



EQUINE SURVEY PROCEDURES

Purpose

The 2002 Indiana Equine Survey was designed to determine equine inventory, economic contribution, and identify health related issues for the Indiana equine operations. Survey efforts were sponsored by the Indiana Horse Council (IHC), Indiana Horse Racing Commission, Indiana Livestock Development and Promotion Fund, Purdue University Veterinary School, and Purdue University Agricultural Statistics Department.

Survey Design

To conduct the survey, a list of equine operations was constructed from all available sources to provide as complete coverage of the industry as possible. The Indiana Horse Council, State and National Breed Associations, 4-H Extension Service, Indiana Horse Racing Commission, Indiana Board of Animal Health, and list building work by the Agricultural Statistics Department provided names of potential equine operations throughout the State of Indiana.. Nearly 70,000 names were identified, the lists were merged, duplication removed, and 31,876 questionnaires were mailed to everyone remaining on the list in mid-January 2002. Following the receipt of 4,871 mail responses, the universe list was stratified into five strata based on prior knowledge about operation size and age of the operation size information. The five strata were: 1) no control data available, 2) control data < 15 head, but more than 3 years of age, 3) control data <15 head, and less than three years of age, 4) control data >15 head, but more than 3 years of age, and 5) control data >15 head, and less than three years of age. The strata were utilized to enhance sampling of survey non-respondents for a non-response telephone survey contact. Office Enumerators completed a telephone survey contact with 2,999 of the mail non-respondents. Mail responses were given a weight of one, whereas, telephone responses were given a weight proportional to their sample rate from the non-respondents within each strata. Because it is impossible to develop a complete list of equine operations, an "area frame sample" was used to measure and account for list incompleteness. The area sample consisted of 260 areas of land, called segments, which average about one square mile in size. Operations located within the area segment which had equine, but not included on the list of potential operations, were mailed, telephoned, or personally visited to collect current equine inventory which was expanded to represent equine on similar segments across the state. The list and area data were combined to estimate for all equine in Indiana.

Summarization

All questionnaires were manually reviewed before being computer edited and summarized. The results of the survey were compiled from the voluntary and confidential responses of 9,294 individuals or businesses across the State. Reported data from the list respondents were expanded by strata and summarized. Then the data from all of the area tracts that were non-match with the equine list frame were expanded and added to the results of the list summary. This results in a multi-frame indicator which was rounded and published as a statistical estimate.

Test for Non-response Bias

Because most survey recipients did not respond to the mailed questionnaire, it is important to verify that non-respondents do not differ from respondents in ways that would render the sample of respondents unrepresentative of the population. The most basic tests of this is to compare the percentages of responses currently having equine, and comparing the mean of the positive

equine reports per positive mail respondent, and per telephone respondent, then apply statistical tests to determine if the percentages and means are significantly different from one another.

A sample of 2,999 mail non-respondents interviews were completed by telephone using the inventory, breed, value, and primary use questions. The percentage of positive equine reports were compared by using the chi-square statistical test. A chi-square value greater than 3.841 would disprove the null hypothesis that the percentages were the same. All strata chi-square values were <3.841, thus we fail to reject the null hypothesis that the percentages are the same between the mail and telephone non-response sample at the 95% confidence level.

The average number of horses per mail respondent, and telephone respondent, were calculated along with the variances. A z-test statistic was performed for each strata, and a value of >1.645 would allow us to reject the null hypothesis that the means were the same between mail respondents and telephone respondents. With exception of strata 1, the null hypothesis cannot be rejected that the means were equal. When a similar test was prepared using the mean of all responses, rather than the mean of the positive responses, all strata were below the Z-test significance level with 95% confidence.

Strata	** Percentage Positive Reports **			** Means of Positive Reports **		
	Mail	Telephone	Chi-Square	Mail	Telephone	Z-test
Strata 1	61.6	59.0	.976	4.106	4.753	2.879
Sample	2952	1652				
Variance				16.24	39.30	
Strata 2	73.8	70.1	2.214	5.314	5.298	0.040
Sample	799	546				
Variance				17.27	51.34	
Strata 3	90.3	89.2	.447	4.588	4.916	1.296
Sample	1325	427				
Variance				11.18	20.84	
Strata 4	90.4	88.4	.229	22.590	26.379	1.415
Sample	73	215				
Variance				334.83	398.13	
Strata 5	95.1	95.0	.003	22.740	24.550	0.642
Sample	82	159				
Variance				214.71	785.30	

Reliability

The estimate from a sample survey will vary depending upon the units responding to the survey. The variation in the expansions are measured by the standard error of the estimate, expressed as a percent of the estimate, also identified as the coefficient of variation. The resulting coefficient of variation for the total number of equine in Indiana (160,000), was 3.4%. Chances are 95 out of 100 that the interval created by the estimate plus or minus two standard errors will contain the true population value. Therefore, there is a 95% confidence, that the survey estimate of 160,000 head would reflect the true population, plus or minus 6.8% (10,880 head).

Breed Classification

A large quantity of unique breed names, or crossbreed names were written by the respondent into the "Other" breed line on the questionnaire. Many of these write-in breeds were reclassified into one of the pre-listed breeds, while others remained grouped in the "All Other Breed"

classification because of relatively few reports. The wide use of abbreviations, and or unique spellings, or crosses, required some editorial judgment about the proper breed classification, thus there could be some margin of error regarding this interpretation. The quantity of write-in responses for Tennessee Walking Horse, and American Miniature, provided sufficient data to add those breeds to the pre-listed groups for publication.

The Quarter Horse classification included all write-in breed reports of Appendix, $\frac{1}{2}$ Qtr + $\frac{1}{2}$ TB, $\frac{1}{2}$ Qtr + $\frac{1}{2}$ Arab, $\frac{1}{2}$ Qtr + $\frac{1}{2}$ TW, Quarter Gueula, AP XTH, Quarterhorse Duns, QUA, Quarab, and Quarter Arab.

Arabian included all write-in breed reports of Arabian/Qtr $\frac{1}{2}$, $\frac{3}{4}$ Arab, and $\frac{1}{2}$ Arab.

Appaloosa included all write-in breed reports of $\frac{1}{2}$ App + $\frac{1}{2}$ Qtr.

Donkey & Mule included all write-in breed reports of Burro

Grade Horse included all write-in breed reports of BLM Mustang, Connemara TBX, Connemara Thorosil, Cross Bred, Don't Know, Feral Horse, Gaited, Half Breed, Kentucky Mountain, Kentucky Gaited, Mixed, Mo. Fox/TW, Paso Fino/Spanish Mustang, TB/Connemara Cross, TB/Perch Cross, and TW/Mo. Fox.

Warmblood included all write-in breed reports of American Warmblood, Dutch Warmblood, Fjord, Friesian, Hanoverian, Trakehner, and TB/Warmblood.

Standardbred included all write-in breed reports of Buggy Horses, Drivers, and Standard.

Draft Horse included all write-in breed reports of Belgian, Clydesdales, Haflinger, Haflinger Work Pony, Percheron, Small Draft, and Suffolk.

Pony included all write-in breed reports of Hackney, Icelandic, Pony, Pony of America (POA), Shetland, Trotting Breed Pony, and Welsh.