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Winter Feeding

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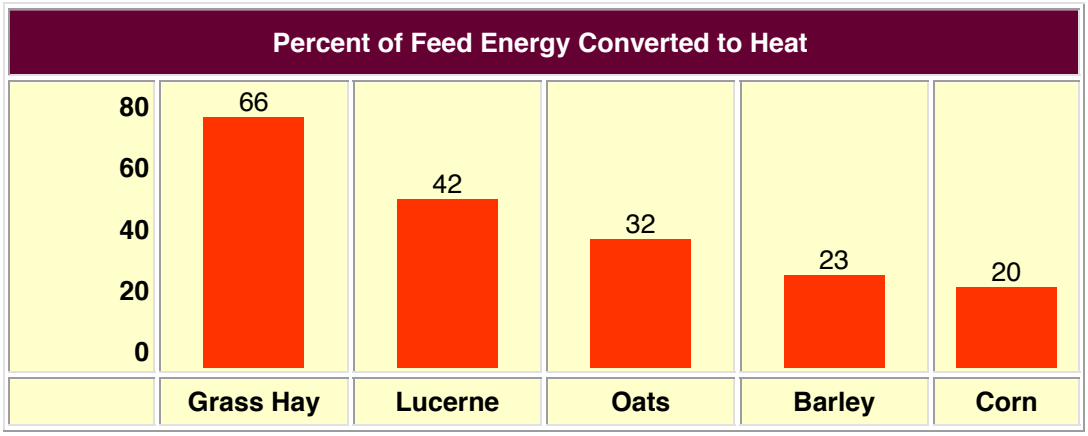
As the chill of winter descends upon the paddocks, our thoughts turn to how we can best make our horses warm and comfortable in the cold, wet and often windy conditions. Although some acclimatization occurs, generally horses **shiver** if the temperature drops below 17ºC and **sweat** if it rises above 36ºC. This is called the **comfort zone**. Outside this 20ºC range, shivering and sweating are necessary to maintain body temperature - but both use up body energy and protein stores, leading to stress and loss of condition. Newborn foals have high metabolic rates and tolerate lower temperatures, but because they have little insulation in the form of hair coat or body fat, they rely on shivering, food intake and acitivity to maintain core body temperature.

Rugs and hoods warm from the outside - what is the best way to warm horses from the inside?

Most body heat is generated by the digestion of food. Heat produced by digestion enables mammals to maintain steady body temperature in the face of changing environmental conditions. By increasing heat produced during digestion we can reduce the amount of shivering.

Reducing shivering and weight loss by shifting the 'comfort zone'.

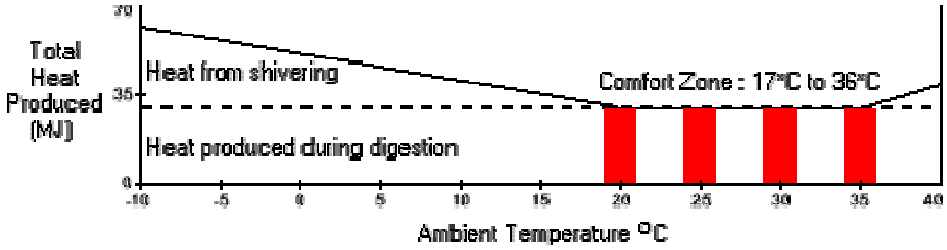
During digestion different feeds release different amounts of heat. Of the energy in meadow hay, 66% is converted to heat, in lucerne hay 42%, and oats and corn, 32 and 20% respectively.



Heat liberated during digestion makes the horse warm on the inside and hence they can tolerate colder outside temperatures.

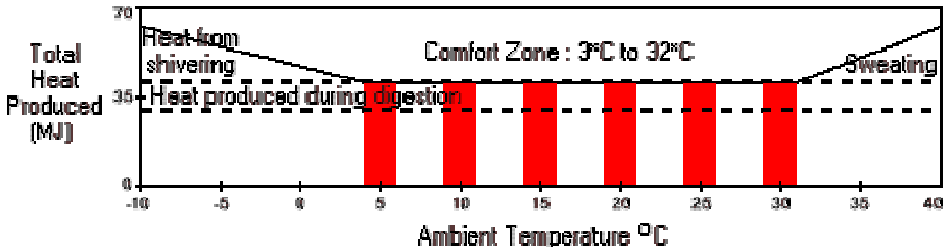
The graphs show how heat produced during fermentation allows horses to tolerate different temperature ranges. When a horse has not eaten for a while, ongoing metabolic processes produce 30MJ of body heat. This allows the horse to maintain body temperatue when the outside air (ambient) temperature is between 17ºC and 36ºC.

Comfort Zone in Fasting Horses



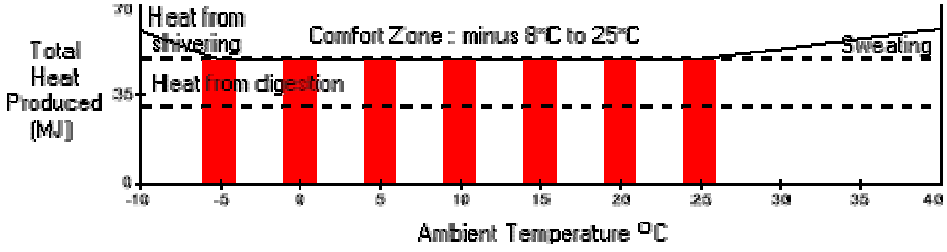
Heat produced during digestion of 3.5 - 4kg of grain yields 10 MJ of body heat, allowing the horse to maintain body temperature, without having to 'top up' by shivering, when ambient temperature is between about 3ºC and 32ºC.

Comfort Zone for Horses Fed 3.5 - 4 kg Grain



The heat generated by hay digestion allows horses to be comfortable from minus 8ºC to 26ºC.

Comfort Zone for Horses Fed 5 - 6 kg of Meadow Hay



From the above graphs, it can be seen that the most efficient way to keep our equine athletes and companions warm during winter, is to feed more hay.

Concentrates: A balanced concentrate, based on grains, protein meals, vitamins and minerals will supply nutrients not present in hay. As the proportion of hay increases, concentrate intake may drop, so it is important to provide a highly digestible, energy-dense concentrate. The more digestible the concentrate, the lower the amount needed to meet requirements.

Crushing and cracking do little to improve digestibility and cause oxidation of nutrients; boiling reduces vitamin content - unless the temperature and duration of cooking are carefully controlled and pelleting reduces calcium and magnesium absorption. Fortunately continuing nutrition research is advancing and refining these older feed processing techniques.

Pressure-cooking and steam extrusion of feedstuffs combines and fine-tunes the time-honoured practices of milling and cooking. It is done under carefully controlled conditions designed to minimise nutrient changes, while maximising digestibility. This increases both energy and protein digestibility, so a smaller amount of extruded

feed is required compared to pellets, raw grains and unprocessed feeds - offering cost advantages as well as preventing overfilling of the gut - especially when hay intake increases in cold weather.

Energy: Two factors increase energy requirements in winter. Firstly, the digestible energy of winter pastures is low; second, energy requirements increase by about 5% for every 1ºC drop in temperature below 15ºC. If the weather is wet and windy as well as, energy needs increase a further 40 - 50%. To sustain a high metabolic rate without losing condition, horses must be given more feed or feed with a higher energy-density.

There are several ways to increase energy. Adding an extra dipper of oats or corn; adding oil or using a highly digestible feed. When adding extra grain, it is important to have the diet analysed, because high phosphorus and low minerals in grain could unbalance the diet and supplements may be required - especially for young, pregnant or working horses. Increasing the oil in the diet is a safe and effective way of increasing energy, because oils are high in energy and well digested.

Steam extrusion improves protein, mineral, fibre and energy digestibility by up to 40% and releases nutrients that were previously unavailable. The untangling of nutrients during steam extrusion allows digestive enzymes in the small intestine to work up to 100 times faster - increasing nutrient availability and reducing acid, heat and gas production.

Body condition: Having energy stored in the form of muscle and fat is important. Thin horses have a higher metabolic rate just to maintain body temperature because they lack insulation. A thick hair coat can mask thinness and weight loss, so it is important to run your hands over your horse regularly to pick up condition loss. Horses that are clipped begin to shiver when the temperature is some 10 - 15ºC higher than those that have a thick hair coat.

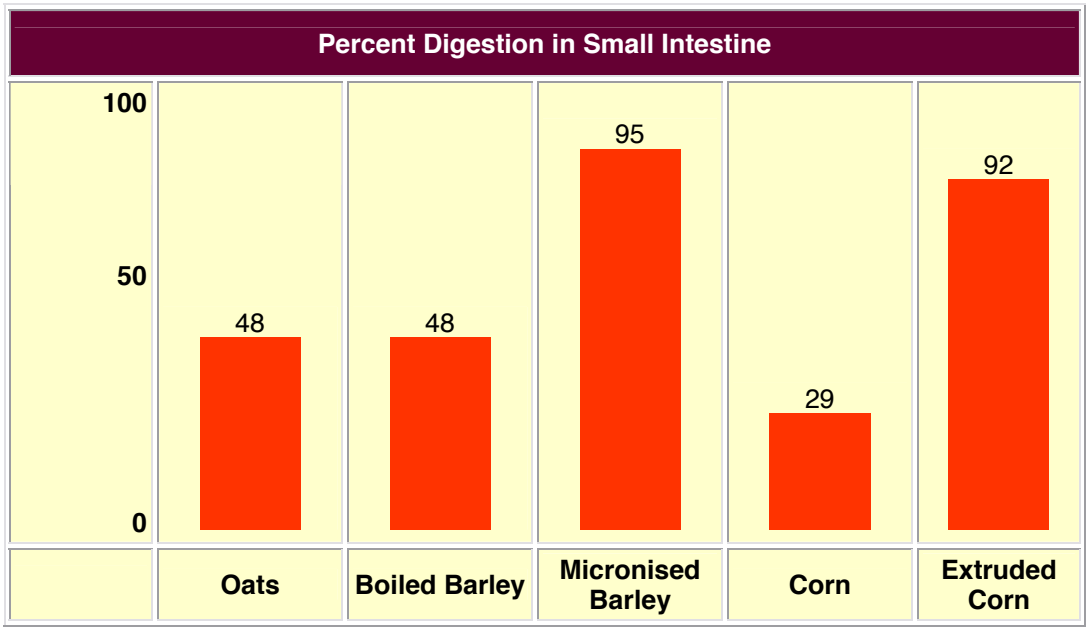
Warm feeds:

Water: Impaction colics are more common in winter, partly because mature hay and pasture have a lower water content than young pastures, but also because horses drink less if the water is cold. To encourage drinking, water should be warmed to 2 - 10ºC.

A bran mash: The warm smell of bran freshly mixed with hot molasses promises comfort and contentment. Whilst high in B-group vitamins bran contains poor quality protein and is only 12% fibre - the same as oats. Meadow hay is 38% fibre and lucerne 28%, making bran a low fibre supplement and expensive for the low level of nutrition it provides. Loose manure the day after a bran mash is due not to a laxative effect, but to the sudden change in diet which induces a low grade digestive upset by irritating the gut wall and compromising the bacteria in the large intestine. Never-the-less, bran is very palatable to horses - especially when suffused with warm molasses - making it a great way to tempt appetite and give horses a treat on cold nights.

Bran should be restricted to less than 10% of the diet as it contains 9 times as much phosphorus than calcium. Bran is also high in phytates which bind calcium, preventing absorption. An occasional bran mash is not harmful, but a separate calcium supp1ement may be necessary. Steam extruded complete feeds, such as Mitavite Economix, Breeda, Munga and Gumnuts are readily softened to a warm mash and because they are balanced, require no supplements.

Cooked grains: Horsemen have long known grain must be processed to improve digestion and reduce risk of gastro-intestinal disturbances. The graph below shows how cooking and processing affect digestibility of different feeds. Crushing and cracking oats and corn has little effect on digestibility. The digestibility of barley increases from 21% to 48% with boiling and to 95% when it is micronized. Pressure-cooking and steam extrusion of corn increases digestion from 29% to 92%.



Horses and Ponies: Ponies evolved in the cold, harsh areas of northern Europe and England, while predecessors of modern day Arabian and Thoroughbred horses evolved in North Africa - adapting to hot, dry conditions. Thoroughbred and Arabians have thinner skin, less subcutanoues fat and are less tolerant of winter conditions. Quarter rugs are necessary when working in winter and extra time is required for warming up before and cooling down after exercise.

Ponies developed thicker coats, subcutaneous fat and slight differences in metabolism to survive extremes of cold. Altered insulin sensitivity, a hearty appetite and shunting of blood away from the feet favoured evolution in harsh, cold conditions. Today, these traits increase risk of laminitis - which from a veterinary perspective means there are only 2 types of pony in the world - ponies that have foundered and ponies that are going to founder - making it important to prevent excess condition in winter as risk of laminitis (founder) is higher when spring pastures come through.

While on the subject of hooves, foot abcesses, white line disease, wall cracks and seedy toe occur more in winter and hoof hygiene must be maintained - especially if exercise is limited. To maintain hoof wall strength the diet must contain good quality protein and adequate levels of biotin, zinc and other minerals. Steam extrusion increases protein and mineral digestibility and both veterinary research and field studies consistently demonstrate the benefits of this advanced method of feed processing - for summer and winter feeding.

*Original articles available on request