

# Betaine from sugarbeet gives an energy boost

BY DR GARY PARTRIDGE

Feed ingredients

**T**rials in Germany this year have demonstrated advantages throughout the pork chain from supplementing grower-finisher feeds with a natural extract from sugarbeet. Pig feed manufacturers saved on ingredient costs. Producers gained from better growth performance and from premium payments on carcasses. Processors could see potential benefits such as a reduced drip loss from the meat.

Most often called betaine although also known as trimethylglycine, the extract had already come to

prominence in human nutrition over the last decade, with claims as a dietary supplement to



Betaine is a natural extract of the sugarbeet used for sugar production, hence food-standard quality is guaranteed.

for chickens include protecting the birds against heat stress or disease stresses so their growth performance is more consistent. As a natural donor of methyl groups for key metabolic processes it has the additional important merit of saving part of the requirement for methionine and choline so feed costs are reduced.

Accumulating evidence now supports the view that betaine is equally useful in pig nutrition, because it allows more feed energy to be used for functions other than body maintenance. These energy-boosting effects have been helpful, for example, with sows during lactation. A sow stressed by heat usually eats less feed than the optimum,

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prevent diseases of the heart and vascular system. Today it is rapidly establishing acceptance in poultry feeds. Its documented effects

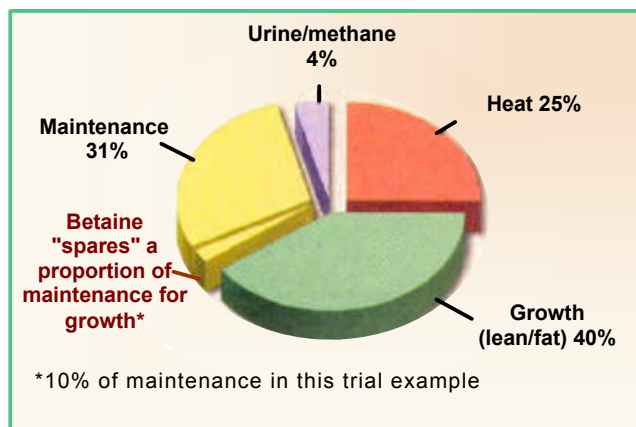


FIGURE: How betaine changes the partitioning of energy intake in the growing pig.



Growing pigs use a surprising amount of their feed energy just to maintain the osmotic (water movement) balance in their gut and other tissues. Dietary betaine has been shown to spare some of that energy, which can then be used for growth and lean meat deposition in pigs receiving an adequate supply of amino acids.

Table 1 - Key data from betaine trials in Germany

|                           | TRIAL 1 |                          |                           | TRIAL 2 |                        |                           |
|---------------------------|---------|--------------------------|---------------------------|---------|------------------------|---------------------------|
|                           | Control | Betaine <sup>1</sup>     | Improvement<br>vs control | Control | Betaine <sup>1</sup>   | Improvement<br>vs control |
|                           |         | (-4.3% DE <sup>2</sup> ) |                           |         | (-3% DE <sup>2</sup> ) |                           |
| Days of growth            | 102     | 100                      |                           | 129     | 129                    |                           |
| Grower daily gain (g/d)   | 697     | 729**                    | +5%                       | 723     | 727                    |                           |
| Finisher daily gain (g/d) | 809     | 828*                     | +2%                       | 728     | 740                    |                           |
| Whole trial (g/d)         | 760     | 785**                    | +3%                       | 731     | 735                    |                           |
| Feed:gain (FCR)           | 2.76    | 2.80                     |                           | 2.92    | 2.98                   |                           |
| Carcass weight (kg)       | 89.9    | 90.5                     |                           | 92.4    | 92.2                   |                           |
| Fat thickness at P2 (mm)  | 15.8    | 15.7                     |                           | 16.8    | 16.3*                  | -3%                       |
| Meat thickness (mm)       | 62.8    | 64.2**                   | +2%                       | 61.8    | 63.3**                 | +2%                       |
| Lean meat %               | 57.1    | 57.4                     |                           | 56.1    | 56.8**                 | +1%                       |
| Drip loss (%)             | 4.9     | 4.0                      | -18%                      | 3.6     | 3.6                    |                           |

<sup>1</sup> Betaine is Betafin® (Finnfeeds); <sup>2</sup> DE = Digestible Energy;  
\*/\*\* Statistical significance at 5 or 10%. \*\*P<0.05; \*P<0.10 respectively

decreasing subsequent litter size. But betaine usage has compensated for a low feed intake, the extra energy supply resulting in larger litters next time round.

Feeding it to weaned pigs has improved their welfare and performance by creating a better osmotic balance in the intestines, counteracting the common problems of digestive upsets and dehydration. Studies of the key modes of action of betaine in pigs confirm it maintains a healthy balance of water and electrolytes within cells, particularly those lining the gut. The pig's compensatory mechanism controlling the movement of water into and out of every cell uses so-called ion pumps that consume relatively large amounts of energy. With betaine in the ration, however, these cellular pumps do not need to expend so much energy. Accordingly the pig's demands for maintenance are lower and some of the energy spared can be redirected towards growth and lean meat deposition.

Then there is the proven ability of betaine to eliminate the need to add synthetic

choline chloride to pig diets. Betaine can entirely replace choline for the particular function of supplying methyl groups in the cycle of events known as transmethylation. This process of methyl group donation is fundamental to many important functions in the body, such as protein synthesis and the development of immune functions. The pig will still need a certain amount of choline for other essential metabolic pathways, but under practical conditions its requirement can be met by the raw materials in the feed.

No less valid with a betaine supplement is to assume it will mean a lower dietary requirement for methionine - by providing a methyl group to convert homocysteine into methionine in the transmethylation cycle - with consequent savings in feed costs.

In Germany during 2001, over 600 grower-finisher pigs were studied in 2 trials from a starting liveweight of about 30kg until 120kg (see **Table**). Control and test (betaine) diets had the same amino acid levels; but the test versions were formulated to contain 3-4%

less energy, with no added synthetic choline chloride.

Compared with the more energy-dense control, feeding betaine maintained or improved daily gain and increased both lean meat percentage and meat thickness. In addition, a spot test of 29 hams from Trial 1 showed that betaine use resulted in less drip loss.

The German results indicated significant economic advantages from betaine usage. In the first trial, pigs reached slaughter 2 days earlier than controls and with more meat in the carcass, giving a net benefit of DM1.60/pig - equivalent to 0.82 Euros or US\$0.73. The second trial showed significant lean meat benefits, amounting to DM2.45 (1.25 Euros or US\$1.12) per pig. Over the 2 trials the additional income per pig averaged around DM2 (1 Euro or 91 US cents).

**Key words:** Betaine, Betafin, Pig, Swine, Backfat, Carcass yield, Carcass fat, Osmolyte, Osmotic stress, Energy, Sparing, Downspec, Lean meat, Drip loss