
Professional Certificate in Advanced Equine Parasitology

Introduction to Equine Parasitology

Equine parasitology is the scientific study of organisms that live in, on, or interact with horses in a way that may cause disease, reduced performance, or economic loss. A solid grasp of the terminology used in this field is essential for accurate communication, diagnosis, treatment, and research. The following glossary provides detailed explanations of the most important terms and concepts that students of the Professional Certificate in Advanced Equine Parasitology must master. Each entry includes a definition, examples, practical applications, and common challenges associated with the term.

Parasite – Any organism that obtains nutrients at the expense of a host. In the equine context, parasites can be classified as endoparasites (living inside the host) or ectoparasites (living on the surface). Endoparasites include nematodes, cestodes, trematodes, and protozoa, while ectoparasites comprise insects such as flies and mites. Understanding whether a parasite is internal or external influences both diagnostic approach and control strategies.

Host – The animal that harbors a parasite. The horse is the definitive host for most equine parasites, meaning the parasite reaches sexual maturity and reproduces within the horse. Some parasites also require an intermediate host to complete their life cycle; for example, the tapeworm *Anoplocephala perfoliata* uses oribatid mites as intermediate hosts. Recognizing the host status of horses helps determine where control measures should be applied.

Definitive host – The organism in which a parasite completes its sexual development. For most equine helminths, the horse is both the definitive and the only host required for the parasite's life cycle. However, some parasites, such as the lungworm *Dictyocaulus arnfieldi*, may have additional wildlife hosts that serve as reservoirs, complicating control programs.

Intermediate host – An organism that harbors a parasite for a developmental stage but not for sexual reproduction. The role of intermediate hosts is critical in the epidemiology of parasites like *Anoplocephala perfoliata* (oribatid mites) and the larval stages of bot flies (*Gasterophilus* spp.) that develop in the environment before infecting horses. Control strategies often target the environment to reduce exposure to intermediate hosts.

Reservoir host – A species that maintains a parasite in the environment without showing overt disease, thereby serving as a source of infection for other susceptible animals. Donkeys and mules frequently act as reservoir hosts for *Dictyocaulus arnfieldi*, making cross-species management essential in mixed-species farms.

Life cycle – The series of developmental stages that a parasite undergoes from egg to adult, including any

required hosts or environmental phases. Equine parasites exhibit a range of life cycles, from simple direct cycles (e.G., Small strongyles) to complex indirect cycles involving intermediate hosts (e.G., Tapeworms). Mastery of life-cycle knowledge enables practitioners to predict infection timing, seasonal peaks, and optimal deworming windows.

Direct life cycle – A life cycle that does not require an intermediate host; eggs are passed in feces, develop in the environment, and become infective larvae that are ingested by the same host species. Small strongyles (Cyathostominae) exemplify a direct cycle, with infective L3 larvae on pasture being the primary source of infection for grazing horses.

Indirect life cycle – A life cycle that involves one or more intermediate hosts. Tapeworm *Anoplocephala perfoliata* utilizes oribatid mites to develop from egg to cysticercoid before the horse ingests the infected mite. Understanding indirect cycles is essential for designing environmental control measures, such as pasture mowing or manure management, that disrupt transmission.

Prepatent period – The interval between infection and the appearance of diagnostic stages (e.G., Eggs or larvae) in the host's feces. For *Strongylus vulgaris*, the prepatent period is approximately 6–8 weeks. Knowledge of prepatent periods informs timing of fecal examinations and helps avoid false-negative results when testing too early after exposure.

Patent period – The time during which a parasite is actively shedding diagnostic stages and can be detected in feces. The patent period of small strongyles can last many months, providing a relatively wide window for detection via fecal egg counts. However, seasonal variations in egg shedding may still affect detection sensitivity.

Fecal egg count (FEC) – A quantitative method for estimating the number of parasite eggs per gram of feces (EPG). The most common technique is the McMaster flotation, which provides an approximate count based on a known volume of fecal suspension. FECs are used to assess infection intensity, monitor anthelmintic efficacy, and guide targeted deworming decisions. Challenges include variability due to sampling error, egg shedding fluctuations, and the presence of mixed infections that may mask low-level infestations.

Egg per gram (EPG) – The numeric output of a fecal egg count, representing the concentration of parasite eggs in a gram of feces. Thresholds for treatment vary by region but commonly a value of 200–500 EPG is considered the point at which deworming is recommended for many strongyle infections. Interpretation must consider the specific parasite species, age of the horse, and management context.

Larval culture – A laboratory procedure that incubates fecal material under controlled conditions to allow strongyle eggs to hatch and develop to the third-stage larva (L3). Morphological identification of L3 larvae enables differentiation between large strongyles (*Strongylus* spp.) And small strongyles (Cyathostominae). Larval culture is indispensable for epidemiological studies but requires appropriate temperature, humidity, and skilled microscopy.

Baermann technique – A method used to recover motile larvae from feces, primarily for detecting lungworm (*Dictyocaulus*) and strongyle larvae. The sample is placed on a porous material in water, and larvae migrate out of the feces and collect at the bottom of a funnel. The Baermann technique is highly sensitive for detecting low-level infections but can be labor-intensive and requires fresh, unpreserved feces.

Serology – Diagnostic tests that detect antibodies or antigens in the host's blood. For equine parasites, serology is most commonly applied to detect exposure to bots (*Gasterophilus* spp.) Or to assess infection with the tapeworm *Anoplocephala perfoliata*. Serological assays can identify pre-patent infections, but they do not differentiate between active and past exposure, which may lead to overtreatment if not interpreted carefully.

Polymerase chain reaction (PCR) – A molecular technique that amplifies parasite DNA from fecal or tissue samples, allowing species-specific detection. PCR assays have been developed for strongyles, tapeworms, and protozoa such as *Cryptosporidium*. While PCR offers high sensitivity and specificity, it is more costly and requires specialized equipment, limiting its routine use in many veterinary practices.

Anthelmintic – A drug that expels or kills parasitic worms. Major anthelmintic classes used in horses include benzimidazoles (e.g., Fenbendazole), macrocyclic lactones (e.g., Ivermectin, moxidectin), and tetrahydropyrimidines (e.g., Pyrantel). Each class has a distinct mode of action, spectrum of activity, and resistance profile. Proper selection and rotation of anthelmintics are crucial to preserve efficacy.

Benzimidazole – A class of anthelmintics that disrupt microtubule formation in nematodes, leading to paralysis and death. Fenbendazole and oxbendazole are commonly used benzimidazoles in equine practice. Resistance to benzimidazoles is widespread among small strongyles, making it essential to perform fecal egg count reduction tests (FECRTs) before relying on this class for control.

Macrocyclic lactone – A group of anthelmintics that target glutamate-gated chloride channels, causing hyperpolarization of nematode nerve cells. Ivermectin, moxidectin, and doramectin fall within this class. Macrocyclic lactones are effective against a broad range of parasites, including large strongyles and lungworms, but resistance has emerged in some cyathostomin populations, especially in regions with frequent prophylactic use.

Tetrahydropyrimidine – An anthelmintic class represented by pyrantel, which acts as a nicotinic acetylcholine receptor agonist, causing spastic paralysis of nematodes. Pyrantel is primarily effective against small strongyles and some large strongyles but has limited activity against tapeworms and bots. Its relatively short half-life makes it useful for rapid reduction of egg shedding but less suitable for long-acting control.

Resistance – The heritable ability of a parasite population to survive doses of anthelmintic that would normally be lethal. Anthelmintic resistance (AR) is a growing global concern, especially for cyathostomin strongyles. Resistance arises through repeated exposure to sub-therapeutic drug levels, inadequate dosing, and lack of refugia. Detecting AR requires systematic monitoring using fecal egg count reduction tests.

Refugia – The proportion of a parasite population that is not exposed to anthelmintics at a given time, usually because those parasites reside in untreated animals or in the environment. Maintaining a refugia helps preserve susceptible genes within the population, slowing the development of resistance. Strategic deworming programs aim to preserve refugia while still reducing parasite burdens to acceptable levels.

Fecal egg count reduction test (FECRT) – An in-field assay used to evaluate anthelmintic efficacy. Baseline fecal egg counts are taken before treatment, and a second sample is collected 10–14 days after drug administration. The percentage reduction in egg counts indicates drug performance; a reduction of Strategic deworming – A control approach that administers anthelmintics at predetermined intervals based on seasonal risk and life-cycle knowledge rather than on individual fecal egg counts. While historically common, strategic deworming can accelerate resistance if applied indiscriminately. Modern programs favor targeted or selective deworming, integrating FECRT data and pasture management.

Targeted deworming – Also known as selective deworming, this strategy treats only those horses that exceed a defined fecal egg count threshold, thereby reducing drug pressure on the overall parasite population. Targeted deworming relies on regular monitoring, accurate FEC interpretation, and awareness of the herd's infection dynamics. It is considered a best-practice approach for preserving anthelmintic efficacy.

Pasture management – Non-chemical interventions designed to reduce parasite transmission. Techniques include rotational grazing, removal of fecal pats, harrowing, and maintaining optimal stocking densities. For cyathostomin control, frequent removal of manure reduces the number of infective L3 larvae on pasture. For tapeworms, regular mowing diminishes the abundance of oribatid mites that serve as intermediate hosts.

Quarantine – A period of isolation for newly acquired horses to allow for diagnostic testing and, if necessary, treatment before integration with the resident herd. Quarantine protocols typically involve a 2–4 week isolation with fecal examinations at entry and again before release. This practice prevents introduction of resistant parasites and novel species into established populations.

Biosecurity – A set of practices designed to prevent the introduction and spread of infectious agents, including parasites. Biosecurity measures for equine facilities include controlling horse movement, using dedicated equipment, disinfecting transport vehicles, and enforcing strict hand-washing protocols. Effective biosecurity reduces the risk of importing resistant parasites and supports overall herd health.

Hypobiosis – A state of arrested development in which parasite larvae remain dormant within the host for extended periods, often in response to unfavorable environmental conditions. Cyathostomin larvae can undergo hypobiosis for months, emerging synchronously when conditions improve, potentially causing a sudden surge in egg shedding and clinical disease. Recognizing hypobiosis is vital for timing deworming and anticipating disease outbreaks.

Larval arrest – Synonymous with hypobiosis, this term emphasizes the physiological pause in larval development. In horses, larval arrest of cyathostomins typically occurs in the small intestine's mucosa, where larvae can persist for up to a year. Failure to address arrested larvae can result in "larval cyathostominosis," a

severe condition characterized by weight loss, diarrhea, and protein loss.

Cyathostominosis – A disease caused by massive emergence of previously arrested cyathostomin larvae, leading to extensive intestinal inflammation, protein loss, and potentially fatal colic. Clinical signs include weight loss, progressive diarrhea, peripheral edema, and hypoalbuminemia. Diagnosis relies on clinical suspicion, fecal egg counts (often low despite severe disease), and histopathology. Prompt treatment with high-dose benzimidazoles is required, but the condition has a high mortality rate if not addressed early.

Strongyle – A broad term for nematodes of the superfamily Strongyloidea that infect the gastrointestinal tract of horses. Strongyles are divided into large strongyles (subfamily Strongylinae) and small strongyles (subfamily Cyathostominae). Large strongyles, such as *Strongylus vulgaris*, are known for causing arterial lesions, while small strongyles are the most prevalent and have become a major focus due to widespread anthelmintic resistance.

Large strongyle – Members of the Strongylinae subfamily, including *Strongylus vulgaris*, *Strongylus equinus*, and *Strongylus edentatus*. These parasites are characterized by long, robust bodies and a predilection for the large intestine. *Strongylus vulgaris* is notorious for its larval migration through the mesenteric arteries, leading to arteritis, thrombosis, and intestinal infarction. Although prevalence has declined with effective deworming, resurgence can occur when resistance compromises control.

Small strongyle – Also known as cyathostomins, these are the most abundant equine gastrointestinal nematodes, encompassing over 50 species. Small strongyles reside in the small colon and caecum, where they cause mucosal inflammation, villous atrophy, and, in severe cases, larval cyathostominosis. Their high reproductive capacity and rapid life cycle make them a formidable management challenge, especially in the face of growing anthelmintic resistance.

Cyathostomin – A term referring specifically to the small strongyle group (family Cyathostomidae). The most common species include *Cyathostomum catinatum*, *Cylicocyclus nassatus*, and *Cylicostephanus longibursa*. Cyathostomins are distinguished by their short buccal capsules and the ability of their larvae to undergo hypobiosis. Accurate identification often requires larval culture and microscopic examination of L3 morphology.

Strongylus vulgaris – The “large strongyle” most implicated in severe vascular disease in horses. Its L3 larvae migrate through the cranial mesenteric artery, causing arteritis, intimal thickening, and thrombosis. Clinical consequences range from intermittent colic to life-threatening intestinal infarction. Diagnosis is challenging because fecal egg counts may be low; therefore, targeted deworming based on risk assessment and periodic larval culture is recommended.

Oxyuris equi – The pinworm that inhabits the large intestine and rectum of horses. Adult pinworms are slender, white, and measure 8–10 cm in length. The characteristic clinical sign is the presence of cylindrical, white eggs around the perineum, often described as “pinworm egg deposits.” Pinworm infection is generally mild, causing pruritus and occasional tail rubbing, but heavy infestations can lead to irritation and

secondary bacterial infection. Diagnosis is made by direct observation of adult worms in the feces or by identifying eggs on the perineal area. Treatment typically involves a single dose of pyrantel or benzimidazole, with repeat dosing after two weeks to eliminate newly hatched larvae.

Gasterophilus spp. – Bot flies that deposit eggs on the hair of the horse's forehead. After ingestion, the larvae migrate through the oral cavity, esophagus, and stomach, eventually attaching to the gastric mucosa. The three most common species are *Gasterophilus intestinalis*, *G. Nasalis*, and *G. Haemorrhoidalis*. Bot infestation is usually subclinical but can cause gastric ulceration, gastritis, and, rarely, obstruction. Diagnosis relies on visual identification of eggs on the hair or retrieval of larvae during gastroscopy. Control includes strategic deworming with ivermectin or moxidectin in late winter or early spring before the eggs hatch.

Anoplocephala perfoliata – The tapeworm of horses, found in the ileocecal junction. Adult tapeworms are flat, segmented, and can reach lengths of 1–3 m. Infection occurs when horses ingest oribatid mites that carry the cysticercoid stage. Clinical signs range from mild intermittent colic to severe intestinal obstruction, especially in horses with a history of "saw-dust" colic. Diagnosis is challenging because egg shedding is intermittent and low; a fecal sedimentation technique with multiple samples increases detection sensitivity. Treatment of choice is praziquantel, often administered in combination with a broad-spectrum anthelmintic to address co-existing nematodes.

Dictyocaulus arnfieldi – The lungworm that primarily infects donkeys but can cause pulmonary disease in horses, especially when shared pastures are used. Adult worms reside in the bronchi and bronchioles, producing L1 larvae that are coughed up, swallowed, and passed in feces. Clinical manifestations include coughing, dyspnea, and exercise intolerance. Diagnosis is performed using the Baermann technique to recover L1 larvae from feces. Control involves strategic use of macrocyclic lactones, but resistance concerns necessitate careful monitoring and integration of pasture management.

Parasite burden – The quantity of parasites present within a host at a given time, often expressed as eggs per gram (EPG) for nematodes. Burden assessment guides treatment decisions; low burdens may be tolerated without intervention, whereas high burdens increase the risk of pathology and transmission. Burden is influenced by age, immunity, nutrition, and management practices.

Immunity – The host's ability to resist infection or limit parasite growth. Horses develop partial, age-related immunity to many parasites; foals are particularly susceptible, while mature adults often maintain lower fecal egg counts despite exposure. Immunity is not sterilizing; thus, horses can remain carriers and contribute to pasture contamination. Enhancing immunity through proper nutrition, reduced stress, and strategic deworming can improve overall herd health.

Diagnostic sensitivity – The probability that a test will correctly identify an infected animal. Sensitivity is affected by sample size, parasite life stage, and technique. For example, the McMaster flotation method has a detection limit of 50 EPG, meaning low-level infections may be missed. Combining multiple diagnostic approaches (e.g., FEC plus larval culture) improves overall sensitivity.

Diagnostic specificity – The probability that a test will correctly identify a non-infected animal. Specificity is crucial to avoid false-positive results that could lead to unnecessary treatment. Microscopic identification of strongyle eggs is generally specific, but cross-reactivity can occur with other nematodes that produce morphologically similar eggs. Confirmatory tests such as PCR enhance specificity.

Egg morphology – The shape, size, and structural features of parasite eggs used for identification. Strongyle eggs are typically oval, 70–90 µm long, with a thin shell, while pinworm eggs are barrel-shaped, 70–80 µm long, and contain polar plugs. Accurate interpretation of egg morphology assists in distinguishing between parasite groups and informs treatment selection.

Larval morphology – The physical characteristics of infective larvae (L3) that aid species identification. In larval cultures, large strongyle L3 larvae have a longer tail and a distinct sheath, whereas cyathostomin L3 are shorter with a blunt tail. Mastery of larval morphology is essential for differentiating resistant species from susceptible ones.

Prevalence – The proportion of a population that is infected at a specific point in time. Prevalence surveys provide epidemiological data that help shape herd-level control programs. High prevalence of cyathostomins may indicate inadequate deworming or environmental contamination, while low prevalence of large strongyles suggests effective control measures.

Incidence – The rate of new infections occurring in a population over a defined period. Incidence data are valuable for evaluating the impact of interventions such as pasture rotation or targeted deworming. A decline in incidence after implementing a new management plan indicates successful reduction of transmission.

Risk factor – Any attribute, behavior, or environmental condition that increases the likelihood of parasite infection. Common risk factors for equine parasites include high stocking density, poor manure management, co-grazing with donkeys (for lungworm), and inadequate deworming protocols. Identifying risk factors enables targeted mitigation strategies.

Environmental contamination – The presence of infective parasite stages (e.G., Eggs, larvae, cysticercoids) in the surrounding environment. Contamination levels are directly related to herd management practices. Regular removal of feces, strategic grazing, and avoiding over-stocking reduce environmental load and lower infection pressure.

Artemisia – A genus of plants sometimes investigated for natural anthelmintic properties. While some studies suggest that Artemisia extracts may have modest activity against certain nematodes, their efficacy is not yet proven in field conditions, and they should not replace conventional anthelmintics in a control program.

Pharmacokinetics – The study of how a drug is absorbed, distributed, metabolized, and eliminated by the host. Understanding pharmacokinetics is vital for selecting appropriate dosing intervals and ensuring

therapeutic drug levels. For example, moxidectin has a longer half-life than ivermectin, providing extended protection against larval development.

Half-life – The time required for the concentration of a drug in the body to decrease by 50%. A longer half-life, as seen with moxidectin (approximately 28 days), offers prolonged efficacy, whereas a shorter half-life, such as pyrantel (approximately 6 hours), necessitates more frequent administration for sustained control.

Therapeutic index – The ratio between a drug's toxic dose and its effective dose. Anthelmintics used in horses generally have a wide therapeutic index, allowing for a margin of safety in dosing. However, overdosing can still cause adverse reactions, especially with macrocyclic lactones in foals, highlighting the importance of accurate weight estimation.

Dosage calculation – Determining the correct amount of anthelmintic based on the horse's body weight. Inaccurate dosing is a leading cause of resistance development; under-dosing fails to eliminate all parasites, while overdosing may increase toxicity risk. Weighing horses or using calibrated weight tapes improves dosing accuracy.

Weight tape – A measuring device that estimates a horse's weight based on its heart girth and body length. Weight tapes are a practical alternative to scales, particularly in field settings. Consistent use of weight tapes helps ensure correct anthelmintic dosing and reduces the likelihood of resistance selection.

Drug rotation – The practice of alternating between different anthelmintic classes over time to reduce selection pressure for resistant parasites. Rotating benzimidazoles with macrocyclic lactones, for example, can delay resistance emergence, but rotation must be accompanied by regular efficacy testing to avoid inadvertently selecting for multi-drug resistance.

Combination therapy – Administering two or more anthelmintics simultaneously, often to broaden the spectrum of activity and mitigate resistance. Common combinations include ivermectin with praziquantel (targeting nematodes and tapeworms) or fenbendazole with pyrantel. While combination therapy can be effective, it may also increase cost and the risk of drug interactions; therefore, it should be used judiciously.

Integrated parasite management (IPM) – A holistic approach that combines chemical, biological, and management strategies to control parasites sustainably. IPM for horses incorporates targeted deworming, pasture rotation, fecal monitoring, quarantine, and biosecurity. The goal is to maintain parasite burdens below clinical thresholds while preserving anthelmintic efficacy.

Biocontrol – Use of natural predators or antagonists to reduce parasite populations. In equine parasitology, biocontrol research includes the use of nematophagous fungi (e.g., *Paecilomyces lilacinus*) that can infect and kill strongyle larvae in the environment. Although promising, biocontrol methods are not yet widely adopted in commercial equine operations.

Larvicidal – Referring to agents that kill parasite larvae. Certain pasture treatments, such as copper sulfate applications, have larvicidal effects on strongyle L3 stages. However, environmental concerns and potential toxicity limit their routine use, underscoring the need for balanced decision-making.

Colic – A broad term for abdominal pain in horses, often associated with gastrointestinal disturbances. Parasite-related colic can result from large strongyle arteritis, tapeworm attachment at the ileocecal valve, or impaction caused by heavy bot infestations. Recognizing parasitic causes of colic is essential for timely intervention and appropriate deworming.

Impaction – Obstruction of the gastrointestinal tract by solid material. In horses, impaction may be secondary to excessive parasite load, particularly with high numbers of tapeworms or bots that cause mechanical blockage. Clinical signs include reduced appetite, abdominal distension, and altered fecal output. Radiographs and ultrasound aid diagnosis, while surgical or medical removal of the obstruction is required.

Protein loss – A clinical consequence of severe intestinal inflammation, often seen in cyathostomiasis. Loss of serum albumin leads to edema, weight loss, and weakened immunity. Laboratory evaluation of serum protein levels assists in diagnosing the severity of cyathostomin infection and monitoring response to treatment.

Hypoproteinemia – Decreased plasma protein concentration, frequently observed in horses with heavy cyathostomin burdens. Management includes aggressive anthelmintic therapy, supportive nutrition, and monitoring for secondary infections.

Weight loss – A common sign of chronic parasitic infection, particularly with strongyle and tapeworm infestations. Persistent weight loss despite adequate nutrition signals the need for parasitological investigation and may indicate suboptimal deworming efficacy.

Foal – A young horse up to one year of age. Foals are especially vulnerable to parasites because they have immature immune systems and may acquire infection via nursing or contaminated environments. Early life deworming protocols often involve low-dose pyrantel or benzimidazole, followed by strategic dosing as the foal matures.

Weanling – A horse between six months and two years of age, transitioning from milk to solid feed. Weanlings experience a surge in parasite exposure as they begin grazing, making this period critical for monitoring fecal egg counts and adjusting deworming schedules.

Adult horse – Equine individuals older than two years. Adult horses generally have higher natural resistance to many parasites, but they can still harbor significant burdens, especially in high-risk environments. Adult management focuses on maintaining low parasite loads through monitoring and selective treatment.

Geriatric horse – An older horse, typically over 15–20 years of age. Age-related decline in immunity can

increase susceptibility to parasites, and comorbidities may complicate treatment choices. Dose adjustments and careful monitoring for drug toxicity are advisable in this population.

Pasture contamination index (PCI) – A quantitative estimate of the number of infective larvae per square meter of pasture. PCI is derived from systematic larval sampling and can guide grazing rotations. High PCI values indicate a need for pasture rest or strategic deworming to lower infection pressure.

Grazing rotation – The practice of moving horses between paddocks on a scheduled basis to allow pastures time to “rest” and reduce larval load. A typical rotation might involve a 30-day grazing period followed by a 60-day rest, during which larvae die off due to lack of a host. Effective rotation requires careful record-keeping and knowledge of local climate influences on larval survival.

Manure management – Strategies for handling horse feces to minimize environmental contamination. Composting manure at temperatures exceeding 55 °C for at least three weeks destroys most parasite eggs and larvae. Alternatively, frequent removal of manure from high-traffic areas reduces the risk of ingestion by grazing horses.

Sanitation – General cleanliness measures that limit parasite transmission. This includes regular cleaning of water troughs, disinfection of equipment, and removal of feed spillage that could attract flies or other vectors. Good sanitation complements other control methods and reduces the overall parasite burden.

Fly control – Measures aimed at reducing populations of biting flies that can mechanically transmit parasites such as *Oxyuris equi* eggs. Fly traps, insecticide-treated blankets, and strategic stabling during peak fly activity periods are common approaches. Effective fly control diminishes the likelihood of mechanical transmission of pinworm eggs.

Resistance monitoring – Ongoing surveillance to detect anthelmintic resistance within a herd. Resistance monitoring typically involves periodic FECRTs, molecular assays for resistance genes, and analysis of treatment failure patterns. Early detection allows for timely modification of deworming protocols to prevent widespread resistance.

Resistance allele – A genetic variant in a parasite population that confers survival after exposure to an anthelmintic. For benzimidazole resistance, mutations in the β -tubulin gene (e.g., F200Y) are well documented. Molecular detection of resistance alleles provides a rapid, sensitive method for identifying emerging resistance before clinical failure becomes apparent.

Multidrug resistance (MDR) – The situation in which a parasite population shows reduced susceptibility to two or more anthelmintic classes. MDR is of particular concern for cyathostomins, where resistance to benzimidazoles, macrocyclic lactones, and tetrahydropyrimidines has been reported in several regions. MDR limits therapeutic options and underscores the importance of integrated management.

Selective therapy – Another term for targeted deworming, emphasizing the decision to treat only horses

that meet specific criteria (e.G., High FEC, clinical signs). Selective therapy reduces overall drug use, preserves refugia, and slows resistance development while still protecting animal health.

Strategic timing – Scheduling deworming events to coincide with periods of peak parasite transmission or larval development. For example, treating horses in late autumn targets overwintering strongyle larvae before they become infective in spring. Strategic timing maximizes drug impact and reduces the number of treatments needed throughout the year.

Seasonal variation – Fluctuations in parasite prevalence and larval development rates driven by climatic factors such as temperature, humidity, and rainfall. Warm, moist conditions accelerate strongyle development, leading to higher infection rates in spring and early summer. Understanding seasonal patterns assists in planning monitoring and treatment schedules.

Climate impact – The influence of regional climate on parasite life cycles. In temperate zones, strongyle larvae may survive the winter, whereas in colder regions they may be killed by frost, reducing the need for winter deworming. Conversely, milder winters associated with climate change can prolong larval survival, increasing infection pressure.

Heat-stable – Refers to parasite eggs or larvae that can withstand elevated temperatures without loss of viability. Some strongyle eggs are moderately heat-stable, which means that simple sun drying of pastures may not be sufficient to eliminate infective stages. Heat-stable eggs require more aggressive control measures, such as composting or chemical treatment.

Cold-tolerant – Parasite stages that survive low temperatures. Certain cyathostomin larvae can endure sub-zero temperatures, allowing them to persist through winter and emerge in spring. Cold tolerance complicates control strategies in colder climates and may necessitate earlier deworming.

Egg hatch assay (EHA) – An in-vitro test that measures the ability of parasite eggs to hatch under various drug concentrations. EHA is used to detect benzimidazole resistance by comparing hatch rates in the presence of fenbendazole to a control. While labor-intensive, EHA provides a quantitative resistance metric that complements FECRT data.

Larval development assay (LDA) – Similar to EHA, LDA evaluates the effect of anthelmintics on larval development from egg to L3. LDA is particularly useful for assessing resistance to macrocyclic lactones. The assay requires specialized laboratory facilities and expertise, limiting its routine use.

Pharmacodynamics – The study of how a drug affects a parasite at the molecular level, including the mechanism of action and the relationship between drug concentration and parasite mortality. Understanding pharmacodynamics helps in optimizing dosing regimens and anticipating potential resistance mechanisms.

Pharmacovigilance – The systematic monitoring of adverse drug reactions and treatment failures in the

field. In equine parasitology, pharmacovigilance data contribute to post-market surveillance of anthelmintic safety and efficacy, informing regulatory decisions and best-practice guidelines.

Adverse drug reaction (ADR) – An unwanted or harmful effect resulting from the administration of an anthelmintic.