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A Practical Approach to the Diagnosis of Weight Loss in the Horse

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Although a common presentation in practice it is important to categorize the situation and attempt to document whether the owner’s impressions are correct.

Common scenarios:
1. Obvious weight loss on subjective examination or objective measurement
2. Failure to gain weight as expected with increased nutrition
3. Failure to put on or maintain condition as expected with training and appropriate nutrition

Weight loss can be assessed subjectively by eye or better objectively with serial measurements using a weighbridge or weight tape with a standardized technique. Body shape (girth) measurements are not accurate but they are repeatable and provided they are taken at the same point weekly (e.g. base of neck, girth and abdominal circumference).

BROAD CATEGORIZATION OF CAUSES

1. Inadequate nutrition for demands (pregnancy, increased workload, weather)
2. Competition for food (change in herd structure)
3. Unable to access food (pain – neck, back, limb)
4. Unwilling or unable to eat or swallow (teeth, dysphagia, Equine Gastric Ulceration Syndrome [EGUS], anorexia)
5. Malabsorption (infiltrative bowel disease including neoplasia, Inflammatory Bowel Disease, Cyathostominosis)
6. Metabolic Abnormalities (Liver disease, Equine Cushing’s Disease)
7. Increased consumption or loss of nutrients / protein (parasites, protein losing enteropathy, nephropathy, chronic infection,

Categorisation of weight loss

Normal horse

Management?

Nutrition

Metabolic demands

Hierarchy

Vices

Normal

Rule outs

Perceptions

Diseased Horse

Specific Signs

Focussed Investigation

No / Vague Signs

Full Investigation

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neoplasia, congestive heart failure, Equine Grass Sickness [EGS], Equine Motorneuron Disease, severe chronic pain)
8.Old Age (increased catabolism)

INVESTIGATION OF WEIGHT LOSS

In depth investigations can become very expensive without a guaranteed diagnosis. Thus a careful stepwise approach is used and the cost and likely diagnostic yield of individual diagnostic procedures should be carefully considered and discussed with the owner.

PRIMARY FIELD DIAGNOSTIC TECHNIQUES

1. Detailed history inc. anthelmintics & dentistry, previous & intercurrent dz
2. Thorough clinical examination (demeanour, oedema, significant respiratory or cardiac dz, enlarged lymph nodes?)
3. Rectal examination (Thickened bowel, enlarged LN, discrete masses, Cyathostomin larvae)
4. Oral/dental examination (significant dental dz?)
5. Routine haematology & clinical chemistry
6. Repeated faecal egg counts or microscopy for cyathostomin larvae (3) or cultures (5)

SECONDARY FIELD INVESTIGATIONS

1. Response to change in dietary regime. This should be the primary approach unless specific abnormalities are found at the first examination.
2. Peritoneal fluid analysis
3. Serum protein electrophoresis
4. Diagnostic larvicidal anthelmintic therapy (5 days x 7.5 mg/kg fenbendazole, followed by 0.4 mg/Kg moxidectin (care in ponies & weanlings)
5. Organ-specific serum biochemistry (e.g. investigation of hepatic disease)
6. Urinalysis (cheap and simple assessment of renal function)
7. Rectal biopsy
8. Oral glucose tolerance test

SPECIALIZED INVESTIGATIONS

1. Transabdominal and rectal ultrasonography
2. Endoscopy of pharynx, oesophagus, stomach, small intestine ± biopsy
3. Transcutaneous organ / lymph node biopsy
4. Echocardiography
5. Full thickness intestinal and lymph node biopsies at exploratory laparoscopy or laparotomy

To demonstrate the validity of this approach the results of a study on chronic weight loss in 60 horses are valuable (Tamzali 2005 Rev Med Vet 154 405-414), a positive diagnosis was made in 56 (93%). In 20 (33%) on primary investigations, 24 (40%) diagnosed on secondary investigations and 9 (15%) diagnosed with specialized techniques. 73% diagnosed on 1° or 2° investigations. These results were achieved at a referral centre so in general practice even better results are possible.

CLINICAL EXAMINATION

Clinical signs even with severe small intestinal malabsorption may initially be subtle and non-specific with changes in demeanour and exercise tolerance. Similarly appetite may be poor, capricious or voracious. Weight loss may be gradual or precipitous being governed by the extent and nature of pathology. Fever can result from tumour necrosis, endotoxin absorption through ulcerated bowel mucosa or chronic infection. Varying degrees of abdominal pain may occur with abdo minal, usually peritoneal or intestinal disease. Diarrhoea indicates large bowel dysfunction either due to a primary disease process or due to altered function secondary to small bowel malassimilation. Abnormal small bowel effluent delivered to the caecum and colon, particularly excess starch, can alter luminal pH, os-
motric load and fermentation. Increased secretion may overwhelm the large bowel’s capacity for water resorption. **Oedema** of the ventral thorax, abdomen, sheath and limbs can occur with significant hypoalbuminaemia (typically <20 g/L), the hydrostatic effect of third space effusion within the thorax or abdomen or local lymphatic obstruction by neoplastic masses or abscesses. The skin may be affected with crusting exudative dermatitis, alopecia and coronitis in immune-mediated disorders including multisystemic eosinophilic epitheliotropic disease, granulomatous enteritis, sarcoidosis and lymphoma. Peripheral lymphadenopathy and pleuropulmonary signs may accompany generalised lymphosarcoma. Signs of cardiopulmonary disease may be noted with pleural effusion / pleuropneumonia and decompensated congestive heart failure.

**HAEMATOLOGY AND CLINICAL CHEMISTRY**

This may show anaemia of chronic disease and a leucocytosis suggestive of chronic inflammation/infection. This is supported by hyperfibrinogenaemia and occasionally hypergammaglobulinaemia. Increased globulins suggest inflammation, neoplasia, liver disease or immune-mediated disease. Serum protein electrophoresis should be carried out if there is hyperproteinaemia or unconvincing Alb & Glob results. An increased γGlobulin may be seen with antibody response, chronic infection, inflammation, neoplasia. An β1 peak is suggestive of cyathostominositis but sensitivity (True positive rate) 45% and specificity (True negative rate) 86% are not high. Hypoproteinaemia and hypoalbuminaemia characterise malabsorption syndromes. Hypoproteinaemia results from a combination of poor appetite, malabsorption and most significantly, protein losing enteroopathy, which is common in many infiltrative or inflammatory bowel diseases. Enteric protein loss can occur by diffusion, active secretion or exudation through inflamed or ulcerated mucosa. Protein losses into a third space (peritonitis, pleurisy) usually results in more modest falls in albumin.

Screening serum biochemistry (i.e. AST, CK, AP (IAP), γGT, GLDH, urea, creatinine, may help direct investigation of a specific organ (e.g. liver or kidneys) or raise suspicion of neoplasia (glucose, calcium).

In a retrospective study of 36 weight loss cases in which transendoscopic duodenal biopsies were harvested because inflammatory bowel disease was suspected (Brazil 2009 JVIM) a number of diagnostic tests were examined to determine whether any test could help predict outcome of these cases. Survival rates of 95% in the 21/36 horses (58.3%) with normal serum albumin (30 g/L), 66% in the 9/36 (25%) with moderate hypoalbuminaemia (<30 & > 20 g/L) and 66% in the 6/36 (16.6%) with severe hypoalbuminaemia (< 20/g/L) were reported.

**PERITONEAL FLUID ANALYSIS**

This may help to diagnose chronic peritonitis but non-specific low grade inflammatory changes characterize many abdominal diseases and are rarely specifically diagnostic. Few infiltrative or neoplastic bowel diseases exfoliate abnormal cells however they do occasionally. Harvest from midline lowest point of abdomen, 21 - 19G 11/2” needle, 2” – 3.5” spinal needle or stab + teat cannula. Ultrasound can be used to assess depth of body wall and detect fluid pockets. Normal cytology: TNCC < 5 x 10⁹/L, TP < 20 g/L, PMN 40-60%.

**ORAL GLUCOSE ABSORPTION TESTS (OGAT)**

Small intestinal malabsorption can be confirmed by the oral glucose tolerance test (OGAT). Following overnight starvation, administer 1 g/kg anhydrous glucose as a 20% solution by stomach tube, collect blood samples into potassium oxalate-sodium fluoride anticoagulant at time 0 and at 30 min intervals for 4-6 hours. Normally, during the initial phase of continuous small intestinal glucose absorption plasma glucose rises to a peak (>85% increase above basal levels) at 90-120 minutes.
the second, insulin dependent phase, plasma glucose falls to basal levels by 6 hours. The absence of a plasma glucose response (<15% increase) suggests complete malabsorption, a sensitive indicator of severe pathology with generally a poor prognosis. An intermediate result suggests partial malabsorption, which in about 70% of animals is associated with intestinal pathology. (see graph below)

What do the results mean in reality?

*Normal curve* - 100% of horses have normal small bowel

*Partial malabsorption* - 70% have abnormal small intestine. Therefore a repeat OGTT is warranted at a later date if clinical signs persist.

*Total malabsorption* - 100% severe pathology

Test results may be affected by age and diet although the shape of the curve is similar. A two sample test (basal and 120 minutes only, using a 20% cut off for complete malabsorption) has been validated with similar sensitivity (90%) and specificity (64%) for detection of complete malabsorption (Murphy et al 1997 Vet Record 140 342-343) and is obviously cheaper. Remember that some total malabsorption cases can recover but they are rare! In my retrospective study, survival rates of 89% in the 9/17 (53%) with normal absorption, 83% in the 6/17 (35.3%) with partial malabsorption and 0% in the 2/17 (1.7%) with complete malabsorption were reported.

**RECTAL BIOPSY**

Cheap and easy to perform. Performed under standing sedation at wrist depth from the dorso-lateral rectal wall using mare uterine biopsy or sow vaginal biopsy forceps. Grasp and cut pinched fold of mucosa, transfer to 10% neutral buffered formalin. Expect bleeding from anus! 50% of horses with chronic wasting +/or diarrhoea have detectable pathology on rectal biopsy. 30% of these biopsies were diagnostic in one study of chronic enteropathy cases with a sensitivity of 30% in comparison to necropsy diagnosis. Therefore although a low yield diagnostic technique it is always worth performing as it may reveal a diagnosis.

**TRANSCUTANEOUS AND TRANSRECTAL ABDOMINAL ULTRASONOGRAPHY**

Applied on a case by case basis depending on prior diagnostic information. Both techniques are useful for assessing intestine but a lower
frequency sector probe is required for a complete examination. Transrectal ultrasound – 5-7.5 MHz linear probe, Transcutaneous ultrasound – 2.5-5 MHz. It is possible to identify peritoneal or pleural effusion, thickened bowel (>3 mm suspicious, 4 mm abnormal), abnormal masses and to screen the major organs (lungs, liver, spleen, kidneys & intestines) and if necessary to harvest biopsies. In general transcutaneous biopsies are indicated for laboratory confirmed hepatic or renal disease or readily accessible masses that would not run the risk of bowel puncture. In my retrospective study survival rates of 82% in the 11/27 (40.7%) with ultrasonographically normal small intestine and 75% in the 16/27 (59.3%) with thickened small intestine (>4 mm wall thickness) were reported.

EXPLORATORY SURGERY & BIOPSY

A final attempt to make a diagnosis! Both laparoscopy & laparotomy are available if abdominal disease is suspected. Laparotomy is preferred to facilitate a thorough examination and harvest of multiple full thickness biopsies from all intestinal segments and associated lymph nodes. This may include ileal biopsies to rule out chronic EGS.

ECHOCARDIOGRAPHY

Vague progressive weight loss especially of the musculature from the topline and hindquarters may be an early sign of impending congestive cardiac failure. Echocardiography is only indicated in animals with signs suggestive of early congestive heart failure, pyrexia of unknown origin, sudden onset of ≥ grade III/VI cardiac murmurs with consistent resting tachycardia ≥ 50bpm.

DIAGNOSTIC TESTS FOR SPECIFIC DISEASES

Plasma Vitamin E levels and sacrocaudalis dorsalis medialis or accessory nerve biopsy for confirmation of suspected Equine Motor Neurone Disease.
Bone marrow aspirate / biopsy in cases of leukaemia or other suspected lymphoproliferative diseases.
Phenylephrine eye drop test and possibly rectal biopsy in EGS.
SUMMARY

Establish weight loss (serial weights, girth band)
Detailed history and careful observation
Thorough clinical examination inc. RECTAL
Rule out as many differential diagnoses as possible
Laboratory and histopathological investigation

DIFFERENTIAL DIAGNOSES

- Inadequate nutrition
- Parasitism
- Dental disease
- Stress
- Dysphagia
- Chronic pain
- Chronic infection
- Chronic grass sickness
- Chronic peritonitis
- Chronic Hepatic disease
- Malabsorption syndromes
- Chronic Renal disease
- Chronic Cardiac disease
- Non-intestinal neoplasia
- Equine Motor Neurone Disease

During investigation of significant weight loss it is important to establish **time and weight related goals** for progress and in the mean time encourage optimal nutritional support with multiple small feeds, a *d lib* high quality fibre (hay, silage, pasture), high energy density concentrates (cooked maize, Sugar Beet pulp, micronized wheat, vegetable oil [up to 1 ml/Kg introduced slowly], rice bran).