The article is written by Dr. Dag Austbø at the Norwegian University of Life Sciences institution. Dr. Dag Austbø and Dr. Knut Hove are two of the key people behind the development of PC-Horse. Their scientific work and international networks contribute to the continued development of PC-Horse and to secure that our calculations are based on established scientific data.

It is important to know the energy content of the feed we give our horses. If a horse takes in more energy than it expends, it will grow fat. Too little energy coming in and the horse will lose weight. Most countries have adopted units for energy in feeds but, because of differing traditions, the official units vary between countries. This often creates problems when concentrate mixtures from England or Germany are marketed, for example, in Scandinavia or France, since the latter may use other energy units than those used in the country of origin.

In this article we shall help explain these differences, and enable readers to obtain proper labelling of energy content when they buy imported feeds.

Photo: Elina Björklund, Roccamshots

Gross energy

Gross energy is the energy released when a feed is burned, as in a laboratory oven, and only the ashes remain. Gross energy says little about the feeds energy value for the horse however. This is because the body's metabolism, which takes place at body temperature, is far less complete than combustion in a furnace. After the horse has eaten and digested a given quantity of a food, there will be losses in the form of faeces, urine, intestinal gases and heat. Since these

losses are energy-containing, they have to be accounted for in a horse's energy balance. While gross energy of a feed can be measured easily in the laboratory, costly digestibility experiments are needed to determine how much energy any horse can obtain from a feed.

Digestible energy
The easiest way to express the energy value of feeds is as digestible energy. In digestibility experiments the horse is given a certain amount of a feed for several days. All faeces is collected and its energy value is measured. The digestible energy of the feed is the difference between the gross energy of the feed and the energy in the collected faeces.

In Ireland , England and Germany the energy content of horse feeds is given as units of digestible energy. The unit used is MJ (Megajoules). In the USA the unit is MCal (Mega calories). Conversion is done using the formula: 1 MCal = 4.185 MJ.

Metabolisable energy
Since energy is also lost through urine and intestinal gases, we can go a step further in the calculation of a feed's energy value by subtracting these energy losses too. Then we get what is called metabolisable energy. This represents the portion of the energy from the feed that is available for the body's many functions. Metabolisable energy provides a more accurate measure of a feed's energy value for the animal than digestible energy.

In Sweden and Finland the energy content of horse feeds is given as metabolisable energy. The unit is MJ, and the numerical value of metabolisable energy is lower than energy content given as digestible energy.

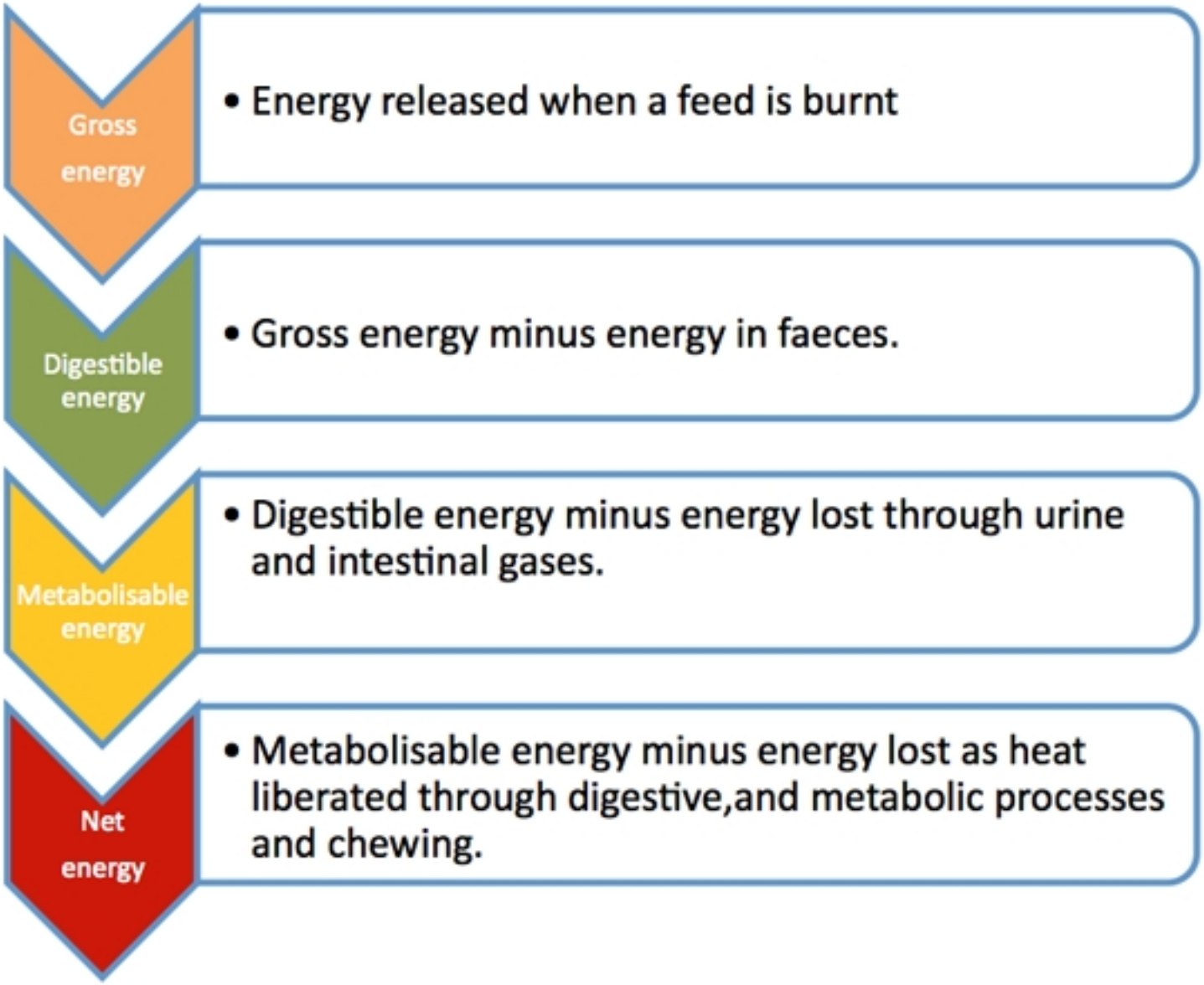
Net Energy
Net energy is even more complicated to measure. When, in addition to energy losses via faeces, urine and intestinal gas we also measure the energy costs of digestion processes and the turnover of nutrients absorbed from the diet, we get what is called the feed's net energy. This represents the portion of feed energy that can be used by the horse for work, for growth, for the production of a foetus or milk and for the maintenance of the body.

In Norway, Denmark, Iceland, the Netherlands and France, the feed energy is given as net energy.

The unit is feed units for horses, called FEh in Scandinavia, EWpa in the Netherlands and UFC in France.
Conversion between net energy given as MJ and as FEh is done with: FEh = MJ / 9.414.

The factor 9.414 is the net energy content of 1 kg barley when utilized by the horse.
We express the net energy content of all other feeds relative to the energy value of 1 kg of barley. If 1 kg hay has an net energy value 0.5 FEh, this means that one kg of that hay has half as much net energy as 1 kg barley.

A schematic representation of the differences between the various ways of expressing the energy content of horse feeds is shown in the chart below.



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