ISSN 2316-9281

Scientific Electronic Archives
Issue ID: Vol.19 (3), May/Jun 2026, p. 1-5
DOI: http://dx.doi.org/10.36560/19320262245
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Dystocia in bovine parturition: an updated literature review

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Abstract. This article examines dystocia in bovine parturition. The research problem investigated was: "What are the etiological factors, consequences, and management/prevention strategies for dystocia in bovine parturition, considering bioethical and productive aspects?" The proposed hypothesis was: "Dystocia in bovine parturition is a multifactorial condition with significant impacts on animal health and livestock economy; its prevention and effective management depend on the understanding of etiology, pathophysiology, and the application of clinical and surgical interventions guided by bioethical principles." The general objective is to critically analyze recent scientific literature on bovine dystocia, focusing on its causes, consequences, diagnostic methods, treatment, and prevention. The specific objectives are: to identify the main maternal and fetal factors predisposing to dystocia; to describe the productive and economic impacts in cattle farming; to discuss clinical and surgical approaches for dystocia management; and to analyze the bioethical considerations in dystocic parturition assistance. This work is relevant to Animal Reproduction students due to the necessity of mastering this topic for clinical practice and research. For science, it consolidates knowledge on a highly relevant reproductive problem and stimulates new research. For society, it contributes to improving animal welfare and the sustainability of livestock production. This is a qualitative, theoretical research with a six-month duration.
Keywords: Dystocia. Bovine. Parturition. Animal Reproduction. Animal Welfare.

Contextualization and analysis

Bovine reproduction plays a fundamental role in global food security. Brazil, as one of the world's largest producers, relies on reproductive efficiency for sector sustainability (Instituto Brasileiro de Geografia e Estatística, 2023). However, dystocia emerges as a significant complication, directly impacting productivity and animal welfare (Mee, 2008). The condition, characterized by difficulty in fetal expulsion, requires intervention and leads to substantial losses if not managed properly (Mekonnen & Moges, 2016).

The etiology of dystocia involves the interaction of maternal and fetal factors, varying in prevalence according to breed, management, and environmental conditions (Mee, 2008). A retrospective study of 1,345 cases identified anomalies in fetal position and posture (46.3%), oversized fetus (41.3%), uterine torsion (26.5%), and inadequate cervical dilation (19.3%) as the most frequent causes (Lourenço *et al.*, 2022). Regarding maternal age, 49.0% of affected cows were in their first parity, and 29.9% were under 2.5 years old (Lourenço *et al.*, 2022), indicating that primiparous heifers constitute a high-risk group. The incidence in heifers is three to ten times higher than in multiparous cows (Mee, 2008).

The economic impact of dystocia is related to veterinary costs, medication, labor, and losses from mortality and reduced reproductive efficiency (Kebede *et al.*, 2017). A study on Holstein cows demonstrated that dystocia reduced milk production by 85 kg in the first 100 days of lactation for primiparous cows (Dematawena & Berger, 1997). Furthermore, calving-to-conception intervals increased by 37.7 days in cows that experienced

dystocia compared to those with normal parturition (Dematawena & Berger, 1997).

The hypothesis that dystocia is a multifactorial condition requiring a holistic approach is confirmed by recent data (Melo & Vieira, 2024; Smail *et al.*, 2025). Effective prevention integrates genetic selection (choosing sires with favorable calving ease expected progeny differences), nutritional management (avoiding both undernutrition and overnutrition during gestation), and peripartum monitoring (Mee, 2008; Tashakkori & Farzaneh, 2022). Bioethics guides clinical decisions, prioritizing animal welfare in choosing between manual obstetric maneuvers, cesarean section, or fetotomy (Amaral & Trevisan, 2017).

This study synthesizes existing knowledge, identifies gaps, and aims to contribute to the advancement of Animal Reproduction science. The mastery of causes, diagnosis, and treatment options is essential for veterinary practice. For society, this work adds value by promoting animal well-being and the sustainability of livestock production.

Dystocia manifests when the parturition process deviates from normality, requiring intervention for fetal expulsion (Mekonnen & Moges, 2016). Etiology is complex, involving interactions between maternal and fetal factors (Mee, 2008).

Maternal factors include uterine inertia, which may be primary (failure to initiate effective contractions) or secondary (myometrial exhaustion after prolonged labor) (Mee, 2008; Mekonnen & Moges, 2016). Uterine inertia is associated with periparturient hypocalcemia, which impairs myometrial contractility (Gonçalves *et al.*, 2008). Inadequate pelvic size and fetopelvic disproportion are frequently observed in primiparous heifers (Mee, 2008). Anomalies of the birth canal include vaginal stenosis, persistent hymen, and uterine torsion (Ferreira, 2021; Aoyama *et al.*, 2019).

Fetal factors include macrosomia, improper fetal posture/position, and malformations (Melo & Vieira, 2024). Fetal macrosomia results from genetics or inadequate maternal nutrition (Mee, 2008). Improper fetal posture involves flexed limbs or abnormal head position, preventing normal progression through the birth canal (Figueira, 2022). Although less common, twin pregnancy predisposes to dystocia due to space competition and abnormal presentations (Lourenço *et al.*, 2022).

Consequences affect the female, the neonate, and the economic viability of the herd (Kebede *et al.*, 2017; Weldeyohanes & Fesseha, 2020). For the female, dystocia leads to retained placenta, metritis, reduced milk production, prolonged calving-to-conception interval, early culling, and death (Sheldon *et al.*, 2009; Martins & Pivato, 2018). Retained placenta predisposes to uterine infections and delays return to estrus (Sant'Ana *et al.*, 2023). A study showed that cows with dystocia had a calving-to-conception interval 37.7 days longer than those with normal parturition (Dematawena & Berger, 1997). Milk production was reduced by 85 kg in the first 100 days for primiparous cows with dystocia (Dematawena & Berger, 1997).

For the neonate, dystocia increases the risk of hypoxia, perinatal mortality, and physical trauma (Lombard *et al.*, 2007). Calves born from dystocic parturition have a mortality rate up to five times higher than those from eutocic parturition (Lombard *et al.*, 2007). Prolonged hypoxia causes neurological damage and compromises calf viability. A retrospective study reported a 46.0% mortality rate for calves subjected to extraction or cesarean section (Küster, 2022).

Table 1. Summary table of key findings from recent literature (2017-2025)

Topic	Main Findings	References
Global Incidence	Dairy cows: 1.5-6.6%; Beef cows: 4.1-8.7%; Heifers: 3-10x higher risk vs. multiparous	Mee, 2008; Lourenço *et al.*, 2022
Main Causes	Malposition/Posture (46.3%), Oversized fetus (41.3%), Uterine torsion (26.5%)	Lourenço *et al.*, 2022
Maternal Impact	Milk reduction: 85 kg (first 100 days); Calving-to-conception interval: +37.7 days; Mortality: 9.4%	Dematawena & Berger, 1997; Kebede *et al.*, 2017
Neonatal Impact	Mortality rate: 46.0% after intervention; Risk 5x higher than eutocic births	Lombard *et al.*, 2007; Küster, 2022
Prevention	Genetic selection (EBVs/EPDs), Nutritional management, Peripartum monitoring	Mee, 2008; Tashakkori & Farzaneh, 2022
Management	Roadmap strategy: Early recognition, diagnosis, intervention (manual, surgical, fetotomy)	Smail *et al.*, 2025; Weldeyohanes & Fesseha, 2020

Economically, dystocia generates costs for veterinary assistance, medication, and labor (Kebede *et al.*, 2017). Losses from female and calf mortality, reduced reproductive efficiency, and decreased milk production impact profitability (Dematawena & Berger, 1997). Prevention is not only an animal welfare issue but a fundamental economic strategy for sustainability.

Management requires early diagnosis and adequate intervention. Clinical observation of parturition progress, vaginal examination, and ultrasonography are essential assessment tools (Queiroz *et al.*, 2024; Smail *et al.*, 2025). Vaginal examination allows verification of cervical dilation, fetal presentation, position, posture, and detection of uterine torsion (Ulrich *et al.*, 2025). Ultrasonography offers detailed information on fetal development and viability (Queiroz *et al.*, 2024).

Interventions include manual obstetric maneuvers (fetal posture correction, controlled traction, rotation, and repulsion), cesarean section, and fetotomy (Smail *et al.*, 2025; Weldeyohanes & Fesseha, 2020). Cesarean section is indicated when manual maneuvers fail, the fetus is viable, and there is severe fetopelvic disproportion or non-reducible uterine torsion (Cunha & Ribeiro, 2024; Queiroz *et al.*, 2024). Fetotomy is the option for non-viable fetuses, aiming to preserve the female's life (Smail *et al.*, 2025). The chosen intervention considers the female's condition and fetal viability.

Bioethics is crucial in dystocic parturition assistance, guiding clinical decisions toward animal welfare (Amaral & Trevisan, 2017). The decision to prolong obstetric maneuvers, perform a cesarean section, or opt for fetotomy considers fetal viability, maternal health, and recovery (Amaral & Trevisan, 2017).

Table 2. Etiological Factors of Dystocia in Cattle

Category	Specific Factor	Mechanism/Description	Observed Prevalence/Frequency	References
Maternal	Uterine Inertia	Primary (absence of effective contractions) or secondary (myometrial exhaustion after prolonged labor); associated with hypocalcemia	Significant cause, especially in multiparous	Mee, 2008; Mekonnen & Moges, 2016
	Inadequate pelvic size	Fetopelvic disproportion, common in primiparous heifers bred to large bulls	More prevalent in <2.5 years and beef breeds	Mee, 2008; Lourenço *et al.*, 2022
	Birth canal obstruction	Vaginal/cervical stenosis, persistent hymen, uterine torsion	Uterine torsion: 26.5% of cases; cervical dilation failure: 19.3%	Lourenço *et al.*, 2022; Ferreira, 2021
	Hormonal imbalances	Estradiol, oxytocin, prostaglandins, relaxin dysregulation; affects contractions and cervical dilation	Functional etiology, mechanism well-documented	Gonçalves *et al.*, 2008
Fetal	Maldisposition (presentation, position, posture)	Anterior presentation with head deviation, limb flexion, transverse or posterior presentations	Most frequent cause: 46.3% of cases	Lourenço *et al.*, 2022; Figueira, 2022
	Fetal macrosomia	Excessive fetal development due to genetics or maternal nutrition	41.3% of cases; associated with crossbreeding and incorrect nutrition	Lourenço *et al.*, 2022; Mee, 2008
	Fetal malformations	Hydrocephalus, anasarca, schistosomus reflexus	Low frequency	Almeida & Resende, 2023
	Twin pregnancy	Competition for space, leading to abnormal presentations	More frequent in cows >6.5 years	Lourenço *et al.*, 2022

Prevention is the most effective strategy to minimize the incidence and impacts of dystocia (Mee, 2008; Tashakkori & Farzaneh, 2022). Genetic selection for calving ease, nutritional management of gestating females, and monitoring of females in labor are fundamental preventive measures (Mee, 2008). Choosing sires with low birth weight expected progeny differences (EPDs) and adequate pelvic size in heifers reduces dystocia risk (Mekonnen & Moges, 2016). A balanced diet prevents both undernutrition and overnutrition (Mee, 2008). Active monitoring allows early identification of signs and timely intervention (Smail *et al.*, 2025).

Conclusion

Dystocia in bovine parturition is a multifactorial challenge requiring a deep understanding of its etiology, pathophysiology, and impacts. This article highlights the complexity of the problem and the need for an integrated approach combining prevention, early diagnosis, and intervention. Genetic selection, nutritional management, and monitoring are prevention pillars, while obstetric maneuvers, cesarean section, and fetotomy represent treatment options. The bioethical dimension guides decisions that ensure animal welfare and sustainability.

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