

ENDOPARASITES OF CATTLE RAISED IN EXTENSIVE SYSTEMS

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REVIEW

Abstract

Extensive cattle farming systems are characterized by continuous access to pasture. This management method, although advantageous from an animal welfare and operational cost perspective, exposes the cattle herds to a higher risk of endoparasite infestation. The prevalence and intensity of these parasites vary considerably depending on climatic and geographical factors, animal age, the presence of intermediate hosts and farm management practices (Charlier et al., 2020). The main pathogens include gastrointestinal nematodes, hepatic and ruminal trematodes (Forstmaier et al., 2021; Huson & Oliver, 2017) and protozoa. The need for integrated and sustainable control strategies specifically adapted to the grazing environment is highlighted to reduce the economic impact and maintain animal welfare (Forbes, 2023; Takeuchi-Storm et al., 2019).

Keywords: cattle, extensive system, endoparasites, prevalence, natural pasture
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INTRODUCTION

Extensive cattle farming, although it does provide benefits regarding the animal welfare and the access to pasture, exposes the herd to a complex interaction with pathogens present in the environment. Endoparasites represent a major barrier to zootechnical efficiency, causing subclinical losses, and in severe cases, morbidity and mortality. Unlike the intensive systems, extensive management requires a deep understanding of the biological cycles of parasites and the dynamics of pasture contamination, especially in the context of recent climate change.

This type of cattle farming is based on the use of natural pasture resources, which constitutes an essential component of sustainable European agriculture. However, the constant interaction between the host and the environment on grazing surfaces favors the life cycles of endoparasites (Fox et al., 2013). Subclinical infestations, although often overlooked, can lead to significant economic losses by reducing weight gain, decreased milk production and affecting reproductive efficiency (Beesley et al., 2018).

Parasitic infestations in cattle kept in extensive systems are often polyparasitic (Chihai, 2006), with a pronounced seasonal variation dictated by environmental conditions that favor the survival of eggs and larvae on pasture (Kemper & Henze, 2009).

Gastrointestinal nematodes (G.I.N) are the most widespread problem, with high prevalences, especially at young animals on their first grazing (Shaw et al., 1998). *Ostertagia ostertagi* is the key pathogen, whose dynamics are closely linked to pasture management (Almería & Uriarte, 1999). Studies from Serbia (Kulišić et al., 2012) and from the Balkan region (Radev et al., 1994) confirm this high prevalence.

Data on the seasonal dynamics of pasture contamination with gastrointestinal nematode eggs over a calendar year in European extensive systems show that during the winter periods (January-February), contamination levels are minimal, usually ranging between 50 and 100 eggs per gram of faeces (EGF), due to reduced transmission and low survival of larvae in the environment. As spring approaches (March-April), levels remain relatively low, with a slight increase to 100-200 EGF as the animal resume grazing. A moderate increase in contamination takes place at the end of spring and beginning of summer (May-June), reaching to 200-500 EGF, as the optimal temperature and humidity conditions favor larval development on pastures. Summer (July-August) is the peak period of contamination, where levels can exceed 800 or even 1000+ EGF, indicating a maximum risk of infestation (Charlier et al., 2020). Towards autumn (September-October), with decreasing temperatures, EGF levels drop rapidly to around 300-400, and early winter (November-December), the concentration

returns to a low level, around 100-150 EGF.(Charlier et al., 2020 și Shaw et al., 1998).

Nematodirus spp is positively correlated with prevalence of other strongyloides; predominantly affects young adults.

Bunostomum spp. Presents higher prevalence in subtropical/tropical regions.

Strongyloides spp. it may reach higher prevalences (up to 42%) in conditions of poor hygiene or high humidity.

Trichuris spp. generally considered a low prevalence parasite in cattle populations, although it may be more common in sheep.

Lungworms infestation (Dictyocaulus viviparus), generally has a moderate-low prevalence comparated to Gastrointestinal nematodes, and can cause severe clinical outbreaks, especially among young cattle (Schnieder et al., 1993), which are much more susceptible to infestation than adults (Charlier et al., 2020).

Trematodes present a dynamic dependent on the presence of intermediate hosts (snails). Fasciola hepatica requires specific wet habitats, and its prevalence varies dramatically between humid and arid regions (Beesley et al., 2018).

Calicophoron daubneyi is recognized as an emerging parasite in Europe, with an increasing prevalence that requires careful monitoring (Huson & Oliver, 2017). Studies from Romania have confirmed the presence of both trematode species in cattle in extensive systems (Sîrbu et al., 2020).

Cestodes prevalence depends on access to the intermediate host (mite) and reaches a peak in late summer/early autumn in young individuals.

Coccidian (Eimeria spp.) predominantly affect calves. They do not have developed immunity and, although adults are resistant to the harmful effects, can act as carriers, continuously contaminating the pasture and farrowing area (Chihai, 2006). In case of coccidial infestation, diarrhea and growth retardation can appear, although subclinical infestations are also common in adults (Gillandt et al., 2018; Morgoglione et al., 2020; Pinto et al., 2021). Prevalence is higher in humid areas and with high precipitation, as these are favorable conditions for the survival of Eimeria (Forstmaier et al., 2021).

Table 1

Frequency of the main endoparasites in cattle raised in an extensive system

Classification	Parasitic agent	Prevalence (%) (estimated range)	Bibliographical sources
G.I. Nematodes	Trichostrongyloidea (<i>Ostertagia</i> , <i>Cooperia</i> , <i>Haemonchus</i> , etc.)	Very common (>70%, often >90%).	(Charlier et al., 2020; Gillandt et al., 2018; Njok et al., 2023; Alemayehu et al., 2022)
G.I. Nematodes	Nematodirus spp.	Variable (5–20% depending on study).	(Shaw et al., 1998; Njok et al., 2023)
G.I. Nematodes	Bunostomum spp.	Low in temperate Europe (often <10%).	(Sîrbu et al., 2020; Njok et al., 2023)
G.I. Nematodes	Strongyloides spp.	Low to moderate (5–15% in Europe).	(Gillandt et al., 2018; Sîrbu et al., 2020; Alemayehu et al., 2022)
G.I. Nematodes	Trichuris spp.	Low (often <10%).	(Gillandt et al., 2018; Alemayehu et al., 2022)
Pulmonar Nematodes	Dictyocaulus viviparus	5% – 20%	(Schnieder et al., 1993)
Hepatic Trematodes	Fasciola hepatica (<i>Fasciolosis</i>)	Variable (20–60% in endemic areas).	(Beesley et al., 2018; Forstmaier et al., 2021; Sîrbu et al., 2020)
Ruminal Trematodes	Calicophoron/Paramphistomum spp.	Increasing (10–50%).	(Huson et al., 2017; Forstmaier et al., 2021; Njok et al., 2023)
Cestodes	Moniezia spp.	Variable (5–30%).	(Pilarczyk et al., 2019; Alemayehu et al., 2022)
Coccidia	Eimeria spp.	30% – 70% (calves)	(Morgoglione et al., 2020; Pinto et al., 2021; Pilarczyk et al., 2019)

Risk factors and management

Extensive systems require proactive management of parasitic risk.

Key factors include:

Animal density and pasture rotation: holistic management and rotational grazing can reduce parasite burden by interrupting the parasite life cycle on the pasture. The effectiveness of these methods is superior compared to conventional systems (Silva et al., 2013).

Agro-climatic conditions: Areas with high humidity and moderate temperatures favor the survival of NGI larvae and snail hosts for trematodes (Morgan et al., 2013; May et al., 2022).

Age and host immunity: Adult animals develop partial immunity, while the young are most vulnerable (Charlier et al., 2020; Fox et al., 2013).

Table 2

Risk factors associated with the prevalence of endoparasites in extensive systems and mitigation measures

Risk factor	Impact on parasitic transmission	Mitigation strategies (Management)
Continuous grazing	Maintains a high parasite load on pastures	Pasture rotation (Rapiya et al., 2019).
Climatic conditions	Optimal humidity and temperatures favor larvae/eggs	Avoiding grazing in permanently wet areas (Kemper & Henze, 2009).
Animals age	Youth are more susceptible due to lack of immunity	Separation of age groups on different pastures
Lack of monitoring	Unjustified use or lack of treatments	Regular stool monitoring (Takeuchi-Storm et al., 2019).

Integrated control requires combining management practices (avoiding overgrazing, drainin wet lands) with strategic antiparasitic treatments, avoiding the development of

resistance as much as possible (Takeuchi-Storm et al., 2019). Continuous monitoring, as practiced in field studies (Gillandt et al., 2018), is essential.

CONCLUSIONS

Endoparasites remain a major challenge in cattle farming in extensive systems. The high prevalence of gastrointestinal nematodes and the emergence of ruminal trematodes such as *Calicophoron daubneyi*, stresses the need for continued vigilance and control strategies that do not only rely exclusively on chemical treatments but to be based on knowledge of the local ecology (Huson & Oliver, 2017), pasture

rotation and avoidance of risk areas (Takeuchi-Storm et al., 2019).

Regular monitoring and understanding seasonal dynamics are essential to ensure the health and productivity of cattle herds in these production systems.

The future of parasite management in extensive systems will depend on the integration of new epidemiological knowledge with sustainable agricultural practices.

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