

Amino-acid balance improves protein use, Calf milk replacers off

More isn't necessarily better when it comes to protein levels in calf milk replacers. The latest research shows that lower concentrations of protein, but with a specific balance of amino acids, can improve growth rates in pre-weaned calves. And such a move can also reduce milk replacer costs and 'waste' nitrogen

text **Karen Wright**

Calf nutrition is changing fast, according to Cargill's Jim Quigley who, after more than 25 years in the industry, says that he's seeing more progress now than ever before. "People have challenged the protocols that we've followed for many years. And this is good – it's led to one of the most comprehensive reviews of calf nutrition for many years."

Dr Quigley, an international authority in calf and heifer rearing, spends 50% of his time on research projects and the other 50% communicating the latest knowledge through Cargill global specialists, has recently been in the UK to disseminate the latest developments in calf milk replacers with precisely balanced amino acid supplementation – and lower protein concentrations.

"Pre-weaned calves receive nearly all their daily protein intake from milk or milk replacer," he says. "Essentially all the amino acids needed for growth will come from the liquid diet. Complete milk proteins – casein plus whey – have been considered ideal. When corrected for digestibility, this amino-acid profile matches that required for lean tissue growth. Until recently, we've believed this to be a 'perfect' match."

Amino-acid profiles

However, the components of milk protein can have different amino-acid profiles. These can be limiting in certain essential amino acids. "This is already well researched in the pig and poultry sectors, and it has

allowed them to improve feed efficiency, reduce wasted nutrients and minimise feed costs. Even dairy cow rations are formulated to optimise amino acids for maximum milk yields with lower protein concentrations. Yet, until now, we haven't adequately specified amino-acid requirements for dairy calves."

Calf milk replacers in the UK are typical between 22% and 23% protein and 26% for a high-protein milk replacer. Some may even have protein levels of 28%. "But more isn't necessarily better," says Dr Quigley, adding that the company's latest trial work looked at key questions in calf nutrition.

These included, how much CMR can we feed and what sort of response can we get? Can we improve growth rates and productivity with a better combination of constituents? What's the best balance of amino acids for growth rates and performance?

Trials using combinations of amino acids with milk replacers of varying protein contents were carried out with calves at Cargill's Nurture Research Centre in New Paris, Ohio.

Calves were fed on milk replacer and starter from two days old through to weaning, at four to six weeks old, using multiple titrations of amino acids under many different feed programmes.

Weight-gain increase

Combinations of lysine and methionine and threonine, often referred to as 'limiting' amino acids where a lack of one results in a 'gap' in the diet that hinders growth, were used, plus two other important amino acids – arginine and histidine.

Calves were measured for daily live weight gain and skeletal size – height, circumference and hip width. Results showed that calves up to four weeks old achieved an 18% increase in average daily weight gain where a specific amino-acid supplementation was added to 24% and 26% crude protein milk replacers (see Figure 1).

These calves achieved average daily weight gain above that delivered by a 28% crude protein milk replacer. All milk replacers contained 17% fat and were fed at 0.7kg/head/day up to weaning.

"These results show that lower concentrations of protein

New-look replacers

"Work in the US has demonstrated the benefit of balancing calf milk replacers for amino acids rather than formulating to protein, says Cargill UK's calf and heifer specialist Bianca Theeruth.

"Trial results show that we can achieve the same performance in calf development on a lower-protein calf

milk replacer balanced for amino acids compared with a higher, more expensive, protein replacer with no additional amino-acid supplementation.

"The advantages also include better use of protein and contribute to a more sustainable industry."

These latest developments in calf

nutrition have been put into practice in Cargill's ProviMilk milk replacers.

"These are now formulated to an amino-acid requirement and not protein per se. They will help producers to achieve more protein-efficient and cost-effective growth rates," she adds.

calf performance and nitrogen efficiency

er more precise feeding



Calf milk replacers with balanced amino acids can improve performance and reduce cost and waste through more efficient protein use

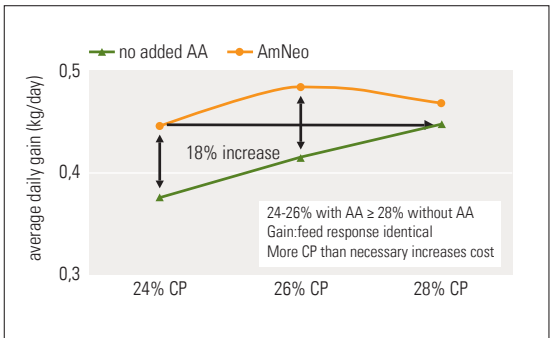
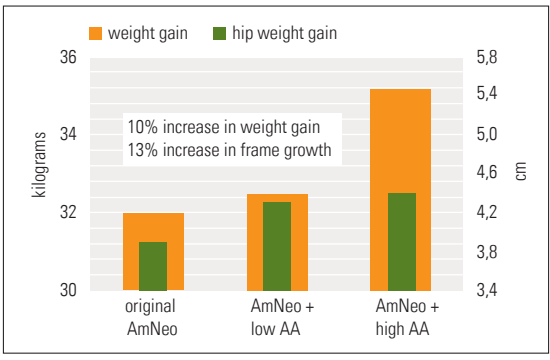


Figure 1: Effect of amino-acid (AA) supplementation in milk replacer on calf growth rates (17% fat, MR fed at 660g/day, and weaned at 28 days).

Figure 2: Effect of low and high amino-acid (AA) supplementation included on calf growth rates (24% CP, 17% fat, MR fed at 680g/day, and weaned at 42 days).



but with specific amino acid supplementation can produce better results, more cost-effectively and with less waste,” says Dr Quigley.

Cargill’s research went on to develop its amino-acid balancing technology, AmNeo, and include more amino acids in the evaluations. The performance of groups of calves, fed varying levels of amino-acid supplementation in an optimal 24% crude protein milk replacer at 17% fat, were compared. Results (see Figure 2) indicate a 10% average increase in total weight gain and 13% increase in frame growth where the additional amino acids were included.

“And when we consider costs, we can see a better return where calves are fed a milk replacer with optimal protein (24%) and the latest package of balanced amino acids compared with a 28% protein milk replacer and no supplementary amino-acid balance,” says Dr Quigley. “This is because feed costs and cost per kilogramme of weight gain are less in the lower-protein ration.”

Another advantage of feeding lower protein is the improvement in nitrogen efficiency. “There’s less waste. A 28% milk replacer creates more waste nitrogen than a 24% protein product that, based on our trials, we consider to be ideal. More waste is uneconomical and has environmental and stewardship implications.”

Dr Quigley believes that they have arrived at protein levels with a balance of amino acids for calf milk replacers that will improve performance and reduce the cost per unit of body weight gain through more efficient protein use. |