

# Increasing breastmeat yield in broilers and turkeys

*A sugar by-product, betaine is an osmolyte and methyl donor. Trials under commercial conditions have shown that dietary supplementation with betaine improves the high-value breast and can increase financial returns to the grower. -Dr Milan Hruby*

In the current climate, where competition is fierce and every cost counts, maximising the return from every part of the business is crucial. For broiler and turkey producers, increasing breastmeat yield is a priority if full advantage is to be taken of its high market value in many countries. While bird genetic improvement has been a major driver in increasing the yield of breastmeat, there is still scope for further improvement by fine-tuning the diet to ensure that the full genetic potential of the bird is achieved.

One tactic for improving carcass characteristics, such as breastmeat yield, is to include the feed supplement, betaine, which is extracted from sugar beet and is a high value by-product of sugar production.

Studies in collaboration with Danisco Animal Nutrition [formerly Finnfeeds] using Betafin, a highly purified form of betaine, have shown that diets including this supplement can increase breastmeat yield by, on average, 3% in broilers and turkeys under typical commercial conditions.

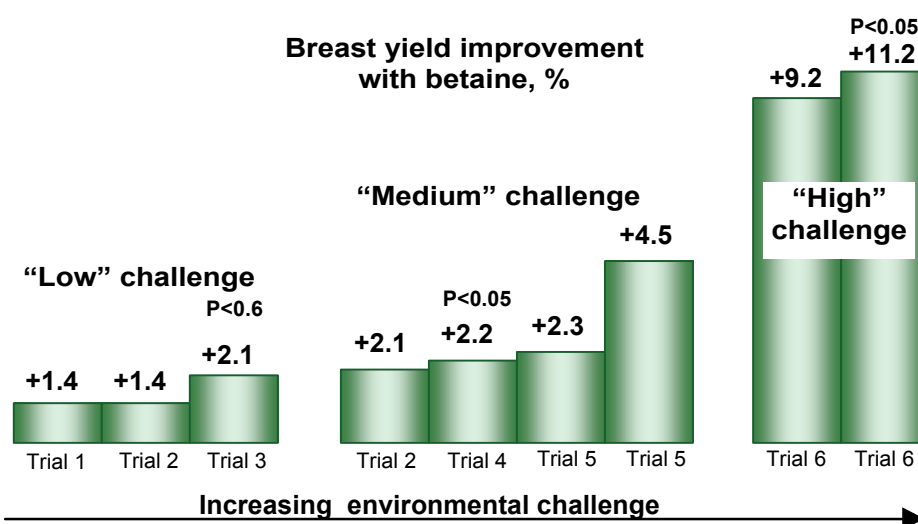
Betaine increases breastmeat yield through its unique combined functions as an osmolyte and a methyl donor.

## Betaine as an osmolyte

It is important to remember that water is essential for protein synthesis, as well as accounting for up to three-quarters of the constituents of muscle. Water is also key in regulating the bird's cell metabolism. If the water content in a cell changes, there is a knock-on effect on the growth potential and health of the cell.

The bird's mechanism for controlling cell water balance is based on so-called "ion pumps" that consume relatively large amounts of energy. Betaine, as an osmolyte, helps to maintain a healthy balance of water within cells. With betaine in the feed, the bird is less reliant on ion pumps and so retains water more efficiently. Therefore the bird's energy requirement for maintenance purposes is lower, leaving more energy available for growth and production

**Figure 1** Breastmeat yield improvement in broilers in response to betaine under different levels of environmental challenge (9 datasets from six broiler trials)



of breast meat. In addition, by improving cell hydration, betaine stimulates protein synthesis, and hence muscle growth.

### Betaine as a methyl donor

Betaine may also increase breastmeat yield through its function as a methyl donor, which contributes to the synthesis of important compounds including protein and DNA/RNA.

As a methyl donor, betaine allows more methionine to be available for protein synthesis and hence muscle growth. In addition, the metabolism of betaine (also known as trimethylglycine) produces glycine, an amino acid also important in protein synthesis and hence breast muscle growth.

### Environmental challenge increases the betaine-effect on breast yield

Replicated trials conducted in several countries across a range of production conditions, including differences in bird ages, diet types and rearing conditions, have demonstrated that diets supplemented with betaine can improve breastmeat yield in broilers.

In particular, the results show that with greater environmental challenge, such as heat stress and/or coccidia challenge, the effect of betaine on breastmeat yield increases

The environmental challenge present in these trials has been broadly categorised into three levels:

- low challenge, e.g. research conditions, low pathogen challenge, low bird density, new litter and a controlled environment
- medium challenge, e.g. commercial conditions, temperate climate, commercial bird densities and pathogen challenge
- high challenge, e.g. commercial conditions, high bird density, high pathogen challenge, high humidity, high altitude, high temperature, old litter

Improvements in breast yield ranged from 1.4% to more than 11% according to the level of environmental

challenge (figure 1). Additionally, in birds exposed to 'medium-high' challenge situations, increasing the dose rate of betaine increased the improvement in breast meat yield further.

Similarly, feed conversion ratio (FCR) was improved with betaine supplementation and the level of improvement was also related to environmental challenge. In "low to medium" challenge conditions the average FCR improvement was 1.8%; "medium" challenge conditions, 2.6%; while for "medium-high" challenge conditions the average FCR response was 3.6%.

For turkeys, research conducted in the USA demonstrated that betaine increased turkey breastmeat yield in market-age turkeys by an average of 2.9% (figure 2). Betaine was added to the feed at a rate of 1kg/tonne and the environmental challenge in all trials was estimated to be "low-medium", according to the categories described earlier.

For turkeys, there is also the added benefit that the ME value of the diet may be reduced by up to 3% from 5 weeks of age, resulting in reduced feed costs, without loss in growth and FCR and without compromising improvements in breastmeat yield.

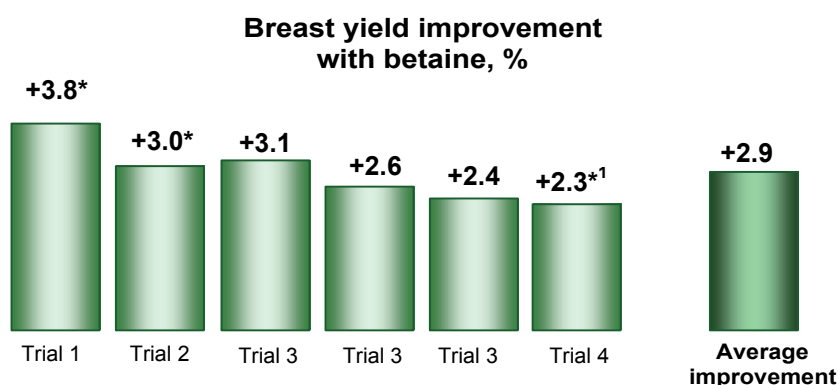
For the broiler producer, the economic value of betaine, when used to improve breastmeat yield, can be highly significant. For example, assuming a feed cost of 230 Euro per tonne, an increase in breastmeat yield of 2.3% and an FCR improvement of 2 points, producers could see an additional net profit per bird of 2 cents, equivalent to 4.6 Euro per tonne of feed.

For the turkey producer, assuming a feed price of 210 Euro per tonne and an improvement in breast meat yield of 2.9%, producers could expect to see an additional 45 cents profit per bird, equivalent to 9 Euro per tonne of feed.

In summary, betaine represents a valuable tool to help poultry producers improve their profitability through improvements in premium value breastmeat yield. When added to broiler and turkey feeds at 1.0-1.5kg/tonne, improvements in breastmeat yield of approximately 3% can be achieved under commercial conditions.

- Dr Milan Hruby, Technical Services Manager, Danisco Animal Nutrition, UK.

**Figure 2** Breastmeat yield improvement in turkeys in response to betaine (6 datasets from four turkey trials)



**Data from 6 treatment comparisons**  
**Betafin significantly increased breast yield in all studies, p<0.05**

\*Betaine diets also reduced in ME <sup>1</sup>Hens