

# Succulence and tenderness – a quality issue in meat production

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Successful marketing of any food depends on the sensory characteristic of the product. In the marketing of meat, tenderness and succulence of the meat are of high importance. Unfortunately, the meat processor has only a limited influence on these factors.

Therefore, knowledge about the possibilities of optimisation at the primary production of the meat on the farm is important for the food industry. In collaboration with the Georg-August University, Göttingen, Germany, two studies have been carried out to evaluate the sensory quality of broiler thighs and breast meat resulting from the use of a natural phytogenic (plant origin) feed additive known under the brand name digestarom.

In both studies the use of the product in the feedstuff positively changed the sensory quality in the direction of juicier and more tender meat.

## New study

A recent study (April 2011) compared the effects of digestarom and an anti-microbial growth promoter (AGP) namely BMD (Bacitracin methylene disalicylate) on the performance and meat quality of broilers at the West Bengal University of Animal Sciences, Kolkata, India. The use of AGPs is still common in Asia and other parts of the world in order to increase profitability in farming. In the study digestarom has provided a significant increase in profitability compared to the negative control and the additive was even more successful than the AMG.

At 39 days, eight birds with body weight closest to the mean weight of the group were selected from each dietary treatment. After slaughter and the removal of feathers, viscera, shanks and neck, the weights of the eviscerated hot carcass, breast, drumsticks and thighs were measured. Carcass yield and yields of breast, thighs and drumsticks relative

Parameter	Control	BMD	digestarom	SEM	P-value
Protein (g/kg)	184.3	184.5	187.1	1.11	0.526
pH	6.3	6.4	6.3	0.02	0.457
WHC (%)	38.6 <sup>a</sup>	42.5 <sup>ab</sup>	44.8 <sup>b</sup>	0.92	0.016
Drip loss (%)	2.4 <sup>a</sup>	2.2 <sup>b</sup>	1.7 <sup>a</sup>	0.10	0.025

Means with dissimilar letters in a row varied significantly

**Table 1. Meat properties of broilers supplemented with 500mg/kg BMD or 150mg/kg digestarom.**

to live weight (g/kg) were measured. Breast fillets (approximately 200g) were stored at 4°C for 24 hours for determination of pH, moisture, drip loss, water holding capacity (WHC) and crude protein contents.

Moisture in the meat was determined by drying a ground breast meat sample (100g) at 98°C for 48 hours. The dried meat was cooled to room temperature in a desiccator prior to taking the final weights.

Meat protein (N x 6.25) was determined by Kjeldahl distillation method taking 1g of ground meat. All analyses were performed in duplicate.

Drip loss and pH were determined according to Qiao et al. (2007). Pieces of breast fillet (50g) were stored at 4°C for 48 hours and the loss of weight, as the percentage of the original sample weight was determined. This loss was equivalent to the drip loss from the stored meat. Meat pH was measured at six different locations across the sample surface with a pH meter.

The average represented the ultimate pH of the sample. WHC was estimated according to Qiao et al. (2001). A meat sample (200 and 400mg) was placed on 11 cm diameter filter paper between plexi glass plates and pressed at 2000psi for one minute. The outline area of the expressible juice and the meat film was traced, and the two areas were determined. Higher expressible juice percentage is related to lower WHC. Express juice, as a percentage was calculated as under:  $\text{expressible juice \%} = 100 \times \frac{[(\text{total juice area} - \text{meat film area}) \times \text{water/inch}^2 \text{ filter paper}]}{\text{moisture of sample (mg)}}$

It was observed that supplementation of digestarom significantly increased the WHC in the poultry meat compared with the control group. Consequently, the drip loss

(48 hours) was significantly less in the digestarom group compared to the BMD group (Table 1).

The ability of meat to retain inherent water even though external pressures, for example gravity, heating are applied to it, is an important property of fresh meat as it affects both the yield and the succulence of the end product. This characteristic can be described in several ways, but in fresh products that have not been extensively processed, it is often described as drip loss or purge.

Excessive drip loss results in economic losses in numerous ways including reduction in saleable product weight and the loss of export customers who demand high quality product with a minimum amount of drip loss. In addition, valuable water soluble proteins and vitamins are lost along with the moisture.

WHC of meat can also influence processing characteristics. Meat with low WHC often tends to produce inferior processed products.

The mechanism by which drip or purge is lost from meat is influenced by both the pH of the tissue and by the amount of space in the muscle cell and particularly the myofibril that retains the water. Numerous factors affect both the rate and the amount of drip. Of extreme importance is the metabolic state of the live bird at the time of harvest, which is influenced by the genetic make-up of the bird, characteristics of the muscle and the production regime and standards.

Since WHC is a positive and important character of meat quality, scientists are making repeated efforts to evolve a strategy to enhance and increase the WHC of different meats because poor WHC is characteristic of lesser quality meat.

The aqueous solution that is lost from post-mortem muscle (drip)

contains significant amount of proteins, myoglobin, glycolytic enzymes, other sarcoplasmic proteins, amino acids and water soluble vitamins.

Hence, it can be well understood as to how important is the reduction of drip loss as well as WHC of meat from the nutritional as well as the eating quality aspect of meat for the consumers.

Since supplementation of digestarom significantly increased the WHC in meat and consequently reduced the drip loss in 48 hours compared to the BMD group, this advantageous effect of digestarom is not only of nutritional and aesthetic importance but also of considerable economic importance, benefit for slaughter houses, meat processors and consumers of poultry meat.

## Conclusion

The entire meat production chain from the genetics of the chicken through to nutrition can influence the WHC of meat and in turn the drip loss. It is therefore important that each segment of the production chain seeks to optimise their operation to reduce the drip loss from the products. This coordinated effort is needed to ensure production of an economically viable and desirable high quality fresh meat product.

The positive experiences of consumers regarding the sensory characteristics of meat and carcass expression with digestarom fed chickens have also been repeatedly confirmed in scientific investigations under field conditions. It can be concluded that supplementation of digestarom is effective in improving the overall meat quality attributes such as carcass yield, dressing percentage, fillet and tender yield, organoleptic cooked meat parameters, overall palatability and acceptability of meat. The product does not have any residual or adverse effect on carcass traits, eating and cooking quality of meat and is completely safe – a proven additional bonus reason for the use of digestarom in broiler feeds. ■

References available upon request