**Animal Production 2018**
**Fostering innovation through the value chain**
**32nd Biennial Conference of the**
**Australian Society of Animal Production**
Category: Meat Science

ABSTRACT

# Carcass attributes of crossbred Wagyu steers

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Wagyu cattle have become a globally recognized breed in premium beef markets. The attributes of Wagyu beef can be utilized in crossbreeding programs to increase the value of other beef and dairy breeds. In the present study, purebred Wagyu bulls were mated to Angus, Brahman-cross, dairy-cross and Shorthorn cows to produce F1 progeny. Fl females and subsequent generations were mated to fullblood Wagyu bulls to produce F2, F3 and F4 genotypes with 75%, 87.5% and 93.75% Wagyu, respectively. 3695 steers entered a commercial long-fed (approx. 450 days) feedlot production system over multiple years. Hot standard carcass weight (HSCW) and marble score (AUS-MEAT) were recorded at slaughter and used to calculate a carcass index (CI). Data were analyzed using a mixed-effects linear model with % Wagyu, initial dam breed, and their interaction as fixed factors, and year as a random factor.

Linear regression was used to determine the effect of marbling and HSCW on CI (CI = -2425 + 420 x Marbling Score + 5.8 x HSCW; $P < 0.001$; $R^2 = 0.989$) and carcass index on carcass value in AU$ (Carcass Value = -11238 + 0.95 x CI; $P < 0.001$). All fixed effects were significant ($P < 0.001$; Table 1). Dairy cross steers showed no response to grading up Wagyu content ($P > 0.05$) in contrast to the other breeds. Shorthorn showed larger CI compared to Angus for Fl and F2 ($P < 0.05$). Dairy animals had the greatest variance within the dataset due to the low number of animals. Shorthorn had the greatest positive response from Fl to F2 ($P < 0.0001$) whereas Angus had greater response to the grading up process from Fl to F4 compared to Brahman and Dairy. Brahman cross animals showed significantly higher CI for F3 and F4 compared to Fl and F2 ($P < 0.05$) however their response to crossbreeding was lower than Angus or Shorthorn.

Results indicate that Carcass Index, and therefore Carcass Value can be significantly increased with the inclusion of Wagyu bulls however the magnitude of this increase depends on the breed of the dam. The limitations of the study included limited numbers of dairy animals and only two generations of Shorthorn animals as generations F3 and F4 had not been reached yet. Shorthorn responded the most to increasing Wagyu content from FI to F2 and Angus from FI to F4. However, dairy crosses showed the greatest Carcass Index for F2 and F3 and this could also be a valuable crossbreeding program to increase the value of dairy animals.

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**Table 1. Carcass value index (mean ± SEM) of crossbred steers with increasing Wagyu content**

| Dam Breed | Fl | F2 | F3 | F4 |
|---|---|---|---|---|
| Angus | $3225 \pm 106^{A, X}$ ($n = 108$) | $3610 \pm 73^{A, X}$ ($n = 228$) | $4125 \pm 95^{B,C X}$ ($n = 134$) | $4617 \pm 115^{C, X}$ ($n = 91$) |
| Brahman Cross | $3548 \pm 65^{A, XY}$ ($n = 286$) | $3658 \pm 41^{A X}$ ($n = 722$) | $4071 \pm 61^{B, X}$ ($n = 320$) | $4221 \pm 77^{B, X}$ ($n = 201$) |
| Dairy | $4056 \pm 450^{A, XY}$ ($n = 6$) | $4268 \pm 121^{A, Y}$ ($n = 82$) | $4775 \pm 154^{A, Y}$ ($n = 51$) | $4738 \pm 235^{A, X}$ ($n = 22$) |
| Shorthorn | $3975 \pm 33^{A, Y}$ ($n = 1086$) | $4543 \pm 102^{B, Y}$ ($n = 115$) | - | - |

$^{A-C}$Means within rows without a common superscript differ ($P < 0.05$).
$^{X,Y}$Means within a column without a common superscript differ ($P < 0.05$).

END