Management of Equine Obesity

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Take home message

Obesity is a 'disease of domestication'. It is practically unheard of in wild horses and ponies. By taking animals into our care, we have a duty to feed them correctly and to prevent the accumulation of excessive and harmful body fat. Under domestic conditions, the prevention of obesity can be especially difficult and weight management can be a lifelong commitment.

Background

Over the last 50 years, rising affluence in developed nations increased the time and money directed to leisure activities. For our horses and ponies, this has seen a swing away from 'economically-essential' ownership towards elective leisure homes, where work may be less onerous or even secondary to companionship.

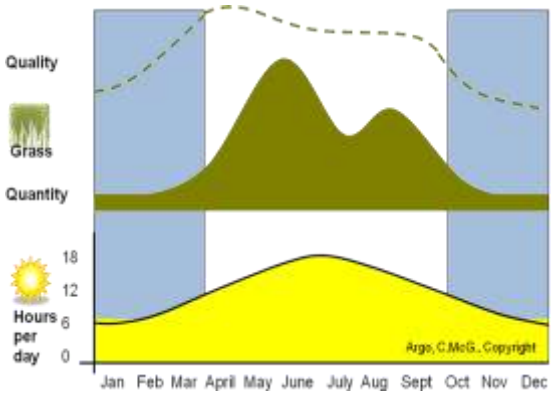
For people and their companion animals, less physically-demanding lifestyles and the availability of affordable, energy-dense (high carbohydrate) foods, has led to an increase in the incidence of obesity. In the UK, an estimated 50% of equines are overweight and obese, states which greatly increase not only the risk of life-threatening and debilitating diseases, such as laminitis but also impact on performance, reproductive success and longevity (Wyse *et al.,* 2008; Argo, 2009).

Energy balance and body weight

Weight gain in horses and ponies happens for exactly the same reasons it does in humans. To maintain an ideal body weight, energy ingested as food should be balanced against energy spent on a) maintaining our body in working order and b) performing work, whether this is as a result of physical activities, growing, keeping warm/cool, supporting a pregnancy or producing milk. When this balance is disturbed by overeating or under-performing, animals are said to be in positive energy balance and 'excess energy' is stored as fat in specific storage sites or 'white adipose tissues' (WAT) throughout the body. A state of negative energy balance, when energy expenditure exceeds energy intake, is required before weight loss can occur.

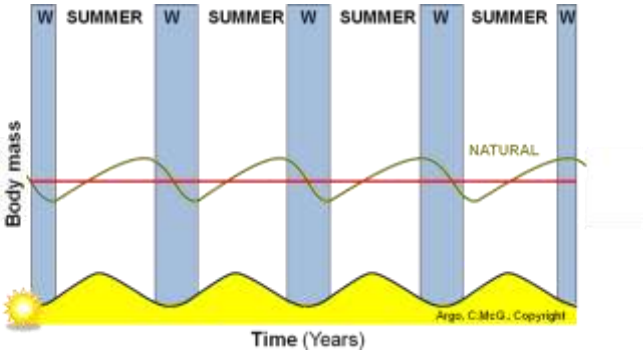
Nature's equilibrium

Over millennia, the wild ancestors of modern horses adapted their entire biology to survive in harsh, highly seasonal environments. Horses specialized in digesting coarse, low-quality grasses which, although plentiful in summer, were sparse in winter (Fig. 2).



By eating and digesting grass steadily over the larger part of the day, sufficient energy and

nutrients were gained in summer to meet and even exceed requirements. Adult animals store surplus energy in WAT and / or direct it towards milk production and breeding activity. Young stock direct energy to growth. The scarcity of winter foods demanded an alternative strategy. In winter, expensive growth and reproductive processes are checked, a thick coat is grown to minimize energy loss, appetite is decreased and energy stored in WAT is mobilised to compensate shortfalls in energy intake.

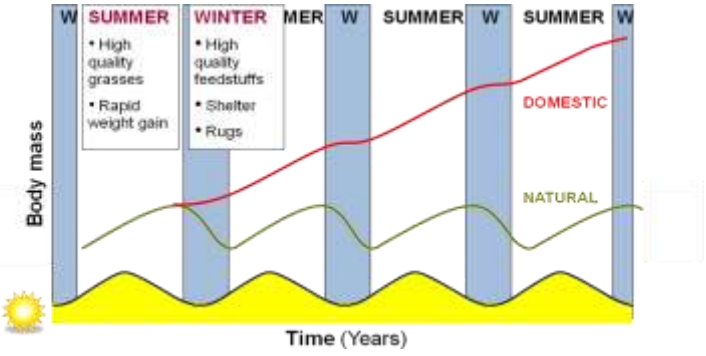


In Nature, energy balance in long-lived animals like horses is a long-term concept. Seasonal cycles of weight gain and weight loss allow the average body weight of mature animals to remain relatively constant across many years (Fuller *et al,* 2001, Fig. 3).

Management challenges to energy balance

These seasonal drives have persisted despite domestication (Fuller *et al.,* 2001). In combination, this strong evolutionary heritage, low work demands and 'high' husbandry standards, promote the development of obesity in modern leisure animals.

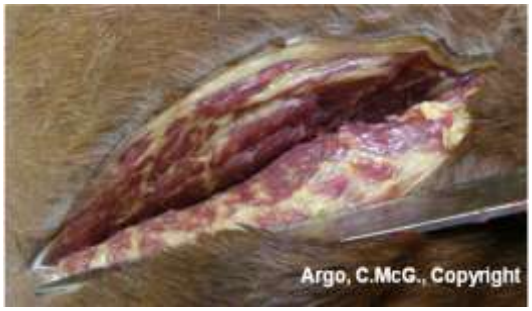
Today, horses and ponies are generally maintained on high-sugar grasses, selected to increase the production efficiency of cattle and sheep. Domestic pastures are best considered as 'rocket fuel' when compared to the coarse, natural foods of the horse. Summer grass intakes greatly exceed energy requirements for all bar the hardest work situations. Add to this our supplementary feeding of energy-dense concentrate feeds and it is easy to see why so much energy is available to store as fat.



In addition, the provision of shelter, rugs and high quality conserved forages, over-ride the natural winter 'hardships' which would naturally induce weight loss, 'resetting' body weight before the emergence of spring grasses. Year-on-year, our management encourages the accumulation of fat and the rapid attainment of obesity (Fig. 4).

Obesity issues

When considering our own preferred-physique, we generally aspire to lean or muscular body shapes. Alarmingly, this aspiration has been reversed for the horses in our care. The 'fatter is better' concept of equine perfection owes much to our desire to be seen to care and to out-dated 'show-ring' preferences and has little to do with animal welfare, sports science or common sense.



The accumulation of excessive body fat impairs normal skeletal development, is associated with

some forms of colic, decreases fertility, increases foaling difficulties and decreases performance potential; not least by asking animals to carry more weight but also by impairing muscle function. The sheer volume of fat lining the chest must surely compromise respiratory function. Similarly, fatty deposits inside muscles (Fig. 5) and around the heart could be expected to impair athletic performance. Perhaps the most alarming, debilitating and painful condition for which obesity is a major risk factor is laminitis, the severity of which frequently warrants euthanasia (Argo, 2009).

Fat deposition

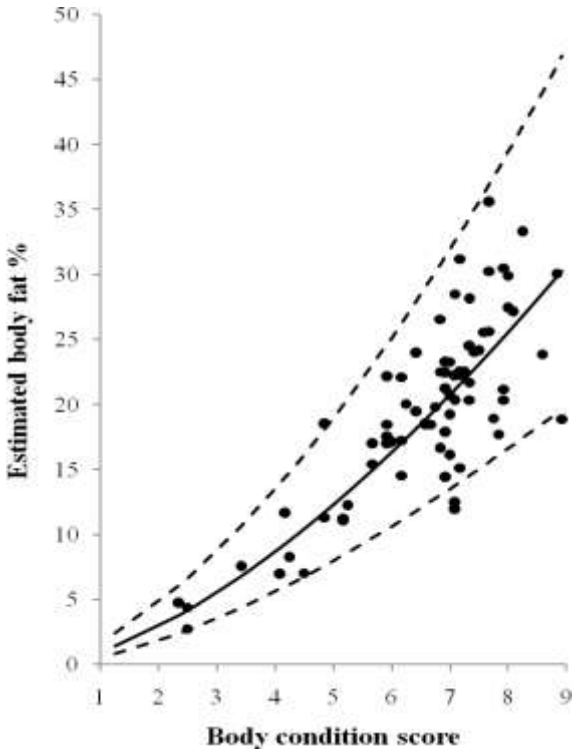
Although we can 'see' accumulated fat by recognizing changes in the animal's appearance, it is important to understand that fat is deposited throughout the body. Just as much fat may be stored in 'invisible' WAT deposits inside the body (internal WAT), as accumulates in more 'visible' superficial areas (external WAT).

Internal WAT is deposited around the body organs, including the heart, kidneys, uterus and gastro-intestinal tract and against the internal walls of the abdomen and thorax, where WAT eventually forms extensive and thick sheets (Dugdale *et al.,* unpublished).

External WAT includes all of the fat located just below the skin (sub-cutaneous WAT), in the neck crest (Fig. 6), around the udder and sheath and fat which lies between the muscles (inter-muscular WAT). Together, these external WAT deposits 'bulk up' the outside of the animal, obscuring bony landmarks and increasing the sponginess felt when the animal is palpated.

Recognising overweight or obese horses and ponies

The body fat content of horses can vary widely and has been recorded to range between ~3 and 45%! To date, accurate measures of body fat are based on the dilution of hydrogen or oxygen isotopes (deuterium or ^{18}O) in the animals' body water (Dugdale *et al.,* 2010a). However, this technique is both expensive and impractical for routine use.



Routine monitoring of 'body fatness' in horses and ponies depends on indirect estimates; most commonly body condition scores (BCS). Various BCS systems are in use (0 to 5, Carroll and Huntingdon, 1988; 1 to 9, Henneke *et al.,* 1983). All match standardized 'descriptors' to various

anatomical regions e.g. neck, shoulder. In our experience, the nine-point scale developed by Henneke et al., 1983 and later modified by Kohnke in 1992, has proved to be the most applicable across animals from a wide range of breeds, ages and condition. Regardless of which BCS system is used, it is important that they are applied consistently and correctly. For animals in thin to moderate condition, these scales work well, each incremental point being clearly associated with a progressive loss in the ability to detect bony landmarks. However, for animals in overweight to obese states, most bony prominences have already been obscured by fat, making clear distinctions between the higher BCS points difficult. Nonetheless, horses in BCS >7/9 probably contain more than 20% body fat, a value which most likely exceeds requirements for optimal health and performance so these animals, in need of weight loss management can readily identified (Fig. 7).

Controlled weight loss

Weight loss management is generally instigated for one of two reasons. Either owners recognise that animals **are obese** and seek to return them to an optimal BCS or the animals' **propensity to become fat** is recognized and management systems are initiated to maintain an ideal BCS.

a) Re-appraising the nutrition of over-fed horses.

Quite often, all that may be required to prevent or correct unwanted weight gain in our animals (and ourselves!), is an honest re-evaluation of the current diet.

Grass consumption by a horse is very different from our own expectations of the energy we would obtain by eating undressed salad. On a dry matter basis (when the water is removed), spring grass can contain even more food energy than basic pony nuts (Fig. 8). While we happily turn a pony into a field of grass to eat as much as it wants, few of us would open the feed room doors and do the same!

Generally, unless animals are in hard work, *ad libitum* access to forage can often exceed a horse or pony's daily energy requirements. To ensure balanced nutrition, all that may be required in addition, to an appropriate amount of forage, is a small quantity of a concentrated, low energy feed to ensure all vitamins and minerals are available in correct amounts.

If more than this is being offered, especially in an overweight or obese animal or one prone to weight gain, additional concentrate feeds should first be cut down and if necessary, cut out altogether and replaced with a suitable vitamin and mineral provider. If this is still insufficient to prevent weight gain it may be helpful to consider whether lower-energy forages could be used. For ponies, feeding soaked hay (Fig. 9) can be useful to reduce energy intake but it is important to note that it cannot be relied on to reduce the sugar content to below the upper level recommended for those animals prone to laminitis. Alternatively, up to 50% of the hay being offered can be gradually exchanged for good quality barley or oat straw. Straws generally

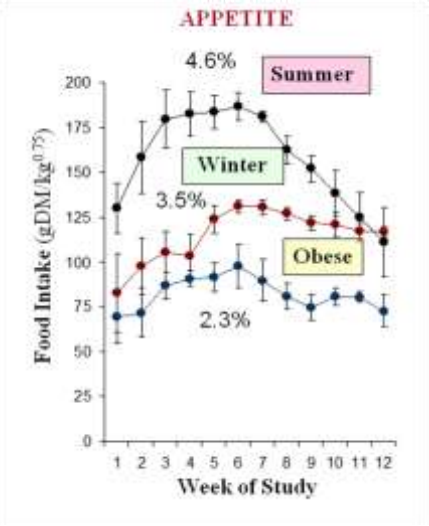
have lower energy contents than good quality horse hays and are quite palatable once ponies become accustomed to them. Take care to select clean, carefully harvested straw. If there are too many cereal heads on the straw stalks, the energy content can be very high! By diluting the energy content of the forage, adding straw allows the same total volume of forage to be fed daily without decreasing the time spent eating. However, it is unadvisable to exceed 50% of forage intake as straw and some studies suggest that including mainly straw in the diet increases the risk of gastric ulceration in horses. Introducing the straw very slowly is extremely important. Slow introduction allows the pony to adapt to digesting this new form of forage which reduces the risk of straw becoming impacted in the intestines. Impaction can still occur especially in some individuals and alternative low energy forage replacers may be required. Anecdotal evidence suggests that ponies are generally more tolerant than horses when significant amounts of straw are included in the diet. Prolonging feeding times helps to prevent 'boredom'. Whatever forages are fed, offering them from small mesh single or doubled hay nets can also help to slow the rate of consumption.

The advice of an experienced equine nutritionist can be invaluable to confirm the appropriateness of any major changes. As always, any dietary changes, including changes in forage, should be introduced gradually and where low energy forages are to be fed, it is important to also feed a forage balancer product every day to make sure that vitamin and mineral provision is adequate.

b) Nutritional restriction of the housed horse.

Restriction of food intake is essential to promote negative energy balance in housed, non-exercising animals. Until recently, the normal food intake (appetite) of unrestricted ponies was unknown, making it difficult to offer advice on appropriate levels of restriction.

The normal appetite of ponies is measured by recording daily intakes when animals are permitted free access to food. Appetite is conveniently expressed as the weight of food dry matter (DM) eaten daily, as a percentage of body mass (BM). The appetite of pony mares in thin and moderate body condition varied seasonally. Appetite peaked at around 4.6% of BM as daily DM intake in summer and was 25% less (3.5% of BM as daily DM intake) in winter (Dugdale *et al.,* 2008, Fig. 11).



Food restriction to induce weight loss: Owners are often advised to begin feed restriction at around 2.0 to 2.5% of BM as daily DM intake. However, obese ponies already have decreased appetites! Obese ponies (BCS 8 to 9) in the above trial ate only 2.0% of BM as DM daily (Dugdale *et al.,* 2008). To achieve weight loss by feed restriction alone, veterinary involvement is strongly recommended. Guidance on how this was undertaken throughout this study is available to vets on request by contacting World Horse Welfare.

c) Nutritional restriction for the grazing horse.

A positive aspect of weight loss management while animals remain at pasture is that continued exercise and exposure to the elements can help to increase energy expenditure. Conversely, precise control of food intake is lost and it is possible that restrictions can be excessive.

'Poo-picking' provides a useful index of food intake. If animals are initially placed in individual paddocks where graze is un-restricted, daily faecal production can be measured (e.g. half barrow, 12 dung pats). The aim of graze restriction should be to reduce faecal output by roughly half. At this level of restriction, a forage-balancer product should also be offered. Remember, the nutritional value of grass is much greater in spring and summer and the level of restriction should account for this.

Principal methods for restricting access to pasture are,

- **Confinement in small, 'graze-poor' paddocks:**
    - Care must be taken to ensure that paddocks used for graze restriction are 'safe'. Hungry animals will be more inclined to consume toxic plants (e.g. ragwort, bracken) or damage hedges and trees (Fig. 13).
- **Housing for significant portions of each day**
- **Strip grazing:**
    - Movable electric fencing can be useful in controlling access to fresh grass.
- **Grazing muzzles:**
    - Muzzles should be fitted to ensure that access to water is not restricted. Muzzled animals are unable to defend their social position and care should be taken to ensure that they do not become the focus of bullying in the herd. Muzzling is not always the easy alternative it might seem. The duration of daily muzzling needs to be changed regularly as bodyweight changes and some time without the muzzle, possibly in the stable, is needed to allow the animal to groom itself (Fig. 14).

It must be remembered that short term removal from grazing (<4 hours), by housing or the use of muzzles, can cause more harm than good! Hungry horses eat faster and for longer when food is returned.

d) Exercise in weight loss management

Irrespective of the nutritional management system used, exercise forms an important component of weight loss and weight management programmes. Exercise not only promotes energy expenditure directly but by increasing fitness and building muscle, it encourages weight loss from body fat and spares losses from lean tissues.

Exercise must be introduced gradually, especially where obese animals are unfit. Veterinary advice should be sought before laminitic animals are brought into work. Ten

minutes' walking in hand twice daily may be sufficient in the first week. The duration and intensity of exercise can be progressively increased until animals are working for a minimum of one hour daily. Initially exercise will need to be used in conjunction with feed restriction measures but as fitness and work demands increase, feed restriction can gradually be relaxed.

d) Winter, a natural aid to weight loss

Obesity is a disease of domestication. Weight management is promoted by returning to more natural husbandry systems. Allowing horses to remain outdoors and / or un-rugged through winter, allows us to capitalize on the increased energy costs of movement and keeping warm and the decreased energy contents of winter pasture (Fig. 15).

Horses and especially native ponies are adapted to mobilise fat in winter and the need to use fat energy in thermoregulation is a natural solution to shedding the largesse of summer. If needed, weight loss can be further increased by limited clipping of the winter coat. Contrary to expectations, most animals do well under this system. Body condition should be carefully monitored. Shelter, rugging and nutritional provision should be adjusted accordingly once an ideal BCS is achieved.

Weight management is a life-long commitment. Even modest weight loss can improve insulin sensitivity. Regular monitoring of BCS allows subtle changes in body condition to be noticed and corrected before radical action is needed.

References

Argo C. McG. (2009) Appraising the portly pony: Body condition and adiposity. The Veterinary Journal, Volume 179, Issue 2, February 2009, 158-160.

Carroll, C.L. and Huntingdon, P.J. (1988). Body condition scoring and weight estimation of horses. Equine Veterinary Journal 20, 41-45.

Curtis, G.C., Barfoot, C.F., Dugdale, A.H.A., Harris, P.A, Grove-White, D. and Argo, C.McG. (2010) Comparison of two, practical weight loss protocols for the management of overweight and obese horses and ponies. European Workshop on Equine Nutrition Cirencester, September 2010.

Dugdale, A.H.A., Curtis, G.C., Knottenbelt, D.C., Harris, P.A. and Argo, C.McG. (2008) Changes in body condition and fat deposition in ponies offered an *ad libitum* chaff-based diet. Proceedings of the European Society for Comparative Veterinary Nutrition, Vienna, September 2008.

Dugdale, A., Curtis, G., Harris, P.A., Milne, E., Argo, C. McG (2010a).Validation of the deuterium oxide (D_2O) dilution method for the measurement of body fat content in living ponies. British Equine Veterinary Association Congress. Birmingham, September 2010.

Dugdale, A.H.A., Curtis, G.C., Cripps, P., Harris, P.A and Argo, C.McG. (2010) Effect of dietary restriction on body condition, composition and welfare of overweight and obese pony mares. Equine Veterinary Journal. Accepted for publication 5th November 2009.

Fuller, Z., Cox, J.E. and Argo, C.McG. (2001) Photoperiodic entrainment of seasonal changes in the appetite, feeding behaviour, growth rate and pelage of pony colts. *Animal Science,* 72 65 - 74.

Henneke, D.R., Potter, G.D., Kreider, J.L., Yeates, B.F. 1983. Relationship between condition score, physical measurements and body fat percentage in mares. Equine Veterinary Journal 15, 371-372.

Kohnke, J. 1992. Feeding and nutrition: The making of a champion. Birubi Pacific, Australia. pp.163-166.

Wyse, C.A., McNie, K.A., Tannahil, V.J., Murray, J.K., Love, S. 2008. Prevalence of obesity in riding horses in Scotland. The Veterinary Record 162, 590-591.