THE EFFECT OF SOUS-VIDE GRILL COOK METHOD ON CONSUMER SENSORY SCORES FOR BEEF STEAKS

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I. INTRODUCTION

Tenderness is the key parameter leading to consumer acceptance and enjoyment for grilled beef steaks. Flavour and juiciness are also important but only when tenderness is acceptable [1]. Many genetic, production and management factors impact the tenderness of beef however long time, low temperature sous-vide cooking can reduce the toughness of beef. Sou-vide beef does have issues with flavour hence grilling prior to serving to consumers should allow the maillard reaction to overcome the negative flavour issues. It was hypothesised that sous-vide then grilling beef steaks will have higher consumer sensory scores than grilled beef steaks.

II. MATERIALS AND METHODS

The m. *semi tendinosus* (EYE075) and m. *longissimus thoracis* (CUB045) were collected from the left side of 80 composite bred steers which had up to 75% *Bos indicus* content. The steers were grass fed, 24 to 36 months of age and had received an androgenic hormonal growth promotant. The meat was aged for 7 days post-mortem and processed into 25mm steaks for consumer testing. The 2 positions in the EYE075 and CUB045 were rotated between the grill (GRL) and sous-vide grill (GSV) cook methods. The samples used for sensory testing followed the protocol presented by Watson et al. [2]. Following processing, the samples were vacuum packed and frozen at - 20 C until required. Samples were defrosted 24h before the sensory session. Sous-vide samples were cooked at 60°C for 4 hours and then rapidly cooled in their vacuum bags under running water. Prior to sensory testing, the sous-vide steaks were cooked on a silex grill for 3 minutes to allow the outside of the steaks to brown and the inside to return to 65°C. The grill samples were cooked on a Silex grill for 5 minutes to reach a desired internal temperature of 67°C or medium doneness. The steaks were assigned to consumers in a 6x6 latin square design so that the order of sample presentation did not impact the sensory scores. Ten untrained consumers assessed the samples from cut x cook combination for tenderness, juiciness, flavour and overall liking using a 100 point scale line. Consumer meat quality score (MQ4) is a weighted index score of tenderness (30%), juiciness (10%), flavour (30%) and overall liking (30%). MQ4 score was analysed using a linear mixed effect models in R [3] with cuts and cook method as fixed effects and animal cohort and carcass number as random terms. Individual carcase traits for ossification, hump height, marbling, carcass weight, rib fat, meat colour and fat colour were fitted individual in the model as continuous variables.

III. RESULTS AND DISCUSSION

Results showed that the sous-vide grill cook method did not improve the MQ4 score for the CUB045 or the EYE075 when compared to the grill cook method of the same muscle ($P>0.05$, Figure 1), rejecting the initial hypothesis. The CUB045 grill scored 4.93 ± 1.64 points higher than the EYE075 grilled steaks ($P=0.015$). Meanwhile the CUB045 sous-vide grill scored 11.44 ± 2.15 points higher than the EYE075 sous-vide grilled steaks ($P<0.001$). Hump height had a significant effect on all cut by cook

combinations (P<0.01). As hump height increased from 75mm to 200 mm, MQ4 score decreased from 51 to 39 points. Marbling had a significant interaction with cut (P=0.02). As Meat Standards Australia marbling increased from 110 to 510, MQ4 scores increased from 37.5 to 56.5 in the CUB045 while it had no effect on MQ4 scores in the EYE075. Ossification, carcass weight, rib fat, meat colour and fat colour did not have a significant effect on MQ4 score.

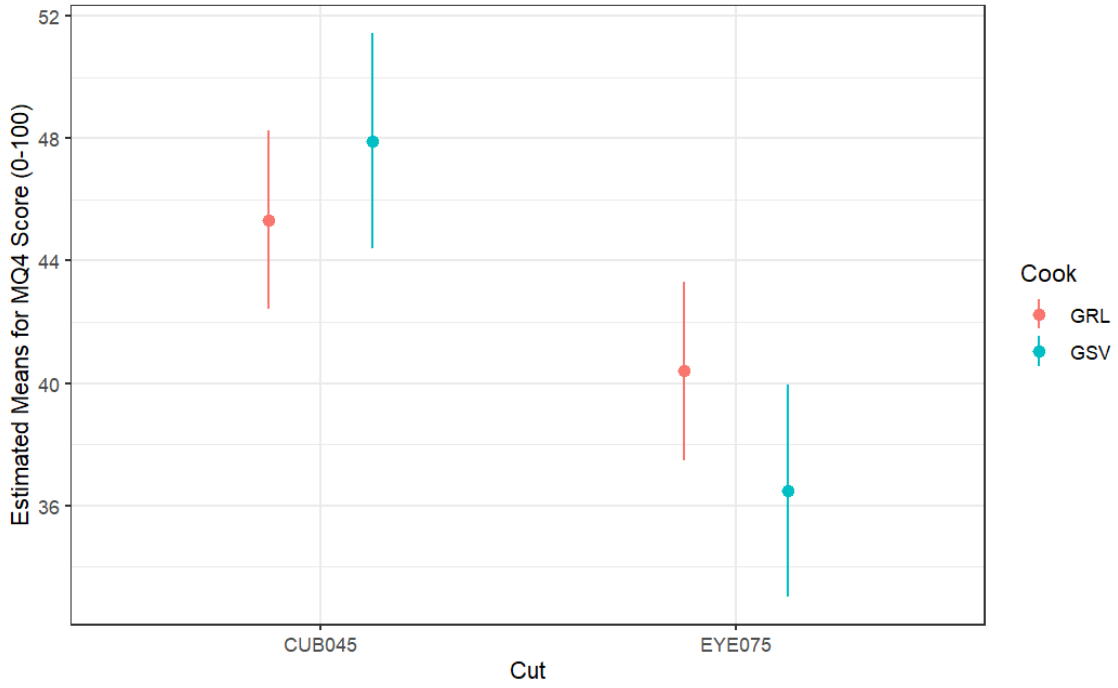

Figure 1. Estimated margin means (±95% confidence intervals) of consumer meat quality scores (MQ4) for the *m. logissimus thoracis* (CUB045) and *m. semi tendinosus* (EYE075) when cooked using a grill (GRL) or sous vide grill (GSV) methods.

IV. CONCLUSION

Utilising the sous-vide cook method prior to grilling steaks for consumers did not improve the consumer sensory scores and is not a viable option for improving the quality of tough or low quality beef steaks. Reduction of hump heights and increasing marble scores are viable methods for increasing consumer sensory scores in beef with *Bos indicus* content. Further analysis is required to determine which sensory scores (tenderness, juiciness, flavour or overall liking) are negatively impacted in the sous-vide grill cook method.

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