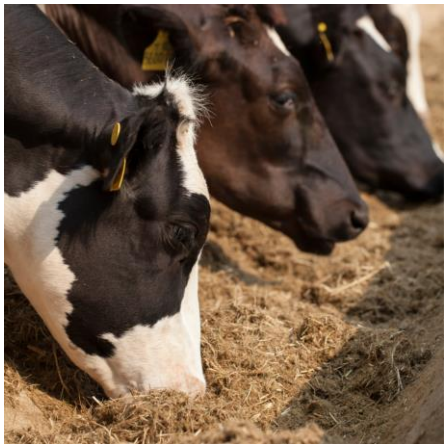
Amino Acid balancing for Improved Performance



An Amino Acid is the building block of protein and needed for many vital processes like the synthesis of hormones, neurotransmitters, and cell structures. There are twenty that are required, with ten of those called essential, because the cow cannot produce them herself. Each essential amino acid must be supplied by the diet, with two, Lysine and methionine being classed as first limiting. The cow also requires the non-essential amino acids but can produce them to match her needs.

The cow takes individual amino acids and combines them in chains with specific sequences to make protein in different forms to match her requirements for: - milk, foetal growth, tissue and muscle. She does not need Crude protein, which as nitrogen, on average 30% is utilized as milk or tissue. Consequently, up to 70% of the nitrogen is excreted in urine and faeces -wasted. Efficiency of nitrogen utilization can be increased along with animal performance by balancing the amino acid supply.

The positive effects of balancing the supply of the ten essential amino acids are significant, positively influencing; -

- Maintenance
- Lactation
- Growth
- Reproduction
- Milk Solids

The two first limiting amino acids are, Lysine and Methionine. It is necessary that these two make up a certain portion of the dietary protein content. In doing so they will increase the efficiency and utilization of the other eight essential amino acids. The first requirement for balancing a ration for amino acids is to provide enough rumen degradable protein (RDP) to maximise microbial protein synthesis in the rumen. Energy supply, fermentable carbohydrates and digestible fibre, will drive “protein yield” and Optimum Rumen Efficiency for amino acid production. The second requirement is to balance for rumen undegradable protein (DUP), including protected Lysine and Methionine to optimize metabolizable protein production, which is “True Protein”, and absorbed in the small intestine as amino acids. The

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supply of both Lysine and Methionine for balancing the requirement must be in a protected form so they are not degraded in the rumen by microbial bacteria and pass into the small intestine.

What are the effects on cow performance when balancing for amino acids?

Toledo et.al 2017 reports that when balancing transition diets for Lysine and methionine at a ratio of 2.8:1 pregnancy losses were reduced by 13.6% over the control, with protected methionine being top dressed. Additionally, Batistel et.al.2017 improved calf birth weight by 3kgs over the control when diets were supplemented with protected methionine.

Equally, Zhou et.al 2016, fed a diet balanced with protected Lysine and Methionine at a ratio of 2.9:1 against control with no protected amino acids balanced at a ratio of 3.5:1, to lactation cows. Those cows fed the protected Lysine and Methionine diet produced an average of 4 kgs more milk than the control, with a milk protein percent increase of .18% over the control.

This autumn on a 400-cow herd in West Wales the TMR diet was balanced with a supplement for a Lysine and Methionine ratio of 2.8:1 with protected Lysine and Methionine being fed. Milk yield increased by 2.5 litres, per cow, with milk proteins increasing by an average of .2% to 3.6% with an increase in conception rate of 5% to 49%.

Balancing diets for amino acid requirements will become more prevalent as we go forward, giving the farmer healthier cows, better performance, with increased efficiency- a win, win for both farmer and cow.

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