News
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HIGHLIGHT

The concept of limiting amino acid also applies to fattening beef cattle.

For sustainable livestock systems, feeding strategies should evolve to incorporate more food not edible for human consumption into farm animal's diets. Given the ability of ruminants to transform cellulose into high-quality foods for humans, ruminant diets incorporating the more and more grass and forages seems a sustainable strategy for the future. However, one particular concern when using diets rich in cellulose (grass, forages) is the low efficiency of their conversion into animal products (i.e feed efficiency) compared to diets including cereals and high dense protein meals. The amino acid profile supplied by cellulosic feedstuffs in ruminants is believed to be one factor lowering this feed efficiency. The French INRA feeding system for ruminants establishes requirements s for specific amino acids known to limit the performances of dairy cows but no recommendations are given yet for growing ruminants. This study showed that when diets rich in grass silage are not well balanced in limiting amino acids (methionine) the growth performances of animals decreased in relation to well-balanced diets. Thus, our results justify the need for integrating amino acids recommendation for growing ruminants.

Animal agriculture is facing substantial challenges due to an expected increase in the demand for high-quality animal food products. Livestock production systems need therefore to evolve towards improving the efficiency with which ruminants transform feedstock into high-quality food for human consumption. This transition needs to take into account the unique potential of ruminants to use resources non-edible for humans, such as cellulose-rich feedstuffs (Schader et al., 2015).

Nevertheless, the dietary methionine (Met) supply may not match the animal requirements when growing cattle are fed high-forages diets (Storm and Orskov, 1984; Titgemeyer and Merchen, 1990) and thus Met can be considering a limiting amino acid in beef cattle fed high grass silage diets. The current French feeding system (INRA, 2018) includes no recommendation for limiting AA for growing ruminants. There is a need therefore to evaluate the impact of Met supplementation on beef cattle performances as well as to study the mechanisms involved at the metabolic level in the potential gain in feed efficiency.

***Legend**: Performance of young Charolais cattle fed diets rich in grass silage supplemented with rumen protected methionine. Author: Gonzalo Cantalapiedra*

When diets rich in grass silage were balanced in methionine digestible in the intestine (MetDI), the growth of young bulls was higher than that of unsupplemented animals (+8%; P=0.02) with a tendency for a greater increase at high (16.2%MAT) vs. low (13.5%MAT) protein levels (P=0.10). Feed efficiency and nitrogen use efficiency were not significantly affected by MetDI supplementation (P>0.05). However, some plasma indicators such as urea concentration, natural ^{15}N abundance and the isotopic nitrogen turnover rate suggested a better metabolic utilisation of amino acids when MetDI supplementation was applied to the high protein diet.

Data on slaughterhouse performances showed an increase in total fat deposition in carcasses (+5%; P=0.03) to the detriment of muscle (-0.8%; P=0.05) for animals supplemented with MetDI and regardless of the protein level of the diet. Thus, it is necessary to integrate individual amino acid requirements in the feeding systems for growing and fattening young bulls.

As the concept of limiting amino acids has been proved in growing cattle, the next step will be to define recommendations for the supply of limiting individual amino acids in ruminant feeding systems. To this end, dose-response trials aiming at defining MetDI recommendations are currently being considered with our private partner (Adisseo France).

Learn more:

Cantalapiedra-Hijar G., I. Ortigues-Marty, B. Sepchat, E. Titgemeyer, L. Bahloul. Methionine balanced diets improve cattle performance in fattening young bulls fed high-forage diets through changes in nitrogen metabolism. 2020. British Journal of Nutrition, 273-285. https://doi.org/10.1017/S0007114520001154.

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