

ESTIMATION OF GROWTH RATES IN UK THOROUGHBREDS

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Introduction:

Studies have shown that abnormal growth is linked to the onset of developmental problems. Despite this growth rate data for Thoroughbreds (TB) in the UK is limited. Large studies in America have shown that both sex of the foal & month of its birth influence birth mass & growth rate¹ and this has resulted in industry norms being set. However TB born in the UK are exposed to vastly different climatic & management regimes, hence these industry norms may not be appropriate.

The objectives of this study were to determine body mass as a function of age & investigate the effect of sex of foal & month of its birth on birth mass & subsequent growth in UK TB's.

Materials and Methods:

Birth mass (measured using a weigh bridge), sex & date of birth were recorded for 200 individuals born in 2003-2004. Body mass was subsequently measured fortnightly during the first month of age & then at monthly intervals, until 540 days of age. The hypothesis that birth mass was different for colts & fillies was tested using an unpaired Student's t-test. The effect of birth month on birth mass was investigated using a one-way ANOVA followed by post-hoc tests. Growth rate was modelled using the Gompertz curve.

$$Y = A + Ce^{-e^{-b(x-m)}}$$

Results:

There were differences, although not statistically significant ($p > 0.05$), between the birth mass of colts ($\pm 6.05\text{kg}$) & fillies ($\pm 6.08\text{kg}$) (Figure 1). Significant differences ($p < 0.05$) were found between the birth mass of all foals born in January & foals born in March & April (Figure 2).

Sex affected growth rate at < 100 days of age, with colts having a higher growth rate compared with fillies. This first impacted upon body mass at > 100 days of age

when colts had significantly ($p = 0.005$) higher body masses compared with fillies (Figure 3). Foals born in different months had similar body masses until approximately 200 days of age when January born foals had significantly ($p = 0.05$) lower body masses than those born in Feb-April (Figure 4). Furthermore, there was a definite tendency for the rate of growth to decline more rapidly in January born foals compared to those born in other months

Discussion:

Effect of sex on birth mass

American studies have reported the birth mass of colts to be significantly ($p < 0.05$) greater than fillies.^{1,2} In humans, the greater birth mass of boys compared with girls has been attributed to androgen action³ & serum IG-F1.⁴

Effect of month of birth on birth mass

Although the age & parity of the dam was not studied, this may have had a confounding effect on the data. Offspring of younger dams (< 7 years) have significantly ($p < 0.01$) lower birth masses than those from dams aged 7-11 years.² Primiparous mares, which typically are < 6 years of age & give birth earlier in the season, produce offspring with lower birth masses as a result of differences in the physiology of the placenta^{5,6} & these foals have lower levels of serum IG-F1, which decreases foetal & post natal growth⁷⁻⁸.

Effect of sex on growth rate

The differences in body mass between colts at 200 days of age coincides with the onset of puberty⁹⁻¹⁰ during which weight gain increases dramatically due to increasing levels of sex hormones¹⁰. In addition, studies in other species have reported differences in muscle distribution & muscle weights between males

& females.¹¹⁻¹² Colts & fillies are typically segregated & differences in the feeding & management regimes may explain the differences found in this study.

Effect of month of birth on growth rate

Studies have reported that foals born in January had lower body masses compared with foals born in March & April¹. Foals will typically be weaned at around 200 days of age, thus January born foals are usually weaned in July whereas foals born later in the season are weaned during the autumn flush of grass growth. This may explain the differences found in this study. Additionally, a low DM availability of grass was observed as a result of a prolonged period of dry weather. Therefore, the 2003 cohort of January foals may have had lower energy intakes than foals born later in the season.

Comparison of UK and USA growth rate data

There were differences in body mass, at specific ages, between UK & USA TB (Figure 5). Therefore, USA body mass data may not be appropriate for use in UK TB.

Figure 1: Mean birth mass of colts & fillies.

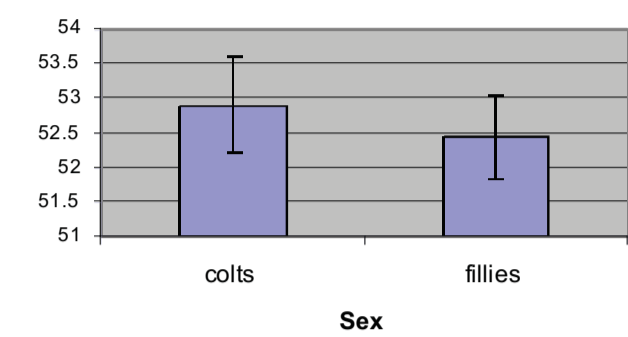


Figure 2: The relationship between month of birth and birth mass.

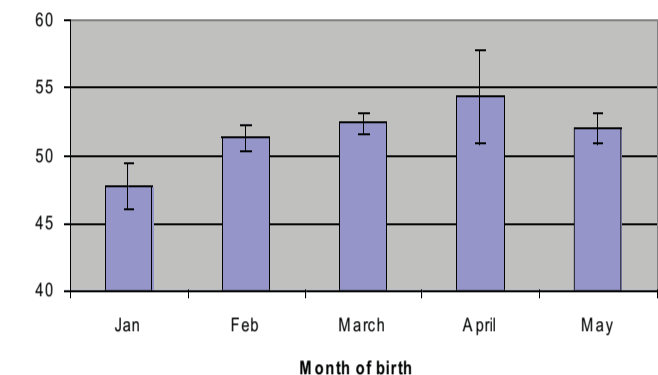


Figure 3: Bodymass of colts and fillies.

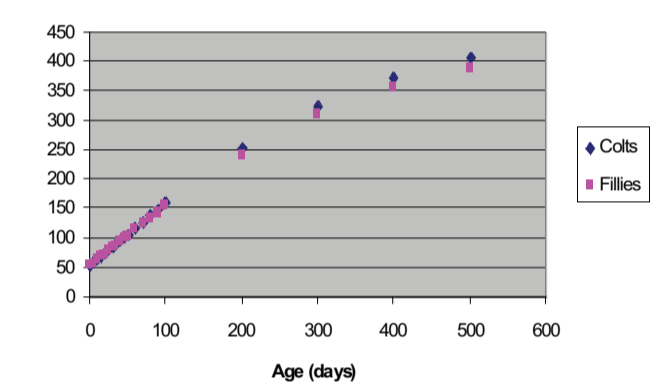


Figure 4: The relationship between bodymass and month of birth.

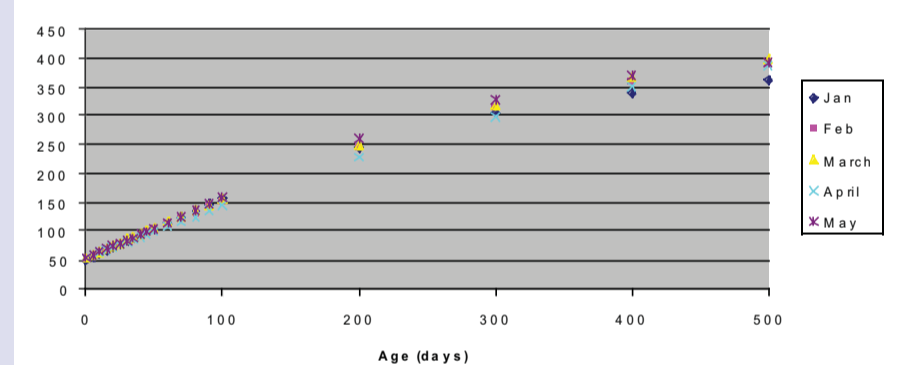
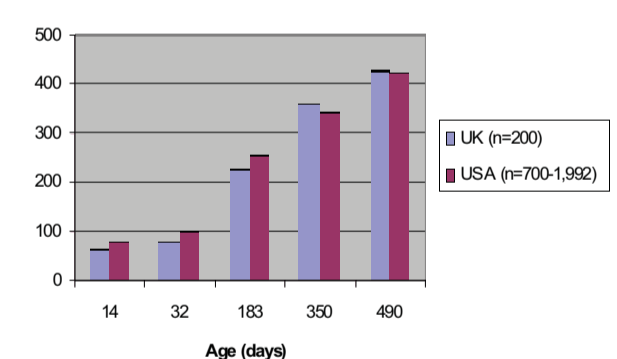


Figure 5: The bodymass of UK & USATB.



Conclusion:

Growth curves provide a prediction of body mass at a specific age, allowing more accurate nutritional support to achieve the requisite growth rate. Although commonly used, USA growth rate data may not be appropriate for UK TB & attempting to achieve USA growth rates may increase the risk of developmental problems. Further investigation is required to determine the relationships between diet, body mass, growth rate & developmental problems.

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References:

For a full list of references cited in the text please contact L. Jones (ljones@dodsonandhorrell.com)