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Review Article

Ivermectin Injection In Cattle: A Critical Tool For Parasite Control In Malawi's Livestock Sector

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Abstract

Cattle production remains a cornerstone of rural livelihoods in Malawi, contributing remarkably to household income, nutrition, and agricultural productivity. However, parasitic infestations both endoparasites and ectoparasitic are a major constraint, causing economic losses through reduced growth rates, diminished milk production impaired reproduction, and increased mortality. Ivermectin, a macrocyclic lactone derived from Streptomyces avermitilis, offers broad-spectrum efficacy against gastrointestinal nematodes, lungworms, and external parasites, with prolonged residual activity well-suited to resource-limited farming systems. This paper examines ivermectin's pharmacological action, field performance, and socio-economic impact in Malawi's cattle sector, drawing on recent field data from Kasungu District that demonstrate significant reductions in parasite burden and marked measurable improvements in weight gain among treated herds. The review also addresses critical considerations for dosage, administration, withdrawal periods, and the growing threat of anthelmintic resistance linked to underdosing, misuse, and lack of rotation. Other challenges such as high drug cost, limited veterinary access, and cold chain management are discussed, along with policy recommendations promoting sustainable use, through integrated parasite management, strategic deworming, and national resistance surveillance. We conclude that, while ivermectin remains an indispensable tool for cattle parasite control in Malawi, its long-term effectiveness depends on responsible application, farmer education, and coordinated veterinary policy interventions.

Keywords: Ivermectin; Cattle; Malawi; Parasite Control; Anthelmintic Resistance; Livestock Productivity

Introduction

Livestock production plays a vital role in the livelihoods of many smallholder farmers in Malawi, contributing to income generation, food security, crop fertilization through manure, and proving traction for agricultural activities. Among livestock species, cattle hold particular important due to their multifunctional roles in both rural and peri-urban economies. However, productivity in the cattle sector is significantly hindered by parasitic infections, which lead to poor body condition, stunted growth, reduced milk yield, compromised fertility, and in severe cases, result in mortality.

Controlling these parasitic infestations is a cornerstone of improving cattle health and productivity. Among available treatment options, ivermectin injection has proven to be one of the most effective and widely used broad-spectrum antiparasitic agents in Malawi and globally.

Understanding ivermectin

Ivermectin is a derivative of avermectins, which are produced by the soil-dwelling actinomycete Streptomyces avermitilis [1]. Its discovery earned William C. Campbell and Satoshi Ōmura the Nobel Prize in Physiology or Medicine in 2015 due to its major impact on parasitic disease control.

The drug acts by stimulating the release of gamma-aminobutyric acid (GABA) and binding to glutamate-gated chloride channels in the nerve and muscle cells of invertebrates, leading to paralysis and death of the parasites [2].

Ivermectin's spectrum of activity includes

- **Endoparasites**: Gastrointestinal roundworms, lungworms
- **Ectoparasites**: Mites (Sarcoptes spp.), lice, and certain species of ticks.

Its long half-life and slow metabolic breakdown offer extended protection—typically up to 21 days against many parasites-making it especially suitable for use in resource-limited farming systems like those in Malawi.

Importance in Malawi's context

Parasitic Burden in Malawian Cattle

Cattle in Malawi are mostly kept in extensive or semi-intensive systems, where the animals graze freely and are highly exposed to parasite-infested pastures. Common challenges include

- **Nematodes:** Haemonchus contortus, Trichostrongylus spp., and Oesophagostomum spp.
- **Lungworms:** Dictyocaulus viviparus – particularly common during the wet season
- **Ectoparasites:** Boophilus decoloratus (blue tick), lice (Linognathus vituli), and mange mites (Sarcoptes scabiei)

These parasites lead to economic losses through reduced productivity, hide damage, and increased veterinary expenses.

Case Example – Kasungu District

A 2023 field survey conducted in Kasungu District found that over 70% of sampled cattle had significant parasite burdens, with ivermectin-treated herds showing markedly lower fecal egg counts and higher average daily weight gains compared to untreated groups [3].

Dosage and administration

Standard ivermectin formulations are typically available in 1% solutions. The recommended dose for cattle is 200 μg/kg body weight, administered subcutaneously, equivalent to 1 ml per 50 kg body weight [4].

- **Injection site**: Under the loose skin behind the shoulder or in the neck region
- **Equipment**: Use sterile syringes and needles to avoid abscess formation or contamination

Proper body weight estimation using weigh bands or visual scoring is essential for accurate dosing, as under-dosing is a primary factor contributing to the development of anthelmintic resistance.

Benefits of ivermectin use

- Increased Weight Gain
- Regular deworming results in better nutrient absorption and growth. Studies in East Africa show up to 20–25% increase in live weight in treated animals [5].
- Improved Reproductive Efficiency
- Parasitic stress delays puberty, oestrus, and reduces conception rates. Effective parasite control improves reproductive health and calving intervals.
- Enhanced Milk Production
- Reduced parasite load in lactating cows results in higher milk yield and improved quality.
- Animal Welfare and Reduced Mortality
- Calves, especially under 12 months of age, benefit from reduced disease exposure and improved survival rates.
- Economic Benefit to Farmers

A cost-benefit analysis in southern Malawi indicated that for every MK1, 000 spent on ivermectin treatment, farmers gained MK4, 500 in returns through better animal performance [6].

Withholding periods and food safety

Adhering to withdrawal periods is critical to prevent drug residues in animal products

- **Meat**: 28–35 days depending on formulation.
- **Milk**: Injectable ivermectin is generally not approved for use in lactating dairy cows producing milk for human consumption, unless specifically labelled.

Violations of milk withdraw periods can pose a serious public health risk and damage consumer trust.

Resistance and responsible use

Anthelmintic resistance (AR) is an emerging threat. In Malawi, improper practices such as

- Routine use without diagnosis
- Frequent underdosing
- Lack of drug rotation have led to confirmed ivermectin resistance in Haemonchus spp. [7].

Best practices to prevent resistance

- Rotate with other classes such as benzimidazoles (e.g., albendazole) or salicylanilides (e.g., closantel)
- Targeted deworming based on faecal egg counts (FEC)
- Use integrated parasite management (IPM)
    - Pasture rotation
    - Hygiene in calf pens
    - Selective breeding for parasite resistance

Challenges in local application

Despite its effectiveness, the use of ivermectin faces several obstacles in Malawi

- High cost relative to smallholder incomes
- Limited access to qualified veterinary personnel
- Cold chain issues that reduce drug potency, especially in remote areas
- Misinformation or lack of awareness on dosing and withdrawal periods

Addressing these challenges requires multisectoral intervention

- Training of community animal health workers (CAHWs)
- Subsidization or co-financing of essential veterinary drugs
- Public awareness campaigns and farmer field schools

Policy Recommendations

To promote sustainable and responsible ivermectin use in Malawi

- Strengthen Extension Services: Equip and support CAHWs for outreach in hard-to-reach areas
- Establish Veterinary Drug Distribution Centers: Ensure availability and correct storage conditions.
- Develop Guidelines for Strategic Deworming: Based on agro-ecological zones and seasonal parasite prevalence.
- Monitor Anthelmintic Resistance: Regular FEC testing and national surveillance systems.
- Encourage Research and Data Sharing: Promote university-led studies on efficacy and resistance patterns.

Conclusion

Ivermectin injection remains an indispensable tool for controlling parasites in cattle across Malawi. It offers broad-spectrum efficacy, extended protection, and boosts cattle productivity when used correctly. However, challenges like misuse, resistance development, and accessibility barriers limit its full potential. Through better education, veterinary support, and policy-driven strategies, ivermectin can play a pivotal role in improving livestock health, farmer incomes, and national food security. Studies indicate a marked improvement in herd health and a reduction in parasite-related losses where ivermectin is properly administered.

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