monitoring and intervention strategies in dairy herds.

Conclusion

The obtained results, indicate the significant impact of udder health status on daily milk production parameters in Holstein cattle, considering lactation stage, parity, and production level. Across all analyzed factors, cows diagnosed with subclinical and clinical mastitis exhibited lower daily milk yield compared to their healthy counterparts, with the greatest reductions observed in animals suffering from clinical mastitis. Additionally, milk composition was notably affected, with mastitis-associated increases in milk fat and protein content, while lactose concentration consistently declined as the severity of mastitis increased.

Somatic cell count, a key indicator of mastitis, reaffirms its role as a crucial parameter for monitoring udder health. The negative effects of mastitis, indicated by the SCC, on milk production traits were evident regardless of lactation stage, parity, or production level, indicating that disease management strategies should be implemented comprehensively across all groups of dairy cows. Furthermore, minor but consistent reductions in milk urea concentration were observed in cows with the highest SCC, suggesting potential alterations in nitrogen metabolism related to udder health status. Finally, the obtained results emphasize the critical need for effective mastitis prevention and control strategies to maintain optimal milk production and composition in dairy herds. Considering the economic and physiological consequences of mastitis, precision health monitoring and early detection remain essential for improving overall dairy farm efficiency and animal welfare.

Uticaj zdravstvenog stanja vimena na dnevne parametre proizvodnje mleka uzimajući u obzir faktore povezane sa životinjama kod holštajnskih krava

Boris Ljubojević, Zvonimir Steiner, Čedomir Radović, Ranko Gantner, Klemen Potočnik, Vesna Gantner

Rezime

Ova studija je analizirala uticaj zdravstvenog statusa vimena na parametre dnevne proizvodnje mleka kod holštajnskih krava, uzimajući u obzir fazu laktacije, redosled teljenja i nivo proizvodnje. Ukupno je analizirano 2.509.222 zapisa sa kontrolnih muži, pri čemu je broj somatskih ćelija (SCC) korišćen kao ključni pokazatelj za detekciju mastitisa. Krave su klasifikovane u tri zdravstvene kategorije na osnovu SCC pragova: zdrave (<200.000 ćelija/ml), subklinički mastitis (200.000–400.000 ćelija/ml) i klinički mastitis (>400.000 ćelija/ml). Rezultati su pokazali značajno smanjenje dnevnog prinosa mleka kod krava obolelih od mastitisa, pri čemu su najizraženiji padovi zabeleženi u slučajevima kliničkog mastitisa. Takođe, zdravstveni status vimena uticao je na parametre sastava mleka – zabeleženo je povećanje sadržaja masti i proteina, dok je koncentracija laktoze bila smanjena kod krava sa mastitisom. Kod svih nivoa proizvodnje i redosleda teljenja, krave sa mastitisom su imale nižu koncentraciju uree u mleku, što ukazuje na moguće metaboličke promene. Dobijeni rezultati ističu štetan uticaj mastitisa na efikasnost proizvodnje mleka i njegov sastav, naglašavajući potrebu za efikasnim strategijama prevencije i upravljanja bolešću. Precizno praćenje i rana detekcija mastitisa ostaju ključni za optimizaciju kvaliteta mleka, unapređenje održivosti mlečne proizvodnje i očuvanje dobrobiti životinja.

Ključne reči: mastitis, dnevna proizvodnja mleka, broj somatskih ćelija, holštajnske krave

Conflict of interest
The authors declare that they have no conflict of interest.

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