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Clinicopathologic assessment of weight loss cases – PART 1: *Initial 'Screening' Tests*

In this information sheet, initial 'screening' laboratory tests are discussed which might be first employed following a fruitless historical and clinical examination of the weight loss case. Further information sheets will follow that discuss further diagnostic tests that may be indicated after consideration and interpretation of the initial screening test results. Although clinical pathology ideally makes use of a very few selected tests, in weight loss cases with no clinical leads on which to base narrow and specific test selection one may have to cast a speculative net a little wider than is perhaps ideal. In these circumstances one must always be aware that some results will be outside the normal range even in completely normal horses and marginally abnormal results (especially if not supported by other clinical or clinicopathological data) should be repeated with possible confounding variables in mind.

The following tests often provide a useful initial insight into differential diagnosis and should all be considered as a first clinicopathological step in all unexplained "examination negative" weight loss cases.

1. HAEMATOLOGY

a. Anaemia

Commonly seen in weight loss cases - if marked or chronic this should be considered in conjunction with a bone marrow aspirate to differentiate regenerative and non-regenerative types. Mild non-regenerative anaemia is a very common, non-specific finding in chronic weight loss cases and is not often very helpful in the differential diagnosis. This mild anaemia may result from chronic inflammatory conditions such as abscessation or inflammatory bowel disease (IBD), parasitism, chronic renal failure or many forms of neoplasia (especially lymphoma). A regenerative anaemia is more helpful diagnostically and is suggestive of a chronic source of blood loss (eg. parasitism, gastric scc, adenocarcinoma) or immune mediated haemolysis (eg. secondary to lymphoma).

b. Neutrophilia

Can be a feature of septic and non-septic conditions such as infectious challenge (viral, bacterial or parasitic), IBD, neoplasia, autoimmune diseases and Cushing's disease. A band neutrophilia (left shift) is more suggestive of septic than non-septic conditions.

c. Neutropaenia

Common in acute sepsis (especially when loss into effusions occurs – eg. peritonitis) but uncommon in chronic bacterial diseases which have more relevance to this discussion. Chronic equine fatigue syndrome is typified by chronic neutropaenia but weight loss is not a feature of this condition. A finding of chronic neutropaenia in a thin horse may therefore more suggestive of sinister conditions such as lymphoma.

d. Eosinophilia

Worth a mention owing to its overuse and overinterpretation - contrary to popular belief is not at all specific for intestinal parasitism. The eosinophil is a general inflammatory cell but peripheral eosinophilia may suggest allergic or infiltrative eosinophilic diseases.

2. SERUM BIOCHEMISTRY

a. Blood proteins

Total serum protein has a circadian rhythm and may vary by as much as 10-15 g/l over the day (high evening, low noon) usually associated with hydration status and intestinal secretory activity.

i. Albumin

Albumin is one of the primary parameters to check in weight loss cases. Marked hypoalbumenaemia (eg. <20g/l and as low as 6 g/l) strongly indicates protein losing enteropathy of various types (including IBD, lymphoma and PBZ-toxicity) although some wasting enteropathy cases can retain normal plasma albumin. Mild hypoalbumenaemia (eg. 20-25g/l) may result from hepatopathy, malnutrition, chronic blood loss (eg. gastric squamous cell carcinoma) and chronic inflammation (eg. abscesses or effusions) and very rarely protein-losing nephropathies may be seen.

ii. Globulins

Not as helpful as albumin but increased levels are common in weight loss cases. Hyperglobulinaemia generally indicates hepatopathy, parasitism or chronic inflammation although other causes are possible such as neoplasia.

iii. Acute phase proteins (Fibrinogen and Serum amyloid A)

Sensitive indicators of inflammation/sepsis. Highest levels tend to suggest bacterial infectious processes with milder increases associated with viral disease and non-septic tissue inflammation (eg. neoplasia).

b. Serum enzymes and metabolites

i. AST (aspartate aminotransferase)

Can arise form many tissue sources but elevated plasma levels are usually of hepatic and/or muscular origin (check with CPK, GGT, and GDH). Long $t_{½}$ and slow to clear and can remain elevated for a 1-2 weeks after resolution of the inciting cause.

ii. γGT (gamma glutamyltransferase)

A very sensitive indicator of hepatopathy but increased levels are sometimes misleading and not associated with severe liver disease. The pancreas contains high concentrations of GGT but pancreatic disease is rare in horses. Damaged renal tubules may also release GGT but this appears in urine rather than blood. Anecdotally, enteropathies and colics may often have raised GGT in the absence of liver disease – perhaps due to the close anatomic and vascular association between the gut and the liver. GGT may remain elevated for a long time after hepatic insult is resolving (?due to biliary hyperplasia).

iii. AP (alkaline phosphatase)

A potentially very useful enzyme. AP arises from many sources but high levels in adult horses are usually from hepatopathy and enteropathy cases. The majority of significant hepatopathies show raised levels as do many enteropathies. NB. young, growing horses have normally high levels derived from bone sources. The "intestinal isoform" may have dubious reliability.

iv. Creatinine and urea

Insensitive indicators of renal disease but quite likely to be raised if renal disease is severe enough to be causing weight loss. Urea not uncommonly up to 9 or 10 in normal horses and both can be raised out of normal range by wasting, dehydration (check urine SG) or high protein diets. Urea may be low in hepatic failure. Urea is much higher in morning than evening (eg as much as 2 vs 9mmol/l)

v. Glucose

A simple screening test for Cushing's disease – persistent fasted hyperglycaemia is highly suggestive but not that common (NB. α_2 sedatives or hard feed increase glucose). Usually normal in enteropathies and hepatopathies.

3. FAECAL ANALYSIS

a. Parasite eggs/larvae

An adult parasite burden is greatly overestimated as a cause of weight loss (especially as owners will invariably have dewormed a thin horse) but cyathostominosis is a common cause of acute (and sometimes chronic) weight loss usually but not necessarily with diarrhoea. Overreliance on fenbendazole could lead to a significant parasite problem in horses which are reportedly 'well wormed'.

b. Sand

Chronic weight loss may result from an abrasive enteropathy due to voluntary or involuntary sand consumption.

c. Occult blood

Positive faecal occult blood generally indicates colonic bleeding rather than gastric / small intestinal – eg. colitis, NSAID toxicity, neoplasia or just prior rectal examination. Also high numbers of leucocytes in stained smears may be significant

d. Culture

Rarely very helpful.

e. Clostridial toxin immunoassay (C.difficile Tox A/B, C.perfringens enterotoxin)

In the absence of diarrhoea, faecal samples positive for clostridial toxins have been associated with necrotic intestinal lesions such as neoplasia.