Improving diagnostic outcomes with the lab

At the 2025 Masterclass Shirley Turner (pathologist at BSL QDPI) led a workshop discussion on improving diagnostic outcomes from lab submissions, and trouble-shooting problems if they do occur. Here's a summary of her advice:

Tips for sending samples

- Consider all possible differentials when deciding what samples to take - don't 'cherry pick' – remember, this may be your only opportunity!
- Use the resources available to you to guide sampling:
    - laboratory guides (hard copy/on-line) or EAD field guide
    - phone the lab (before and during the visit)
    - refer to government websites for specific information
    - take multiple samples from each animal to cover as many differentials as possible
- Sample multiple animals if available (live and dead)
- Consider environmental samples/feed sources
- Collect sufficient sample quantity for multiple tests
- Take representative samples of the tissues you are sampling (lung, kidney, normal/abnormal tissue)
- Take care with sample collection, handling and preservation
- Complete the specimen advice sheet fully, include a full clinical history
- Describe the lesions and take photos if possible (you are the pathologist's eyes)

Troubleshooting unsatisfactory outcomes

Unsatisfactory outcome	Possible cause	Remedy
No haematology result • PM blood • EDTA clotted • EDTA haemolysed	• Animal DOA or not sampled prior to euthanasia • Inadequate mixing of the EDTA blood tube • Difficulty at collection, excessive shaking of tube, storage and transportation issues • Li hep instead of EDTA • Insufficient volume – EDTA toxicity	• Sample prior to euthanasia • Use vacutainers for collection rather than syringe and needle • Fill vacutainer to the line • Collect EDTA blood first, invert EDTA tube gently 10 times immediately after blood collection • Care with handling, storage and transport
No tick fever result • Smears unsuitable	• Exposure to formalin • Condensation on the slide • High contamination • Carcase too decomposed	• Use slide holder, place in sealed container away from cooler brick • Use clean slides, avoid contamination at collection (handle by edges only, dry quickly and package immediately to avoid flies, dust etc)
No biochemistry result • Haemolysed serum • Insufficient volume	• Needle and syringe rather than vacutainers for collection • Rough handling / transport • Difficult collection (poor technique / fractious patient)	• Use vacutainers for collection • Allow blood to clot at room temp, take serum off clot within 18 hours
No bacteriology results • Contaminated samples • Damaged samples	• Poor sample choice • Poor aseptic technique • Fresh tissues not in separate containers • Poor sample handling (not chilled, frozen) • Decomposed carcase	• Choose fresh lesions • Use good aseptic technique (sear surface, cut with sterile scalpel blade, swab cut surface) and sterile containers • Keep samples chilled not frozen (generally) • Keep fresh tissues separate, submit 2cm cube samples instead of swabs • Use Amies transport swabs (not dry swabs)
Serology – no result or inconclusive results • Haemolysed samples • Insufficient volume • Uninterpretable results	• Needle and syringe rather than vacutainers for collection • Rough handling / transport • Difficult collection (poor technique / fractious patient) • Serum left on clot for >18 hours • Single sample collection only (need paired sera for VNTs) • Vaccination interference with interpretation e.g. lepto MAT	• Use vacutainers for collection • Take serum off clot within 18 hours • Collect paired samples to detect titre rise (3-4 weeks apart, except BEF 2 weeks apart) • Take care with over interpretation – in most cases positive results indicate exposure, not disease • Many tests are herd tests and not suitable for diagnosis of disease in individual animals
No PCR results • Contaminated samples • Insufficient sample • Sample unsuitable for test / disease exclusion requested • Inappropriate sample handling	• Not checking what samples are required • Poor sampling technique (e.g. owner collection of samples) • Poor quality samples, heavy contamination (inhibition of PCR) • Poor sample storage, packaging and transport • Decomposed carcase	• Call the lab or refer to lab manual • Use aseptic technique, sterile containers, keep samples separate • Use appropriate media for swabs (VTM or saline) – beware of sample dilution if using saline • EDTA blood preferred to Li hep (inhibitory) • Keep samples chilled during storage and transport. Fresh tissues (but not blood) can be frozen

Unsatisfactory outcome	Possible cause	Remedy
No parasitology results • Insufficient sample • Damaged sample • Inappropriate samples	• Diarrhoea, no faeces available • Poor sampling technique • Contaminated faecal samples (free living nematodes) • Samples not representative	• Collect large intestine content in lieu of faeces at necropsy • Collect faecal samples from the rectum, not off the ground • Avoid freezing or prolonged chilling of faeces • Collect faeces from multiple animals • Take multiple deep skin scrapings for mite detection from edges of active lesions
No toxicology possible • Insufficient sample • Incorrect sample type	• Not checking what samples are required	• Call the lab or refer to lab manual • Include larger amounts of fresh tissue such as liver and kidney also sometimes heart, skeletal muscle, gut contents
No (useful) histology results • Autolysis • Poor fixation • Sample not representative of the lesion	• Decomposed carcase • Samples not fixed immediately • Inadequate volume of formalin • Tissues frozen prior to fixation • Samples too thick (ideal is 1.5 cm) • Formalin chilled or incorrectly prepared • Poor sample collection technique • Poor sample selection, samples too small	• Choose freshest carcase/s • Fix immediately at room temperature • Do not freeze samples before fixation • Cut blocks of tissue 2 cm^2 and 0.5-1.0 cm thick, fix brains whole, open hollow organs • Take samples from interface of normal and abnormal tissue • Take multiple samples from organs / tissues of interest • Use adequate volume of 10% NBF (1:10) • Use commercial premixed buffered formalin or ensure correct mixing • Handle all tissues gently • Always include a full range of organs plus other tissues of interest (brain and spinal cord for neurological cases)
Shirley Turner (Principal Veterinary Pathologist, Biosecurity Sciences Laboratory, Qld Department of Primary Industries), at the 2025 NABSnet Masterclass		