**Comparison of organoleptic quality and composition of beef from suckler bulls from different production systems**

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**Supplementary Material S1** *Correlations among selected production, carcass and beef quality traits*

The correlations between production, carcass and beef quality traits are summarised in Table S1. Animal age was negatively correlated (*P* < 0.01) with ADG overall, IMF tenderness, overall liking and soluble collagen proportion but positively correlated (*P* < 0.05) with slaughter weight, CW, conformation score, muscle colour grade and total collagen. The ADG indoor was positively correlated (*P* < 0.05) with ADG overall, slaughter weight and muscle moisture content but negatively correlated (*P* < 0.05) with subcutaneous fat lightness and IMF content. The ADG overall was positively correlated (*P* < 0.05) with slaughter weight, CW, conformation score, fat score, subcutaneous fat lightness, IMF, tenderness, beefy flavour, flavour liking, overall liking and soluble collagen proportion but negatively correlated (*P* < 0.05) with muscle colour grade and muscle moisture content. Slaughter weight was positively correlated (*P* < 0.05) with CW, conformation score, fat score, subcutaneous fat lightness, subcutaneous fat redness and beefy flavour but negatively correlated (*P* < 0.05) with soluble collagen proportion. The CW was positively correlated (*P* < 0.05) with conformation score, fat score, subcutaneous fat lightness and flavour liking but negatively correlated (*P* < 0.05) with soluble collagen proportion.

Fat score was negatively correlated (*P* < 0.01) with muscle colour grade, muscle moisture content and abnormal flavour but positively correlated (*P* < 0.05) with subcutaneous fat lightness, redness and yellowness, IMF, tenderness, beefy flavour, flavour liking, overall liking and soluble collagen proportion. Ultimate pH was positively correlated (*P* < 0.01) with muscle colour grade. Muscle colour grade was negatively correlated (*P* < 0.05) with subcutaneous fat redness, IMF content and soluble collagen proportion. Subcutaneous fat lightness was negatively correlated (*P* < 0.01) with subcutaneous fat redness and muscle moisture content but positively correlated (*P* < 0.05) with IMF content, tenderness and flavour liking. Subcutaneous fat redness was positively correlated (*P* < 0.001) with subcutaneous fat yellowness.

Muscle moisture content was negatively correlated (*P* < 0.05) with IMF, tenderness, beefy flavour, flavour liking, overall liking and soluble collage proportion. The IMF content was positively correlated (*P* < 0.01) with tenderness, beefy flavour, flavour liking, overall liking and soluble collagen proportion but negatively correlated (*P* < 0.05) with abnormal flavour. Tenderness was positively correlated (*P* < 0.05) with juiciness, beefy flavour, flavour liking, overall liking and soluble collagen proportion. Juiciness was positively correlated (*P* < 0.01) with overall liking. Beefy flavour was negatively correlated (*P* < 0.001) with abnormal flavour but positively correlated (*P* < 0.001) with flavour liking and overall liking. Abnormal flavour was negatively correlated (*P* < 0.001) with flavour liking and overall liking. Flavour liking was positively correlated (*P* < 0.001) with overall liking. Overall liking was positively correlated (*P* < 0.05) with soluble collagen proportion.

**Table S1** *Correlations (r) between different production, carcass and quality traits of bull beef (n = 126)*

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Traits1 | Production traits | | | | |  | Carcass traits | | | | | | |  | Beef quality traits | | | | | | | | |
| Age | ADGi | ADGo | SW | CW |  | CnfS | FatS | pHu | MCG | SLgt | SRed | SYel |  | Mois | IMF | Ten | Jui | BefF | AbnF | FlL | OveL | ToC |
| ADGi | -0.04 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ADGo | -0.31\*\*\* | 0.34\*\*\* |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| SW | 0.50\*\*\* | 0.22\* | 0.42\*\*\* |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| CW | 0.52\*\*\* | 0.10 | 0.38\*\* | 0.95\*\*\* |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| CnfS | 0.20\* | 0.01 | 0.27\*\* | 0.51\*\*\* | 0.67\*\*\* |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| FatS | -0.16 | -0.02 | 0.35\*\*\* | 0.21\* | 0.21\* |  | 0.13 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| pHu | -0.10 | 0.05 | -0.07 | -0.11 | -0.17 |  | -0.16 | -0.04 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| MCG | 0.19\* | 0.10 | -0.20\* | 0.01 | -0.01 |  | -0.12 | -0.24\*\* | 0.23\*\* |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| SLgt | 0.06 | -0.30\*\*\* | 0.19\* | 0.25\*\* | 0.27\*\* |  | 0.16 | 0.27\*\* | -0.13 | -0.13 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| SRed | 0.12 | 0.15 | -0.04 | 0.19\* | 0.12 |  | 0.03 | 0.31\*\*\* | -0.12 | -0.18\* | -0.28\*\* |  |  |  |  |  |  |  |  |  |  |  |  |
| SYel | 0.11 | 0.02 | -0.14 | 0.05 | -0.03 |  | -0.16 | 0.19\* | -0.08 | -0.12 | 0.06 | 0.67\*\*\* |  |  |  |  |  |  |  |  |  |  |  |
| Mois | 0.08 | 0.23\*\* | -0.25\*\* | -0.13 | -0.13 |  | -0.04 | -0.26\*\* | -0.05 | 0.10 | -0.36\*\*\* | 0.07 | -0.08 |  |  |  |  |  |  |  |  |  |  |
| IMF | -0.28\*\* | -0.18\* | 0.40\*\*\* | 0.02 | 0.02 |  | 0.05 | 0.31\*\*\* | 0.08 | -0.25\*\* | 0.42\*\*\* | -0.14 | 0.05 |  | -0.77\*\*\* |  |  |  |  |  |  |  |  |
| Ten | -0.31\*\*\* | 0.08 | 0.30\*\*\* | 0.04 | 0.05 |  | 0.08 | 0.39\*\*\* | 0.00 | -0.14 | 0.18\* | 0.13 | 0.13 |  | -0.25\*\* | 0.29\*\*\* |  |  |  |  |  |  |  |
| Jui | -0.15 | 0.10 | 0.07 | -0.08 | -0.11 |  | -0.11 | 0.08 | 0.09 | 0.12 | 0.02 | -0.03 | 0.04 |  | -0.12 | 0.12 | 0.28\*\* |  |  |  |  |  |  |
| BefF | -0.17 | 0.13 | 0.48\*\*\* | 0.18\* | 0.17 |  | 0.11 | 0.33\*\*\* | -0.08 | -0.12 | 0.07 | 0.05 | -0.04 |  | -0.21\* | 0.28\*\* | 0.44\*\*\* | 0.08 |  |  |  |  |  |
| AbnF | 0.05 | 0.07 | -0.17 | 0.06 | 0.04 |  | -0.02 | -0.25\*\* | 0.04 | 0.14 | -0.11 | 0.07 | 0.01 |  | 0.11 | -0.23\* | -0.17 | 0.13 | -0.41\*\*\* |  |  |  |  |
| FlL | -0.11 | 0.11 | 0.45\*\*\* | 0.15 | 0.20\* |  | 0.17 | 0.36\*\*\* | -0.13 | -0.13 | 0.19\* | -0.10 | -0.13 |  | -0.26\*\* | 0.33\*\*\* | 0.43\*\*\* | 0.10 | 0.73\*\*\* | -0.65\*\*\* |  |  |  |
| OveL | -0.26\*\* | 0.07 | 0.40\*\*\* | 0.05 | 0.10 |  | 0.12 | 0.43\*\*\* | -0.09 | -0.13 | 0.22 | 0.02 | 0.01 |  | -0.31\*\*\* | 0.36\*\*\* | 0.84\*\*\* | 0.26\*\* | 0.61\*\*\* | -0.44\*\*\* | 0.78\*\*\* |  |  |
| ToC | 0.20\* | -0.03 | -0.10 | 0.13 | 0.11 |  | -0.07 | -0.06 | 0.02 | 0.09 | -0.08 | 0.06 | 0.11 |  | -0.06 | 0.00 | 0.00 | 0.05 | 0.09 | 0.03 | 0.07 | -0.01 |  |
| SoC | -0.48\*\* | -0.12 | 0.32\*\* | -0.22\* | -0.23\* |  | -0.15 | 0.22\* | 0.03 | -0.19\* | 0.13 | -0.09 | 0.02 |  | -0.32\*\* | 0.46\*\* | 0.21\* | 0.02 | 0.08 | -0.11 | 0.09 | 0.20\* | -0.11 |

1 Age (months); ADGi: Average daily live weight gain indoor (kg day -1); ADGo: Average daily live weight gain overall (kg day -1); SW: Slaughter weight (kg); CW: Carcass weight (kg); CnfS: Conformation score; FatS: Fat score; pHu: Ultimate pH; MCG: Muscle colour grade; SLgt: Subcutaneous fat lightness; SRed: Subcutaneous fat redness; SYel: Subcutaneous fat yellowness; Mois: Moisture (%); IMF: Intramuscular fat (%); Ten: Tenderness; Jui: Juiciness; BefF: Beefy flavour; AbnF: Abnormal flavour; FlL: Flavour liking; OveF: Overall liking; ToC: Total collagen (mg/g); SoC: Soluble collagen (%)

\*: *P* < 0.05; \*\*: *P* < 0.01; \*\*\*: *P* < 0.001