REVIEW ARTICLE

A SYSTEMATIC REVIEW OF EFFECT OF CALVING SEASON AND PARITY AS NON-GENETIC FACTORS ON MILK PRODUCTION TRAITS OF CATTLE

Thlarihani Cynthia Makamu, Thobela Louis Tyasi*

Department of Agricultural Economics and Animal Production, University of Limpopo, Private Bag X1106, Sovenga, 0727, Limpopo, South Africa.

***Corresponding author**: Prof. Dr. Thobela Louis Tyasi
Department of Agricultural Economics and Animal Production, University of Limpopo Polokwane/South Africa

Address: Bag X1106, Sovenga, 0727, Polokwane/South Africa
Phone: +27152682803
ORCID: 0000-0002-3519-7806
E-mail: louis.tyasi@ul.ac.za

Original Submission:
16 November 2023
Revised Submission:
08 January 2024
Accepted:
18 January 2024

How to cite this article: Makamu TC, Tyasi TL. 2024. A systematic review of effect of calving season and parity as non-genetic factors on milk production traits of cattle. Veterinaria, 73(1), 1-12.

ABSTRACT

This study was carried out to systematically review the effect of calving season and parity on milk production traits. This systematic review was conducted in agreement with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA). Google Scholar, PubMed, ScienceDirect, and Web of Science databases were searched systematically using 'non-genetic factors/season of calving /parity', 'milk production traits', and 'cattle' as keywords. The results indicated that fifteen (n = 15) articles were used from the ninety-four (n = 94) articles identified and screened. The results of this systematic review indicated that 8 out of 10 articles found milk yield to be significantly affected by parity, whereas 7 out of 13 articles indicated that calving season did not significantly affect milk yield. Out of 4 articles, 3 of them showed that parity had a significant effect on fat. Parity had a significant effect on lactose and protein, 1 of these articles investigated and found significant effect of parity and calving season on somatic cell score (SCS). Out of 13 articles, 5, 4, and 2 of these articles investigated fat, protein, and lactose, respectively. The results showed that 3 articles on fat, 4 on protein and 2 on lactose were significantly affected by calving season. In conclusion, parity and calving season had a great influence on fat, protein, lactose, and SCS. Milk yield was not affected by calving season, however, it was affected by parity. Thus, calving season and parity can be used to improve milk production traits.

Keywords: Fat, milk yield, protein, lactose, SCS

doi.org/10.51607/22331360.2024.73.1.1

INTRODUCTION

Non-genetic factors are those effects that are not part of the genetic make-up of an animal (Nyamushamba et al., 2014). Hussain et al. (2015) stated that evaluation of the influence of non-genetic factors on milk production traits was important for formulating breeding improvement programme for dairy cattle (Hussain et al., 2015). Milk consumption is very high per person per year worldwide, and the consumption is bound to go up due to increased urbanization and wages (Hoka et al., 2019). Thus, factors that affect milk production must be identified and addressed if milk production is to keep pace with the increasing demand. However, studies conducted on the effect of calving season and parity draw different conclusions. According to Bolacali and Öztürk (2018), non-genetic factors such as parity and calving season affect the cattle milk production traits, while Fouda et al. (2017) stated that non-genetic factors such as parity and calving season did not affect the cattle milk production traits. Based on our knowledge, there is no systematic review on the effect of calving season and parity on milk production traits of cattle. The objective of this study was to systematically review the articles on the effect of calving season and parity on milk production traits of cattle and to provide information on the influence that calving season and parity have on milk production traits of cattle. Hence, the current systematic review is needed to combine their results as to give a summarized conclusion for the possibility of these non-genetic factors to be used in selection for improvement of milk production traits. This systematic review will help researchers and dairy cattle farmers to know the milk production traits of dairy cattle that are influenced by parity and calving season.

MATERIAL AND METHODS

Eligibility criteria

It is necessary to identify the Population, Exposure, and Outcomes (PEO) components of the research question to undertake a systematic review, as explained by Bettany-Saltikov (2010). The population was defined as "Cattle", with an exposure of "non-genetic factors" and outcomes of "Milk production traits". A preliminary search of the PEO components on PubMed, Google Scholar, Web of Science, and ScienceDirect databases was conducted before deciding to carry out the study.

Search strategy for identification of relevant studies

The results of this systematic review were presented according to the recommendations proposed by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) (Moher et al., 2009). The search of published studies was independently conducted by both authors in the databases of Google Scholar, PubMed, Science Direct, and Web of Science from 10 August to 20 October 2023. The following keywords: 'non-genetic factors/season of calving/parity', 'milk production traits', and 'cattle' were used when performing publication search.

Inclusion criteria

Titles and abstracts found using the search strategy were screened manually to identify studies that were potentially relevant. Studies were considered for inclusion in this systematic review provided that they included effect of parity and/or season of calving on milk production traits of cattle.

Exclusion criteria

Articles that had the missing keywords and the ones that were talking about different species other than cattle were excluded. Duplicate studies were also excluded.

Data extraction

The study content and data were extracted independently by both authors and an agreement was reached concerning all key items. The following data were extracted from the selected studies: first author's name, year of publication, geographical location, cattle breed, sample size, studied milk production traits and non-genetic factors.

RESULTS

Searched results

Process that was followed when selecting studies to be included in this systematic review is shown in Figure 1. Publications that were identified in the search engines were ninety-four (n = 94); after screening, a total of fifteen (n = 15) studies were included in this systematic review.

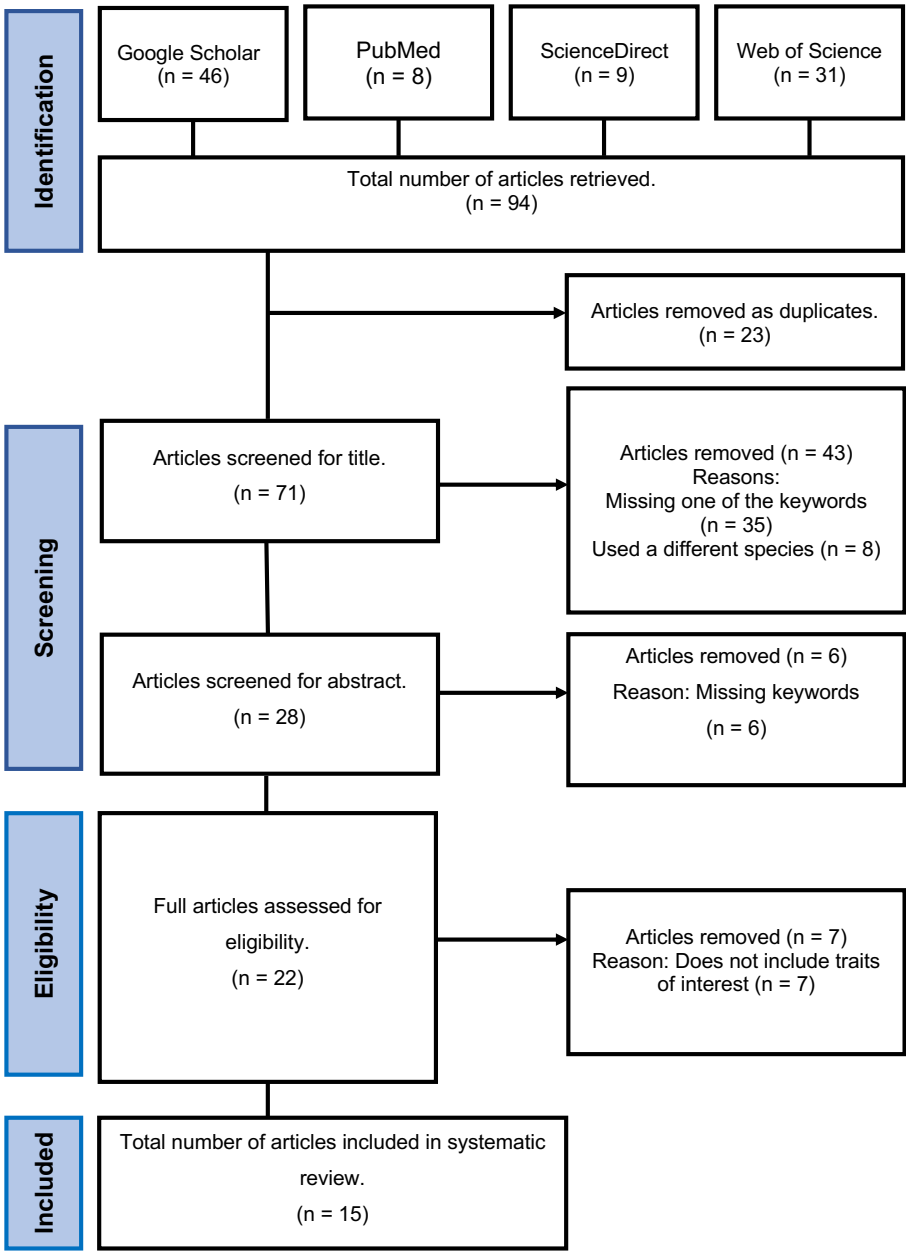

Figure 1
Flowchart of the process of study selection

Characteristics of included studies

The characteristics of the fifteen (n = 15) included articles are presented in Table 1. Out of 15 included studies, most of them used Holstein cattle breed with 26.67% (n = 4), followed by Jersey cattle breed (Mostert et al., 2001; Nyamushamba et al., 2014; Beneberu et al., 2020) with 20% (n = 3), then Sahiwal cattle breed (Verma et al., 2016; Pandey et al., 2019) with 13.33% (n = 2). All the remaining cattle breeds (Ayrshire, Naks, Deoni, Simmental, Friesian, Red Dane, HF×Deoni crossbred) were only investigated in one article (n = 1) with 6.67%. A total number of 148051 animals were used within the reviewed articles, ranging from 18 to 116073.

Table 1 Characterization of included studies

Author	Year	Country	Breed	Sample size	Milk production traits	Non-genetic factors
Amimo et al	2007	Kenya	Ayrshire	1955	Milk yield	Parity
Barsila	2019	Nepal	Naks	18	Milk yield, fat, protein, lactose	Parity, season of calving
Beneberu et al	2020	Ethiopia	Jersey	2912	Milk yield	Parity, season of calving
Bhutkar et al	2014	India	Deoni	114	Milk yield	Season of calving
Bolacali and Öztürk	2018	Turkey	Simmental	706	Milk yield	Season of calving
Boujenane	2021	Morocco	Holstein	6343	Milk yield, fat, protein, lactose, SCS	Parity, season of calving
Fouda et al	2017	Egypt	Holstein	1575	Milk yield	Parity, season of calving
Hoka et al	2019	Kenya	Friesian	20	Milk yield	Parity
Hussain et al	2015	India	Tharparkar	230	Milk yield	Season of calving
Jónás et al	2016	Turkey	Holstein	4891	Milk yield, fat, protein, lactose	Parity, season of calving
Mostert et al	2001	South Africa	Holstein, Jersey	116073	Milk yield, fat, protein	Season of calving
Nyamushamba et al	2014	Zimbabwe	Red Dane, Jersey	12307	Milk yield	Parity, season of calving
Pandey et al	2019	India	Sahiwal	392	Milk yield	Season of calving
Verma et al	2016	India	Sahiwal	259	Milk yield, fat	Parity, season of calving
Wondifraw et al	2013	India	HF×Deoni crossbred	256	Milk yield	Parity, season of calving

SCS – Somatic cell score, HF – Holstein Friesian

Publication by country

The countries of origin for included studies are shown in Figure 2. The findings of this systematic review indicated that the included studies were published from 9 different countries worldwide. India was ranking first with 5 articles out of 15 included articles (Wondifraw et al., 2013; Bhutkar et al., 2014; Hussain et al., 2015; Verma et al., 2016; Pandey et al., 2019), followed by Kenya (Amimo et al., 2007; Hoka et al., 2019) and Turkey (Jónás et al., 2016; Bolacali and **Öztürk**, 2018) with 2 articles each. The remaining 6 countries (Egypt, Ethiopia, Morocco, Nepal, South Africa, Zimbabwe) had 1 article each out of 15 included articles.

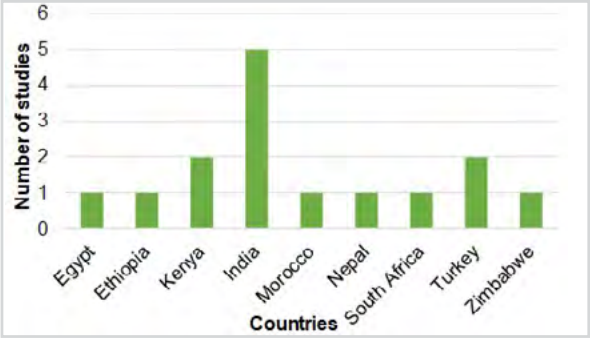

Figure 2 Publication by country

Publication by year

Figure 3 below displays the publication by year of included studies (n = 15) in the current systematic review. The results showed that the studies included were published from 2001 to 2021. Most of the studies were published in 2019 with 3 out of 15 included articles (Barsila, 2019; Hoka et al., 2019; Pandey et al., 2019), followed by 2014 (Bhutkar et al., 2014; Nyamushamba et al., 2014) and 2016 (Jónás et al., 2016; Verma et al., 2016) that had 2 published studies each out of 15 included articles. The other 8 different years (2001, 2007, 2013, 2015, 2017, 2018, 2020, 2021) had 1 publication each out of 15.

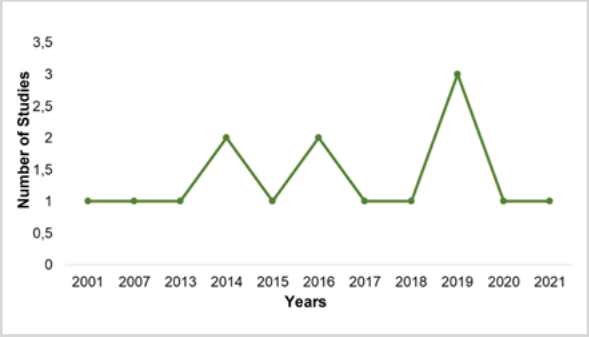

Figure 3 Publication by year

Investigated parities

Table 2 indicates the parities that were investigated in the included articles. Out of 15 selected studies, about 10 studies investigated the effect of parity on milk production traits. These studies all used parity number 2, followed by 3 different parities (1, 3, 4) that were investigated by 9 studies out of 10 each; then 2 parities (5, 6) were used by 6 articles out of 10 each. The results also indicated that parity 7 was looked into by 3 studies out of 10, and parities from 8 to 10 were all investigated by 1 article out of 10 articles.

Table 2 Investigated parities

Author	Breed	N	Parity
Amimo et al. (2007)	Ayrshire	1955	1-7
Barsila (2019)	Naks	18	2,4,6
Beneberu et al. (2020)	Jersey	2912	1-6
Boujenane (2021)	Holstein	6343	1-3
Fouda et al. (2017)	Holstein	1575	1-4
Hoka et al. (2019)	Friesian	20	1-4
Jónás et al. (2016)	Holstein	4891	1-5
Nyamushamba et al. (2014)	Red Dane, Jersey	12307	1-7
Verma et al. (2016)	Sahiwal	259	1-6
Wondifraw et al. (2013)	HF×Deoni crossbred	256	1-10

Investigated calving seasons

The investigated calving seasons in the studies included in this systematic review are presented on Table 3. Out of the 15 reviewed articles, 13 of them explored the calving season as one of their non-genetic factors. All the 13 studies researched about summer as one of the calving seasons, followed by 12 studies out of 13 that included winter in their studies, then autumn that was investigated by 11 articles out of 13; lastly, 9 out of 13 studies looked into spring as one of the calving seasons.

Table 3 Investigated calving seasons

Author	Breed	N	Calving season
Barsila (2019)	Naks	18	Summer, Autumn
Beneberu et al. (2020)	Jersey	2912	Summer, Autumn, Winter
Bhutkar et al. (2014)	Deoni	114	Summer, Autumn, Winter, Spring
Bolacali and Öztürk (2018)	Simmental	706	Summer, Autumn, Winter, Spring
Boujenane (2021)	Holstein	6343	Summer, Winter
Fouda et al. (2017)	Holstein	1575	Summer, Winter
Hussain et al. (2015)	Tharparkar	230	Summer, Autumn, Winter, Spring
Jónás et al. (2016)	Holstein	4891	Summer, Autumn, Winter, Spring
Mostert et al. (2001)	Holstein, Jersey	116073	Summer, Autumn, Winter, Spring
Nyamushamba et al. (2014)	Red Dane, Jersey	12307	Summer, Autumn, Winter, Spring
Pandey et al. (2019)	Sahiwal	392	Summer, Autumn, Winter, Spring
Verma et al. (2016)	Sahiwal	259	Summer, Autumn, Winter, Spring
Wondifraw et al. (2013)	HF×Deoni crossbred	256	Summer, Autumn, Winter, Spring

Distribution of articles by non-genetic factor

The distribution of the studies included in this systematic review by non-genetic factors is displayed in Table 4 below. Only 53.3% (n = 8) studies investigated both parity and calving season, whereas 13.33% (n = 2) focused only on parity (Amimo et al., 2007; Hoka et al., 2019) and 33.33% (n = 5) only focused on calving season (Mostert et al., 2001; Bhutkar et al., 2014; Hussain et al., 2015; Bolacali and Öztürk., 2018; Pandey et al., 2019).

Table 4 Distribution of articles by non-genetic factor

Author	Breed	Sample size	Non-genetic factors
Amimo et al. (2007)	Ayrshire	1955	Parity
Barsila (2019)	Naks	18	Parity, season of calving
Beneberu et al. (2020)	Jersey	2912	Parity, season of calving
Bhutkar et al. (2014)	Deoni	114	Season of calving
Bolacali and Öztürk (2018)	Simmental	706	Season of calving
Boujenane (2021)	Holstein	6343	Parity, season of calving
Fouda et al. (2017)	Holstein	1575	Parity, season of calving
Hoka et al. (2019)	Friesian	20	Parity
Hussain et al. (2015)	Tharparkar	230	Season of calving
Jónás et al. (2016)	Holstein	4891	Parity, season of calving
Mostert et al. (2001)	Holstein, Jersey	116073	Season of calving
Nyamushamba et al. (2014)	Red Dane, Jersey	12307	Parity, season of calving
Pandey et al. (2019)	Sahiwal	392	Season of calving
Verma et al. (2016)	Sahiwal	259	Parity, season of calving
Wondifraw et al. (2013)	HF×Deoni crossbred	256	Parity, season of calving

Distribution of articles by milk production traits

Table 5 highlighted the distribution of the included studies by milk production traits. This systematic review only took into consideration 5 different milk production traits, namely: milk yield, fat, protein, lactose, and SCS. All the studies (100%) included in this systematic review investigated milk yield. Out of 15 reviewed studies, only 33.33% (n = 5) of them studied fat, followed by 26.67% (n = 4) that investigated protein (Mostert et al., 2001; Jónás et al., 2016; Barsila., 2019; Boujenane., 2021), with 20% (n = 3) of them studying lactose (Jónás et al., 2016; Barsila., 2019; Boujenane., 2021) and 6.67% (n = 1) SCS (Boujenane., 2021).

Table 5 Distribution of articles by milk production traits

Author	Breed	Sample size	Milk production traits
Amimo et al. (2007)	Ayrshire	1955	Milk yield
Barsila (2019)	Naks	18	Milk yield, fat, protein, lactose
Beneberu et al. (2020)	Jersey	2912	Milk yield
Bhutkar et al. (2014)	Deoni	114	Milk yield
Bolacali and **Öztürk** (2018)	Simmental	706	Milk yield
Boujenane. (2021)	Holstein	6343	Milk yield, fat, protein, lactose, SCS
Fouda et al. (2017)	Holstein	1575	Milk yield
Hoka et al. (2019)	Friesian	20	Milk yield
Hussain et al. (2015)	Tharparkar	230	Milk yield
Jónás et al. (2016)	Holstein	4891	Milk yield, fat, protein, lactose
Mostert et al. (2001)	Holstein, Jersey	116073	Milk yield, fat, protein
Nyamushamba et al. (2014)	Red Dane, Jersey	12307	Milk yield
Pandey et al. (2019)	Sahiwal	392	Milk yield
Verma et al. (2016)	Sahiwal	259	Milk yield, fat
Wondifraw et al. (2013)	HF×Deoni crossbred	256	Milk yield

SCS: Somatic count score.

Effect of parity on milk production traits

Effect of parity on milk production traits findings of the selected studies are shown in Table 4. Out of 15 reviewed articles, 10 of them studied the effect of parity on milk production traits. These articles investigated milk yield and the results showed that parity on 8 articles out of 10 included articles, had a significant effect on milk yield, whereas 2 out of 10 articles showed that parity had no significant effect on milk yield. Out of the 10 reviewed papers, only 4 of them considered fat, and the findings showed that 3 articles discovered that parity had a significant effect on fat, whereas 1 showed that parity had no significant effect on fat. The results also indicated that 3 articles showed parity had significant effect on protein (Jónás et al., 2016; Barsila., 2019; Boujenane., 2021), lactose (Jónás et al., 2016; Barsila., 2019; Boujenane., 2021), and only 1 article showed the significance on SCS (Boujenane., 2021).

Table 6 Effect of parity on milk production traits

Author	Breed	Parity	Milk production traits	Sign
Amimo et al. (2007)	Ayrshire	1-7	Milk yield	*
Barsila (2019)	Naks	2,4,6	Milk yield	*
			Fat	*
			Protein	*
			Lactose	*
Beneberu et al. (2020)	Jersey	1-6	Milk yield	*

Author	Breed	Parity	Milk production traits	Sign
Boujenane (2021)	Holstein	1-3	Milk yield	*
			Fat	*
			Protein	*
			Lactose	*
			SCS	*
Fouda et al. (2017)	Holstein	1-4	Milk yield	ns
Hoka et al. (2019)	Friesian	1-4	Milk yield	*
Jónás et al. (2016)	Holstein	1-5	Milk yield	*
			Fat	*
			Protein	*
			Lactose	*
Nyamushamba et al. (2014)	Red Dane, Jersey	1-7	Milk yield	*
Verma et al. (2016)	Sahiwal	1-6	Milk yield	ns
			Fat	ns
Wondifraw et al. (2013)	HF×Deoni cross-bred	1-10	Milk yield	*

Sign – Significant, * – Significant at $p<0.05$, ns – Non-significant

Effect of calving season on milk production traits

Table 5 indicates the findings of the effect of calving season on milk production traits of the reviewed articles. Only 13 out of 15 studies included in this systematic review indicated the effect of calving season on milk production traits of interest. The results showed that 7 out of 13 studies found that calving season had no significant effect on milk yield, whereas 6 out of 13 articles showed that calving season had significant influence on milk yield. A total of 3 out of 13 studies discovered that calving season had a significant influence on fat, whereas 2 out of 13 studies indicated that there was no significant effect. Calving season on 4 studies out of 13 showed significant effect on protein. About 2 out of 13 articles highlighted that season of calving affected lactose significantly, whereas 1 article discovered that it did not significantly affect lactose. Only 1 out of 13 articles indicated that season used for calving significantly affected SCS.

Table 7 Effect of calving season on milk production traits

Author	Breed	Calving season	Milk production traits	Sign
Barsila (2019)	Naks	Summer, Autumn	Milk yield	*
			Fat	*
			Protein	*
			Lactose	*
Beneberu et al. (2020)	Jersey	Summer, Autumn, Winter	Milk yield	ns
Bhutkar et al. (2014)	Deoni	Summer, Autumn, Winter, Spring	Milk yield	ns
Bolacali and Öztürk (2018)	Simmental	Summer, Autumn, Winter, Spring	Milk yield	ns

Author	Breed	Calving season	Milk production traits	Sign
Boujenane (2021)	Holstein	Summer, Winter	Milk yield	*
			Fat	ns
			Protein	*
			Lactose	ns
			SCS	*
Fouda et al. (2017)	Holstein	Summer, Winter	Milk yield	ns
Hussain et al. (2015)	Tharparkar	Summer, Autumn, Winter, Spring	Milk yield	ns
Jónás et al. (2016)	Holstein	Summer, Autumn, Winter, Spring	Milk yield	*
			Fat	*
			Protein	*
			Lactose	*
Mostert et al. (2001)	Holstein, Jersey	Summer, Autumn, Winter, Spring	Milk yield	*
			Fat	*
			Protein	*
Nyamushamba et al. (2014)	Red Dane, Jersey	Summer, Autumn, Winter, Spring	Milk yield	*
Pandey et al. (2019)	Sahiwal	Summer, Autumn, Winter, Spring	Milk yield	ns
Verma et al. (2016)	Sahiwal	Summer, Autumn, Winter, Spring	Milk yield	ns
			Fat	ns
Wondifraw et al. (2013)	HF×Deoni crossbred	Summer, Autumn, Winter, Spring	Milk yield	*

Sign – Significant, * – Significant at $p<0.05$, ns – Non-significant

DISCUSSION AND CONCLUSION

It is necessary to optimize the factors affecting milk production traits to enhance productivity of dairy cattle (Fouda et al., 2017). Hence, the objective of this systematic review was to provide information on the effect of parity and season of calving on milk yield, fat, protein, lactose, and SCS of cattle. Knowledge of non-genetic factors such as parity and calving season and their influence on cattle milk productive performance is important in the formulation of management and selection decisions (Beneberu et al., 2020). The results of this systematic review indicated that 10 out of 15 studies investigated the influence of parity on milk production traits, whereas 13 out of 15 included studies researched about the effect of calving season on milk production traits. Majority of the reviewed articles discovered that parity affected milk yield, fat, protein, lactose and SCS. The findings of this systematic review indicated that parity had an influence on the investigated milk production traits. Majority of the studies found that calving season had no influence on milk yield, however, it affected fat, protein, lactose, and SCS. There are no comparisons of the other systematic review findings due to this systematic review being the first one reporting on the effect of non-genetic factors (parity, calving season) on milk production traits of cattle based on the knowledge that we have. The findings of this systematic review imply that parity and calving season can be used to improve milk production traits such

as fat, protein, lactose, and SCS. Furthermore, parity can be used to improve milk yield, whereas calving season cannot be used to improve milk yield. The contribution of this systematic review to the body of knowledge is that parity and calving season can be used in the selection for increased milk production traits, reproductive efficiency, formulation of management and in making selection decisions. The limitation of this systematic review is that few (less than 34%) of the reviewed articles investigated on milk production traits such as fat, protein, lactose, and SCS and the difference between results of articles indicating the effect of calving season on milk yield was low. Hence, it is highly recommended that more studies need to be conducted on the effect of parity and season of calving on milk production traits such as milk yield, fat, protein, lactose, and SCS.

The current systematic review concludes that parity affects milk yield, fat, protein, lactose and SCS of cattle. Calving season affects fat, protein, lactose, and SCS but not milk yield of cattle. Parity and calving season might be used as potential factors for the improvement of milk production traits of cattle.

ACKNOWLEDGEMENTS

This systematic review has been supported and approved by the University of Limpopo. It was financially supported by the South African National Research Foundation (Postgraduate: Reference No. MND210614611303).

CONFLICT OF INTEREST

The authors declared that there is no conflict of interest.

CONTRIBUTIONS

Concept – TCM, TLT; Design – TCM, TLT; Supervision – TLT; Resources –TCM, TLT; Materials – TCM; Data Collection and Processing – TCM, TLT; Interpretation – TCM; Literature Search – TCM, TLT; Writing Manuscript – TCM; Critical Review – TLT. Both authors approved the final manuscript.

REFERENCES

Amimo JO, Wakhungu JW, Inyangala BO, Mosi RO. 2007. The effects of non-genetic factors and estimation of genetic and phenotypic parameters and trends for milk yield in Ayrshire cattle in Kenya. Livestock Res Rural Dev, 19(01).

Barsila SR. 2019. Effect of parity in different grazing seasons on milk yield and composition of cattle × yak hybrids in the Himalayan alpines. J Appl Anim Res, 47(1), 591-6. doi: https://doi.org/10.1080/09712119.2019.1697274.

Beneberu N, Shibabaw W, Getahun K, Alemayehu K. 2020. Effect of Non-genetic Factors on Milk Production Traits of Pure Jersey Dairy Cattle in Central Highland Ethiopia. Food Science and Quality Management, 103, 7-12.

Bettany-Saltikov J. 2010. Learning how to undertake a systematic review: part 2. Nurs Stand, 24(51), 47.

Bhutkar SS, Thombre BM, Bainwad DV. 2014. Effect of Non–Genetic Factors on Production Traits in Deoni Cows. J Agricul Vet Sci, 7(12), 9-14. doi: https://doi.org/10.9790/2380-071230914.

Bolacali M, Öztürk Y. 2018. Effect of non-genetic factors on milk yields traits in Simmental cows raised subtropical climate condition. Arq Bras Med Vet Zootec, 70(1), 297-305. doi: http://dx.doi.org/10.1590/1678-4162-9325.

Boujenane I. 2021. Non-genetic effects on daily milk yield and components of Holstein cows in Morocco. Trop Anim Health Prod, 53(224), 1-9. doi: https://doi.org/10.1007/s11250-021-02663-w.

Fouda MM, El-Bayomi KM, Darwish RA, Eltanahy AR. 2017. Evaluation of non-genetic factors affecting milk production traits of Holstein cattle. Mansoura Vet Med J, 18(1), 133-41.

Hoka AI, Gicheru M, Otieno S. 2019. Effect of Cow Parity and Calf Characteristics on Milk Production and Reproduction of Friesian Dairy Cows. J Natural Sci Res, 9(10), 41-6. doi: https://doi.org/10.7176/JNSR.

Hussain A, Gupta AK, Dash SK, Manoj M, Ahmad S. 2015. Effect of non-genetic factors on first lactation production and reproduction traits in Tharparkar cattle. Indian J Anim Res, 49(4), 438-41. doi: https://doi.org/10.5958/0976-0555.2015.00096.5.

Jónás EM, Atasever S, Gráff M, Erdem H. 2016. Non-Genetic Factors Affecting Milk Yield, Composition and Somatic Cell Count in Hungarian Holstein Cows. Kafkas Univ Veteriner Fak Derg, 22(3), 361-6. doi: https://doi.org/ 10.9775/kvfd.2015.14672.

Moher D, Liberati A, Tetzlaff J, Altman DG, PRISMA Group. 2009. Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. Ann Intern Med, 151(4), 264-9.

Mostert BE, Theron HE, Kanfer FHJ. 2001. The effect of calving season and age at calving on production traits of South African dairy cattle. South African J Anim Sci, 31(3), 205-14.

Nyamushamba GB, Halimani TE, Imbayarwo-Chikosi VE, Tavirimirwa B. 2014. Comparative evaluation of non-genetic factors affecting milk yield and composition of Red Dane and Jersey cattle in Zimbabwe. Springerplus, 3(88), 1-5. doi: https://doi.org/10.1186/2193-1801-3-88.

Pandey M, Raja KN, Yousuf S, Gupta AK. 2019. Effect of non-genetic factors on First Lactation 305 days and Lifetime Milk Yield in Sahiwal cattle. Indian J Dairy Sci, 72(1), 89-92.

Verma MK, Sachdeva GK, Yadav AK, Gautam S, Ali MM, Bindal S. 2016. Effect of genetic and non-genetic factors on milk yield and milk constituents on Sahiwal cattle. Indian J Anim Res, 50(5), 808-10. doi: https://doi.org/10.18805/ijar.5711.

Wondifraw Z, Thombre BM, Bainwad DV. 2013. Effect of non-genetic factors on milk production of Holstein Friesian × Deoni crossbred cows. Int J Livestock Product, 4(7), 106-12.

SISTEMATSKI PREGLED EFEKATA TELIDBENE SEZONE I PARITETA KAO NEGENETSKIH FAKTORA NA KARAKTERISTIKE PROIZVODNJE MLIJEKA KOD GOVEDA

SAŽETAK

Ovo istraživanje je izvedeno sa ciljem sistematskog pregleda literature o efektu telidbene sezone i pariteta na karakteristike proizvodnje mlijeka. Ovaj sistematski pregled je obavljen prema Preferentnim izvještajnim karakteristikama za sistematski pregled i meta-analize (PRISMA). Baze podataka Google Scholar, PubMed, ScienceDirect i Web of Science su sistematski pretražene koristeći kao ključne riječi "negenetske faktore/telidbenu sezonu/paritet", "karakteristike proizvodnje mlijeka" i "goveda". Prema rezultatima, u istraživanje je uključeno 15 (n = 15) radova od identificiranih i pregledanih devedeset i četiri (n = 94). Rezultati ovog sistematskog pregleda su pokazali da je u 8 od 10 članaka dokazano da je mliječnost krava signifikantno povezana sa paritetom, dok je u 7 od 13 članaka dokazano da telidbena sezona nije signifikantno utjecala na mliječnost. 3 od 4 članka su dokazala da paritet ima signifikantan efekat na sadržaj masnoće. Paritet je signifikantno utjecao na sadržaj laktoze i proteina. U jednom od članaka je istraživan i dokazan signifikantan efekat pariteta i telidbene sezone na broj somatskih stanica (SCS). Od 13 članaka, u 5 je istraživan sadržaj masnoće, u 4 proteina, a u 2 laktoze. Rezultati 3 članka o sadržaju masti, 4 o sadržaju proteina i 2 o sadržaju laktoze su pokazali da je na iste signifikantno utjecala telidbena sezona. U zaključku, paritet i telidbena sezona imaju veliki utjecaj na sadržaj masnoće, proteina, laktoze i SCS. Mliječnost krava nije bila pod utjecajem telidbene sezone, ali je bila pod utjecajem pariteta. Na ovaj način se telidbena sezona i paritet mogu koristiti za poboljšanje karakteristika proizvodnje mlijeka.

Ključne riječi: Laktoza, masnoća, mliječnost, protein, SCS