

# Is Racetrack Performance Related to Yearling Sale Price?

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## Abstract

This study aimed to investigate the relationship between Thoroughbred yearling sale price and race performance at the age of three. Sales details of all yearlings sold at Tattersalls October Yearling sales (Newmarket, UK) and Goffs Yearling sales (County Kildare, Ireland) in 2004 and 2005 were collected. End-of-year Timeform ratings were used to measure racetrack performance at the age of three. Yearlings that did not meet the study's criteria were excluded from the statistical analysis, reducing the sample size from 5,749 to 1,735. Comparisons between Tattersalls and Goffs were made for sale prices and end-of-year Timeform ratings. Tattersalls had a greater average sale price (56,787.51 gns) than Goffs (52,680.49 gns). Average end-of-year Timeform ratings were extremely similar for those yearlings sold from Tattersalls (78) and Goffs (77). A very highly significant correlation between LOG yearling sale price and end-of-year Timeform rating at the age of three ( $r = 0.363$ ,  $n = 1,735$ ,  $p < 0.001$ ) was established. Yearling sale price accounted for 13.3% of the variation in end-of-year Timeform ratings at the age of three ( $p < 0.01$ ). A regression equation was formulated, allowing end-of-year Timeform rating at the age of three to be predicted from yearling sale price. The relationship between Thoroughbred yearling sale price and end-of-year Timeform rating at the age of three has been established, as well as identifying other external factors contributing to Timeform rating. An expensive yearling will not guarantee a successful racehorse; however, it increases the likelihood.

**Keywords:** Racetrack performance, yearling sale price.

## Introduction

The Thoroughbred industry is one of the largest and most profitable sectors of the equine industry (Cassidy, 2002). The growth of the Thoroughbred racing industry can be seen by the increase in racehorse ownership; in 2007 there were 15,294 racehorses owned, a 3.4% increase from the 14,795 racehorses owned in 2006 (British Horseracing Board, 2006, 2007). Prospective buyers spend thousands and sometimes millions of pounds at one of the many Thoroughbred auctions with the hope that their purchase will prove successful (Weatherbys, 2004). Two of the leading yearling<sup>1</sup> sales venues are Tattersalls, Newmarket, UK and Goffs, County Kildare, Ireland. Tattersalls is the oldest firm of Thoroughbred auctioneers in the world, as well as the largest in Europe and it accounts for approximately 70% of yearlings sold within the British market (Pacemaker, 2003; Parsons and Smith, 2008). Goffs is currently Ireland's leading Bloodstock Sales Company (Goffs, 2008a).

All horses are sold through a standard auction process. Bidding normally occurs between a number of bloodstock agents, who are employed by owners to act on their behalf at the auction. Sale price is dependent upon many factors, including pedigree, conformation and behaviour in the sale ring; therefore predicting the sale price can be extremely difficult (Cassidy, 2005; Parsons and Smith, 2008). Yearlings are purchased for a wide range of prices from a minimum bid ranging from 800 guineas (gns) – 5,000 gns (Tattersalls October yearling sales) or €2,000 - €5,000 (Goffs yearling sales) to exceptionally high prices such as *Diaghilev*, the *Sadler's Wells* colt, purchased for an incredible 3,400,000 gns from Tattersalls in 2000; the highest selling Thoroughbred yearling in Europe to date (Weatherbys, 2005).

Once yearlings have been purchased the owner will make the choice of which trainer to send them to. The majority of horses enter training at the age of two, even though only approximately half of them race during the two-year-old season (Bailey *et al.*, 1999). However, for a number of reasons, including injury, death and poor performance, a large proportion of horses never make it to the racetrack.

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<sup>1</sup> All Thoroughbreds are given an official birthday of January 1<sup>st</sup> to keep the age groups easily defined for race conditions. A Thoroughbred racehorse is defined as a yearling when they are in their second calendar year, beginning January 1<sup>st</sup> of the year following their birth.

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Wilsher *et al.* (2006) established that 45% of the 1999 foal crop never entered training, compared to the 38% found by Jeffcott *et al.* (1982). Others do not begin their race career until they are older. The true worth of the horse is determined on the racetrack where its performance is measured in a number of ways, including prize money, black type and race times (Cassidy, 2002); however, Timeform Rating<sup>2</sup> is perceived as the definitive measure of racing merit (Timeform, 2008).

The majority of owners hope to win a race with their racehorse and earn prize money to cover their expenses for the upkeep and training of their horse; however, this is not always the case. More (1998) studied 1804 Thoroughbreds during their first year of racing, and found that 1567 (86.9%) of them earned insufficient funds to cover their training costs; 701 (38.9%) of these were three year olds.

The aim of this study was to investigate whether price paid for Thoroughbred yearlings is related to their performance on the racetrack as three year olds. The study was based upon the hypothesis that there is a significant correlation between the sale prices of Thoroughbred yearlings sold at Tattersalls and Goffs and their performance on the racetrack as three year olds, measured via end-of-year Timeform ratings.

### Materials and methods

The initial population sample consisted of 5,749 yearlings. This was made up of all sales returns from:

- Tattersalls October Yearling Sale Part 1 (2004 and 2005)
- Tattersalls October Yearling Sale Part 2 (2004 and 2005)
- Tattersalls October Yearling Sale Part 3 (2005)

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<sup>2</sup> Timeform ratings are assigned to racehorses to express their level of performance; they consider the horse's weight, sex, age and the race's distance, going and level of competition, therefore racehorses of all standards can be compared (Yiannikouris, 1998). Timeform ratings express in terms of pounds the level of form a horse has shown; on the flat the ratings range from below 30 for bad performers to over 130 for the top performers (Timeform, 2009).

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- Goffs Orby Sale (2004)
- Goffs Millions Sale (2005)
- Goffs Sportsman's Sale (2005)

Data collected for each individual yearling was discriminated by lot number, sex, sire, dam, vendor, purchaser, and price. Sale prices from Goffs were converted from Euros to gns using the standard exchange rates used by Weatherbys in 2004 (€1.42 : 1 gns) and 2005 (€1.41 : 1 gns), to allow accurate comparisons to be made between sales (Weatherbys, 2004; Weatherbys, 2005).

The Racing Post website was used to examine all yearlings that were sold, to identify if they went on to race in Britain on the Flat turf as a three year old (Racing Post, 2008). Those that had were then searched for within the Timeform annual publications, *Racehorses of 2006* and *Racehorses of 2007* to obtain their end-of-year Timeform rating at the age of three (Timeform Racing, 2007, 2008).

Yearlings that were withdrawn, not sold, unnamed, did not race on the Flat turf in Britain as a three year old or did not receive an end-of-year Timeform rating at the age of three were excluded from the statistical analysis. The final sample population included 1,735 yearlings (1,329 from Tattersalls and 406 from Goffs).

The statistical package, SPSS version 15.0, was used to produce descriptive statistics of both yearling sale price and end-of-year Timeform ratings at the age of three (SPSS Inc., 2001). Pearson's Skewness values were produced to examine the distribution of the data; the sales data was not normally distributed, therefore a LOG transformation was performed (Zar, 1999). Pearson's Product Moment Correlation Coefficient ( $r$ ) was used to assess the association between LOG yearling sale price and end-of-year Timeform ratings. A linear regression analysis was performed within SPSS (using the enter method), where LOG yearling sale price was the independent variable and end-of-year Timeform rating the dependent variable.

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### Results

#### *Study Sample size*

The total population size for this study consisted of 5,749 yearlings that were sold at Tattersalls October Yearling Sales and Goffs Yearling Sales during 2004 and 2005. However, 69.8% of these yearlings were not used within the statistical analysis as they did not meet the study criteria, resulting in a final sample size of 1,735 yearlings (Table 1).

*Table 1: Study population size*

|   | Tattersalls Yearling Sales |      | Goffs Yearling Sales |      | Total number | Sample Size (as a percentage of the initial population) |
|---|----------------------------|------|----------------------|------|--------------|---|
|   | 2004                       | 2004 | 2004                 | 2005 |              |   |
| Number of yearlings entered at auction  | 2093                       | 1764 | 1018                 | 874  | 5,749        | 100   |
| Number of yearlings withdrawn   | 206                        | 220  | 97                   | 67   | 590          | 10.3  |
| Number of yearlings recorded as not sold  | 152                        | 78   | 115                  | 33   | 378          | 6.6   |
| Number of yearlings returned as unnamed   | 319                        | 267  | 231                  | 171  | 988          | 17.2  |
| Number of horses that did not run on the Flat turf in Britain at the age of three   | 768                        | 608  | 153                  | 433  | 1962         | 34.1  |
| Number of horses that died as two year olds   | 5                          | 6    | 1                    | 0    | 12           | 0.2   |
| Number of horses that died as three year olds   | 17                         | 21   | 0                    | 0    | 38           | 0.7   |
| Number of horses that did not run to a sufficient standard to receive a published three year old end-of-year Timeform rating            | 100                        | 79   | 36                   | 27   | 242          | 4.2   |
| Number of horses that did run on the Flat turf in Britain as a three year old but were not published in the annual Timeform publication | 181                        | 138  | 172                  | 212  | 703          | 12.2  |
| Sample population included within price/performance analysis  | 690                        | 639  | 204                  | 202  | 1735         | 30.2  |

Note: Yearlings may be part of more than one group e.g. unnamed and did not run on the Flat turf in Britain at the age of three.

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### *Sale Price*

Table 2 shows the variation in mean sale prices seen at both Tattersalls and Goffs Yearling sales during 2004 and 2005 for those yearlings that went on to race as three year olds and receive a published Timeform rating.

*Table 2: Descriptive statistics and measures of dispersion: yearlings sold at Tattersalls and Goffs sales in 2004 and 2005*

| Sale name and year         |       | Sample number | Mean sale price (gns) | Standard deviation (gns) | Standard error |
|----------------------------|-------|---------------|-----------------------|--------------------------|----------------|
| Tattersalls Yearling Sales | 2004  | 690           | 53,041.88             | 82,086.974               | 3124.998       |
|                            | 2005  | 639           | 60,832.08             | 81,076.107               | 3207.321       |
|                            | Total | 1329          | 56,787.51             | 81,664.676               | 2240.122       |
| Goffs Yearling Sales       | 2004  | 204           | 40,307.24             | 42,562.805               | 2979.992       |
|                            | 2005  | 202           | 65,176.25             | 77,745.353               | 5470.144       |
|                            | Total | 406           | 52,680.49             | 63,740.185               | 3163.372       |

Both sales saw an increase in their mean sale price from 2004 to 2005 despite the sample numbers decreasing. The mean sale price increased by 7,790.20 gns and 24,869.01 gns for Tattersalls and Goffs respectively from 2004 to 2005. The mean sale price varied amongst individual sales; however, Tattersalls October Sale Part 1 had the largest mean sale price for both 2004 (95,006.31 gns) and 2005 (104,890.51 gns). Goffs Millions Sale 2005 had the highest mean sale price (77,725.24 gns) amongst the Goffs yearling sales in 2004 and 2005.

The sale prices of all 1,735 yearlings included in this study, sold from both Tattersalls and Goffs in 2004 and 2005, did not follow a normal distribution and produced a Pearson's Skewness value of 4.524. The yearling sale prices were transformed using a log transformation and the log of the yearling sale prices had a Pearson's skewness value of -0.255, therefore following a normal distribution.

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The Pearson's skewness values for the end-of-year Timeform ratings of yearlings sold at Tattersalls and Goffs were 0.364 and 0.361 respectively, thus following a normal distribution.

### *End-of-year Timeform ratings*

Little variation was seen in the end-of-year Timeform ratings (age three) between those yearlings sold from Tattersalls in 2004 and 2005 and those sold from Goffs (Table 3).

*Table 3: Descriptive statistics and measures of dispersion: Timeform ratings at the age of three years*

| Sale name and year         |       | Mean Timeform Rating | Standard deviation | Standard error |
|----------------------------|-------|----------------------|--------------------|----------------|
| Tattersalls Yearling Sales | 2004  | 78                   | 19                 | 0.706          |
|                            | 2005  | 77                   | 18                 | 0.725          |
|                            | Total | 78                   | 18                 | 0.506          |
| Goffs Yearling Sales       | 2004  | 76                   | 19                 | 1.317          |
|                            | 2005  | 78                   | 18                 | 1.252          |
|                            | Total | 77                   | 18                 | 0.909          |

The mean end-of-year Timeform ratings varied more with individual sales, with yearlings sold from Tattersalls October Sale Part 1 (2004 and 2005) achieving the highest average end-of-year Timeform rating at the age of three (82) compared to those sold from Tattersalls October Sale Part 3 (2005) who achieved the lowest average end-of-year Timeform rating at the age of three (67); emphasising the high quality of the yearlings sold at Tattersalls October Part 1.

No yearlings achieved an end-of-year Timeform rating higher than 133 (Figure 1). The two yearlings that achieved a rating of 133 at the age of three were purchased for very different amounts as

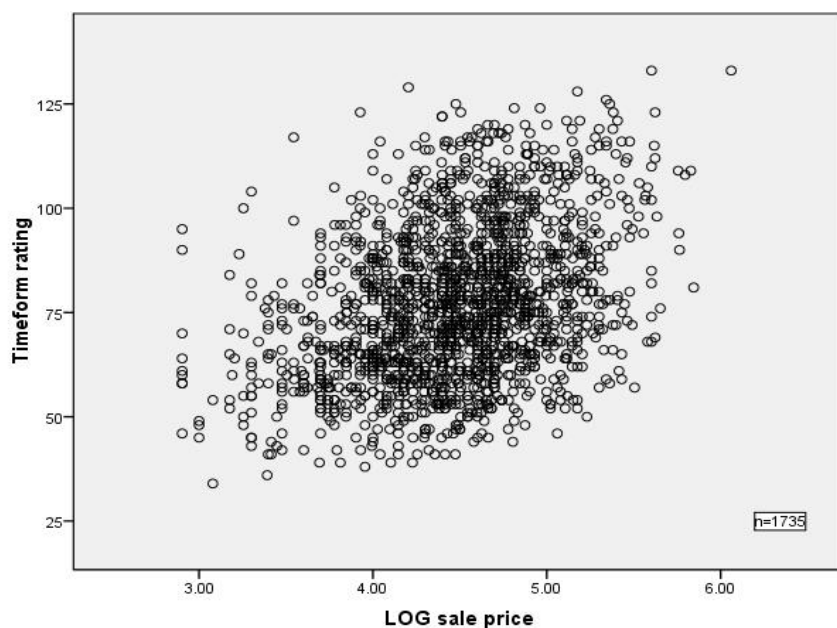
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yearlings; one for 400,000 gns, and the other for 1,150,000 gns. The latter purchased for 1,150,000 gns was not only the highest rated horse within this study, but also the second highest priced horse; the highest priced horse was purchased for 1,250,000 gns and only achieved an end-of-year Timeform rating of 93. One notable purchase (*Sir Percy*, 2006 Epsom Derby winner at the age of three) was sold for 16,000 gns and achieved an end-of-year Timeform rating of 129 at the age of three. Other notable purchases include a yearling purchased for 3,500 gns that achieved a rating of 117, a yearling purchased for 2,000 gns that achieved a rating of 104, and two yearlings purchased for 420,000 gns and 320,000 gns, that only achieved of 69 and 57, respectively.

### Correlations

A very highly significant correlation between LOG yearling sale price and end-of-year Timeform rating was observed across the whole population (Figure 1), ( $r = 0.363$ ,  $n = 1,735$ ,  $p < 0.001$ ). Individual sales showed varying levels of correlation. The highest level of association at an individual sale was observed at Goffs Orby Sale 2004 ( $r = 0.389$ ,  $n = 202$ ,  $p < 0.01$ ). Two sales, Tattersalls October Sale Part 3 2005 and Goffs Sportsman's Sale 2005, returned no statistical significance in their sales price vs. Timeform rating correlations.

Figure 1: The association between LOG yearling sale price (2004-2005 Tattersalls and Goffs sales) and end-of-year Timeform rating.





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### *Regression analysis*

Regression analysis was performed on the whole population (n=1,735), to establish a prediction of end-of-year Timeform rating via LOG yearling sale price. The analysis returned an  $r^2 = 0.133$ , (n = 1,735,  $p < 0.01$ ), unstandardized beta coefficient ( $\beta$ ) of 13.118, and a constant ( $y$ ) of 18.775.

Using these variables with a standard regression equation ( $a = y + \beta x$ ) it was estimated that on average a yearling with a sale price of 10,000 gns (LOG = 4) would return an end-of-year Timeform rating of 71 at the age of three.

### **Summary**

Seventy percent of yearlings purchased at Tattersalls October Yearling sales and Goffs Yearling sales in 2004 and 2005, did not go on to run on the Flat turf in Britain and obtain an end-of-year Timeform rating at the age of three. The reasons for this effective culling from the population are likely to be multifactorial. They may include death or injury. Sobczyńska (2007) studied 1759 Polish Thoroughbreds that raced from 1998-2005 and found that an incredible 28% of those that first raced as two or three year olds did not continue to race for more than one year. A large number of the yearlings within the presented study were purchased by foreign buyers to train and race abroad, such as the *Sadler's Wells* colt purchased for 700,000 gns at Tattersalls October Part 1 2004 by Japanese agent Nobutaka Tada who went to Japan to be trained (Weatherbys, 2004). A higher percentage of the yearlings sold at Goffs in 2004 and 2005 did not run on the Flat turf in Britain and achieve an end-of-year Timeform rating at the age of three, compared to those sold from Tattersalls. John Ingles (an employee at Timeform), explains this may be because Goffs is a more popular sale for foreign buyers than Tattersalls; therefore more horses move abroad and thus are not included in the Timeform annual publications (personal communication, 10 November 2008). This reason provides part of the explanation why only fifty percent of the yearlings from Fuller's (2003) study did not run on the Flat turf in Britain at the age of three, compared to the seventy percent in this study. Fuller (2003) only studied Tattersalls, which is not as popular with foreign buyers as Goffs, therefore fewer horses will move abroad to be trained and race.

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Additionally non-performance to an expected level is likely to account for a large proportion of the excluded yearlings within this study. Of the yearlings sold from Tattersalls and Goffs in 2004 and 2005 that went on to be named, 34% did not run on the Flat turf in Britain at the age of three years. The most common reason for this was that horses either did not run to a sufficient standard to achieve an end-of-year Timeform rating or if they did achieve one, it was not sufficient enough to be published in the annual Timeform publication. John Ingles (an employee at Timeform) explained that a lot of horses sold at Goffs are trained and run in Ireland, therefore their details are not provided in the Timeform annual publications unless they are of an exceptional standard. This accounted for a large number of horses that were not suitable for this study's statistical analysis (personal communication, 10 November 2008). Not all yearlings sold went on to race on the Flat turf, a large number became hurdlers ( $n=105$ ) or ran on all weather racetracks ( $n=109$ ), therefore they were excluded from the statistical analysis. The gamble involved with purchasing a yearling for future racing is considerably high. This was demonstrated by the large number of horses purchased that failed to either achieve an end-of-year Timeform rating or were unable to be assessed with confidence.

As yearling sale price increases the performance on the racetrack does not increase proportionately, however a low-medium correlation ( $r=0.363$ ,  $n=1,735$ ,  $p<0.001$ ) was found for the whole population between LOG yearling sale price and end-of-year Timeform rating at the age of three (Figure 1). This indicated some level of association. Fuller (2003) had similar findings ( $r=0.380$ ,  $n=919$ ,  $p<0.001$ ) but from only one auction house (Tattersalls). Standard linear regression analysis shows that end-of-year Timeform rating at the age of three can to an extent be predicted from yearling sale price; yearling price accounts for 13.3% of the variation in end-of-year Timeform rating. There are likely to be many environmental factors that affect racehorse performance. Cunningham (1991) stated that racecourse performance is approximately 65% due to environmental factors. Environmental factors include amongst other things, handicap weight, track condition, year, season, class of race, post-position, distance, trainer, jockey and race effect (Thiruvankadan *et al*, 2008). The yearling's environment after being sold at auction is likely to be a key factor in determining their performance on the racetrack.

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In order to take account of environmental factors affecting racetrack performance further investigative study is needed. The correlations established in this study are relatively low, therefore predictions of racetrack performance should be considered with caution.

### Conclusions

There is a significant relationship between Thoroughbred yearling sale price and racetrack performance at the age of three when end-of-year Timeform ratings are used. However, the study has confirmed that the high prices paid for yearlings at auction are often not justified by their performance on the racetrack, with many performing worse when compared to less expensive yearlings. There are a number of factors affecting yearling sale price; principally conformation and pedigree are considered most important by buyers. There are a great number of yearlings sold at auction that do not succeed in achieving an end-of-year Timeform rating at the age of three, either due to never racing or racing to an insufficient standard. The reasons for such failures are not clear; however, they are likely to depend on environmental factors such as the effect of the trainer and jockey, or the inability of buyers to value yearlings accurately.

The hypothesis for this study was accepted; yearling sale price does have a significant effect on end-of-year Timeform rating at the age of three. However, although the horses in this study showed a statistically significant correlation, the actual biological strength of this relationship is moderate to weak. Consequently, the use of any predictive modelling needs to be treated with considerable caution. Further work requires the inclusion of other factors that are likely to affect racetrack performance within the modelling process. This is likely to achieve a greater amount of accountable variation with the predictive model and therefore greater confidence in any prediction made.

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