



Innovative bull production systems and beef quality

In the BullBeef project, **TEAGASC** and collaborators are looking at the profitable production of bull beef to market specification while ensuring optimum quality for the consumer.

Approximately 900,000 male cattle are slaughtered annually in Ireland. The majority of these animals are castrated and 'steers' are perceived to be a unique selling point for Irish beef, particularly in European markets where bull beef production predominates. The superior growth and feed conversion efficiency of bulls, however, make them attractive to producers. The proportion of the male slaughter represented by young bulls varies from year to year (e.g., 12.9% in 2008, 29.3% in 2012 and 21.6% in 2017 – Department of Agriculture, Food and the Marine (DAFM), Beef carcass classification and price reporting section, Annual Report, 2017). Traditionally, bulls were reared indoors on a high-energy ration, which is a relatively expensive production system. Exploiting grazing is one strategy to decrease the cost of production but meeting the abattoir specifications of animal age and carcass fat score and weight is likely to be a challenge. The DAFM, under the Research Stimulus Fund, has funded a large, multi-institutional project (BullBeef 11/SF/322) that has addressed novel production systems for bulls, the impact on beef quality and whether current abattoir specifications are valid from a meat quality perspective. This article gives an overview of the project and some emerging findings.

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The BullBeef project

This project is a collaboration between Teagasc, University College Dublin, University College Cork and INRA (France). The overarching tasks concern the modification of production systems for suckler and dairy-origin bull beef to increase profitability, and the assessment of

the resulting beef for market-relevant quality characteristics. Underpinning research tasks focus on elements from farm to fork that limit achievement of market specifications. These include the impact of slaughter age and castration, the duration at pasture prior to slaughter, the need for concentrate supplementation at pasture, the maturity/breed of suckler bull, and the interaction with carcass intervention strategies. Since carcass fat score is a key market specification, the underlying biology of fat deposition is being explored. Beef colour, eating quality and shelf life are being comprehensively measured.

Recent findings

- When finished from pasture at the same age – ca. 19 months – carcasses from spring-born, suckler-bred, early-maturing breeds were lighter, fatter, and had poorer conformation than late-maturing breeds; bulls had greater growth, liveweight, better kill-out proportion, a heavier carcass, better carcass conformation score and a lower carcass fat score than steers.
- Early-maturing breed steers were adequately ‘finished’ at 19-20 months of age from unsupplemented pasture in all experiments, whereas late-maturing breed steers were finished in some but not other experiments. This inconsistency across studies was likely due to inclement weather-related grazing conditions having an adverse effect on intake and performance.
- Concentrate supplementation during the latter half of the grazing season (i.e., ca. 4-5kg daily for 75-95 days) is a possible strategy for finishing late-maturing breed suckler steers from grass at ca. 19-20 months.
- Compared to late-maturing breed steers, carcasses from late-maturing breed bulls were only adequately finished at 19 months of age when supplemented with concentrates (i.e., ca. 4kg daily for 95 days).
- Carcasses of early-maturing breed bulls slaughtered at 19 months of age from pasture were lighter but adequately finished, with or without concentrate supplementation during the latter half of the grazing season (i.e., ca. 4kg daily for 95 days), whereas the heavier, late-maturing breed bull carcasses were only adequately finished when supplemented.
- Carcasses of both early- and late-maturing breed suckler bulls were inadequately finished from pasture, with or without concentrate supplementation at 15 months of age.

Collectively, these findings indicate that spring-born, early-maturing breed suckler steers can be finished from well-managed pasture in autumn at ca. 19-20 months of age without concentrate supplementation, whereas late-maturing breeds may need concentrate supplementation. Spring-born, early- and late-maturing breed suckler bulls produced from pasture under 16 months of age are unlikely to meet market-specific requirements in terms of carcass fat cover, even with moderate concentrate supplementation; however, this carcass fat target (2+) is achievable from well-managed pasture at ca. 19-20 months of age without concentrate supplementation for early-maturing breeds, and with moderate levels of concentrate supplementation for late-maturing breeds.

- Within dairy bull production, the 19-month-old, grass-based system was the most profitable. However, the possibility of a price discount due to the animals being older than the 16 months currently required in many markets needs to be considered.
- There is little commercially important difference in tenderness or overall liking of striploins from continental-breed sired suckler bulls slaughtered between 15 and 22 months of age, or from dairy bulls slaughtered at 16, 19 or 21 months of age.
- There was some evidence that production system *per se* may have a small negative effect on eating quality. For example, when suckler bulls from early- or late-maturing breed sires were slaughtered at 380kg carcass from an *ad libitum* concentrate diet or grazed prior to finishing on an *ad libitum* concentrate diet, the tenderness rating by trained assessors was lower for the grass-based system. The scale of this decrease is unlikely to be detected by untrained consumers.
- Continental breed-sired bulls and steers were compared within two production systems; the striploin from steers was fatter and rated more highly for tenderness and acceptability than the striploin from bulls. The absolute differences in eating quality were, however, small.

The final outcome of this project will be blueprints for bull beef production, with associated costs and meat quality implications.

Acknowledgements

The contributions of David Kenny, Lara Moran and Paul Allen (Teagasc), Alan Kelly and Frank Monahan (UCD), Joe Kerry and Maurice O’Sullivan (UCC) and Brigitte Picard (INRA) are greatly appreciated.

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