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## Characteristics of Adopted Thoroughbred Racehorses in Second Careers

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### ABSTRACT

The unwanted horse issue continues to be a major concern in the U.S. equine industry. Nonprofit organizations dedicated to rescuing, retraining, and rehoming unwanted horses are critical in minimizing this problem. This study utilized data collected nationwide from organizations that provide these services for thoroughbreds retired from racing to identify individual horse characteristics that influenced length of stay at the adoption facility as well as characteristics that increased the probability that an adopted horse would be returned to the facility. The results suggested that horses with fewer activity limitations were rehomed more quickly ( $p < .01$ ), as were gray horses (relative to bays,  $p < .03$ ) and stallions (relative to geldings,  $p < .04$ ). Older horses took longer to rehome ( $p < .05$ ). Interestingly, the results also suggested that gray horses were more likely to be returned to the facility postadoption ( $p < .02$ ). Results from this study could benefit thoroughbreds retired from racing, nonprofit organizations, end consumers, and the thoroughbred racing industry.

### KEYWORDS

Off-the-track thoroughbreds; unwanted horses; equine welfare

In the 2009–2010 and 2012 American Horse Publications Equine Industry Surveys, respondents identified the unwanted horse problem as the top issue facing the equine industry in the United States (Stowe, 2010, 2012). Although there has been little academic research on this issue, recently, Holcomb, Stull, and Kass (2010, 2012) published a pair of studies investigating issues surrounding the growing unwanted horse problem. In their 2010 research, they examined whether individual horse characteristics could be used to predict which unwanted horses were more desirable among adopters; their results were inconclusive. This topic warrants further investigation, however, because it is important to the welfare of these horses and the effectiveness of the nonprofit organizations that find new homes for them.

We revisited this question by focusing on one breed of horse, thoroughbreds. More specifically, we focused on thoroughbred racehorses retired from the racetrack. There are a number of reasons to focus on this segment of the equine population. First, there seems to be a steady supply of “unwanted” thoroughbreds; the number of racehorses produced annually combined with a low success rate on the track results in a yearly excess supply of thoroughbreds. Many of these horses are donated to nonprofit “adoption” organizations that specialize in rehoming them after some period of rehabilitation and retraining. Second, thoroughbred horse racing is highly visible in the United States, and unwanted thoroughbreds often receive the bulk of media attention, even though English or thoroughbred-type horses are not the most prolific type of unwanted horse (Lenz, 2009). Finally, there is a well-established aftermarket for thoroughbreds, as they are naturally suited for a number of other disciplines, such as combined training, jumping, and dressage, and they are often competitive both nationally and internationally.

The purpose of this study was to identify characteristics among thoroughbred racehorses retired from racing that influence length of stay at the adoption facility and the probability that a horse would be returned to the facility postadoption. Ultimately, we expect these results to benefit equine welfare, nonprofit adoption organizations, end consumers, and the thoroughbred racing industry.

## Materials and methods

The University of Kentucky Institutional Review Board provided approval to administer the survey tool to human participants on September 7, 2011.

### Study design

Surveys were mailed on September 12, 2011, to 70 nonprofit organizations nationwide that were identified as being involved in adopting, rescuing, retraining, retiring, and/or rehoming retired thoroughbred racehorses using GuideStar, an online database of all U.S. nonprofit organizations registered with the Internal Revenue Service as 501(c)(3) organizations. Thoroughbred Charities of America was also consulted to identify any possible additional organizations. Respondents were offered the opportunity to complete the survey online via Qualtrics Survey Software (<http://uky.qualtrics.com>). If the surveys were returned as undeliverable, a different address was sought. Two follow-up mailings of reminder postcards were mailed on October 11, 2011, and October 31, 2011. Data collection ceased on December 2, 2011.

### Survey

The survey tool, which is available from the corresponding author upon request, consisted of two parts and was pilot-tested. Part 1 of the survey consisted of 18 questions requesting demographic and policy-related information from the nonprofit organizations. The demographic information requested included the location of the facility and year it was founded, number of volunteers and paid employees, services provided, whether any prescreening takes place, the amount of land available, maximum capacity, primary means of acquiring horses, methods of promotion, postadoption policies, and minimum length-of-stay requirements. Respondents were asked to describe both the type of horse that is easiest and the type of horse that is most difficult to place. Finally, they were asked to provide criteria for euthanasia and the number of horses euthanized annually.

Part 2 of the survey, which was considerably more time-intensive, asked respondents to report 13 different characteristics of every horse who had gone through the facility from July 1, 2010, to June 30, 2011. These characteristics included gender, age, height, color, racing history, training level, physical limitations, temperament, presence of vices, length of stay at the facility, adoption fee, whether the horse was adopted as of June 30, 2011, and whether the horse had been returned to the facility after adoption. Space was provided for 115 horses, and respondents were requested to make photocopies if additional space was needed.

### Statistical analysis and empirical methodology

Stata/IC 11.0 Data Analysis and Statistical Software (StataCorp LP, College Station, TX) was used to compute descriptive statistics and estimate linear and probabilistic regression models. Linear regression was utilized to estimate a hedonic model identifying characteristics that influence time until adoption. A logistic regression model was utilized to investigate determinants contributing to the likelihood of a horse being returned to an adoption facility. Statistical significance was defined as  $p < .05$ , although we report trends toward significance when they exist. Means, standard deviations, minimums, and maximums are reported in the summary statistics. All participants provided complete responses to Part 1 of the survey, but some were unable to provide all information requested in Part 2. Relevant samples sizes are noted.

**Length of stay at facility.** A model was developed to identify the determinants of the number of days a horse remained at an adoption facility before being placed in a new home. The length of time a horse remained at the facility was assumed to depend on certain characteristics that may influence the desirability of a horse such as age, gender, height, color, performance restrictions, and adoption fee.

Two variables, length of stay and adoption fee, possessed significant variation within and across facilities, some of which may be due to differences in facility policies and management. To control for these effects, an index was created for both measurements. For example, for length of stay, average length of stay was computed at each facility. Then, an index was created by dividing each horse's actual length of stay at a facility by that facility's average length of stay. The same procedure was applied to adoption fee. This transformation standardized length-of-stay and adoption fee measures across facilities.

In the linear regression model (Model 1), the index representing the relative number of days that a horse remained at a facility prior to adoption was assumed to be a function of individual characteristics of that horse. These characteristics included (relative) adoption fee, age, height, gender (where mare and stallion were compared to the base case, gelding), color (where dark bay/brown, chestnut, gray, and black were compared to the base case, bay), whether the horse was indicated as being able to participate in at least some amount of jumping, whether the horse possessed a stable vice, and whether the horse was eventually returned to the facility within the relevant time frame.

**Likelihood of being returned.** The second model in this study utilized logistic regression to identify determinants that influence the likelihood that a horse would be returned to the facility after adoption. According to the standard economic dichotomous choice specification, it was assumed that an adoptive caregiver chose to keep or return his/her horse to approximately maximize utility ( $u$ ), or happiness, according to

$$u(\text{alternative } k) = \beta_k x_k + \varepsilon_k \quad (k = 0, 1)$$

where  $\beta_k$  is a vector of unknown coefficients,  $x_k$  is a matrix of individual horse characteristics, and  $\varepsilon_k$  is a random error term. The observed choice by the adoptive caregiver is equal to  $k$  if  $u(\text{alternative } k) > u(\text{alternative } l)$  for  $k \neq l$ . The probability that the adoptive caregiver would make choice  $k$  is then given by  $p_k = \frac{\exp(I_k)}{1+\exp(I_k)}$ , where  $\exp$  is the exponential function. The coefficient estimates were interpreted as how much more likely choice  $k$  is given a one-unit change in  $x_k$ , holding everything else constant.

The dependent variable was an indicator variable specifying whether the horse was returned to the adoption facility prior to June 30, 2011. The matrix of individual horse characteristics included the same set of individual horse characteristics as in Model 1, with the addition of (relative) length of stay at the facility.

## Results

Of the 70 surveys mailed, 11 were returned as undeliverable with no alternative address available, resulting in a total of 59 viable addresses. The 59 facilities were located in 21 different states. Thirteen completed the surveys (representing 10 different states, from the West coast to the East coast) and were returned for a 22.0% response rate. This response rate is in line with acceptable response rates for organizational surveys (Baldauf, Reisinger, & Moncrief, 1999; Tomaskovic-Devey, Leiter, & Thompson, 1994), but it is about half the response rate achieved by Holcomb et al. (2012). The questionnaire was also available online, and 4 responses were completed in this manner (30.8%).

### Demographic information for organizations

Summary statistics for facility demographic information are reported in Table 1. Of the 13 facilities that responded, 12 were founded after the year 2000. Six of the facilities had paid employees, and all but 1 utilized volunteers. All of the facilities offered horses for adoption, which is different from a sale in

Table 1. Summary statistics for retired racehorse adoption facilities ( $n = 13$ ).

Characteristic	Mean	SD	Min	Max
Time since facility opened (years)	7.92	4.63	2	20
Paid employees (full-time)	1.77	2.68	0	9
Paid employees (part-time)	0.38	0.96	0	3
Volunteers	9.80	10.00	0	100
Acres for operation <sup>a</sup>	66.60	78.18	15	263
Capacity <sup>b</sup> (number of horses)	36.00	34.24	8	65
<i>Services Offered</i>				
Rescue	0.62	0.51	0	1
Retraining	0.77	0.44	0	1
Adoption	1	0	1	1
Sale	0.23	0.44	0	1
Permanent home	0.38	0.51	0	1
Screen potential horses	0.69	0.48	0	1
Require minimum length of stay	0.46	0.52	0	1
Minimum length of stay required (days)	37.50	27.41	15	90
<i>Primary Means of Acquiring Horses</i>				
Caregiver drop-off	0.15	0.38	0	1
Caregiver notification	0.85	0.38	0	1
Local authority	0.23	0.44	0	1
Potential adopter can ride horse prior to adoption	0.77	0.44	0	1
<i>Postadoption Policies</i>				
Adopter can resell horse	0.46	0.52	0	1
Adopter can breed horse	0.31	0.48	0	1
Adopter can race horse	0	0	0	0
Adopter can return horse for a refund	0.46	0.52	0	1

<sup>a</sup>Three facilities reported 0 acres dedicated to the operation because they utilize foster homes.

<sup>b</sup>Two facilities reported that the capacity for horses depends on available and willing foster homes.

that restrictions are imposed on the future transfer of ownership of the horse. Almost 77% (76.9%) provided some type of retraining for the horses, and 38.5% had the ability to offer a permanent retirement home to at least one horse. Nearly 70% (69.2%) screen horses before accepting them.

These facilities vary according to the amount of land available on which to operate. One facility has more than 260 acres, and two facilities rely solely on foster homes. The median number of acres available among facilities with land is 60. The maximum capacity in terms of number of horses depended upon the land available to it. The facility with the most land reported a capacity of 130 horses, while other facilities' capacities are fewer than 10 horses. The median capacity among facilities with their own land was 30 horses.

Facilities have established a variety of management policies regarding the observation period prior to adoption and after adoption. Five of the facilities have formal policies regarding a minimum length of stay at the facility for observation before a horse can be adopted out (most are 30 days, although one is 90 days); many facilities also indicated that the length of time required for evaluation varies by horse. More than 46% percent of the facilities (46.2%) allow the adopters to resell the horse at a later date (although these policies themselves vary, such as requiring a minimum length of time that the adopter must keep the horse before the horse can be sold or giving the facility first right of refusal). In addition, 46.2% of the facilities offer a refund (either monetary or credit toward a different horse) if a horse is returned.

The facilities utilize a variety of media to promote their organizations and attract potential adopters. Respondents identified websites and social media as the two most effective tools for placing horses in new homes.

Six facilities reported having to euthanize on average at least one horse each year, two facilities reported an average of less than one, and five facilities reported zero.

### **Characteristics of adopted horses**

In addition to information related to the nonprofit organization itself, participants were asked to provide information on all horses who had been at the facility from July 1, 2010, to June 30, 2011. From

the 13 participating facilities, we received data on 528 horses, with a minimum of 2 horses from 1 facility and a maximum of 249 horses from another. Of these, 451 had been adopted during the time interval under analysis. In fact, some of these horses had been adopted, returned to the facility, and then readopted; when this occurred, we used only the first appearance of a horse due to differences among facilities in how returns and readoptions were reported. Some of the records were incomplete; these observations were omitted from the analysis. Our final sample size was 327 horses from 8 facilities. Sample summary statistics of the characteristics utilized in this study are provided in [Table 2](#).

Of the horses in the sample, 67.6% were geldings, 30.6% were mares, and 1.8% were stallions. Average age and height for the sample were 6.0 years ( $\pm 3.2$  years) and 163.8 cm ( $\pm 4.8$  cm), respectively. The most prevalent color in the sample was bay (50.2%) followed by chestnut, dark bay/brown, gray, and black (21.7%, 18.0%, 9.2%, and 0.1%, respectively). More than 84% of the horses in the sample (84.1%) were reported to have little or no activity restrictions, defined here as being sound for at least some amount of jumping. More than 8% of the horses (8.8%) were reported to have some type of stable vice, including cribbing, stall walking, or weaving. The average length of stay at the facility before rehoming was 89.2 days ( $\pm 92.9$  days), and horses were adopted for an average fee of \$820.95 ( $\pm \$1,108.87$ ). The only two facilities with a fixed adoption fee charged no fee; the remaining six facilities charged variable fees.

Of the horses in the sample, 85.4% were adopted within the study's time frame and 11.6% were returned to the facility at least once prior to June 30, 2011.

### ***Characteristics influencing time until adoption***

Results from Model 1 are presented in [Table 3](#). Soundness was the most important factor statistically in influencing length of time until adoption. More specifically, horses described to be sound for at least some amount of jumping were adopted nearly 50% faster than those with greater activity restrictions ( $p < .01$ ). Gray horses spent 37.6% fewer days at the facility than bays ( $p < .03$ ), and stallions spent 75.0% fewer days at the facility than geldings ( $p < .04$ ). Older horses spent more days at the facility, but the effect was diminishing as evidenced by the negative sign on the quadratic term ( $p < .05$ ,  $p < .08$ ).

A number of other attributes exhibited a trend toward significance. A horse who ultimately was returned after adoption initially spent 29.2% more days at the facility ( $p < .06$ ). Relatively more expensive horses at any given facility spent 9% fewer days ( $p < .07$ ) there. Finally, there was weak evidence that taller horses were adopted in 44% fewer days ( $p < .11$ ).

### ***Characteristics influencing horses returned postadoption***

Results from Model 2 are presented in [Table 4](#). Two variables were omitted because they perfectly predicted outcomes. Gray horses were 3.6 times more likely to be returned than bay horses ( $p < .02$ ). There were trends toward significance that horses taking longer to adopt were 1.4 times more likely to be returned ( $p < .06$ ) and horses sound for at least some amount of jumping were 4.5 times more likely to be returned ( $p < .06$ ).

## **Discussion**

In 2008, a “perfect storm” of events intensified the severity of the unwanted horse problem. Some of these precipitating factors included lost funding for U.S. Department of Agriculture inspectors and the subsequent closure of U.S. equine slaughter facilities in 2007, the great recession of 2008, and rising prices for feed and hay attributed to rising oil prices as well as widespread drought. In 2009–2010 and 2012, U.S. horse caregivers and managers identified the unwanted horse problem as the top issue facing the equine industry (Stowe, [2010, 2012](#)). Whatever the reason for unwanted horses, the result can be seen in the increased number of these horses as well as in equine rescue facilities that are at or near capacity. Few characteristics regarding unwanted horses are known, but they may prove useful for



Table 2. Summary statistics of characteristics by facility.

Facility	N	Height (cm)	Age	Mare	Stallion	Gelding	Dark bay/brown	Chestnut	Gray	Black	Bay	Jump	Vice	Returned	Price	Days
A	18	162.1	5.7	22.2%	0.0%	77.8%	16.7%	22.2%	16.7%	0.0%	44.4%	88.9%	16.7%	11.1%	\$1,072.22	88.8
B	5	161.0	5.2	60.0%	0.0%	40.0%	0.0%	40.0%	0.0%	0.0%	60.0%	40.0%	0.0%	0.0%	\$0.00	96.0
C	14	163.1	6.9	28.6%	0.0%	71.4%	7.1%	35.7%	0.0%	0.0%	57.1%	85.7%	7.1%	0.0%	\$1,857.14	267.1
D	61	162.9	6.6	41.0%	9.8%	49.2%	4.9%	19.7%	9.8%	0.0%	65.6%	86.9%	8.2%	18.0%	\$461.48	44.7
E	31	164.9	6.4	12.9%	0.0%	87.1%	0.0%	12.9%	9.7%	0.0%	77.4%	83.9%	16.1%	6.5%	\$2,693.55	80.3
F	12	165.7	14.7	16.7%	0.0%	83.3%	8.3%	8.3%	16.7%	25.0%	41.7%	75.0%	25.0%	8.3%	\$0.00	48.2
G	35	164.2	5.6	37.1%	0.0%	62.9%	34.3%	45.7%	0.0%	0.0%	20.0%	82.9%	11.4%	0.0%	\$1,671.43	172.1
H	151	164.0	5.2	29.8%	0.0%	70.2%	25.8%	17.9%	10.6%	0.0%	45.7%	84.8%	5.3%	14.6%	\$350.99	76.4
<b>Total Sample Averages</b>	<b>327</b>	<b>163.8</b>	<b>6.0</b>	<b>30.6%</b>	<b>1.8%</b>	<b>67.6%</b>	<b>18.0%</b>	<b>21.7%</b>	<b>9.2%</b>	<b>50.2%</b>	<b>0.9%</b>	<b>84.1%</b>	<b>8.9%</b>	<b>11.6%</b>	<b>\$820.95</b>	<b>89.2</b>



Table 3. Results from Model 1.

Model 1: Dependent variable: Relative length of stay (n = 327)	
Variable	Coefficient estimate (SE)
Relative price	-0.090* (0.050)
Height	-0.044 (0.027)
Age	0.096** (0.049)
Age <sup>2</sup>	-0.005* (0.003)
Mare	-0.055 (0.108)
Stallion	-0.750** (0.353)
Dark bay/brown	0.037 (0.130)
Chestnut	-0.160 (0.121)
Gray	-0.376** (0.172)
Black	-0.528 (0.510)
Sound for some jumping	-0.498*** (0.136)
Stable vice	0.022 (0.167)
Returned	0.292* (0.150)
Constant	4.046** (1.744)
Adjusted R <sup>2</sup>	.0865
F-statistic (13, 313)	3.37
Prob > F	.0001

Note. \*\*\*, \*\*, and \* represent significance at the 1%, 5%, and 10% levels, respectively.

rehoming efforts (Messer, 2004), as specific characteristics may deem some horses more desirable by potential adopters. With this information, nonprofit organizations can select horses in an effort to minimize the lengths of stay at the facility and/or maximize the number of horses adopted.

Although Holcomb et al. (2010) found inconclusive evidence that certain characteristics can predict which horses are more likely to be adopted, this study revisits the issue utilizing a different approach. Holcomb et al. (2010) pooled data from facilities across the United States that included all breeds, but this approach may have contributed to the lack of findings. For example, different characteristics are desirable in different breeds, so when all breeds are pooled together, predictive ability may be diminished. Another potential confounding factor is that the authors requested that facilities provide information on up to 15 horses, which could potentially result in sample bias depending on which horses the respondents chose to select. We attempted to build upon their approach by focusing on only one breed, while controlling for differences in facility policies, and requesting a full year's worth of horses who had been at a facility.

Table 4. Results from Model 2.

Model 2: Dependent variable: Returned to facility (n = 318)	
Variable	Coefficient estimate (SE)
Relative price	0.101 (0.150)
Relative length of stay	0.363* (0.186)
Height	-0.043 (0.103)
Age	0.161 (0.195)
Age <sup>2</sup>	-0.005 (0.011)
Mare	-0.261 (0.416)
Stallion	omitted
Dark bay/brown	-0.417 (0.541)
Chestnut	-0.516 (0.535)
Gray	1.280** (0.515)
Black	omitted
Sound for some jumping	1.493* (0.785)
Stable vice	0.677 (0.555)
Constant	-1.795 (6.812)
Pseudo-R <sup>2</sup>	.0843
Likelihood Ratio χ <sup>2</sup> (11)	19.62
Prob > χ <sup>2</sup>	.0509

Note. \*\* and \* represent significance at the 5% and 10% levels, respectively.

This study focused on thoroughbreds who had been retired from racing and were ready to start second careers. In this breed, the success of retired racehorses in second careers has spawned an active subsector of nonprofits in the racing industry that reclaims, adopts, and/or rehomes retired racehorses. In addition to these adoption organizations, enthusiasts established the Retired Racehorse Training Project (RRTP) in 2011 to increase demand for retired thoroughbred racehorses through education and awareness. The president of the RRTP said, "There will never be a market for unsound horses. There will always be a need for people and places to take those horses in. The majority of racehorses, however, retire at the perfect age to begin careers as riding horses, and they have basic training that is a solid foundation for that work. Today's sport and recreational riding markets are not appreciating, understanding, or valuing these horses fairly" (Pittman, 2011, p. 15).

Using data on thoroughbreds retired from racing, we find evidence that certain characteristics can be used to predict desirability among potential adopters. In the model describing time until adoption, we found that preferences for soundness were strongest, although adopters also had color and age preferences. When investigating which horses were more likely to be returned to the facility after adoption, we found that very little information could be used to predict which horses would not be successful in their new homes. Surprisingly, a robust result was that horses with few activity limitations were *more* likely to be returned; we suspect that this result may be due in part to unrealistic expectations on the part of more competitive riders who seek these types of horses. In addition, gray horses may be significantly more likely to be returned. This result is unexpected because gray horses were adopted more quickly than any other color of horse. In general, the lack of statistically significant explanatory variables suggests that reasons for returning a horse to his or her adoption facility were highly variable and may depend more on the caregiver's personal circumstances rather than on individual attributes of the horse.

Results from this study should be helpful to adoption facilities and racehorse caregivers and trainers alike. First, the information may help adoption facilities screen horses more effectively to select horses who can be rehomed more quickly based on potential adopters' anticipated preferences. Second, the results can inform racehorse caregivers and trainers regarding what types of horses are most attractive to the aftermarket. Horses with little obvious racing potential may then be given the opportunity at a second career at an earlier stage, thereby increasing the number of sound horses who can be placed more quickly.

These results should be taken with some discretion. First, the results apply to prescreened horses, as all facilities included in the analysis prescreened horses prior to adoption. This fact no doubt contributed to the high rate of adoption; the 85.4% adoption rate is more than triple the 26.3% of horses who were rehomed in the data collected and analyzed by Holcomb et al. (2012). Second, the response rate, although acceptable for a mail survey, is about half that of the Holcomb et al. (2010) study. And while the method of data collection used in this study should limit respondent bias, the low response rate has the potential to present other biases. Third, some facilities adopted only a few horses in the year under observation, while one operation represented 46.2% of the horses adopted, which has the potential to affect the results. However, three considerations suggest that any potential bias may be minimal: (a) There did not appear to be any systematic differences between the characteristics of the horses at that facility and horses at others, as seen in [Table 2](#); (b) the construction of the relative length of stay and relative price variables should eliminate the ability of any one facility to influence the results; and (c) a dummy variable representing this facility in the length-of-stay regression was not significant and did not alter the sign, magnitude, or significance of the remaining explanatory variables in any meaningful way. Fourth, this study focused on unwanted thoroughbreds. Characteristics that adopters find desirable among thoroughbreds may not be extrapolated to other breeds; however, the approach used in this study could be applied to other breeds. Finally, as with any study of this nature, limitations in the data add noise to the results. For example, certain attributes are not observable to the econometrician, such as horses' conformation, and conformation is likely an important attribute for many potential adopters. This shortcoming may be diminished by the fact that conformation tends to be somewhat subjective among prospective buyers and may also be accounted for by price.

## Conclusion

Future research should be aimed toward continuing to improve the postcareer welfare of retired racehorses and should include gaining a better understanding of adoptive horse caregivers to optimize selection of horses, preparation of horses, and marketing. In a future study, we plan to explore demographic characteristics of current adopters, how their adopted horses are used, and what problems have been encountered. This information will help retired racehorse adoption facilities identify new potential adopters and will improve the quality of placements; ultimately, it will benefit both the horses and the racing industry.

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