



# THE PARASITES CONTROL MANUAL

**From Invaders to Immunity — Raising the Rules of  
Parasite War at Tassells Farm Limited (TFL)**

***A HOLISTIC, SCIENCE-  
BACKED APPROACH TO  
DAIRY HERD  
HEALTH***



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From Invaders to Immunity — Raising the Rules of  
Parasite War at Tassells Farm Limited (TFL)

A Holistic, Science-Backed Approach to Dairy Herd  
Health

Authored by: Tassells Farm Limited (TFL) Research Division

Forget routine dosing. At Tassells Farm Limited, we've rewritten the playbook. Parasite control is no longer chemical warfare but ecological wisdom. Through **Operation Refugia**, rigorous monitoring, and integrated biosecurity, TFL turns the stealthy stowaways of 2018 into a sustainable defense system for the future.

This manual is our **covenant for a healthy herd**, a resilient ecosystem, and a legacy of excellence.

*“We don’t just fight parasites — we outsmart them.”*

Tassells Farm Limited (TFL)  
Research & Management Division

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**Dairy agri-research.**

## **THE PARASITES CONTROLL**

### **From Invaders to Immunity:**

### **Raising the Rules of Parasite War at Tassells Farm Limited (TFL)**

Forget everything you think you know about deworming! This isn't about waiting for sickness and reaching for a bottle. This is a story of **espionage, infiltration, and building an unbreakable defense. Parasites can be a menace.**

It's about the active **hidden world** beneath our pastures and within our herds. It's about the "**Stealthy Stowaways**"—parasites that hitch a ride on a *bird's feather, a visitor's boot, or a new heifer*—and their **deadly mission** to undermine entire **herd's health**.

But **TFL** fighting back with a new playbook.

Join the unveiling in farm's most powerful strategy dubbed **Operation Refugia**. This is a counter-intelligence mission where TFL deliberately let some "good guy" parasites survive to outcompete the drug-resistant "super-worms." We're harnessing the power of ecology itself to break the resistance that plagues modern farms.

Discover how TFL turned our biggest failure—the "**Great Heifer Hijack**" of 2018—into our greatest victory.

This is a movement from chemical warfare to ecological wisdom. It's a vibrant, living system that protects TFL cows, TFL land, and TFL future. **Welcome to the new front line. Welcome to Tassells Farm.**

### **The Tassells Farm Limited Parasite Control Manual .** *A Holistic, Science-Backed Approach*

This article provides dairy farmers, livestock practitioners, and researchers with a **scientifically backed guide for dairying process of high-yielding hybrid dairy cows. It reflects the innovations and lessons by Tassells Farm Limited, an award-winning agribusiness redefining dairy farming.**

## Preface

### To the entire team of Tassells Farm Limited.

Welcome to the Tassells Farm Limited Parasite Control Manual.

For generations, our farm has been dedicated to producing the highest quality milk, prioritizing the health and welfare of our herd above all else. We have learned, sometimes the hard way, that our animals' health is intrinsically linked to the health of our entire ecosystem—from the soil they walk on to the wildlife that shares our land.

I recall the summer of 2018 when we noticed a dip in milk yield in our Heifer group 1223 and a dullness in their coats. Despite a good feed ration, they weren't thriving. After fecal testing, Dr. Ben from County Veterinary Services diagnosed a significant burden of **Ostertagia ostertagi** (Brown Stomach Worm) with emerging benzimidazole resistance. It was a wake-up call. It wasn't enough to just dose them; we had to understand *why* they were burdened and *how* the parasites were beating our treatments.

This manual is the culmination of that experience and years of subsequent research, collaboration with parasitologists, and on-farm trials. It moves beyond reactive treatment to a proactive, integrated pest management (IPM) system. **This is our living document, our commitment to breaking the *parasite cycle*, *mitigating resistance*, and *ensuring the sustainability* of Tassells Farm for generations to come.**

This is our story, our science, and our strategy.

— M.Njoroge, Tassells Farm Limited

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# Section 1: The Enemy Within & Without: Identifying Parasites

## 1.1 Internal Parasites (Endoparasites)

- **Roundworms (Nematodes):**
  - ***Ostertagia ostertagi* (Brown Stomach Worm):** The most economically significant. Causes diarrhea, weight loss, edema ("bottle jaw"), and reduced milk yield. Larvae can undergo arrested development (hypobiosis) inside the cow, emerging later to cause disease.
  - ***Cooperia spp.*:** Affects the small intestine, causing poor growth and diarrhea, especially in youngstock.
  - ***Haemonchus placei* (Barber's Pole Worm):** A blood-sucker causing severe anemia, bottle jaw, and death. Thrives in warm, moist conditions.
  - ***Dictyocaulus viviparus* (Lungworm):** Causes parasitic bronchitis ("hoose"), characterized by coughing and severe respiratory distress.
- **Flukes (Trematodes):**
  - ***Fasciola hepatica* (Liver Fluke):** Requires a snail intermediate host. Causes liver damage, anemia, reduced productivity, and can predispose animals to other diseases like blackleg.

- **Protozoa:**
  - ***Eimeria spp. (Coccidia)*:** Causes coccidiosis, leading to severe, often bloody diarrhea in calves, resulting in dehydration and stunted growth.
  - ***Cryptosporidium parvum*:** Causes watery diarrhea in neonates and is a significant zoonotic risk to humans.

## 1.2 External Parasites (Ectoparasites)

- **Mites:** Cause mange (sarcoptic, psoroptic, chorioptic), leading to intense itching, hair loss, and skin crusting.
- **Lice:** Biting and sucking lice cause irritation, anemia, and hide damage. Populations explode in winter.
- **Ticks:** Vectors for serious diseases like Anaplasmosis, Babesiosis, and Lyme disease. *Rhipicephalus (Boophilus) microplus* is a major concern.
- **Flies:**
  - **Horn Flies:** Blood-feeders, causing pain and stress, reducing grazing efficiency.
  - **Stable Flies:** "Bite" the legs, causing discomfort and reducing milk yield.
  - **Face Flies:** Irritate eyes and spread pathogens like *Moraxella bovis* (pinkeye).

## 1.3 Microorganisms

While often managed separately, many bacteria and viruses are opportunistic and can be exacerbated by parasitic damage.

- **Bacteria:** *Salmonella spp.*, *Mycobacterium paratuberculosis* (Johne's), *Moraxella bovis* (Pinkeye).
- **Viruses:** Bovine Viral Diarrhea (BVD), Infectious Bovine Rhinotracheitis (IBR).

## 1.4 Zoonotic and Cross-Species Parasites

- ***Cryptosporidium parvum*:** From calves to humans.
- ***Giardia duodenalis*:** From animals to humans.
- ***Sarcoptes scabiei* (Mange Mites):** Can transiently infect humans.



- **Ringworm (*Dermatophytes*):** Highly contagious fungal infection between animals and humans.
- ***Toxoplasma gondii*:** Shed by cats, can cause abortion in ruminants and is a human health risk.

## Section 2: Breaching the Gates: Routes of Infestation

Parasites are master infiltrators. TFL **not only assume but know they are always trying to get in.**

1. **New & Returning Animals:** The single biggest risk. This includes purchased heifers, bulls, or show animals returning from fairs. They can bring in resistant parasites.
2. **People & Equipment (Fomites):** Boots, clothing, tractors, feed buckets, and veterinary equipment can carry parasite eggs, larvae, and microbes from an infected area to a clean one. *Remember the 2019 ringworm outbreak that started in the calf barn? It was traced to a visitor who had been on an infected farm days prior.*
3. **Wildlife & Other Farm Animals:**
  - **Birds (Starlings, Pigeons):** Can carry salmonella, cryptosporidia, and spread parasite eggs via droppings.
  - **Rodents (Rats, Mice):** Carry leptospirosis, salmonella, and can contaminate feed stores.
  - **Mustelids (Mongoose, Raccoons, Foxes):** Potential carriers of rabies, distemper, and internal parasites.
  - **Other Domestic (Cats, Dogs, Chickens):** Roaming farm cats shed *Toxoplasma* oocysts. Dogs can carry *Neospora caninum*, a major cause of abortion in cattle.
4. **Feed, Water, and Bedding:** Contaminated hay, purchased concentrates, or pond water can introduce parasites. Straw bedding can harbor mites and lice.
5. **Environmental Reservoirs:**

- **Wet Areas & Ponds:** Prime habitat for the snail intermediate host of liver fluke.
- **Wooded Areas & Brush:** Provide shelter for ticks and wildlife.
- **Weeds & Certain Plants:** Can harbor snails or provide shelter for tick questing.

## Section 3: The Integrated Shield: Prevention and Eradication

A single method fails. Integration is key.

### 3.1 Biosecurity

- **Quarantine:** ALL new or returning animals are isolated for a minimum of 28 days. They are tested for parasites and treated based on results *before* joining the main herd.
- **Footbaths & Changing Facilities:** Mandatory boot dips ( disinfectant) and coveralls for all staff and visitors entering animal areas.
- **Equipment Hygiene:** Dedicate equipment to specific areas. Clean and disinfect machinery (e.g., tractors used for manure spreading) before moving to clean pastures.

### 3.2 Pasture Management

- **Rotational shades:** Moving cattle to fresh housing breaks the parasite life cycle by leaving larvae behind to die off. We aim for a 30-40 day rotation.
- **Multi-Species :** Grazing sheep, goats, or horses after cattle can help break cycles, as many parasites are host-specific.
- **Mowing & Harrowing:** Cutting grass reduces larval survival. Harrowing pastures in hot, dry weather can expose and kill larvae. *Never harrow in damp, cool conditions—this just spreads larvae!*
- **Managing Wet Areas:** Fence off boggy areas to control liver fluke. Provide clean, trough water instead of pond water.

### 3.3 Nutritional Support

- A well-fed animal with a balanced mineral intake (especially copper, selenium, zinc) has a robust immune system capable of fighting off parasite burdens naturally.

### 3.4 Strategic Monitoring

- **Fecal Egg Counts (FEC):** Conducted regularly to monitor parasite load and identify which groups need treatment.
- **Blood Tests:** For monitoring levels of exposure to worms and flukes.
- **Body Condition Scoring (BCS):** A sudden drop in BCS can indicate a high parasite burden.
- **Milk Yield Monitoring:** Unexplained drops in yield are a key indicator.

### 3.5 Wildlife and Pest Control

- **Rodent Control:** Systematic baiting programs and proofing feed storage areas.
- **Bird Deterrence:** Bird-proofing buildings where possible using nets and spikes.
- **Managing Other Animals:** Farm dogs and cats should be routinely dewormed and kept away from calving areas and feed stores. Chickens should be contained.

## Section 4: Breaking the Resistance: Strategic Deworming

We do not deworm indiscriminately. We deworm strategically.

### 4.1 Understanding Resistance

Resistance occurs when a genetic trait allowing a parasite to survive a drug is passed on. Overusing and under-dosing accelerates this.

## 4.2 FAMACHA© for Haemonchus

For the blood-sucking barber's pole worm, we use the **FAMACHA©** system. This involves checking the color of the animal's ocular conjunctiva (a indicator of anemia) and only treating those that are anemic. This preserves refugia.

## 4.3 Smart Dosing

- **Refugia:** The population of parasites *not* exposed to a drug (e.g., those on pasture or in untreated animals). These "susceptible" worms dilute the resistant genes. We maintain refugia by never deworming more than 80-90% of a group.
- **Combination Therapies:** Using two de-wormer classes from different drug families (e.g., a macrocyclic lactone + a benzimidazole) simultaneously. This is highly effective against resistant strains as a parasite resistant to one drug is killed by the other.
- **Dose-and-Move:** Animals are dosed and then immediately moved on a clean feeds. This prevents them from re-infecting the pasture with eggs from any surviving resistant worms.
- **Accurate Dosing:** WEIGH animals. Under-dosing is a primary driver of resistance.

## 4.4 Record Keeping

We maintain logs of every treatment: product used, batch number, dose given, and animal ID. We perform **Fecal Egg Count Reduction Tests (FECRT)** to check a drug's efficacy: if the reduction is less than 95%, resistance is suspected.

## Section 5: Case Study - Tassells Farm's Battle with Ostertagia (2018)

- **The Problem:** Heifer group 1223 15% drop in milk yield, poor coat condition, mild diarrhea.

- **Diagnosis:** FEC revealed high *Ostertagia* egg count. A FECRT showed only an 80% reduction with fenbendazole (a benzimidazole)—confirming resistance.
- **The Response:**
  1. **Immediate:** Treated the group with a combination therapy (ivermectin + levamisole).
  2. **Pasture:** Immediately moved them to a "dirty" pasture (for silage cutting) and rested their original pasture for 60 days.
  3. **Nutrition:** Boosted their mineral supplementation.
  4. **Policy Change:** Instituted mandatory quarantine and FEC for all incoming animals. Implemented a whole-herd FEC monitoring program every 3 months.
- **The Outcome:** Within 6 weeks, yields returned to normal. Subsequent FECs showed a sustained low burden. We learned that testing is cheaper than guessing and that pasture management is as important as the drug itself.

## Glossary of Terms

- **Anthelmintic:** A drug used to treat worm infections.
- **FEC (Fecal Egg Count):** A quantitative test to measure parasite eggs per gram of feces.
- **FECRT (Fecal Egg Count Reduction Test):** A test to measure the efficacy of a dewormer by comparing FEC before and after treatment.
- **Helminth:** A parasitic worm.
- **Hypobiosis:** A period of arrested development of a parasite larvae inside the host.
- **Integrated Pest Management (IPM):** A holistic approach that uses multiple strategies for sustainable pest control.
- **Refugia:** The portion of a parasite population not exposed to treatment, preserving genetic susceptibility.
- **Zoonosis:** A disease that can be transmitted from animals to humans.
-

## Appendix

### Appendix A: Common Parasites Quick-Reference Chart

Parasite	Type	Primary Effects	Primary Control Method
<b>Ostertagia</b>	Internal Worm	Reduced yield, diarrhea	Rotation, FEC, combo dewormers
<b>Liver Fluke</b>	Internal Fluke	Liver damage, anemia	Fence wet areas, flukicidal drench
<b>Lice</b>	External	Itching, hide damage	Autumn/Winter treatment
<b>Cryptosporidia</b>	Protozoa	Calf diarrhea	Hygiene, halofuginone

### Appendix B: Sample Biosecurity Protocol Checklist

- Quarantine pen empty and clean.
- Boot dip filled with fresh disinfectant.
- Visitor sign-in sheet and protocol briefing complete.
- Equipment cleaned after use from outside sources.

### Appendix C: FECRT Calculation Guide

$$\text{FECRT \%} = [(\text{Pre-Treatment FEC} - \text{Post-Treatment FEC}) / \text{Pre-Treatment FEC}] \times 100$$

A result of <95% indicates potential resistance.

## Conclusion: Our Covenant for a Healthy Herd

At Tassells Farm Limited, we do not see parasite control as a simple task of pouring chemicals into animals. It is a sophisticated, dynamic dance with nature. It is about understanding ecology, genetics, and animal welfare. It is about being stewards of our land and our animals.

This manual is not the end of our journey, but a marker on its path. It embodies our commitment to:

- **Science over tradition.**
- **Prevention over reaction.**
- **Sustainability over short-term gains.**

We will continue to adapt, to learn, and to share our knowledge. Our goal is a thriving herd, a resilient ecosystem, and a legacy of excellence that is defined not just by the milk we produce, but by the health of every creature under our care. This is our covenant.

**Tassells Farm Limited: Where Health is Harvested.**

**Tassells Farm Limited (TFL) :**

## Integral Parasite Control Program (IPPCP)

**Version:** 2.0

**Effective Date:** .....

**Program Director:** [Head Veterinarian/Farm Manager Name.....]

**Philosophy:** This program is a proactive, holistic, and zero-tolerance system. TFL operate on the principle that **parasites are a constant threat that must be managed through rigorous science, impeccable biosecurity, and strategic intervention, not routine calendar-based dosing.**

## 1.0 Pillar I: Strict Biosecurity & Quarantine Protocol

**Objective:** To prevent the introduction of novel or resistant parasite strains onto TFL

### 1.1 Mandatory Quarantine (Q-Station Protocol):

- **Location:** A dedicated, isolated quarantine pen (Q-Station) with its own equipment, located downwind and away from the main herd. Effluent must drain away from all other animal housing and pasture.
- **Duration: Minimum 28 days** for all incoming animals (purchased heifers, bulls, show animals returning).
- **Procedure:**
  - **Day 1:** Upon arrival, collect fresh fecal samples from each animal for **Fecal Egg Count (FEC)** and **pooled sample for PCR testing** for specific parasites (e.g., *Cryptosporidium*, *Giardia*, resistant genotypes).
  - **Day 1-3:** Administer a **combination de-wormer therapy** based on vet consultation (e.g., Macrocytic Lactone (IVM) + Benzimidazole (BZ)) **after** samples are taken. *Rationale: This treats any existing burden while diagnostics are pending. Treating after sampling ensures we get a true picture of what they brought in.*
  - **Day 14:** Conduct a second FEC to check treatment efficacy.
  - **Day 28:** If animals are clinically healthy and FEC results are negative/near zero, they can be released to a designated "intro" group, not directly to the main herd.
- **Personnel:** Only designated, trained staff may enter the Q-Station. They must use dedicated PPE and boot baths specific to that area.

### 1.2 Human & Equipment Movement (Fomite Control):

- **Boot Baths:** Mandatory, well-maintained boot baths (effective disinfectant like Keno™cox or Virkon™ S at correct dilution) at the entrance/exits of **every barn, milking parlor, and the Q-Station.**



- **Visitor Policy:** All non-essential visitors are restricted from animal areas. Essential visitors (vets, consultants) must wear farm-provided disposable overalls and boots.
- **Equipment:** Machinery (tractors, trailers) used off-farm or for manure spreading must be thoroughly pressure-washed and disinfected before being used near livestock or feed areas.

## 2.0 Pillar II: Pasture & Environmental Management

**Objective:** To break the parasite life cycle in the environment, reducing the challenge to our animals.

### 2.1 Strategic Grazing System:

- **Rotational housing:** Adopt a **periodical housing change if resistance is noticed** minimum for all heifers and dry cows. This exceeds the minimum pre-patent period for most worms, leaving larvae behind to die before animals return.
- **Multi-Species :** (where applicable) to break host-specific parasite cycles.
- **"Smart" Harrowing:** Harrowing of pastures is **only permitted during hot, dry, sunny conditions** to desiccate and kill larvae. Harrowing in damp or cool weather is strictly prohibited as it spreads larvae.
- **Mowing:** Regular mowing of pastures reduces microclimates for larval survival.

### 2.2 Wetland Management:

- All boggy, wet areas are fenced off to prevent cattle access and reduce risk of liver fluke transmission.
- Clean, trough water is provided in all fields. Access to natural ponds or streams is prohibited.

### 3.0 Pillar III: Monitoring & Diagnostic-Driven Decisions

**Objective:** To treat only what needs treating, when it needs treating, with the right product.

#### 3.1 Regular Herd Surveillance Schedule:

- **Milking Herd:** FEC from a representative sample (5-10 animals per group) quarterly.
- **Youngstock (Pre-weaning):** FEC monthly.
- **Heifers (Post-weaning to first calving):** FEC every 6-8 weeks.
- **All Animals:** Annual serological testing (ELISA) for exposure to **Liver Fluke** (*Fasciola hepatica*).

#### 3.2 The Tassells Farm Treatment Thresholds:

Treatment is ONLY initiated if monitoring exceeds these thresholds:

- **Dairy Cows:** > 200 eggs per gram (epg) *and* clinical signs (e.g., low yield, BCS loss).
- **Heifers (12-24 months):** > 250 epg.
- **Calves/Weanlings (6-12 months):** > 150 epg.
- **Liver Fluke:** Positive ELISA test result + vet consultation.

#### 3.3 The Refugia-Based Treatment Strategy:

- **Selective Treatment:** We never dose more than 90% of a group. The 10% with the lowest FEC are left untreated to maintain a population of susceptible parasites in *refugia*.
- **FAMACHA© for Haemonchus:** For any group at risk, eye mucous membrane color will be scored weekly. Only animals scoring 3, 4, or 5 (anemic) will be treated.

## 4.0 Pillar IV: Strategic & Responsible Anthelmintic Use

**Objective:** To maximize efficacy and delay the development of anthelmintic resistance indefinitely.

### 4.1 The Tassells Farm Dewormer Formulary:

- **Class 1: Benzimidazoles (BZ)** - "White Drenches"
- **Class 2: Macrocyclic Lactones (ML)** - "Clear Drenches"
- **Class 3: Levamisoles (LV)** - "Yellow Drenches"
- **Class 4: Amino-Acetonitrile Derivatives (AAD)** - e.g., Monepantel (Zolvix®) - **RESTRICTED USE.** This is our "Silver Bullet" drug, only to be used under direct veterinary prescription in a combination therapy for a confirmed multi-drug resistant outbreak.

### 4.2 Dosing Rules:

- **WEIGH, DON'T GUESS:** Every animal to be treated must be weighed using a scale or weigh tape. Underdosing is a cardinal sin.
- **Equipment:** Drenching equipment is calibrated monthly.
- **Combination Therapy:** For any animal requiring treatment in the Q-Station or for a confirmed high burden in the main herd, a **simultaneous combination of two drug classes from different families** (e.g., BZ + ML) is the first-line protocol. *Rationale: This approach is proven to be highly effective against resistant strains and slows the development of new resistance.*

### 4.4 Efficacy Testing - The FECRT:

- A **Fecal Egg Count Reduction Test (FECRT)** will be conducted on each drug class used on the farm **annually**.
- **Procedure:** FEC is done on a group of animals (n=10-15) before treatment and again 14 days post-treatment.

- **Acceptable Efficacy:**  $\geq 95\%$  reduction. Anything below 90% indicates resistance, and that drug class is immediately removed from the formulary for 2 years.

## 5.0 Pillar V: Wildlife & Pest Mitigation

**Objective:** To control vectors and intermediaries in the parasite life cycle.

- **Rodents:** A professional, continuous baiting program around all feed storage and animal housing.
- **Birds:** Bird netting and deterrents in feed sheds and barns.
- **Domestic Animals:** Farm cats and dogs are on a strict, vet-prescribed deworming schedule (including praziquantel for tapeworms). They are not allowed in feed storage or calving areas.
- **Wildlife:** Perimeter fencing is maintained to deter larger pests (foxes, raccoons). Habitat management (keeping hedges trimmed back from buildings) reduces cover.

## 6.0 Compliance & Record Keeping

**Strict records are the foundation of this program.**

- **Individual Animal Health Records:** Every anthelmintic treatment is recorded, including: Animal ID, Date, Product Name, Batch Number, Dose Given, and Person Administering.
- **FEC Results:** All results are logged in a central digital database with trends tracked over time.
- **Pasture Rotation Map:** A digital map tracks which groups were in which paddocks and when.
- **Audit:** This program is audited quarterly by the Farm Manager and annually by our external veterinarian.

**Conclusion:** This program is non-negotiable. It requires diligence, investment, and a shift in mindset from all staff. The reward is a healthier, more productive herd, significantly reduced drug costs, and the peace of mind that we are farming sustainably and responsibly, protecting the efficacy of these crucial drugs for the future of Tassells Farm Limited.

**Acknowledgment of Understanding that is key.**

Disclaimer: **This manual is based on the specific practices and experiences of Tassells Farm Limited. Always consult with your veterinarian to develop a parasite control program tailored to your farm's specific needs and local parasite challenges.**



**Forget routine dosing. At Tassells Farm Limited, we've rewritten the playbook. Parasite control is no longer chemical warfare but ecological wisdom. Through Operation Refugia, rigorous monitoring, and integrated biosecurity, TFL turns the stealthy stowaways of 2018 into a sustainable defense system for the future.**

**This manual is our covenant for a healthy herd, a resilient ecosystem, and a legacy of excellence.**

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