

## Designer nutrition for pigs:

# Feeding against backfat

by Peter Best

**T**rials conducted by Australia's largest pig producer have supported claims of a reduction in the fatness of slaughter pigs, through the use of a feed supplement that is also under test in Scandinavia and North America. Australian pork production company, Bunge Meat Industries, which markets more than 800,000 pigs per year, reported recently that it had observed almost a 15% decrease in the backfat thickness of animals given betaine as a methyl donor in their finishing diet.

Bunge's studies with betaine were described to the 1993 Australian Pig

Science Association meeting held in Canberra. David Cadogan, for the company, presented results from two groups of 20 crossbred gilt pigs fed ad lib on a basal diet that contained 13.5 MJ DE/kg and 0.54g of available lysine per MJ digestible energy. With one group remaining as the unsupplemented control, the other was given 1.25kg betaine per ton of feed.

The supplement is already used commercially in pig and poultry nutrition as a partial replacement for choline chloride, Mr. Cadogan commented. A previous dose response study at Bunge

Meat Industries had indicated an effect on the subcutaneous fat thickness of pigs grown from 55kg to 90kg. The latest trial began when the animals weighed 60kg and continued for at least 35 days, or until they approached 103kg liveweight.

### Carcass uniformity

It found the groups were much the same for daily weight gain and feed conversion efficiency, but supplementation reduced the depth of backfat by 14.8%. Weekly checks during the trial period, using an ultrasound technique, had revealed similar fat depths for both groups until Day 21. At this point, however, the pigs on betaine had 2.2mm less backfat, and the difference in their favour became wider still by the time of slaughter. The thickness of their final fat layer averaged 15.0mm, compared with 17.6mm for the controls.

"We think there may be an application, particularly in cooler weather," Mr. Cadogan remarked, "to bring fast-growing and fatter pigs back into line with the rest for final fat depth so that the group is more uniform at slaughter. What we do not yet know is whether the drop in backfat thickness is associated with a concomitant reduction in carcass fat or simply with a reduction of fat. There is some research evidence from chickens, of a significantly lower carcass fat content."

The development of backfat measurements during the finisher phase in the Australian trial is also highlighted by Erkki Virtanen, of the Cultor Group's Finnsugar Bioproducts subsidiary in Finland, using the graph in Figure 1.

After two weeks from the start of betaine supplementation, the thickening of the fat layer almost ceases, he notes, while the control pigs show a typical pattern of increasing backfat towards

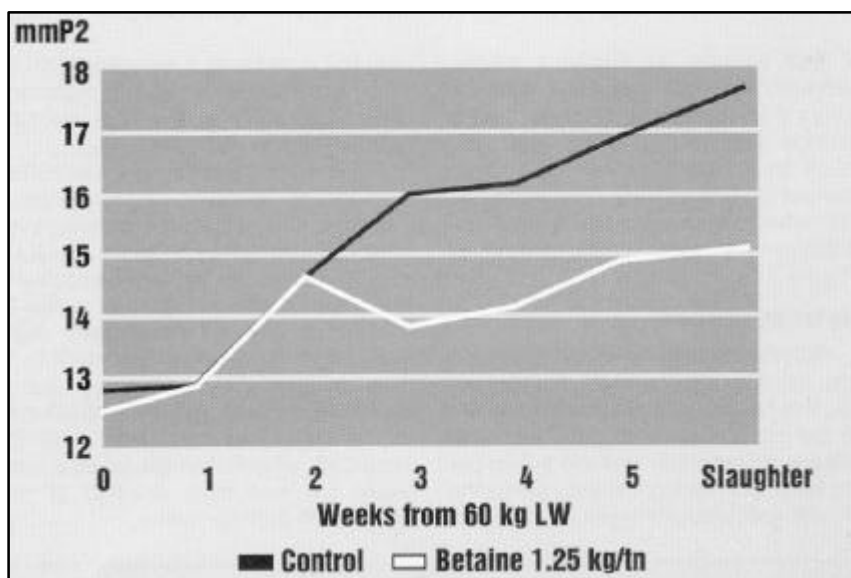


Figure 1. Ultrasonic measurement of backfat at P2 measuring point in female pigs supplemented with betaine from 60kg liveweight.

## Methyl donor

**B**etaine shares similarities with choline chloride in the process of fat metabolism and as a provider of methyl groups for the formation of methionine. Finnsugar's Erkki Virtanen describes it as a natural compound which occurs in highly variable quantities in living organisms and is both non-toxic and stable, tolerating temperatures up to 200°C.

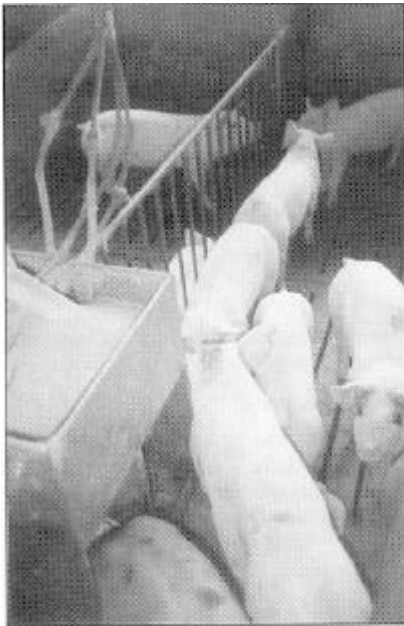
"It is a quaternary ammonium compound with three methyl groups attached to the nitrogen atom of a glycine molecule.

"Its chemical properties are due to its zwitterion nature and the reactive methyl groups which it can donate in enzymatic reactions.

"Because of its direct role in methylation reactions, it has a pronounced lipotropic effect. It stimulates both liver lipid

mobilisation, affecting the blood lipoprotein profile, and carnitine synthesis which thus improves fatty acid oxidation in mitochondria, "Consequently," Finnsugar's Erkki Virtanen says, "betaine supplementation has been reported to decrease and/or redistribute carcass fat in several animal species, including chickens, fish and pigs.

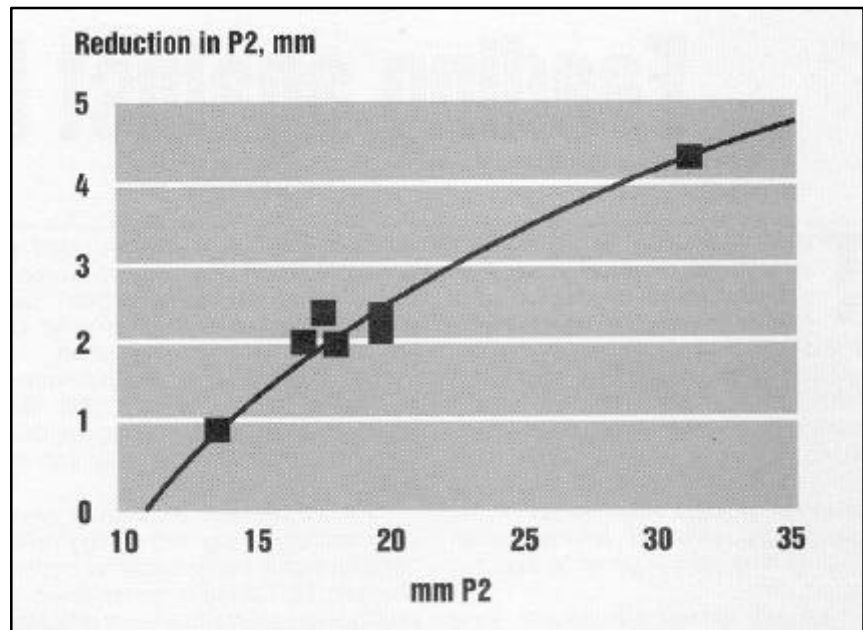
## Feeding against backfat



heavier weights.

"From these and other results it seems that a relatively short period of supplementation, of about three weeks, is enough to reduce backfat in female pigs reared to heavier weights," he adds. "But a longer period is apparently necessary for less backfat in entire males and also for an increase in the eye muscle area of both sexes at slaughter."

In a series of five trials conducted not only in the USA and Finland as well as in Australia, Mr. Virtanen continues, pigs grown to heavier weights and those with greater tendency to accumulate fat (that is, gilts and castrates as opposed to entire males) responded more distinctly to betaine than their lighter and leaner counterparts in terms of final backfat, as Figure 2 shows. Although the high individual variation meant that mean backfat values did not change significantly, there was also much less



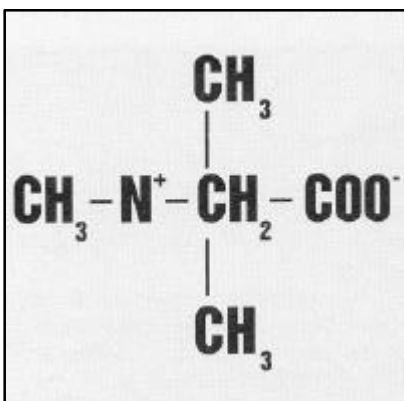
**Figure 2. P2 backfat repose to betaine supplementation (1-2 kg/ton) in relation to P2 backfat thickness at slaughter (females and castrates, liveweight at slaughter >95kg.)**

variation within the supplemented groups so they were more uniform when slaughtered and fewer poor-grading carcasses were produced (Figure 3).

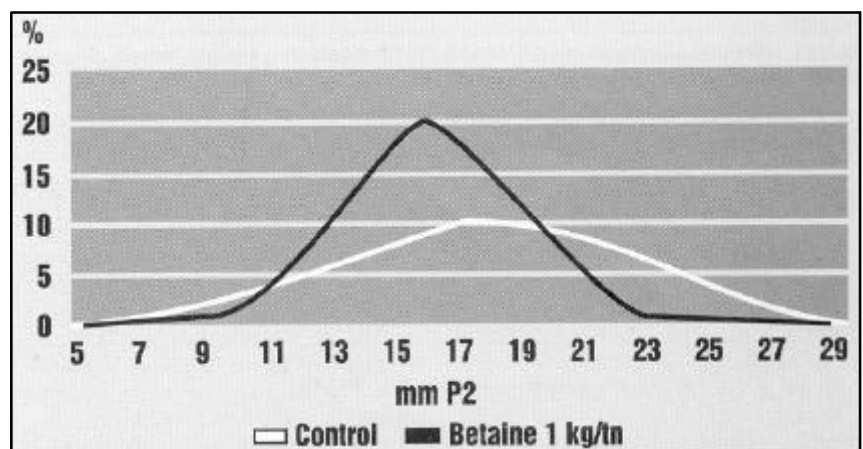
### Loin eye area increased

With the decrease in backfat, the loin eye muscle area tended to increase and this response was significant in two of the trials. Indicated, too, was that while supplementation at the 1-2kg per ton level did not significantly affect the growth and feed conversion of finisher pigs fed a diet with a moderate (11-13 g/MJ) protein:energy ratio, it improved both parameters in the USA animals receiving a low (9.6 g/MJ) ratio.

"In the final analysis the economic benefit of betaine administration depends on the carcass grading system," he concludes. "Based on SEUROP classification system used in the European Union, a 1mm reduction in backfat at the P2 measuring point would add, for example, about DM3 to the carcass price received by a German producer. In pigs with 20mm P2, a 2-2.5mm reduction is to be expected, whereupon the betaine cost would be less than one-fifth of the increase in carcass value." FI



**Betaine chemical formula.**



**Figure 3. Effect of betaine on individual variation of P2 in female pigs at slaughter. Distribution curve based on normal distribution.**