

# DIET HAS MINIMAL IMPACT ON AUSTRALIAN CONSUMER PALITABILITY

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**Abstract – This study tested the palatability of lamb meat derived from pasture versus grain finishing systems. The loin and topside muscles from 105 lambs were collected. Sensory scores were generated using untrained consumers who tasted 5 day aged grilled steaks, scoring tenderness, juiciness, flavour and overall liking. Consumer scores did not differ in female lambs fed grain or pasture diets. However in wether lambs palatability scores for overall liking, tenderness and juiciness were higher for those on grain compared to those on pasture. Correcting for intramuscular fat accounted for most of these differences. These results confirm that Australian consumers do prefer grain-fed lamb meat, but only in wether lambs.**

**Key Words – Grain, Lamb, Pasture.**

## I. INTRODUCTION

In Australia, finishing lambs on grain based diets is an important option during times of limited ability to finish lambs on pasture. Untrained consumer perceptions of lamb derived from different feeding finishing systems is not well published, however a higher consumer acceptability towards concentrate finished lambs compared to pasture fed lambs has been demonstrated for Spanish, German, English and French consumers [1]. In contrast, Australian consumers could not discriminate sensory characteristics between lambs finished on pasture and grain [2], suggesting that cultural aspects and consumption habits also influence sensory preferences. Hence we hypothesised that there are no sensory differences of Australian untrained consumers tasting lamb derived from pasture and concentrate fed animals.

## II. MATERIALS AND METHODS

*Experimental design and slaughter details.* Animals used in this study were from the Meat Livestock Australia Resource Flock. Lambs were separated to be finished on a pasture (n=53) or grain (n=52) based diets and each group represented three different breeding types: Merino × Merino, Merino × Terminal, Border Leicester-Merino × Terminal. The treatment and nutritional composition of grain and pasture diets are presented in Table 1. Lambs were fed on the different rations for 120-160 days (pending growth rates), and slaughtered in two kill groups (July and September). The *longissimus lumborum* (loin) and *semimembranosus* (topside) muscles were dissected from all carcasses and aged for 5 days. Five steaks (15 mm-thick) were sliced from all muscles, grilled using a Silex griller, and halved before consumption to obtain 10 consumer responses per muscle. All samples were assessed by untrained consumers who scored (1: worse to 100: best) the samples for tenderness, overall liking, juiciness and liking of flavour [3]. Intramuscular fat (IMF) was measured on loin samples.

Table 1 Nutritional composition and structure of grain and pasture diets.

Nutritional composition*	Pasture	Grain	Pasture	Grain
Dry matter (%)	30-25	90.9	■ 80% mixed perennial grasses	■ 90% concentration mixture:
Dry matter digestibility (%)	66-79	80.9	(ryegrass, paspalum, coxfoot)	75% whole barley grain, 21%
Metabolisable energy (MJ/kg DM)	9.7-11.9	12.68	■ 15% legumes and herbs (red &	cracked lupins, 4%
Crude protein (%)	12-21	15.96	white clover and plantain)	concentrate pellets
Neutral detergent fiber (%)	53-21	25.7	■ 5% mixed weeds	■ 10% chaffed oaten straw

Note: \* range in values for pasture from half of feeding period (mid-March – mid-June) to second half (mid-June – late-August).

*Statistical analyses.* Linear mixed effects models in SAS included fixed effects of feed type (grain or pasture), cut (loin or topside), sex (female or male), birth type (single, multiple), sire type (Merino, Terminal), dam breed within sire type (Merino-Merino, Merino-Terminal, Border Leicester-Merino-Terminal), kill group within sire type (July-Terminal,

September-Merino, September-Terminal). Sire identification, and animal identification were included as random effects. Non-significant terms were removed. IMF was incorporated as a covariate in the base models to test whether it accounted for feed differences in eating quality.

### III. RESULTS AND DISCUSSION

In agreement with our hypothesis, there was no difference between grain and pasture fed female lambs for any of the sensory traits ( $P>0.05$ , Table 2). This aligns with previous research which found no difference among Australian consumers' acceptability of loin samples from lambs finished on pasture or feedlot rations [2]. Yet contrary to our hypothesis there was a difference between the feed types in wether lambs ( $P<0.05$ , table 2) with grain fed wether lambs having 3.8, 4.1 and 4.7 more overall liking, tenderness and juiciness scores than pasture fed lambs across both the loin and topside. When correcting for IMF, this sensory difference remained for overall liking, but was no longer significant for tenderness and juiciness indicating the effects are mostly explained by differences in IMF between grain (5.6% IMF) and pasture (4.4% IMF) fed groups. Furthermore, Merino sired lambs had higher sensory scores than Terminal sired lambs and these differed by as much as 9.2 and 6.6 tenderness scores for the loin and topside samples. This agrees with previous findings demonstrating the better eating quality of the Merino's [4]. Also as previously reported [4], across both feed types, loin cuts had 23, 30, 21 and 19 eating quality scores higher than topside cuts for overall liking, tenderness, juiciness and flavour.

Table 2 Numerator and denominator degrees of freedom and F-value of fixed effects and their interactions in the base linear mixed effects model.

Effect	Num DF	Den DF	Overall liking	Tenderness	Juiciness	Flavour
Feed	1	97	0.66	1.23	1.24	na
Sex	1	97	0.95	0.97	0.81	na
Cut	1	97	548**	805.69**	491.68**	337.11**
Siretype	1	97	12.29**	12.12**	11.65**	13.65**
Feed*Sex	1	97	6.61*	4.57*	5.69*	na
Sex*Siretype	1	97	5.48*	na	4.27*	na

NDF: Numerator degrees of freedom; DDF: Denominator degrees of freedom; na- not applicable; \*:  $P<0.05$ ; \*\*:  $P<0.01$ .

### IV. CONCLUSION

The results show that Australians consumers have a small preference towards grain-fed lamb meat, but only from wether lambs. This effect was small, and not present in female lambs, therefore while consumer perceptions are important they should not be prioritised above production costs and other growth and carcass composition traits when implementing finishing systems.

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