

Optimising nutrient balance in growing and finishing rations

Energy (mainly from carbohydrates) and protein are the two most important nutrients to consider in beef cattle diets. They can be present in feeds in different forms which make them available to the animal at different rates. Providing a mixture of feeds in a diet helps provide a balanced release of carbohydrate and rumen degradable protein which is required to fuel fermentation in the rumen and optimise cattle performance.

Energy intake is the main determinant of liveweight gain in cattle and is measured as megajoules (MJ) of metabolisable energy (ME) per kilogram of feed in dry matter (DM). Finishing rations driving fast rates of gain will contain higher levels of energy (12 MJ ME/kg DM) compared with growing rations (9.5 – 11.5 MJ ME/kg DM), however this is determined by cattle type, system and target market.

Protein is essential for optimising animal performance, growth, appetite and influencing ruminant health. In beef cattle diets, protein is commonly expressed as crude protein (CP) which is directly proportional to the amount of nitrogen contained within the feed. However, more sophisticated systems characterising protein in terms of its degradability exist and these are used in most rationing software.

CP levels tend to be lower in finishing rations (12 – 14% CP) than in growing rations (12 – 16% CP) with slightly higher levels required for continental bulls versus steers and heifers. Finishing Holstein bulls show no growth rate response to increasing CP levels above 14% CP in DM.

Table 1 provides an overview of the energy and protein density of some common feeds.

Table 1: Common feeds and their composition

| Feed | DM (%) | Energy (MJ ME/kg DM) | Crude protein (% in DM) |
|----------------------------|---------|----------------------|-------------------------|
| Grass silage (good) | 32.0 | 11.5 | 16.0 |
| Grass silage (moderate) | 28.0 | 10.5 | 12.0 |
| Maize silage | 25 – 35 | 10.8 – 11.7 | 8-9 |
| Wholecrop barley (cracked) | 30 – 45 | 13.5 | 11.6 |
| Straw | 85.0 | 5.0 | 4.0 |
| Wheat distillers' grains | 89.0 | 13.5 | 32 |
| Rapeseed meal | 88.0 | 12.1 | 38.5 |
| Barley | 86.0 | 13.2 | 12.1 |

Fibre is also an important source of energy in ruminant diets as well as being key to efficient rumen function. Long fibre has a physical effect in the rumen stimulating rumination and chewing. Forage-based rations will usually provide sufficient structural fibre for good rumen function, however, intensive cereal-based rations that are fed ad-lib will require supplementary long structural fibre. The best type of forage for this is straw as it is rougher and small amounts will help maintain rumen function compared to softer silage or hay.

Further guidance on rationing can be found in the Better Returns Programme manual, [Feeding Growing and Finishing Cattle for Better Returns](#).

A ration calculator is also available on the [AHDB Beef & Lamb website](#) which can be used to calculate the cost and energy and protein density of beef diets.