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**Aspects of Puberty and Growth in pasture-
raised New Zealand Thoroughbreds born
in spring and autumn**

**A Thesis presented in partial fulfilment of the requirements
for the degree of Doctor of Philosophy at Massey Universtiy,
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Abstract

This thesis reports a series of studies conducted to examine the growth and onset of puberty of pasture-raised Thoroughbred horses born in spring and autumn. Current knowledge of the growth characteristics of pasture-raised Thoroughbreds is limited, and there is little information on puberty in horses. An understanding of aspects of growth and the onset of puberty in young, pasture-raised Thoroughbreds born in spring and autumn may be of importance to the New Zealand Thoroughbred industry, with the aim of producing horses for sale in the Northern Hemisphere.

Aspects of growth including the effect of sex, age, birth weight, month of birth, weaning and castration were examined in spring-born Thoroughbreds between birth and 16 months of age, and compared with those born in autumn. All foals had similar growth rates between birth and 5 months of age, after which growth rates were related to seasonal factors. There was little difference in mean body weight between spring and autumn-born horses at the end of the study, despite the 4-month age difference. Body weights were similar to horses in other studies, including supplementary grain-fed Northern Hemisphere horses. Autumn-born horses weaned in the spring had increased growth rate after weaning, whereas spring-born horses had decreased growth rate after weaning in the autumn, indicating that post-weaning growth rate was a factor of seasonal changes.

Puberty was determined by measurement of plasma testosterone and progesterone concentrations. Spring-born fillies and colts were older and heavier than autumn-born fillies and colts at puberty. However, in both spring and autumn-born horses, puberty occurred in October (New Zealand spring) indicating that seasonal changes affect the timing of puberty onset. GnRH challenges were performed every 8 weeks in spring and autumn-born colts from four months of age. Luteinising Hormone concentration followed a seasonal pattern from 4 months of age and was increased in the spring and summer and decreased in the winter months. Testosterone was first detectable in the spring (at 8 and 12 months of age in autumn and spring-born horses, respectively), possibly after a period of Leydig cell maturation.

It appears that, as in some other seasonal-breeding species, horses must reach a threshold body weight at the same time as increasing photoperiod in the spring for puberty to occur, but proof of this requires further study.

The possible implications of this work to the New Zealand Thoroughbred industry, and the suggestions for further research are discussed.

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