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**An investigation of on-farm factors that may affect lamb growth,
carcass characteristics and meat quality.**

A thesis presented in partial fulfilment of the requirements for the degree of

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Abstract

Animal growth and meat yield are important to farmers and meat processors, and market signals indicate meat quality traits are becoming increasingly important to consumers. Therefore, an understanding of the on-farm factors affecting growth performance, carcass characteristics and meat quality attributes is imperative for the industry to be able to meet the requirements of consumers and reward farmers for superior carcass types.

The two experiments were carried out on Pohuetai farms in Central Hawkes Bay, New Zealand. All on farm measurements and management were conducted by Pohuetai farm staff. Slaughter plant carcass measurements were assessed by Silverfern Farms and Rissington Breedline staff members (including the student). Meat quality assessments were conducted by AgResearch, Invermay in Mosgiel. The statistical analyses for the experiments in this thesis were performed by the student.

The aim of experiment one (Chapter three) was to compare alternative forage crops for lamb growth, carcass characteristics and meat quality. 1178 male and female Rissington Primera lambs were grown on one of five forages; Chicory, Lucerne, Ryegrass/white clover mix and two hybrid Rape x Kale cultivars Spitfire and Titan. Lambs were slaughtered at one of three slaughter dates with mean lamb age at slaughter being 181, 214 or 250 respectively. The comparison of forages showed that lambs grazed on brassica forage crop species displayed superior growth performance and carcass characteristics. Both male and female lambs fed rape cultivars, had higher carcass weights, GR, DO% and hind quarter circumference compared to lambs finished on other forages. Female lambs finished on Lucerne and Ryegrass had tougher meat than those lambs finished on Chicory and rape cultivars. Meat from female lambs finished on Spitfire, Titan and Ryegrass had lighter meat after one day of simulated retail conditions compared to meat from lambs fed other forages. Lamb meat from females fed Ryegrass was reddest after 1 day of simulated retail conditions. Lamb from Titan finished female lambs was lighter and yellower over the whole display period. Females finished on Ryegrass had redder meat and a slower decline of redness over the whole display time.

Male lambs fed Ryegrass, Spitfire and Titan had less tender meat than males grazed on Lucerne. Spitfire grazed male lambs had lighter, redder and yellower lamb after 1 day of simulated retail conditions compared to males fed other forages. Lucerne and Ryegrass fed lambs had meat with the lowest redness, lightness and yellowness. Over the whole display time period, lamb from Spitfire fed male lambs was lighter and yellower. Ryegrass and Titan fed male lambs had the reddest meat up to day 7 of air exposure. Titan finished lambs had greater lamb flavour

intensity than other forage fed males. Lamb from male lambs fed Lucerne were juicier than the brassicas and Chicory. Spitfire fed lambs had meat with the highest overall liking compared to males finished on other forages.

The objective of experiment two was to investigate the effects of different forage diets, lamb sex and sire-breed during the finishing period on lamb growth, carcass, eating quality attributes when slaughtered at three slaughter dates. 1459 weaned male and female Rissington Primera, Landcorp Supreme and Landcorp Texel breedlines were used. Male progeny were superior in growth performance, leading to larger carcass weights and superior muscularity suggesting males would have higher lean meat yields compared to female lambs. Female lambs were fatter at the same weight however, there was no effect of sex on dressing out percentage. Lamb meat from females was more tender, redder, lighter and juicier than meat from males, indicating that lamb from females would be liked by consumers more than that from males.

Lamb fed on Titan were superior in all growth performance and carcass aspects, indicating Titan produced lamb with high pre-slaughter and carcass weights, superior muscularity over the hind quarters and higher dressing out percentage. The eating quality of lambs fed Titan was more tender, lighter, juicier and had a better overall liking than the other forages. Ryegrass produced lambs were redder suggesting that Titan fed lambs could deteriorate quicker than ryegrass fed lamb when on retail display. Lamb flavour intensity was also lower for Titan fed lambs compared to Ryegrass and Lucerne.

Primera displayed heavy pre-slaughter weights, high dressing out percentages, and muscularity. However, increased levels of fatness were also displayed. These carcass quality attributes were further implicated by high lamb flavour intensity relative to the other breeds, but no difference between breeds for any of the other meat quality parameters. Texel sired lambs displayed low pre-slaughter and carcass weights, average fat depth. However, high dressing out percentages and alongside superiority in saleable meat productivity at a given carcass weight. Lamb supreme lambs tended to display rapid growth from docking to slaughter, low carcass fat and comparable carcass weights compared with the other genotypes.

This study established that on-farm management can have effects on lamb growth, and meat and carcass characteristics. By manipulating the diet lambs are finished on, the sire-breed of sheep used and the sex slaughtered, changes in product can be seen at the consumer level. Therefore, this study provides an insight into the management factors that could be implemented to grow efficient lambs on quality forage with the carcass and therefore meat parameters that meet the demands of consumers.

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