

Chicken meat

How farming practices influence its quality

Chicken meat is naturally lean and rich in high-quality protein, regardless of the production system. However, farming practices influence several other quality traits that are important for consumers and the poultry industry. The INTAQT project investigated these relationships across 90 commercial broiler farms in five European countries. Results showed that growth rate is the main driver of differences in nutritional composition, technological properties and breast muscle defects, while highlighting significant opportunities to improve meat quality through genetics, nutrition and management practices.

intaqt
one quality

Chicken is the most consumed meat worldwide and an essential source of affordable, high-quality animal protein. Whatever the production system, chicken meat (especially breast) remains naturally lean and rich in protein, making it an important component of healthy and sustainable diets.

At the same time, European poultry production is evolving in response to growing expectations regarding animal welfare, environmental sustainability and product quality. Consumers, retailers and policy makers increasingly expect production systems that combine efficiency with high-quality products. While the effects of farming systems on productivity are well documented, much less is known about their impact on the intrinsic quality of chicken meat, including its nutritional value, technological properties and eating quality. Understanding these relationships is essential to help producers optimize management practices while maintaining competitiveness.



Fig 1: Illustration of the diversity of broiler production systems

To understand how farming practices influence chicken meat quality, the Horizon 2020 INTAQT project established one of the largest European datasets linking poultry production systems with product quality. A network of 90 commercial broiler farms was surveyed across France, Belgium, Italy, Poland and Switzerland, covering the diversity of production systems currently used in Europe. Rather than comparing only conventional and alternative systems, the study investigated a continuum of farming practices, ranging from extensive outdoor production with slow-growing genotypes to intensive indoor systems using fast-growing commercial broilers. These systems were classified into seven main typologies (Figure 2).

Typology	Indoor/outdoor	Slaughter age, day	Slaughter weight, kg	Genotype
Out-layer	Outdoor	87.1	1.66	Lohmann Brown, ÖTZ Coffee
Out-slow	Outdoor	82.1	2.31	Sasso XL451, Brown Nick, Hubbard S757N
Out-med	Outdoor	56.1	2.19	Hubbard JA757, JA957, RedJA57
In-fast-med	Indoor	45.4	2.27	Ranger Classic, Redbro
In-fast-S	Indoor	34.9	1.9	Ross 308
In-fast-H	Indoor	41.1	2.75	Ross 308
In-fast-UH	Indoor	45.8	3.60	Ross 308

The INTAQT project adopted the One Quality concept, an integrated approach that considers both the intrinsic quality of chicken meat and the extrinsic characteristics of the production system. Intrinsic quality included nutritional value, and hazardous compounds, prevalence of breast muscle defects such as White Striping, Wooden Breast and Spaghetti Meat, storage, processing ability and sensory characteristics (see below).

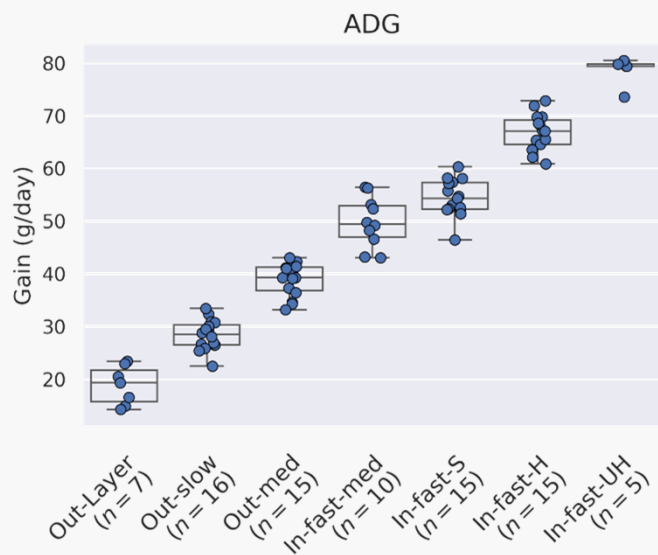


Fig 2: Broiler production system typologies and average daily gain (ADG) range represented in the INTAQT farm survey.

- Sensory profile and consumer test
- Nutrients and health-related compounds (protein, fat, fatty acids, collagen, amino acids, protein digestibility)
- Health-related substances (anserine, carnosine, heme iron, vitamins, minerals)
- Hazardous compounds: organic pollutants, heavy metals, mycotoxins, pathogens, antimicrobial resistance
- Prevalence of breast muscle defects, water-holding capacity, oxidative stability, processing yield

These measurements were combined with detailed information on farming practices, genetics, growth performance, animal welfare and environmental sustainability to identify the key drivers of meat quality and support the development of practical decision-support tools for the poultry sector.

Breast meat yield increased with production intensity, reflecting the efficiency of genetic selection and modern broiler production practices. At the same time, protein concentration gradually decreased, whereas fat content tended to increase in the fastest-growing birds. Despite these differences, chicken meat remains an excellent source of high-quality protein across all farming systems.

Chicken meat also contains bioactive compounds such as anserine and carnosine, recognized for their antioxidant properties and potential benefits for muscle function and healthy ageing. Their concentrations progressively declined as growth rate increased. Similar trends were observed for heme iron in thigh meat, highlighting that farming practices influence not only basic nutritional traits but also compounds contributing to the overall nutritional value of chicken meat.

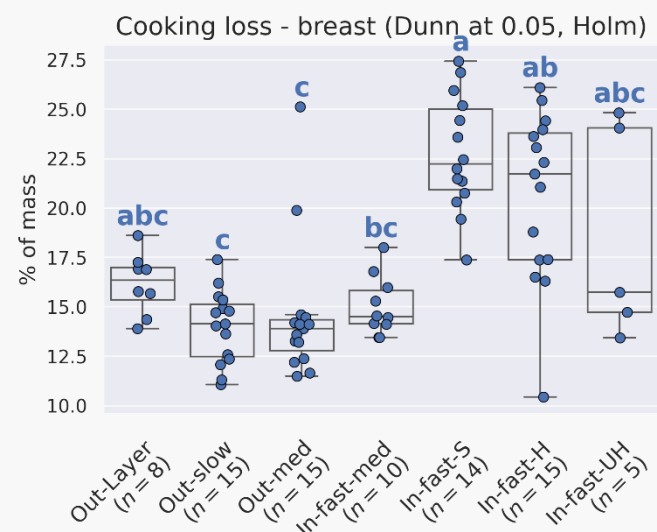


Fig 3: Percentage of cooking loss for breast meat

Although meat color and texture varied among production systems, overall eating quality remained high across all systems. Some intermediate-growth genotypes produced particularly tender breast meat, whereas slow-growing systems were associated with a more fibrous texture and intensive systems with a more powdery texture. Fast-growing broilers were also more frequently affected by White Striping, Wooden Breast, and Spaghetti Meat, confirming the link between rapid growth, high breast yield, and the development of these myopathies (Figure 4).

Broilers with the highest growth rates (>60 g/day) and slaughter weights (2.6–2.8 kg) produced meat with lower protein digestibility and lower essential amino acid availability than medium- and slow-growing genotypes. In particular, the release of key amino acids involved in muscle protein synthesis and metabolism, including leucine, arginine, histidine, and tryptophan, was consistently lower in this intensive production system.

Water-holding capacity is a key trait affecting meat appearance, processing yield and economic value. The highest drip and cooking losses were generally observed in fast-growing broilers, although large differences between farms producing standard broilers indicate substantial opportunities for improvement through better management practices (Figure 3).

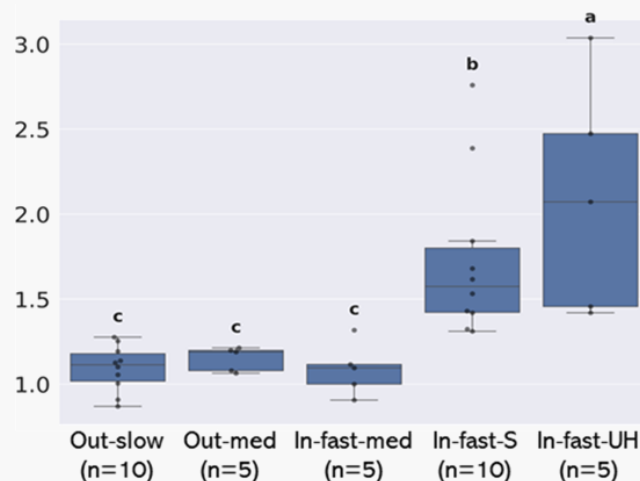


Fig 4: Assessment of breast muscle defects by fluorescent immunolabeling of the MyH15 protein.

The INTAQT project demonstrates that improving chicken meat quality is not about identifying a single "best" production system, but rather about understanding how farming practices influence product characteristics. Across all systems, chicken meat remains a lean and high-quality source of protein. None of the samples exceeded the EFSA safety limits for human consumption for any of the hazardous substances assessed. However, the study shows that growth rate is the major driver of variations in meat composition, bioactive compounds, technological properties and the occurrence of breast muscle defects.

An important finding is the considerable variability observed between farms operating under similar production conditions. This highlights that significant improvements can be achieved through better management practices, including genetics, nutrition and husbandry, without necessarily changing the production system itself. Such improvements can enhance product consistency, processing performance and consumer satisfaction while maintaining production efficiency.

The knowledge generated through the INTAQT project provides a solid scientific foundation for developing decision-support tools, including rapid quality assessment methods, production system authentication, multicriteria scoring of intrinsic quality, and a web application predicting changes in product quality resulting from modifications in farming practices. These tools will help producers, advisors, and other stakeholders assess the effects of farming practices on meat quality and identify the most appropriate strategies for their production systems. By integrating quality, sustainability, and animal welfare within the One Quality framework, they will support evidence-based decision-making across the poultry value chain. Ultimately, INTAQT improves our understanding of the relationships between farming practices and chicken meat quality while providing practical guidance for improving poultry production. The project's results support the development of production systems that meet consumer expectations while ensuring high-quality products, sustainable farming, and a competitive European poultry sector.



Fig. 5: Chemical analyses performed at one of the partner laboratories within the INTAQT laboratory network