METHODOLOGY

Purpose

The purpose of the Kentucky Equine Survey (KyES) was to describe the equine industry of the state in terms of demographics of both equids and equine operations (Phase 1) and economic contribution (Phase 2). No comparable study had been performed since 1977, thus current information was needed for immediate use; the study will also be used as a benchmark to measure future change in the industry. The methodology for both phases of the study is described below.

Phase 1: NASS Inventory Study

The KyES was designed and conducted through a collaborative effort between the University of Kentucky, the United States Department of Agriculture National Agricultural Statistics Service (NASS) and the Kentucky Horse Council.

When the study began, no current or comprehensive list of equine operations that included operations not fitting the NASS definition of a farm existed for Kentucky (according to NASS-USDA, a farm is any establishment that has at least $1,000 in cash receipts annually). More specifically, there was little information on equine residing on private residences that are not used for business purposes. In addition, the long period of time since the previous equine survey necessitated a communications campaign to inform members of the equine industry about the survey, why it was beneficial and ensuring individuals that responses were confidential. List building for the survey sample involved acquiring names and addresses of members of cooperating equine organizations and a general solicitation for individuals to submit contact information through web pages hosted by UK and the Kentucky Horse Council. Additional names and addresses were collected at a series of 36 public engagement meetings. These meetings were programmed by UK faculty and extension workers in counties around the state. In addition to a presentation about the survey, an educational program about a horse-related topic was usually provided to motivate audience attendance. During meetings, attendees were encouraged to provide contact information to the survey personnel.

The list building efforts resulted in the collection of 13,059 names and addresses. As they were received, names were checked for duplication against those already on the NASS list (predominantly operations fitting the definition of a farm) and duplicates were removed. A portion of operations were contacted by telephone by NASS to obtain preliminary information regarding the numbers of horses at those operations so that the survey sample could later be stratified by size (where size of the operation is measured by the approximate number of horses). The final list was comprised of operations and individuals ranging including private owners of one to two horses at their residences, boarding facilities, large commercial breeding operations, and race tracks. From the entire list, a random sample, stratified by geographic location and size, was drawn and surveys were sent to 15,000 equine operations. If surveys were not returned, telephone enumerators

contacted the operations to obtain the information. In addition, field enumerators visited some of the largest farms included in the study to assist with data collection. To capture information on equine operations not on the list, the equine survey was included in the Agricultural Coverage Evaluation Survey, which was combined with the June Area Survey sample in constructing the area component of the sample. Two hundred seventy-nine segments of land were canvassed by field enumerators who collected data on all agricultural activities in those areas.

Of the 15,000 surveys distributed, 10,753 (72%) produced responses. Of those, 1,042 refused to participate; the remaining 9,711 records were used for analysis. Surveys from operations with at least one equid were reviewed, edited and entered into a database by NASS personnel. When a survey was partially completed or the non-respondent was an extremely large operation, imputation was utilized to account for non-response. Otherwise, non-response was accounted for through an adjustment to the original sampling weights. List sample records were expanded by strata and summarized, then records from the 279 area segments that were not on the list (NOL) were expanded and added to the results of the list to produce state level multiple frame indicators. To produce more robust county level indicators, a final reweighting was then done, by which weights on NOL records were set to zero while weights on list records were adjusted, such that the expanded state list indication equaled the expanded state multiple frame indication. The list sample records were expanded by this final weight to produce county level indications. The estimation process produced an estimate of total equine in the state with a relative error of approximately 1.2% of the estimate.

Phase 2: Economic Impact Analysis and other Economic Studies

A variety of economic measures of Kentucky's equine industry was estimated through the use of data from the NASS inventory study using IMPLAN as well as data collected in a set of supplementary surveys. The methodology for each of these is described in separate sections below: (1) IMPLAN analysis; (2) Event Attendance Surveys; (3) Racetrack Management Survey; and (4) Non-market Valuation Survey.

IMPLAN Analysis

To estimate the economic impact of the equine industry on Kentucky, income and expenditure data from the NASS inventory study, as well as supplementary data from studies described below, were utilized in an input-output (IO) model with 2011 IMPLAN data.

Economic impact is usually measured in three ways:

- **The output effect:** measures the increase in sales due to the presence of an industry
- **The employment effect:** measures the number of jobs generated as a result of the presence of the equine industry

- **The value added effect:** a measure of new income paid to workers, profits earned by businesses, or dividends paid to shareholders; in other words, it measures the amount earned by an individual or business after accounting for explicit and implicit costs

In each of these three measures, the full economic impact of the equine industry includes the "multiplier effect," which summarizes the total impact that can be expected from a change in a given economic activity. For example, a new breeding facility represents an economic change which can spur ripple effects or spinoff activities, such as veterinary services and transportation activities. Multipliers measure the economic impact of these new products or services, including the resulting spinoff activities.

While there are several types of multipliers, the Type II multiplier is most widely used in IO analysis. A Type II multiplier includes the effect of **direct** or initial spending, **indirect** spending or businesses buying and selling to each other, and household spending based on the income earned from the direct and indirect effects. Essentially, these latter **induced** effects represent employee spending on goods and services.

All industries included in the analysis are identified in Table 1. Note that banking, legal and accounting services sectors are not included as data are not available. Furthermore, no tourism impacts related to the equine sector are included.

Table 1. Equine sectors included in the economic impact analysis and revenue contribution

IMPLAN Sector	Industry Description	Equine Contribution
2	Grain farming	$ 78,412,500
14	Animal production, except cattle, poultry and eggs	$ 521,000,000
19	Support activities for agriculture and forestry	$ 491,000,000
31	Electric power generation, transmission and distribution	$ 16,340,000
33	Water, sewage and other treatment and delivery systems	$ 16,340,000
39	Maintenance and repair construction of nonresidential structures	$ 149,770,000
42	Other animal food manufacturing	$ 26,137,500
203	Farm machinery and equipment manufacturing	$ 35,500,000
319	Wholesale trade businesses	$ 53,350,000
328	Retail Stores - sporting goods, hobby	$ 21,870,000
332	Transport by air	$ 2,380,000
335	Transport by truck	$ 21,420,000
357	Insurance carriers	$ 31,570,000
360	Real estate establishments	$ 12,320,000
377	Advertising and related services	$ 5,135,000
379	Veterinary services	$ 58,220,000
403	Spectator sports companies	$ 212,938,470
425	Civic, social, professional and similar organizations	$ 28,342,500

Separate multipliers were estimated for each of the equine sectors and economic impact types and are identified in Table 2. The **output multiplier**, which is used to assess the interdependence of sectors in the local economy, estimates the total change in local sales

resulting from a $1 increase in sales outside of the study area. Multiplying the increase in sales of the industry by the output multiplier provides an estimate of the total increase in sales for the study area, including the initial $1. The **employment multiplier** measures the total change in employment resulting from an initial change in employment in the equine industry. Finally, the **value added multiplier** provides an estimate of the additional value added to the product as a result of the equine industry. Value added includes employee compensation, indirect business taxes, and proprietary and other property income.

Table 2. Estimated multipliers for equine sectors

IMPLAN Sector	Industry Description	Output Multiplier	Value Added Multiplier	Labor Income Multiplier	Employ-ment Multiplier
2	Grain farming	1.591	1.534	1.792	1.214
14	Animal production, except cattle and poultry and eggs	1.559	1.841	2.502	1.182
19	Support activities for agriculture and forestry	1.758	1.551	1.247	1.164
31	Electric power generation, transmission and distribution	1.486	1.401	1.962	3.446
33	Water, sewage and other treatment and delivery systems	1.679	1.674	1.890	2.205
39	Maintenance and repair construction of nonresidential structures	1.698	1.662	1.415	1.473
42	Other animal food manufacturing	1.453	2.871	3.191	5.176
203	Farm machinery and equipment manufacturing	1.433	1.649	1.847	2.796
319	Wholesale trade businesses	1.520	1.402	1.408	1.693
328	Retail Stores - sporting goods, hobby	1.673	1.606	1.433	1.253
332	Transport by air	1.633	1.624	1.539	2.038
335	Transport by truck	1.748	1.789	1.561	1.677
357	Insurance carriers	1.466	1.407	1.555	2.077
360	Real estate establishments	1.358	1.287	2.116	1.349
377	Advertising and related services	1.521	1.439	1.433	1.532
379	Veterinary services	1.619	1.557	1.356	1.299
403	Spectator sports companies	1.977	2.212	1.731	1.449
425	Civic, social, professional and similar organizations	1.813	1.716	1.345	1.288

Event Attendance Surveys

Equine-related events generate a number of tourism impacts. In addition to competitors, family and friends as well as pure spectators attend these events. They spend money on the event grounds, in the local community, and in the state. While total attendance at equine events is usually not tracked, we attempted to estimate per-person spending at events. A team of researchers from the Kentucky Equine Survey attended a number of events and race meets and intercepted attendees throughout the day of the event. Attendees were asked to complete a questionnaire which included demographic information as well as questions related to spending in different categories in different areas of the state.

All attempts were made to broadly sample different types of equine events, including major horse shows, smaller horse shows, and organized trail rides. In addition, the study team

visited race meets across the state. Details regarding all events and race meets attending are identified in Tables 3 below.

Table 3. Horse Events and Race Meets Selected for Event Attendance Surveys

Event	Breed/Discipline	County	Date	# of surveys collected
Western KY Open Horse Show	All Breeds	Henderson	6/23/2012	48
Region 14 Arabian Championship	Arabian	Fayette	6/30/2012	76
State 4H Horse Show	All Breeds	Jefferson	7/5/2012	76
Churchill Downs	Thoroughbred Racing	Jefferson	7/16/2012	237
Clayton Woosley HOF Reining	Quarter Horse	Fayette	7/28/2012	77
Shelbyville Horse Show	All Breeds	Shelby	8/3/2012	79
Mid-Summer Horse Show	Tennesee Walker	Lincoln	8/11/2012	61
World's Championship Horse Show	Saddlebred	Jefferson	8/25/2012	80
KQHA Fall Futurity	Quarter Horse	Casey	9/1/2012	75
Kentucky Downs	Thoroughbred Racing	Simpson	9/8/2012	213
NKHN Trail Ride	All Breeds	Campbell	9/15/2012	46
Knott County Trail Ride	All Breeds	Knott	10/6/2012	75
The Red Mile	Standardbred Racing	Fayette	10/7/2012	250
Keeneland	Thoroughbred Racing	Fayette	10/27/2012	250
National Horse Show	Hunter/Jumper/Saddlebred	Fayette	11/3/2012	79

Using the data from these surveys, researchers were able to estimate per-person spending at each event as well as total economic impact from the event (categorized by size).

Racetrack Management Survey

A survey was sent to the general manager or owner of six racetracks in Kentucky: Churchill Downs, Ellis Park, Keeneland, Kentucky Downs, Red Mile, and Turfway Park. The survey requested information from the calendar year 2011 in the following categories: revenues, operating expenses, assets, capital investments, investments in human capital and technology, and use of wagering technology. Despite repeated attempts to get the surveys completed, only one was returned. Hence, all needed racetrack data had to be obtained from the Kentucky Horse Racing Commission's 2010-2011 biennial report (http://khrc.ky.gov/reports/Biennial%20Report%202010-2011.pdf).

Non-market Valuation Survey

The non-market valuation study was conducted to obtain an estimate of the value of the externalities generated by the presence of the equine industry in the state of Kentucky, which may include recreational, environmental, and aesthetic benefits. The writing and administration of the survey was accomplished in four stages. First, a preliminary draft of the survey was created to closely replicate the survey used in Richard Ready's 1990 study "The Value to Kentuckians of the Kentucky Equine Industry: A Contingent Valuation Study." Second, a focus group was conducted to examine the effectiveness, clarity, and navigability

of the survey instrument. Third, the final draft of the survey was prepared; 6,176 survey instruments were compiled and mailed to eight counties (Bourbon, Clark, Fayette, Harrison, Jessamine, Madison, Scott, Woodford) in the Bluegrass Region of Kentucky, and an additional 2,000 surveys were mailed to randomly selected Kentucky residents outside of the Bluegrass Region.

A preliminary draft of the survey was created using the survey methodology section and body of the paper "The Value to Kentuckians of the Kentucky Equine Industry: A Contingent Valuation Study." Unfortunately, a copy of the contingent valuation survey used in the 1990 study was not included in the appendix of the report as stated in the text. To allow for comparability of the two studies, the explanation of the 1990 contingent valuation survey (found in the body of the paper) was used to replicate the original survey as closely as possible. It was tested for effectiveness, clarity, and navigability during a focus group held at Southside Christian Church of Lexington, KY on August 29, 2012.

The questionnaire was distributed to 8,176 households throughout the state of Kentucky in two separate mailings. Table 4 presents the number of surveys distributed by county. Fayette county respondents were randomly selected from a database obtained from the Fayette County Property Valuation Administrator. The addresses for all respondents excluding Fayette County residents were obtained from the company USA Data. Reminder postcards were mailed to increase response rate. The overall response rate, after accounting for bad addresses, was 22.28%. As expected, response in the Bluegrass Counties was significantly higher than non-Bluegrass Counties (25.19% vs. 10.10%).

Table 4: Survey Distribution by County

County	Surveys Distributed	County	Surveys Distributed	County	Surveys Distributed
Adair (NB)	12	Grant (NB)	12	Mason (NB)	9
Allen (NB)	10	Graves (NB)	21	Meade (NB)	15
Anderson (NB)	12	Grayson (NB)	15	Menifee (NB)	3
Ballard (NB)	5	Green (NB)	7	Mercer (NB)	12
Barren (NB)	24	Greenup (NB)	22	Metcalfe (NB)	6
Bath (NB)	6	Hancock (NB)	5	Monroe (NB)	6
Bell (NB)	14	Hardin (NB)	54	Montgomery (NB)	14
Boone (NB)	62	Harlan (NB)	15	Morgan (NB)	6
Bourbon (B)	216	Harrison (B)	203	Muhlenberg (NB)	16
Boyd (NB)	27	Hart (NB)	10	Nelson (NB)	23
Boyle (NB)	16	Henderson (NB)	24	Nicholas (NB)	4
Bracken (NB)	5	Henry (NB)	8	Ohio (NB)	12
Breathitt (NB)	9	Hickman (NB)	3	Oldham (NB)	29
Breckinridge (NB)	10	Hopkins (NB)	25	Owen (NB)	5
Bullitt (NB)	41	Jackson (NB)	7	Owsley (NB)	0
Butler (NB)	7	Jefferson (NB)	408	Pendleton (NB)	7
Caldwell (NB)	7	Jessamine (B)	524	Perry (NB)	15

Calloway (NB)	19	Johnson (NB)	13	Pike (NB)	36
Campbell (NB)	48	Kenton (NB)	85	Powell (NB)	7
Carlisle (NB)	3	Knott (NB)	8	Pulaski (NB)	35
Carroll (NB)	6	Knox (NB)	16	Robertson (NB)	1
Carter (NB)	15	Larue (NB)	8	Rockcastle (NB)	8
Casey (NB)	9	Laurel (NB)	32	Rowan (NB)	12
Christian (NB)	32	Lawrence (NB)	9	Russell (NB)	10
Clark (B)	384	Lee (NB)	4	Scott (B)	509
Clay (NB)	10	Leslie (NB)	6	Shelby (NB)	21
Clinton (NB)	5	Letcher (NB)	13	Simpson (NB)	10
Crittenden (NB)	5	Lewis (NB)	6	Spencer (NB)	9
Cumberland (NB)	4	Lincoln (NB)	13	Taylor (NB)	14
Daviess (NB)	52	Livingston (NB)	6	Todd (NB)	6
Edmonson (NB)	6	Logan (NB)	15	Trigg (NB)	8
Elliott (NB)	2	Lyon (NB)	4	Trimble (NB)	5
Estill (NB)	8	Madison (B)	895	Union (NB)	8
Fayette (B)	3176	McCracken (NB)	37	Warren (NB)	55
Fleming (NB)	8	McCreary (NB)	8	Washington (NB)	6
Floyd (NB)	21	McLean (NB)	5	Wayne (NB)	10
Franklin (NB)	27	Magoffin (NB)	6	Webster (NB)	7
Fulton (NB)	4	Marion (NB)	10	Whitley (NB)	19
Gallatin (NB)	4	Marshall (NB)	18	Wolfe (NB)	4
Garrard (NB)	9	Martin (NB)	5	Woodford (B)	269