Location of Veterinarians and the Economic Impacts of These Veterinary Services to Tennessee’s Economy

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January 2007

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Study Background
In December and January, 2006-2007, an analysis of veterinary practice locations in the state by specialty of practice, along with a state level economic impact analysis of veterinary services was conducted. More specifically, the purpose of the study was to provide statewide visual information on where veterinarians are practicing and to estimate the economic impact the veterinary service industry has on the Tennessee’s economy.

- Veterinary services in the state generate close to $800 million dollars in economic activity creating 10,000 jobs in the state.
- Veterinarians and the services they provide are valued at over $410 million.
- Based on American Veterinary Medical Association membership, an estimated 24 counties do not have the services of a large/mixed animal veterinarian.
- Large/mixed animal veterinarian services exist where larger numbers of cattle are located in the state.
- In 2003, the state’s livestock sectors purchased $13.7 million from veterinarian services and $3.5 million in drugs. The livestock sector impacts the state’s economy by $1,886 million.
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This report examines two aspects of the veterinary service sector – location and economic impacts. Using information from American Veterinary Medical Association (AVMA), veterinarians are classified as:

- Small animal (avian (not poultry), exclusive feline practice, mixed practice (80% small), and small animal exclusive),
- Large farm animal (bovine practice exclusive, large animal all species, large farm animal mixed (80% large), porcine practice, and poultry practice),
- Equine exclusive,
- Equine and small animal,
- Mixed practices,
- Mixed practices that are non-species specific, and
- Specialty animal (amphibians/reptiles, exotic or wildlife animals, zoo animals, etc.).

The veterinarians so classified are identified by zip code and spatially mapped. Comparisons are made to human population numbers for all veterinarians as well as to livestock density for the large farm animal veterinarians.

The analysis uses IMPLAN, an input-output model to conduct the economic impact analysis (Minnesota IMPLAN Group (MIG), 1999). Input-output analysis creates a picture of a regional economy, in this case the state of Tennessee, to describe flows of goods and services to and from industries and institutions. For this analysis, the Tennessee veterinary service’s aggregate annual value of production is used to determine the impacts this sector has on the state’s economy. Economic indicators used in the analysis includes the direct and total effects on the state’s economy as measured by total industry output, employment, and generated value added.
Location of Veterinarians and their Specialties in Tennessee

Veterinarians are located throughout the state (Figure 1). Many of the practices are concentrated around heavily populated areas. According to AVMA, there are fewer large and mixed animal veterinarians located throughout the state (Figure 2). Not surprisingly, Shelby County, or the Memphis area, does not reflect practices of this type compared to Figure 1 where the density is greater because of the number of small animal veterinarians practicing in this locale.

Figure 1. Density of All Veterinarians, 2005.

Figure 3 shows the distribution of veterinarian services, by specialty, mapped by zip code throughout the state. Small animal veterinarian services (avian (not poultry), exclusive feline practice, mixed practice (80% small), and small animal exclusive) are shown in red and located primarily
around population centers. Large farm animal veterinarians (bovine practice exclusive, large animal all species, large farm animal mixed (80% large), porcine practice, and poultry practice) are shown in blue. Green denotes equine exclusive or equine and small animal veterinarians. Mixed practices and mixed practices that are non-species specific are shown in gold. Specialty animal veterinarians (amphibians/reptiles, exotic or wildlife animals, zoo animals, etc.) are shown in yellow. If no information is provided for the veterinarian practice, black is used (AVMA, 2005).

As in Figure 3, Figure 4 shows the distribution of small, large animal, and mixed practice veterinarian services located throughout the state by zip code for 2005 superimposed on a human population level map for 2006 by county. Not surprisingly, many of the veterinarians specializing in small animal practices are located near heavily populated areas.
Figure 3. Distribution of Veterinarian Services, by Specialty.

Figure 4. Distribution of Veterinarian Services, by Specialty and Human Population.
In a report to the Department for Environment, Food, and Rural Affairs in the United Kingdom, Westly Consulting Limited found that farm animal work represents a small proportion of the total time spent by vets in general practice. However, it is closely connected with the future of the livestock industry, particularly the cattle sector (Westly Consulting, 2004). Figures 5 and 6 contain maps of the distribution of large/mixed animal veterinarians located throughout the state by zip code. In Figure 5, this large/mixed animal veterinarian map is superimposed on a map detailing the number of cattle and calves by county for 2005. Counties in Middle (Lincoln, Giles, Maury, Bedford, and Lawrence) and upper East Tennessee (Greene and Washington) have the largest number of head. Figure 6 shows the distribution of large/mixed animal veterinarians located throughout the state by zip code and the number of milk cows by county for 2005. Counties in East (Greene, McMinn, Monroe, Washington, and Loudon) and Middle (Marshall, Robertson, White, and Coffee) Tennessee have the largest number of head.

**Economic Impacts of Veterinary Service Activity on the State’s Economy**

This analysis examines the economic impacts resulting from expenditures by the veterinary service industry on the state’s economy. It does not capture the economic impacts the animal health care industry has on livestock. However, an estimate of the cattle ranching and farming sector’s impact on the state’s economy from an estimated $597 million in annual value of production creates $1,138 million in total economic impacts (Menard, English, and Jensen, 2006). Furthermore, a study of livestock producers’ use of veterinary services project that the financial impacts of a loss of veterinary services would be about $128.9 million to the livestock industry (Jensen, English, and Menard, 2007).
Figure 5. Distribution of Large/Mixed Animal Veterinarians and Number of Cattle/Calves.

Figure 6. Distribution of Large/Mixed Animal Veterinarians and Number of Milk Cows.
The estimated direct impacts that occurred as a result of expenditures by the veterinary services industry exceed $395 million (2006 dollars), and financed more than 6,400 jobs (Table 1). Total value added\(^1\) is estimated at over $179 million. Total impacts for the state’s economy were estimated at over $795 million in total industry output from veterinary services. An estimated 10,000 jobs were created with total value added exceeding $412 million.

Table 1. Direct and Total Impacts for Veterinary Services in Tennessee, 2006.

<table>
<thead>
<tr>
<th></th>
<th>Direct</th>
<th>Total</th>
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</thead>
<tbody>
<tr>
<td>Total Industry Output(^a)</td>
<td>$395,500,736</td>
<td>$795,073,546</td>
</tr>
<tr>
<td>Employment(^b)</td>
<td>6,434</td>
<td>10,128</td>
</tr>
<tr>
<td>Total Value Added(^c)</td>
<td>$179,148,448</td>
<td>$412,184,609</td>
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</tbody>
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\(^{a}\) Total Industrial Output – annual dollar value of goods and services that an industry produces.

\(^{b}\) Employment – estimated number of total wage and salary employees (both full and part-time), as well as self-employed.

\(^{c}\) Total Value Added – estimated employee compensation, proprietary income, other income, and indirect business taxes.

For the economic indicator -- total industrial output -- the estimated multiplier is 2.01. In other words, for every dollar spent on veterinary services, an additional $1.01 is generated throughout the state’s economy. Likewise, the employment multiplier is estimated at 1.57. For every job created based on expenditures for veterinary services, an additional 0.57 jobs are created in other industries throughout the state.

The estimated direct, indirect, and induced impacts for veterinary services are shown in Figure 7. The top ten indirect and induced sectors based on output value are also listed. Direct impacts accounts for 49.7 percent ($395.5 million) of the total impact on output. Indirect impacts (input supplying industries) explained 19.5 percent ($154.6 million) of the total impact on output. The sectors most impacted in descending order include pharmaceutical and medicine manufacturing; wholesale trade; real estate; insurance carriers; telecommunications; food services and drinking places; surgical appliance and supplies manufacturing; postal service;

\(^1\) Consists of employee compensation, proprietary income, indirect business taxes, and other property income.
employment services; and banking. Likewise, induced impacts (expenditures by households and other institutions) explained 30.8 percent ($244.9 million) of the total impact on output. Again in descending order the sectors most impacted include owner-occupied dwellings; wholesale trade; health practitioners; food services and drinking places; hospitals; real estate; state and local education; state and local non-education; insurance carriers; and banking.

Indirect Effects: $Mil  
Total: $154.645 (19.5%)  
Pharmaceutical & Medicine Manufacturing: $19.632  
Wholesale Trade: $14.615  
Real Estate: $9.220  
Insurance Carriers: $8.700  
Telecommunications: $6.591  
Food Services & Drinking Places: $4.369  
Surgical Appliance & Supplies Manufacturing: $3.875  
Postal Service: $3.842  
Employment Services: $3.717  
Banking: $3.490

Induced Effects: $Mil  
Total: $244.928 (30.8%)  
Owner-Occupied Dwellings: $22.141  
Wholesale Trade: $12.645  
Health Practitioners: $12.214  
Food Services & Drinking Places: $12.333  
Hospitals: $11.365  
Real Estate: $11.284  
State & Local Education: $7.133  
State & Local Non-Education: $5.942  
Insurance Carriers: $5.710  
Banking: $5.636

Figure 7. Estimated Direct, Indirect, and Induced Impacts for Veterinary Services.
References


