

1996 NORTH CAROLINA EQUINE SURVEY

NORTH CAROLINA AGRICULTURAL STATISTICS

2 W. Edenton St.
Raleigh, N.C. 27611

Telephone (919) 856-4394

Fax (919) 856-4139

E-mail: agstat@MAIL.agr.state.nc.us/stats

Internet Address: <http://www.agr.state.nc.us/stats>



BOB MURPHY, *State Statistician*
CRAIG HAYES, *Deputy State Statistician*



Issued Cooperatively By



**NORTH CAROLINA
DEPARTMENT OF AGRICULTURE
& CONSUMER SERVICES**

JAMES A. GRAHAM
Commissioner

MAURICE A. WEAVER
Deputy Commissioner of Agriculture

**UNITED STATES
DEPARTMENT OF AGRICULTURE**

DONALD M. BAY
Administrator, NASS

FRED S. BARRETT
Deputy Administrator, Field Operations

Compiled and Edited by:
Donald Buysse, *Statistician*
Teresa Bunch, *Statistical Research Assistant*

Cover and Publication Layout Designed by *Jayme Blackmon*

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Table of Contents

Summary	3
Number of Equine Operations, by Size, Average per Operation, 1996	3
Equine Inventory and Value by Breed, 1996	4-5
Equine Inventory and Value by County, 1996	6
Equine Inventory by Primary Activity and Breed, 1996	7
Equine Related Income, 1996	8
Equine Related Income Inside and Outside North Carolina, 1996	9
Equine Related Expenses, 1996	10
Equine Related Expenses Inside and Outside North Carolina, 1996	11
Equine Related Assets, 1996	12
Equine Related Taxes, Insurance and Debt Expenses, 1996	13
Equine Related Labor, 1996	13
Demographics of Equine Owners, 1996	14
Survey Methodology and Procedures	15-16

Introduction

The Agricultural Statistics Division of the North Carolina Department of Agriculture and Consumer Services is responsible for providing information and statistics about the entire agricultural industry in the state. In 1994, The State Legislature approved funds establishing a Rotational Surveys Program. The Rotational Surveys Program is designed to provide information on sectors of the state's agriculture that are outside the realm of the current statistical program. The 1996 NORTH CAROLINA EQUINE SURVEY is a product of this program and was completed through the cooperative agreement between the North Carolina Department of Agriculture and Consumer Services and United States Department of Agriculture.

The purpose of the 1996 Equine Survey was to determine the inventory and economic impact the equine industry has in North Carolina. Estimates of inventory by county and breed, income, expenses, assets, labor and demographics are presented to help define the industry. The goal was to provide accurate, reliable and unbiased estimates that can be used by everyone in the equine industry. Refer to page 15 for an explanation of survey procedures and methodology.

Summary

The 1996 North Carolina Equine Survey accounted for 132,000 head of equine in the state. Equine are found on 26,300 places and average five horses per operation. The average operation has 18.9 acres of land associated with equine, totaling 446,000 acres for the state. The survey identified 33,000 owners of equine in North Carolina, 6,700 which do not stable horses on their own property. The average equine owner has 4 horses.

Number of Equine Operations, by Size, Average per Operation, 1996

Operation Size (Head)	Number of Operations	Number of Equine	Average Equine Per Operation
1-2	10,800	17,500	1.6
3-5	9,600	35,500	3.7
6-10	3,500	26,000	7.4
11-24	1,800	27,500	15.3
25 +	600	25,500	42.5
Total	26,300	132,000	5.0

Light horse breeds, at 105,400 head, dominate North Carolina's equine inventory, accounting for 80 percent of the equine in the state. Race horse inventory, at 10,400 head, is a distant second and comprise 8 percent of the total.

The value of total equine in North Carolina is estimated at \$533 million dollars. Light horse breeds, valued at \$383 million, account for 72 percent of the total. The average value per animal is \$4,038.

Equine income is estimated at \$97 million in 1996 with sales and boarding representing 65% of the income. Equine related expenses total \$274 million, with feed, labor, maintenance and health accounting for the largest share of the expense. An additional \$40 million is paid in property taxes, insurance and debt payments. Equine related assets are valued at \$3.27 billion with 5 percent of the assets purchased in 1996. The average value of equine related assets per horse in North Carolina is estimated at \$24,773.

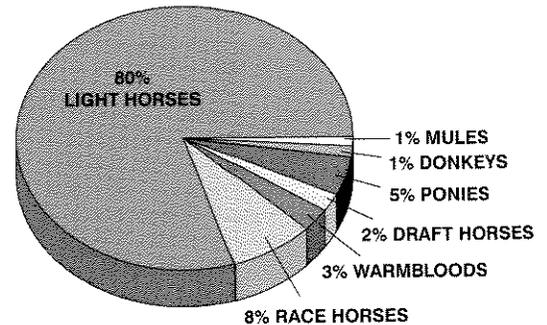
The average age of an equine owner is 44, with 70 percent of the owners falling between the ages of 36 and 65. Eighty-three percent of equine owners have been involved with equine for over 5 years.

Equine Inventory and Value by Breed, 1996

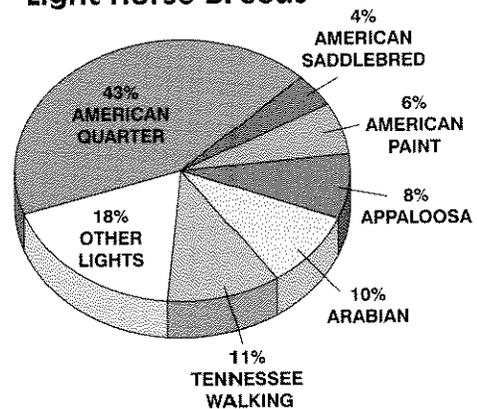
BREED	INVENTORY	AVERAGE VALUE	TOTAL VALUE
American Quarter Horse	45,100	\$3,387	\$152,740,000
Tennessee Walking Horse	11,200	\$3,365	\$37,685,000
Arabian	10,100	\$4,792	\$48,400,000
Appaloosa	8,600	\$2,344	\$20,160,000
American Paint	6,700	\$3,502	\$23,466,000
American Saddlebred	4,300	\$9,109	\$39,167,000
Miniature Horse	2,700	\$2,200	\$5,940,000
Half-Arabian	2,600	\$2,885	\$7,502,000
Morgan	2,500	\$4,186	\$10,465,000
Palomino	1,300	\$3,240	\$4,212,000
Pinto	500	\$2,270	\$1,135,000
Other Light Horses ¹	9,800	\$3,282	\$32,163,000
Light Horse Breeds	105,400	\$3,634	\$383,035,000
Thoroughbred	9,300	\$8,285	\$77,050,000
Standardbred	1,100	\$2,805	\$3,085,000
Race Horse Breeds	10,400	\$7,705	\$80,135,000
Hanoverian	1,500		
Trakehner	500		
Other Warmbloods ¹	1,800		
Warmbloods	3,800	\$12,707	\$48,285,000
Belgian	1,600		
Percheron	800		
Clydesdale	100		
Other Draft Horses ¹	500		
Draft Horses	3,000	\$2,600	\$7,800,000
American Shetland	1,500		
Welsh	1,500		
Hackney Pony	700		
Other Ponies ¹	2,500		
Total Ponies	6,200	\$1,796	\$11,135,000
Mules	1,700	\$1,000	\$1,700,000
Donkeys	1,500	\$607	\$910,000
TOTAL EQUINE	132,000	\$4,038	\$533,000,000

¹ All other types or equine not identified by owner.

Inventory All Horse Breeds



Inventory Light Horse Breeds



Equine inventory in 1996 is estimated at 132,000 head. Light breeds, at 105,400 head, dominate all other categories and account for 80 percent of the equine in the state. The American Quarter Horse is the most commonly owned light breed, totaling 45,100 head. Other light breeds include the Tennessee Walking Horse, 11,200 head; Arabian, 10,100 head; Appaloosa, 8,600 head; American Paint, 6,700 head and American Saddlebred, 4,300 head.

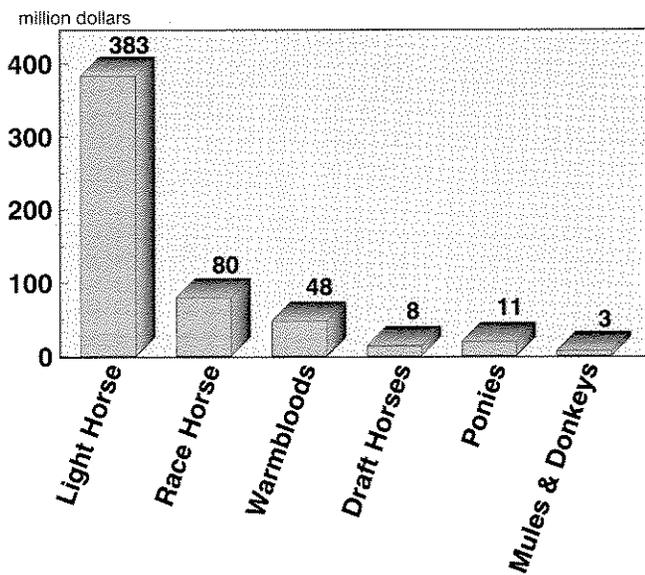
Race horse inventory, at 10,400 head, is a distant second to light breeds, with 8 percent of the state inventory. The remainder of the inventory includes Ponies, 5 percent; Warmbloods, 3 percent; Draft horses, 2 percent; and Donkeys and Mules, 1 percent each.

The value of equine in 1996 is estimated at \$533 million. Light horse breeds, valued at \$383 million, account for 72 percent of the total. Race horses are valued at \$80.1 million, and represent 15 percent of the value. Other categories were Warmbloods at \$48.3 million, 9 percent; Ponies \$11.1 million, 2 percent; Draft horses at \$7.8 million, 1 percent; and mules and donkeys at 2.6 million, each slightly less than one half percent.

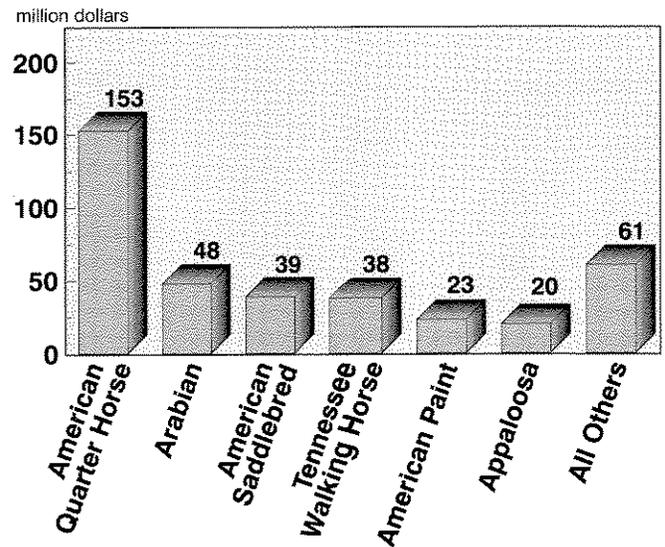
The average value per equine is estimated at \$4,038 per animal. Warmbloods have the highest average value, at \$12,707 per horse. Race horses are second averaging \$7,705 followed by light breeds at \$3,634. Light breed average value ranges from \$2,200 for Miniature horses to \$9,109 for American Saddlebred.

The value for individual equine ranges from \$50 to over \$500,000. The average value was calculated by averaging the combine reports of each owners estimate of equine value.

Equine Value by Breed, 1996



Value of Light Horses, by Type, 1996



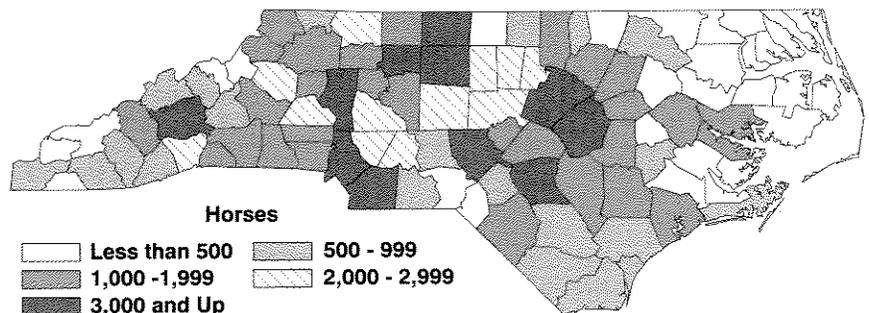
Equine Inventory and Value by County, 1996

COUNTIES AND DISTRICTS	TOTAL EQUINE	INVENTORY VALUE	COUNTIES AND DISTRICTS	TOTAL EQUINE	INVENTORY VALUE
	(Number)	(Thous. Dollars)		(Number)	(Thous. Dollars)
Alleghany 005	700	963	Anson 007	600	1,594
Ashe 009	1,700	3,932	Cabarrus 025	2,200	26,499
Avery 011	350	615	Cleveland 045	1,900	6,195
Caldwell 027	2,200	4,408	Gaston 071	1,500	6,123
Surry 171	2,300	9,569	Lincoln 109	1,600	8,171
Watauga 189	1,700	7,806	Mecklenburg 119	4,400	23,790
Wilkes 193	1,600	4,005	Montgomery 123	800	1,406
Yadkin 197	1,300	2,940	Moore 125	3,100	21,006
N. Mountain 10	11,850	34,238	Richmond 153	400	1,193
Buncombe 021	3,000	11,995	Stanly 167	2,400	6,589
Burke 023	1,400	3,329	Union 179	4,600	14,223
Cherokee 039	800	2,364	S. Piedmont 60	23,500	116,789
Clay 043	270	326	Bertie 015	300	611
Graham 075	130	330	Camden 029	110	447
Haywood 087	1,300	2,489	Chowan 041	400	826
Henderson 089	2,100	9,569	Currituck 053	300	1,132
Jackson 099	540	1,265	Dare 055	120	222
McDowell 111	800	2,224	Edgecombe 065	350	915
Macon 113	780	3,455	Gates 073	350	842
Madison 115	560	869	Halifax 083	800	2,013
Mitchell 121	420	610	Hertford 091	200	309
Polk 149	1,500	11,008	Martin 117	160	356
Rutherford 161	1,900	4,887	Nash 127	1,100	3,513
Swain 173	180	235	Northampton 131	220	583
Transylvania 175	950	1,543	Pasquotank 139	290	655
Yancey 199	900	3,443	Perquimans 143	220	333
W. Mountain 20	17,530	59,941	Tyrrell 177	110	127
Alamance 001	2,400	8,918	Washington 187	210	266
Caswell 033	350	634	N. Coastal 70	5,240	13,150
Durham 063	2,300	11,995	Beaufort 013	1,000	2,642
Forsyth 067	3,600	16,417	Carteret 031	520	1,525
Franklin 069	1,900	7,973	Craven 049	400	1,103
Granville 077	1,500	5,362	Greene 079	360	1,043
Guilford 081	5,600	31,851	Hyde 095	30	39
Orange 135	2,700	14,094	Johnston 101	3,000	8,067
Person 145	730	1,910	Jones 103	300	603
Rockingham 157	3,700	24,452	Lenoir 107	700	1,338
Stokes 169	1,400	4,330	Pamlico 137	110	256
Vance 181	680	1,344	Pitt 147	1,500	7,822
Warren 185	270	670	Wayne 191	1,400	3,882
N. Piedmont 40	27,130	129,950	Wilson 195	1,000	2,356
Alexander 003	1,350	3,108	C. Coastal 80	10,320	30,676
Catawba 035	2,100	8,679	Bladen 017	690	2,459
Chatham 037	2,200	10,646	Brunswick 019	500	1,036
Davidson 057	1,600	4,981	Columbus 047	790	1,938
Davie 059	1,900	5,084	Cumberland 051	3,000	9,344
Iredell 097	3,100	12,853	Duplin 061	1,000	2,628
Lee 105	1,100	3,022	Harnett 085	1,400	5,202
Randolph 151	2,400	7,382	Hoke 093	950	6,344
Rowan 159	2,500	8,015	New Hanover 129	600	2,397
Wake 183	4,100	21,711	Onslow 133	1,400	6,130
C. Piedmont 50	22,350	85,481	Pender 141	850	1,915
			Robeson 155	1,600	20,285
			Sampson 163	1,100	2,409
			Scotland 165	200	688
			S. Coastal 90	14,080	62,775
			State Total	132,000	533,000

Top 11 Equine Counties

COUNTY	NUMBER
Guilford	5,600
Union	4,600
Mecklenburg	4,400
Wake	4,100
Rockingham	3,700
Forsyth	3,600
Iredell	3,100
Moore	3,100
Buncombe	3,000
Cumberland	3,000
Johnston	3,000

Equine Inventory, 1996



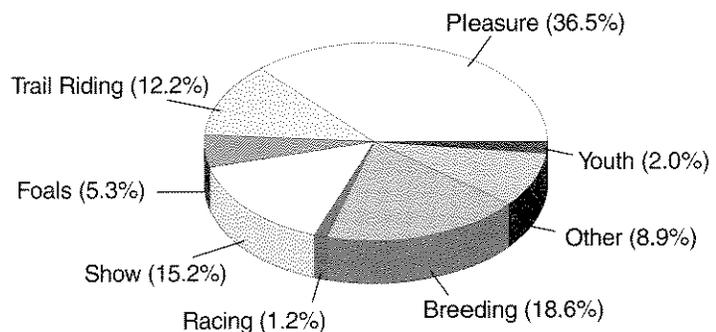
Equine Inventory by Primary Activity and Breed, 1996

Breed or Type	Breeding	Foals	Pleasure	Racing	Show/ Competition	Trail Riding	Youth	Other Activity	Total
<i>(number)</i>									
Light Horse Breeds									
American Quarter Horse	7,770	2,010	17,670	440	6,050	6,670	730	3,760	45,100
Tennessee Walking	1,930	610	4,780	1	1,190	2,220	50	420	11,200
Arabian	2,420	600	3,390	90	1,720	1,140	210	530	10,100
Appaloosa	1,470	430	3,450	30	1,000	1,450	180	590	8,600
American Paint	1,870	730	1,790	1	1,070	890	80	270	6,700
American Saddlebred	870	210	1,320	1	1,280	270	60	290	4,300
Miniature Horses	1,270	280	870	1	120	1	30	130	2,700
Half-Arabian	180	160	1,050	20	430	490	60	210	2,600
Morgan	620	120	740	1	460	270	60	230	2,500
Palomino	220	60	540	1	220	170	30	60	1,300
Pinto	70	40	250	1	40	80	1	20	500
Other Light Horses	1,780	500	3,730	20	1,360	1,280	220	910	9,800
Race Horse Breeds									
Thoroughbred	1,380	380	2,040	750	2,630	390	230	1,500	9,300
Standardbred	150	40	420	140	140	100	40	70	1,100
Warmbloods									
Hanoverian	490	170	210	1	460	40	10	120	1,500
Trakehner	90	1	130	1	220	10	10	40	500
Other Warmbloods	230	200	300	1	640	60	190	180	1,800
Draft Horse Breeds									
Belgian	300	70	650	1	50	30	1	500	1,600
Percheron	140	30	310	1	80	20	1	220	800
Clydesdale	40	1	40	1	1	1	1	20	100
Other Draft Horse	100	50	170	1	70	20	1	90	500
Ponies									
American Shetland	100	30	920	1	50	70	110	220	1,500
Welsh	200	70	570	1	340	80	80	160	1,500
Hackneys	130	60	280	1	120	20	60	30	700
Other or Unknown	240	60	1,130	1	230	140	180	520	2,500
Other Equine									
Mules	90	50	900	20	70	160	10	400	1,700
Donkeys	460	90	590	20	70	20	1	250	1,500
Total Equine	24,610	7,050	48,240	1,530	20,110	16,090	2,630	11,740	132,000

¹ Less than 10 equine not published.

Equine Inventory by Primary Activity, 1996

The leading primary activity or use of equine in North Carolina is pleasure. Breeding is second, followed by show or competition activities and trail riding. If an owner uses equine for multiple purposes, the most important use is considered the primary activity.

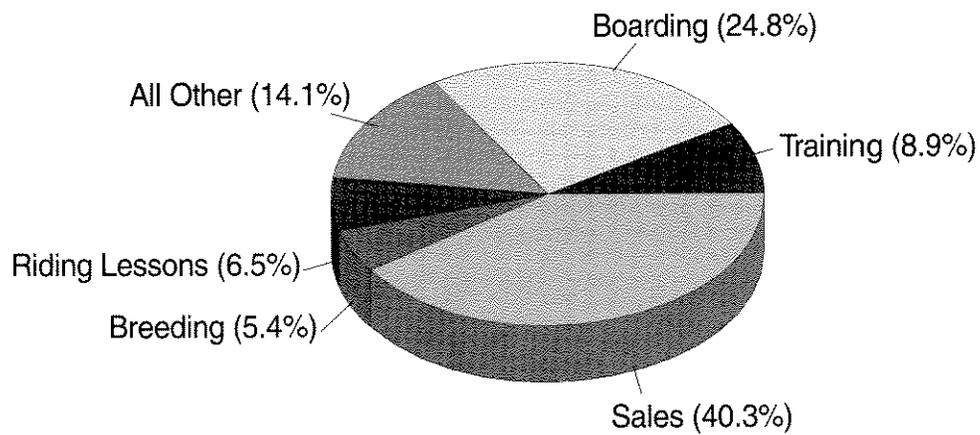


Equine Related Income, 1996

Item	Total Income	Percent of Total	Average Income per Horse	Average Income per Operation
	<i>(million dollars)</i>	<i>(%)</i>	<i>(dollars)</i>	<i>(dollars)</i>
Sales	39.1	40.3	296	1,487
Boarding	24.1	24.8	183	916
Training	8.6	8.9	65	327
Riding Lessons	6.3	6.5	48	240
Breeding	5.2	5.4	39	198
Show Purses	2.1	2.2	16	80
Trail Riding	1.8	1.9	14	68
Feed	1.8	1.9	14	68
Racing	1.6	1.6	12	61
Rodeo	1.0	1.0	8	38
Judging	0.8	.8	6	30
Fund Purses	0.4	.4	3	15
Other	4.2	4.3	32	160
TOTAL	97.0	100.0	735 ¹	3,688

¹ Column does not add to total due to rounding.

Equine Related Income, 1996



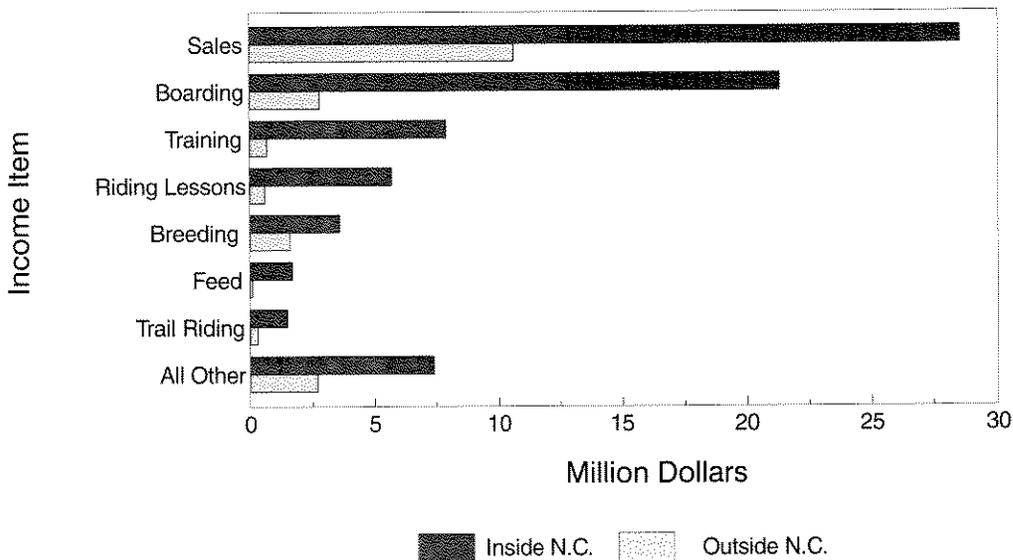
Equine Related Income Inside and Outside North Carolina, 1996

Item	Inside North Carolina		Outside North Carolina	
	Income	Percent	Income	Percent
	<i>(thousand dollars)</i>	<i>(%)</i>	<i>(thousand dollars)</i>	<i>(%)</i>
Sales	28,500	72.9	10,600	27.1
Boarding	21,300	88.4	2,800	11.6
Training	7,900	91.9	700	8.1
Riding Lessons	5,700	90.5	600	9.5
Breeding	3,600	69.2	1,600	30.8
Feed	1,700	94.4	100	5.6
Trail Riding	1,500	83.3	300	16.7
Show Purses	1,300	61.9	800	38.1
Racing	700	43.7	900	56.3
Rodeo	600	60.0	400	40.0
Judging	500	62.5	300	37.5
Fund Purses	200	50.0	200	50.0
Other	4,100	97.6	100	2.4
TOTAL	77,600	80.0	19,400	20.0

Equine related income is estimated at \$97 million in 1996. Equine sales, at \$39.1 million, account for 40 percent of the income while boarding is second with \$24.1 million or 25 percent of the total. Training, riding lessons, and breeding are the other major income categories totaling \$8.6 million, \$6.3 million, and \$5.2 million, respectively. These three categories account for 21 percent of equine income.

Eighty percent of the income generated from equine is from inside North Carolina, totaling \$77.6 million. Income generated outside the state is \$19.4 million. Racing and fund purses are the only income categories that generate 50 percent or more from out of state sources.

Income Distribution Inside N.C. vs. Outside N.C., 1996

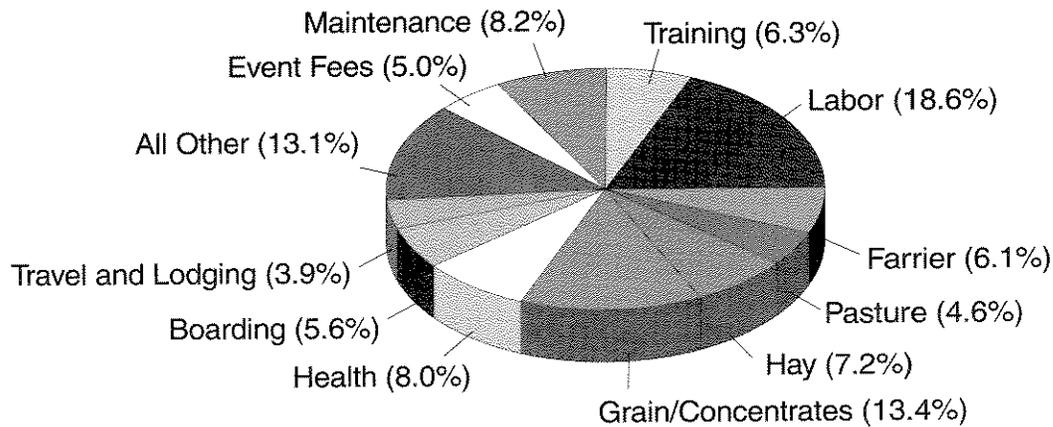


Equine Related Expenses, 1996

Item	Total Expenses	Percent of Total	Average Expense per Owner	Average Expense per Horse
	<i>(million dollars)</i>	<i>(%)</i>	<i>(dollars)</i>	<i>(dollars)</i>
Labor	51.0	18.6	1,545	386
Grain/Concentrates	36.6	13.4	1,109	277
Maintenance (buildings, etc.)	22.4	8.2	679	170
Health	21.8	8.0	661	165
Hay	19.8	7.2	600	150
Training	17.3	6.3	524	131
Farrier	16.6	6.1	503	126
Boarding	15.4	5.6	467	117
Event Fees	13.7	5.0	415	104
Pasture	12.7	4.6	385	96
Travel and Lodging	10.8	3.9	327	82
Utilities	7.4	2.7	224	56
Bedding	6.1	2.2	185	46
Breeding	5.7	2.1	173	43
Grooming	4.6	1.7	139	35
Advertising/Marketing	3.7	1.4	112	28
Supplements	2.9	1.1	88	22
Professional/Membership	2.6	.9	79	20
Other	2.9	1.1	88	22
TOTAL	274.0	100.0 ¹	8,303	2,076

¹ Column does not add to total due to rounding.

Major Equine Expenses, 1996



Equine Related Expenses Inside and Outside North Carolina, 1996

Item	Inside North Carolina		Outside North Carolina	
	Expense	Percent	Expense	Percent
	<i>(thousand dollars)</i>	<i>(%)</i>	<i>(thousand dollars)</i>	<i>(%)</i>
Labor	51,000	100.0	-	-
Grain/Concentrates	36,200	98.9	400	1.1
Maintenance (buildings,etc.)	21,900	97.8	500	2.2
Health	20,700	95.0	1,100	5.0
Hay	18,900	95.5	900	4.5
Farrier	16,100	97.0	500	3.0
Boarding	13,800	89.6	1,600	10.4
Training	13,600	78.6	3,700	21.4
Pasture	12,600	99.2	100	0.8
Event Fees	10,500	76.6	3,200	23.4
Travel and Lodging	8,900	82.4	1,900	17.6
Utilities	7,300	98.6	100	1.4
Bedding	5,900	96.7	200	3.3
Grooming	4,300	93.5	300	6.5
Breeding	4,300	75.4	1,400	24.6
Advertising/Marketing	3,100	83.8	600	16.2
Supplements	2,700	93.1	200	6.9
Professional/Membership	2,200	84.6	400	15.4
Other	2,600	90.0	300	10.0
TOTAL	256,600	93.6	17,400	6.4

The estimated equine related expenses for North Carolina total \$274 million. The combined costs associated with feed including grain, concentrates, supplements and hay account for over 20 percent of the expenses or \$59.3 million. Labor expenses represented 19 percent of the total at \$51 million. Expenses for equine related services including training, farrier, boarding, breeding and grooming combine to total \$59.6 million.

The average owner incurred \$8,303 of equine related expenses in 1996. Expenses per horse average \$2,076. Grain, concentrates and hay annual expenses average \$427, per horse. Labor and maintenance expenses are estimated at \$277 and \$170, respectively.

Nearly 94 percent of equine expenses were incurred inside the state of North Carolina and totaled \$256.6 million. Expense categories with significant expenses outside the state include training, \$3.7 million; event fees, \$3.2 million; travel and lodging, \$1.9 million; boarding, \$1.6 million; and breeding, \$1.4 million. On a percentage basis, out-of-state expenses for breeding, event fees and training are the highest totaling 24.6, 23.4 and 21.4 percent, respectively.

Equine Related Assets, 1996

Asset	Total Asset Value	Percent Purchased in 1996	1996 Purchases	Average Value per Horse	Average Value per Owner
	<i>(million dollars)</i>	<i>(%)</i>	<i>(million dollars)</i>	<i>(dollars)</i>	<i>(dollars)</i>
Land	1,570.0	2.7	42.9	11,893	47,576
Equine	533.0	5.8	31.0	4,038	16,152
Barns & Stables	501.0	4.4	22.6	3,795	15,182
Vehicles	224.0	16.1	36.1	1,697	6,788
Tractors/Farm Mach.	125.0	10.1	12.6	947	3,788
Trailers	101.0	11.2	11.3	765	3,061
Tack/Attire	75.9	5.5	4.2	575	2,300
Fencing	63.4	6.9	4.4	480	1,921
Sheds	27.1	10.7	2.9	205	821
Outdoor Arenas	21.9	10.0	2.2	166	664
Indoor Arenas	20.9	1.4	.3	158	633
Other Equine Equip.	5.3	7.5	.4	40	161
Other Items	1.5	6.7	.1	11	45
TOTAL	3,270.0	5.4	176.0	24,773 ¹	99,091 ¹

¹ Column does not add to total due to rounding.

Total equine related assets are estimated at \$3.27 billion in North Carolina. Nearly half of that total, \$1.57 billion, can be attributed to land values. The combined value of all equine related buildings is estimated at over \$570 million.

In 1996, capital investment expenditures were estimated at \$176 million. Land purchases account for \$42.9 million or 24 percent of 1996 expenditure. Vehicle purchases follow at \$36.1 million while equine purchases totaled \$31 million in 1996. New purchases of all equine related buildings in 1996 are estimated at \$28 million.

The average equine owner in North Carolina has equine related assets totaling at \$99,091. This includes land valued at \$47,576 and \$17,924 worth of barns, stables, sheds and fencing. The average owner has equine valued at \$16,152 and has assets of \$10,576 in equine related vehicles and trailers.

Average value of assets per horse is estimated at \$24,773. Assets attributed on a per equine basis include \$11,893 for land, \$4,480 for barns, stables, sheds and fencing and \$3,409 for vehicles, farm machinery and trailers.

Equine Related Taxes, Insurance and Debt Payments, 1996

Item	Total Payment	Average Payment per Horse	Average Payment per Operation
	<i>(million dollars)</i>	<i>(dollars)</i>	<i>(dollars)</i>
Property Taxes	20.5	155	779
Farm Owners Insurance	9.4	71	357
Debt Repayment	7.6	58	289
Mortality Ins.	1.9	14	72
Care/Custody/Control Ins.	0.6	5	23
TOTAL	40.0	303	1,520

Overhead expenses including taxes, insurance and loan repayment are estimated at \$40 million in 1996. The largest portion of these expenses, \$20.5 million, is property taxes. Average payment per horse is estimated at \$303, and expenses per operation for these overhead costs are estimated at \$1,520.

Equine Related Labor, 1996

TYPE	Full-Time	Part-Time	Total
Manager, Assistant Manager	870	240	1110
Trainer, Assistant Trainer	530	710	1240
Groom, Exercise Rider, etc.	350	610	960
General Farm Worker, Other	750	4040	4790
TOTAL	2,500	5,600	8,100
Cash Wages			44,100,000
Non-Wage Benefits			6,900,000
TOTAL			51,000,000

There were 8,100 equine related positions receiving cash wages in North Carolina during 1996. Of this total, 69 percent, or 5,600 laborers are considered part-time or seasonal workers. A part-time or seasonal worker is defined as a person working less than 150 days annually. The general farm worker represents 59 percent of the equine work force while trainers account for 15 percent. Equine managers represent 14 percent of the work force while groomers and exercise riders represent the remaining 12 percent. Workers that have multiple duties are classified in the category that provides the most important service to the operator. Service professionals such as veterinarians or farriers are not included in this total.

Labor expenditures totaled \$51 million in 1996. Cash labor expenses, at \$44.1 million, account for 86 percent of the total. Non-cash items provided to workers are valued at \$6.9 million.

Demographics of North Carolina Equine Owners, 1996

EDUCATIONAL LEVEL

Education	% of Total
< High School	6.1%
High School	24.4%
Some College	22.3%
2-Year College	13.8%
4-Year College	20.9%
Advanced	12.5%

AVERAGE AGE

Age	% of Total
< 14	0.7%
14 - 18	2.5%
19 - 35	21.0%
36 - 65	69.5%
65 +	6.3%

YEARS INVOLVED WITH EQUINE

Years	% of Total
1 - 2	4.9%
3 - 5	12.3%
6 - 10	19.7%
11 - 20	27.2%
> 20	35.9%

YEARS OWNED EQUINE

Years	% of Total
1 - 2	9.8%
3 - 5	18.0%
6 - 10	22.5%
11 - 20	24.8%
> 20	24.9%



Survey Methodology and Procedures

Survey Objective

The objective of the 1996 Equine Survey was to determine equine inventory and basic characteristics of the industry in North Carolina as well as measure the economic contribution that equine have on the state's economy.

Survey Design

The 1996 North Carolina Equine Survey was conducted utilizing two separate surveys. The first survey concentrated on inventory and industry characteristics and a follow-on survey examined economic issues. The inventory survey employed a multiple frame sampling scheme that utilized both a List Sampling Frame (LSF) and an Area Sampling Frame (ASF). The follow-on survey that examined economic issues was conducted using a sample of the initial survey.

List Sampling Frame

A list frame is a sampling frame consisting of a list of individuals or business that make up the population from which a sample will be selected. For this survey, a list frame for equine owners and operators was developed through breeding associations, veterinarians, Extension Service, riding clubs and other sources to provide the most complete and diverse coverage possible. The various lists were formatted to a common data base and duplication removed prior to mailing the questionnaire. Everyone on the list frame was mailed an inventory and basic characteristics questionnaire because there was not adequate control data to stratify and sample the population. A second request mailing, telephone and personal interviews were used to contact nonrespondents. The economic follow-on survey utilized a stratified sample of the respondents from the initial survey based on the number of equine on the operation.

Area Sampling Frame

An area sample was necessary to estimate equine not accounted for by the list frame because available resources made it impossible to develop a complete list of equine owners and operators. The Area Sampling Frame is a sampling frame that consists of all land area in North Carolina from which a sample of land segments is selected. In constructing the ASF, the land is stratified upon land usage. The resulting strata are composed of segments, which are pieces of land with easily identifiable boundaries. All segments within the same stratum are targeted to be approximately the same size. Each segment is composed of tracts. A tract is an area of land, wholly contained within a segment, that is under a single operation or management. Equine data identified in the area tracts were expanded to represent equine in similar tracts across the state.

Data Editing and Analysis

All questionnaires were manually edited for completeness, accuracy, legibility and validity. After the manual edit and data entry were complete, all data passed through a computer program that performed additional data checks. The errors identified by the computer edit were reviewed and the data updated accordingly. After the data were corrected, an analysis program was executed identifying extreme values that were a specified number of standard deviation from the mean of each data item. Extreme values were reviewed and original data analyzed for accuracy.

Data Summarization

The data was summarized using a combination of LXES and SAS programs. List frame equine reports were poststratified using reported equine inventory numbers. Data from usable list frame reports were summed then multiplied by their item expansion factor. An expansion factor is the value used to expand data from a sample to represent the population. For example, if 600 operations were determined to have 25 or more equine, and only 400 reported data, the expansion factor for this strata would be $600/400 = 1.5$. Thus, reported data would be summed and multiplied by the expansion factor of 1.5 to calculate an estimate of the population total.

Area frame strata were summarized similar to the list frame. The data were expanded by the segment expansion factor which is simply the total number of segments in a given stratum divided by the number of segments sampled in the stratum. The area frame expansion was used for state level estimates and as a component of the multiple frame expansions.

Multiple frame expansions were utilized in estimating equine numbers. Area frame data, not included on the list frame, were expanded and added to list frame expansions to form multiple frame expansions.