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Point-of-care testing in veterinary medicine

Point-of-care testing is revolutionising veterinary pathology.

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Commercial point-of-care testing devices have increasing application in veterinary medicine, with benefits including expedited treatment, improved animal welfare and greater zoonotic disease surveillance. In this article, Dr Pamela Kelly and Professor Roberto La Ragione explore some examples of point-of-care tests currently in use in veterinary pathology.

Point-of-care testing (POCT) has revolutionised veterinary practice by enabling rapid diagnostic capabilities, where and when they are most needed. Often referred to as pen-side, animal-side, farm-side, hive-side, barn-side, pond-side or flock-side testing, these diagnostic tools allow veterinarians to make immediate clinical decisions, expediting treatment and improving patient outcomes. While sharing similarities with human medicine POCT, veterinary applications face unique challenges (different sample types, etc.) and serve additional purposes beyond individual patient care, including surveillance for zoonotic diseases and safeguarding food supplies.

In this article, we highlight some of the POCT options that are currently commercially available. However, it should be noted that the list is not exhaustive, and many tests are also currently in development.

Regulatory background

The general requirements of POCT used in hospitals, clinics and by a healthcare organisation are outlined in International Standard ISO 22870:2016. However, unlike human POCT, veterinary POCT operates within a less coordinated regulatory environment. Currently, no specific EU legislation governs veterinary POCT products, though they must comply with Directive 85/374/EEC on product liability and Directive 2001/95/EC on general product safety. The

regulatory landscape across Europe remains fragmented, with some member states like Belgium and Italy adopting national laws to ensure safety and performance, while others lack specific regulations.[1]

In the United Kingdom, following Brexit, veterinary POCT falls under the Veterinary Medicines Directorate's purview, which provides oversight similar to that for other veterinary medical products. However, the specific regulatory requirements remain less stringent than those for human diagnostic devices. This has resulted in significant interest in the veterinary market and the recent launch of many new rapid diagnostic tests.

The United States presents a contrasting approach, where veterinary POCT is regulated by the Food and Drug Administration's Centre for Veterinary Medicine. Notably, unlike human POCT, veterinary tests are not subject to compulsory pre-market clearances, with regulatory issues typically addressed in the post-marketing phase. Tests that detect animal diseases or assess immunological status are classified as veterinary biological products under the Virus-Serum-Toxin Act, requiring licensing through the United States Department of Agriculture's Animal and Plant Health Inspection Service before market entry.

Veterinary medicine encompasses 3 primary subspecialties: small animal practice (focusing primarily on companion animals such as dogs and cats), farm animal practice (dealing with livestock including cattle, sheep, pigs, and poultry) and equine practice (specialising in horses). Each specialty area addresses distinctly different patient populations with their own unique physiologies, disease presentations and diagnostic challenges.

While some POCT tests span across all 3 disciplines, such as basic haematology and biochemistry, many are tailored to address species-specific conditions and diseases. For instance, small animal practitioners frequently test for companion animal infectious diseases, farm animal practitioners prioritise production-related parameters and herd health metrics, and equine specialists focus on performance-limiting conditions and foal health assessments. This specialisation drives both the development and application of POCT tailored to each practice area's distinct needs, while also reflecting the common underlying principles of veterinary diagnostics.

Examples of POCT used in small animal practice

Blood gas analysers

Blood gas analysis provides critical information about cardiopulmonary and acid-base status in critically ill patients. Arterial samples primarily assess pulmonary function, while venous samples evaluate cardiac performance and whole-body acid-base status. The Abaxis Vetscan i-STAT

handheld analyser offers rapid blood gas, electrolyte and chemistry testing in a portable format. The IDEXX VetStat Electrolyte and Blood Gas Analyzer is another widely used system providing comprehensive results within minutes.

Ammonia meters

Point-of-care ammonia measurement aids in diagnosing hepatic encephalopathy and monitoring treatment response in dogs with liver dysfunction. These tools are particularly valuable when bile acid tests are unavailable or potentially inaccurate. The PocketChem BA PA-4140 (Arkray) provides rapid ammonia measurements and is designed for veterinary use, offering results within minutes from a small blood sample.

Portable blood glucose monitors

These devices are essential for screening hypoglycaemia or hyperglycaemia and assessing glycaemic control in diabetic patients. They enable both in-clinic monitoring and home testing for ongoing management of diabetic dogs and cats. The AlphaTRAK 2 (Zoetis) is specifically calibrated for dogs and cats, addressing the species-specific differences in glucose distribution that can affect readings from human glucose meters.

Coagulation analysers

Screening coagulation assays including prothrombin time (PT), activated partial thromboplastin time (APTT) and thrombin clot time are fundamental for assessing secondary haemostasis. The activated coagulation time serves as a useful screening tool for severe coagulation factor deficiencies. The Coag Dx Analyser (IDEXX) provides rapid PT and APTT results in-clinic, while the VetScan VSpro (Abaxis) offers PT, APTT and fibrinogen testing capabilities.

Immunoassays

Enzyme-linked immunosorbent assays (ELISAs) remain the most widely used immunoassay configuration in veterinary medicine. SNAP tests, which perform sequential ELISA steps with minimal user intervention, are common for detecting infectious diseases and other conditions. IDEXX SNAP tests are widely used for detecting feline immunodeficiency virus, feline leukaemia virus, parvovirus, leptospirosis and *Giardia*. The SNAP cPL and fPL (canine and feline pancreas-specific lipase, respectively) tests aid in diagnosing pancreatitis in dogs and cats, delivering results within 10 minutes.

Pathogen detection

A number of tests have been developed for the detection of pathogens; these tests can be antigen, culture-based or nucleic-acid-based (PCR, loop-mediated isothermal amplification (LAMP), direct sequencing, etc.).[2] The use of isothermal tests, such as LAMP, enables tests to be performed outside of a traditional laboratory setting, without specialist equipment, while still providing rapid and accurate results.[3]

Nucleic-acid-based pathogen detection tests have been developed for a number of companion animal diseases, including anaplasmosis, babesiosis, toxoplasmosis, mycoplasmosis, leptospirosis, bartonellosis, feline parvo, feline leukaemia, feline immunodeficiency, chlamydiosis, canine leishmaniasis, canine distemper, Lyme disease, canine parvo, kennel cough (iiPCR, GeneReach). Generic tests to confirm the presence or absence of bacteria in a sample have also been developed (RapidBac Vet).

POCT can also be used to detect antibiotic resistance and a number of tests are being developed to simultaneously detect pathogens and antimicrobial resistance genes and perform antimicrobial susceptibility testing. These tests can aid pragmatic prescribing and thus contribute to improving antimicrobial stewardship.[4]

Examples of large animal practice POCT

Ketone measurements

On-farm ketone blood tests are crucial for identifying post-parturient cows at risk of ketosis or left displaced abomasum. The Precision Xceed Pro (Abbott) and PortaBHB (PortaCheck) provide rapid cow-side ketone measurements, helping identify subclinical ketosis before clinical signs appear.

Packed cell volume and total protein testing

Using a refractometer and centrifuge, practitioners can quickly assess for anaemia and hypoproteinaemia in large animals. The VetLab Station (IDEXX) integrates with various analysers to provide comprehensive haematology results, while portable refractometers like those from Reichert offer field-ready options.

California mastitis test (CMT)

This simple cow-side test indicates somatic cell count in milk by disrupting cell membranes and creating a gel reaction, enabling detection of subclinical mastitis cases. ImmuCell's CMT-TEST provides an immediate indication of mastitis severity through a visible gel reaction, while the PortaSCC (PortaCheck) offers a more quantitative approach to somatic cell counting.

Enteric pathogen ELISA tests

Multiplex ELISA tests for calf diarrhoea cases detect common pathogens, including rotavirus, coronavirus, *E. coli* F5 (K99), and *Cryptosporidium parvum* in a single sample. The Rainbow Calf Scour 5 Test (Bio-X Diagnostics) simultaneously detects 5 major enteric pathogens, while the Bovine Enterichek (Biovet) offers similar multi-pathogen detection capabilities.

Pathogen detection

Several POCT tests have been developed to detect pathogens in livestock and poultry (antigen, culture and nucleic-acid-based), including rapid nucleic-acid-based, tests for mycoplasmosis, trichomoniasis, salmonellosis, influenza, Newcastle disease, infectious bursal diseases, Marek's disease, proliferative enteropathy, porcine reproductive and respiratory syndrome virus (PRRSV), tuberculosis, brucellosis, Q fever, infectious bovine rhinotracheitis (IBR) and bovine viral diarrhoea virus (BVDV) (iiPCR, GeneReach).

Examples of equine practice specialised POCTs

Serum amyloid A testing

Serum amyloid A (SAA) is a highly sensitive acute-phase inflammatory protein used to monitor early response to infection/inflammation and treatment outcomes. Most healthy horses have very low or undetectable levels, which rise rapidly during acute inflammation. The StableLab SAA test (Zoetis) provides stall-side SAA results within 10 minutes, while the EquiChek (SciMed) offers a lateral flow format for rapid field testing.

Portable lactate monitors

Handheld blood lactate monitors provide rapid diagnostic and prognostic information in critically ill equine patients, even in field settings. Lactate measurement helps distinguish between different types of acidosis and guides treatment decisions. The Lactate Plus (Nova Biomedical) and Lactate Scout+ (EKF Diagnostics) offer portable options for immediate lactate measurement in equine practice.

Immunoglobulin G (IgG) testing for foals

SNAP tests for IgG levels are essential in neonatal foal practice to assess passive transfer of immunity, allowing appropriate therapy to be instituted promptly. The SNAP Foal IgG Test Kit (IDEXX) provides rapid assessment of passive transfer status, while the Gamma-Check E (Kent Laboratories) offers a semiquantitative measurement of IgG levels.

Pathogen detection

A number of POCT tests have been developed to detect pathogens in horses (antigen, culture and nucleic-acid-based) including rapid nucleic-acid-based tests for strangles, coital exanthema, equine rhinopneumonitis, leptospirosis, salmonellosis, anaplasmosis, equine viral arteritis, contagious equine metritis and influenza (iiPCR, GeneReach).

Revolutionary developments

POCT continues to evolve rapidly in veterinary medicine, bridging the gap between clinical suspicion and definitive diagnosis. The advent of rapid nucleic acid POCT has revolutionised the sector. Further developments, such as the introduction of direct sequencing, metagenomics, microfluids and artificial intelligence, will result in further innovation in the coming years. Tests are also now being developed for exotic species and for use in beekeeping and aquaculture. However, for many of the nucleic-acid-based assays, further research is required to streamline the sample preparation process.

While regulatory frameworks remain less structured than in human medicine, quality assurance programmes are critical to ensure test reliability and sustainability. As veterinary specialties become increasingly differentiated, POCT continues to adapt to meet specific needs across small animal, large animal and equine practice. The continued development of these technologies promises improved patient outcomes, enhanced surveillance capabilities and better protection of both animal welfare and public health, through rapid, accurate and accessible diagnostic tools.

References available on our website.

Note: The tests described in this article represent some of those commonly in use. This by no means implies endorsement of these particular tests by the RCPath.

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