ECONOMIC IMPACT OF THE UNITED STATES CERVID FARMING INDUSTRY

Agricultural and Food Policy Center
Texas A&M University

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Executive Summary

- The cervid farming industry is, perhaps, the fastest growing industry in rural America.
- Over 2,000 industry participants were surveyed, with a response rate of 14 percent.
- This survey, designed to estimate the economic impact of the industry, was performed in late 2006-early 2007.
- The average whitetail deer farm had 82 deer, composed of 28 males, 28 females, 26 fawns, and had an average birth rate of 1.31 fawns per doe in 2006.
- Breeding operations reported expenditures averaging $101,000 per year.
- The cervid farming industry has a direct economic impact of $893.5 million.
- When incorporating the indirect impacts of the industry, for example, the farm's expenditures on feed, veterinary supplies, fuel and other purchases, the total economic impact of the industry is $2.3 billion.
- One of the major customers of this industry is hunters. Estimating the impact of hunting dollars spent, with hunters as the consumer of cervid farming products, an additional $757 million is generated by the cervid farming industry.
- The total impact of the industry, combining the farming and hunting components, is $3.0 billion annually.
- The economic activity of the cervid farming industry supports 29,199 jobs, most of which are in rural America. If this industry did not exist, those jobs would have to be supported by some other economic activity.
- These results highlight the fact that the cervid farming industry is a growing and important industry in rural America.
Introduction

The cervid, or deer, farming industry is a vital and growing business in rural areas of the United States. As demographic and market forces tend to shift traditional revenue sources away from rural communities, their economies increasingly rely on new industries such as this one. As the industry has grown, participants and legislators have developed an interest in measuring the economic contribution of the industry on their respective communities. In addition, the industry is governed by a myriad of state and federal laws, regulations, and jurisdictions. Since the majority of industry regulation is left up to the states, a significant amount of variability in the regulations exists from state to state. This lack of consistency in laws and regulations may be a factor affecting future industry growth in some states. The rapid growth of the industry and an array of policy issues led the industry to request this study of the size and economic importance of the cervid farming industry. In 2006, the Agricultural and Food Policy Center (AFPC) at Texas A&M University was requested by former Texas Congressman Henry Bonilla to undertake this study. The primary objective of this study is to determine the economic impact of the United States cervid farming industry. Secondary objectives include providing a current description of typical industry participants and cost estimates for the major categories of expenses on cervid farming operations.
**Cervid Industry**

The term “cervid” refers to any one of the various members of the cervidae family. This family includes members such as whitetail deer, elk, fallow, reindeer, axis, sika, and red deer among others.1

Like any industry, the cervid farming industry involves producers and consumers. In general, the production side of the industry is comprised of breeding stock producers, trophy hunting preserves, commercial venison producers, and commercial scent collection. Some commercial production operations may take on a single segment, such as one producing and selling only breeding stock. Others may consist of any combination of these, such as an operation producing venison and velvet, while also collecting urine for scent sales. Consumers of the industry include hunters (for scent products and hunting) other breeders, and consumers of venison and related products (hides, velvet, shed antlers, etc.).

Figure 1 displays the estimated number of cervid farms per state. This inventory was compiled by the administrative staff at the North American Deer Farmers Association (NADeFA®) through contact with the appropriate state agency. Those states that did not have an exact count provided their best estimate. Across the nation, the total number of cervid farms was 7,828, with Pennsylvania and Texas home to around 1,000 farms each. The total number of hunting preserves is estimated at 2,639, yet this only represents an estimate of those that are related to the cervid farming industry. As an example of the growth the cervid farming industry is experiencing, there were 946 permitted breeding facilities in Texas in late summer 2006. However, when the analysis took place early in the spring of 2007, there were 1,006 permitted facilities. In addition, it is important to note that there are approximately 1,600 Amish operations included in the national total. For many in the Amish communities, deer breeding is another way to diversify their operations. A number of industry participants find that this form of farming provides an opportunity to turn a greater profit on a relatively small amount of acreage than traditional farming or ranching enterprises.

The trophy hunting segment of this industry relates only to those operations that purchase outright or release their own cervids into a hunting preserve. This segment represents the primary end market for the breeding stock industry. Trophy hunting, in this sense, involves hunting trophy cervids within high fenced hunting preserves. This generally occurs via 3-6 day hunt packages, where the hunter is provided lodging, meals, and a guided hunt for a set fee. Hunter expenditures included in this study only include those hunters that are related to this industry. In other words, hunters, in the context of this study, are only those that hunt at operations that either purchase or release deer from breeding operations into their hunting operations. Breeding operations represent the largest segment of the cervid farming industry. These operations raise and sell breeding stock to other industry breeders as well as hunting preserves. The commercial venison segment is similar to other food animal production operations, with fallow, elk, and red deer being the primary species reared. Cervids are raised to market age, processed, and the resulting venison is sold. In addition to venison, these operations may sell other co-products such as velvet, hides, and antlers. The last segment is the commercial urine, or scent, collection operations. These operations are found to stand alone or co-exist with other operational segments, where the urine is collected from males and females to sell as a hunting attractant.

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**Figure 1: Number of Cervid Farms by State.**
Methodology

As previously mentioned, the primary objective of this study is to estimate the economic impact of the United States cervid farming industry. In order to do this, a survey instrument was developed to collect detailed operational information from industry participants. This information was then combined with the inventory of cervid farms to analyze the production side of the industry. In addition, an analysis was performed to determine the impact of hunters, but only the portion of hunters who are related to the cervid farming industry. The production and hunting components were then combined to estimate the economic impact of the cervid farming industry.

Data Collection

During the late summer and early fall of 2006, background information to develop the survey was gained through site visits to cervid farms across the nation. Interviews from these visits provided a base set of information that was then utilized to develop the survey instrument. The survey was then reviewed by industry participants, revised, and sent to over 700 members of NADeFA® and 1,300 members of the Texas Deer Association (TDA) over the fall of 2006 to early 2007. Overall, the extensive survey achieved a response rate of 14 percent. These memberships were selected to participate in this study because they represent all facets of the cervid farming industry.

Survey Development

The actual survey instruments are contained in Appendix A (NADeFA®) and Appendix B (TDA). For the purposes of the survey, the cervid farming industry was segmented into three operational structures: breeding only, breeding and hunting, and hunting only operations. Breeding only operations were defined as those that only involve the scientific breeding and rearing of cervids for the purpose(s) of breeding stock, commercial venison, or commercial urine collection. Hunting only operations relate to only those hunting preserves that purchase cervids from breeding operations as stockers or as breeding stock for release into the preserve. Operations that manage their deer populations by selective harvest and nutritional supplements, rather than supplementing the natural genetics with deer released from breeding operations, are not included in this category. Breeding and hunting operations represent those that engage in breeding activities while also utilizing their own breeding stock, or purchased breeding stock, to supplement the genetics and/or populate their hunting preserve.

While a majority of the industry are whitetail deer producers, a variety of cervid species are raised as well, including elk, red deer, mule deer, sika, pere david’s, reindeer, axis, fallow, and muntjac. The surveys proved to be quite extensive, as they were designed to represent producers of all of these cervid species and operational segments. For breeding operations, the survey included questions regarding the operation in general, herd inventory, purchases, sales, capital expenditures, veterinary expenditures, labor, feeding rates and expenditures, utilities, and other miscellaneous expenses. For hunting operations, the base operational questions remained the same, however, hunting related questions were included as well, such as the number of hunters, harvest rate, percentage of herd from breeding operations, hunt revenues, processing, and taxidermy.

Figure 2: Typical Fenced Paddock.
Survey Results

General Operations

Of the 302 respondents, 61 percent were breeding only operations, 32 percent were breeding and hunting operations, and 7 percent were hunting only operations. Respondents represented 26 of the 48 states that have some type of cervid operation. When combining all survey respondents, operations have been in business, on average, since 1999.

From the NADeFA® survey results, the average whitetail deer breeding operation reported a total of 82 deer, on close to 25 acres. Of these, 28 were bucks, 28 were does, and 26 were fawns. In 2005, bred does had an average of 1.24 fawns each, which increased to 1.31 for the 2006 fawning season. Average annual mortality rate was reported to be 9.6 percent. For comparison, whitetail breeding operations from the Texas survey were slightly larger, averaging 114 head, on a little more than 64 acres. Of these, 42 were bucks, 44 were does, with the remainder being fawns. Bred does averaged 1.27 fawns each in 2005 and 1.37 in 2006, slightly higher than the national results. Overall herd mortality rate was reported to be 5.7 percent.

Table 1 above contains a summary of the average operational costs across all survey respondents. A quick glance through the table reveals expected differences across operations for general expenditures. Breeding and hunting operations displayed the largest footprint, around 1,700 acres, as expected. Breeding only operations were the smallest, averaging around 20 acres in pens. Pens, in this sense, are typically described as a high fenced paddock, as shown in Figure 2. For those pens holding bucks or bulls, a protective screening is often used in conjunction with the fence to keep an antler from hooking in the fence accidentally. In addition, screening may be used as a visual barrier, particularly if the operation is near a road, to shield the deer from view from passers-by.

Breeding and hunting operations had more area devoted to breeding pens, more pens overall, and more deer (Table 2) than breeding only operations. This was expected as the breeding and hunting operations supply their hunting operation from their breeding operation, and are not necessarily relying on sales or transfers to move deer off the operation.

The results indicate expenditures on lodges, fencing, and improvements were the top three in terms of the capital cost for both breeding and hunting and hunting only operations, while breeding operations spent the most on fencing, buildings, and improvements. The category of improvements includes expenditures on land clearing, roads, tanks/ponds, and forage development among others. Large equipment, ranch vehicles, and implements were reported as the highest equipment expenditures across all three types of operations. Of all the respondents, 49 percent reported hiring labor, while 43 percent reported outsourcing labor and/or consulting needs. Breeding and hunting operations reported using four times the amount of outsourced services than breeding only operations, or $16,456 versus $4,042. Examples of outsourced services include those of operational management and or nutritional consulting, bottle feeding services for newborns, annual herd maintenance/vaccination services, and accounting services.

Figure 3 provides a summary of expenditures for a typical breeding operation. Survey categories, such as those shown in Table 1, were combined into four primary expense categories: capital, operational, feed, and general. Figure 3 illustrates the annual expenses for breeding operations. Operational expenditures include items such as supplies, labor,
Table 1: Average Annual Operational Costs of Cervid Industry Survey Respondents.

<table>
<thead>
<tr>
<th></th>
<th>Breeding Only</th>
<th>Breeding &amp; Hunting</th>
<th>Hunting Only</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Operation</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Year started</td>
<td>1999</td>
<td>1998</td>
<td>1998</td>
</tr>
<tr>
<td>Area of breeding (acres)</td>
<td>22</td>
<td>80</td>
<td>NA</td>
</tr>
<tr>
<td>Area of hunting (acres)</td>
<td>NA</td>
<td>1,639</td>
<td>1,123</td>
</tr>
<tr>
<td>Land purchased (acres)</td>
<td>139</td>
<td>895</td>
<td>1,022</td>
</tr>
<tr>
<td>Purchase value ($/ac)</td>
<td>3,166</td>
<td>1,729</td>
<td>1,407</td>
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<tr>
<td><strong>Facilities</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Capital cost of lodge(s)</td>
<td>NA</td>
<td>172,673</td>
<td>159,326</td>
</tr>
<tr>
<td>Number of pens</td>
<td>8</td>
<td>13</td>
<td>NA</td>
</tr>
<tr>
<td>Area of pens (acres)</td>
<td>20</td>
<td>25</td>
<td>NA</td>
</tr>
<tr>
<td>Fencing</td>
<td>27,201</td>
<td>144,039</td>
<td>94,592</td>
</tr>
<tr>
<td>Shelters</td>
<td>6,980</td>
<td>14,479</td>
<td>NA</td>
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<tr>
<td>Improvements</td>
<td>17,270</td>
<td>81,750</td>
<td>63,507</td>
</tr>
<tr>
<td>Buildings</td>
<td>19,693</td>
<td>80,262</td>
<td>55,961</td>
</tr>
<tr>
<td>Working pens</td>
<td>10,336</td>
<td>18,366</td>
<td>NA</td>
</tr>
<tr>
<td>Percent with Handling Facility</td>
<td>64%</td>
<td>54%</td>
<td>NA</td>
</tr>
<tr>
<td>Cost of Handling Facility</td>
<td>15,627</td>
<td>36,502</td>
<td>NA</td>
</tr>
<tr>
<td>Maintenance and Repair</td>
<td>2,907</td>
<td>18,731</td>
<td>12,143</td>
</tr>
<tr>
<td><strong>Equipment</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Large equipment</td>
<td>33,009</td>
<td>93,268</td>
<td>61,665</td>
</tr>
<tr>
<td>ATV(s)</td>
<td>9,325</td>
<td>19,841</td>
<td>14,391</td>
</tr>
<tr>
<td>Ranch vehicles</td>
<td>29,422</td>
<td>55,470</td>
<td>37,208</td>
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<tr>
<td>Implements</td>
<td>9,578</td>
<td>26,510</td>
<td>20,038</td>
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<tr>
<td>Trailers/crates</td>
<td>6,300</td>
<td>14,421</td>
<td>9,228</td>
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<tr>
<td>Bulk feed bins</td>
<td>4,045</td>
<td>13,063</td>
<td>7,490</td>
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<tr>
<td>Feeding equipment</td>
<td>3,667</td>
<td>16,759</td>
<td>9,497</td>
</tr>
<tr>
<td>Watering equipment</td>
<td>2,398</td>
<td>9,413</td>
<td>9,046</td>
</tr>
<tr>
<td>Video equipment</td>
<td>1,916</td>
<td>3,473</td>
<td>2,003</td>
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<tr>
<td>Rental equipment</td>
<td>1,184</td>
<td>4,716</td>
<td>3,424</td>
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<td>Sedation equipment</td>
<td>1,178</td>
<td>1,778</td>
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<tr>
<td><strong>Veterinary &amp; Supplies</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating supplies</td>
<td>3,557</td>
<td>5,560</td>
<td>NA</td>
</tr>
<tr>
<td>Medical supplies</td>
<td>1,675</td>
<td>2,674</td>
<td>NA</td>
</tr>
<tr>
<td>Veterinary expense</td>
<td>2,257</td>
<td>4,121</td>
<td>NA</td>
</tr>
<tr>
<td>Lodge supplies</td>
<td>NA</td>
<td>5,237</td>
<td>5,183</td>
</tr>
<tr>
<td>Lodge food and beverages</td>
<td>NA</td>
<td>5,021</td>
<td>5,023</td>
</tr>
<tr>
<td><strong>Labor</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employees paid salary</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Employees paid hourly</td>
<td>2</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Total salary wages paid</td>
<td>35,613</td>
<td>65,801</td>
<td>39,608</td>
</tr>
<tr>
<td>Average annual salary wage expense</td>
<td>23,667</td>
<td>28,985</td>
<td>22,134</td>
</tr>
<tr>
<td>Total hourly wage paid</td>
<td>8,398</td>
<td>26,805</td>
<td>13,689</td>
</tr>
<tr>
<td>Average annual hourly wage expense</td>
<td>5,522</td>
<td>9,856</td>
<td>9,468</td>
</tr>
<tr>
<td>Outsourced services</td>
<td>4,042</td>
<td>16,456</td>
<td>12,097</td>
</tr>
<tr>
<td><strong>Utilities</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Utilities</td>
<td>1,618</td>
<td>7,551</td>
<td>4,535</td>
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<tr>
<td>Fuel</td>
<td>2,103</td>
<td>10,070</td>
<td>5,104</td>
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<tr>
<td><strong>Miscellaneous Expenses</strong></td>
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</tr>
<tr>
<td>Insurance</td>
<td>1,915</td>
<td>5,916</td>
<td>3,663</td>
</tr>
<tr>
<td>Advertising/marketing</td>
<td>2,322</td>
<td>8,097</td>
<td>6,103</td>
</tr>
<tr>
<td>Travel</td>
<td>2,353</td>
<td>6,308</td>
<td>3,864</td>
</tr>
<tr>
<td>Property tax</td>
<td>2,473</td>
<td>6,564</td>
<td>4,068</td>
</tr>
</tbody>
</table>

Utilities, insurance, advertising, and travel. Capital expenses refer to annualized capital costs for items such as land, improvements, fencing, buildings, breeding stock, feeding equipment, ATV’s, and implements. Feed refers to the annual feed costs, including supplemental feed, hay, and bottle feeding supplies. Lastly, General costs cover the remainder of expenditures on items such as food plots, artificial insemination, veterinary, and disease monitoring.

**Production**

Table 2 contains a summary of production data across all respondents. Feed represents a little over 11 percent of total annual expenditures for breeding operations. From venison production to breeding stock operations, proper nutrition is essential to the physical health, development, and overall well being of all cervids. For breeding only operations with whitetails, 53 percent of respondents indicated bottle feeding their fawns, while only 29 percent of breeding and
Table 2: Average Production Data of Cervid Industry Survey Respondents.

<table>
<thead>
<tr>
<th></th>
<th>Breeding Only</th>
<th>Breeding &amp; Hunting</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Herd Inventory (Final 2005)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Whitetail</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Males</td>
<td>21</td>
<td>49</td>
</tr>
<tr>
<td>Females</td>
<td>25</td>
<td>51</td>
</tr>
<tr>
<td>Fawns</td>
<td>23</td>
<td>48</td>
</tr>
<tr>
<td>Birth rate (2005)</td>
<td>1.3</td>
<td>1.2</td>
</tr>
<tr>
<td>Birth rate (2006)</td>
<td>1.4</td>
<td>1.3</td>
</tr>
<tr>
<td>Annual Mortality Rate</td>
<td>8%</td>
<td>7%</td>
</tr>
<tr>
<td><strong>Elk</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Males</td>
<td>18</td>
<td>12</td>
</tr>
<tr>
<td>Females</td>
<td>24</td>
<td>9</td>
</tr>
<tr>
<td>Fawns</td>
<td>16</td>
<td>3</td>
</tr>
<tr>
<td><strong>Fallow</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Males</td>
<td>43</td>
<td>3</td>
</tr>
<tr>
<td>Females</td>
<td>94</td>
<td>4</td>
</tr>
<tr>
<td>Fawns</td>
<td>50</td>
<td>*</td>
</tr>
<tr>
<td><strong>Red Deer</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Males</td>
<td>46</td>
<td>47</td>
</tr>
<tr>
<td>Females</td>
<td>57</td>
<td>66</td>
</tr>
<tr>
<td>Fawns</td>
<td>35</td>
<td>27</td>
</tr>
<tr>
<td><strong>Feeding</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Whitetail</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fawns</td>
<td></td>
<td></td>
</tr>
<tr>
<td>percent bottle feeding</td>
<td>53%</td>
<td>29%</td>
</tr>
<tr>
<td>percent of fawns bottle fed</td>
<td>53%</td>
<td>44%</td>
</tr>
<tr>
<td>Average bottle feeding days until weaning</td>
<td>98</td>
<td>91</td>
</tr>
<tr>
<td>after weaning</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Daily protein feed rate (lbs)</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Daily hay feed rate (lbs)</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><strong>Does</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Daily protein feed rate (lbs)</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Daily hay feed rate (lbs)</td>
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<td>1</td>
</tr>
<tr>
<td><strong>Bucks</strong></td>
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<td></td>
</tr>
<tr>
<td>Daily protein feed rate (lbs)</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Daily hay feed rate (lbs)</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td><strong>Elk</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Males</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Daily protein feed rate (lbs)</td>
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<td>6</td>
</tr>
<tr>
<td>Daily hay feed rate (lbs)</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Females</td>
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<td></td>
</tr>
<tr>
<td>Daily protein feed rate (lbs)</td>
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<td>7</td>
</tr>
<tr>
<td>Daily hay feed rate (lbs)</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td><strong>Fallow</strong></td>
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<td></td>
</tr>
<tr>
<td>Males</td>
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<td></td>
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<tr>
<td>Daily protein feed rate (lbs)</td>
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<td>Daily hay feed rate (lbs)</td>
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<tr>
<td>Females</td>
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<td></td>
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<tr>
<td>Daily protein feed rate (lbs)</td>
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</tr>
<tr>
<td>Daily hay feed rate (lbs)</td>
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<td>*</td>
</tr>
<tr>
<td><strong>Red Deer</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Males</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Daily protein feed rate (lbs)</td>
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<td>3</td>
</tr>
<tr>
<td>Daily hay feed rate (lbs)</td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>Females</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Daily protein feed rate (lbs)</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Daily hay feed rate (lbs)</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td><strong>Area of food plots (acres)</strong></td>
<td>14</td>
<td>47</td>
</tr>
<tr>
<td><strong>Seed</strong></td>
<td>813</td>
<td>2,560</td>
</tr>
<tr>
<td><strong>Fertilizer</strong></td>
<td>1,011</td>
<td>2,777</td>
</tr>
<tr>
<td><strong>Protein feed price (per ton)</strong></td>
<td>318</td>
<td>305</td>
</tr>
<tr>
<td><strong>Hay price (per ton)</strong></td>
<td>193</td>
<td>268</td>
</tr>
</tbody>
</table>

* Insufficient results
of all species, bottle feeding is primarily practiced with whitetail fawns. Other species will not typically incur such management practices, where bottle feeding may only be utilized for orphaned or sick young.

On average, adult whitetail males were fed close to 4 pounds of supplemental feed per day, while elk consumed slightly over 6 pounds. All of the reported species were fed a protein concentrate and hay. Hay costs were extremely high during the study period due to severe drought conditions across most of the southern plains. In addition to purchased feed, 74 percent of all respondents reported planting food plots on their operations, ranging from half an acre to 500 acres.

When combining results, 70 percent of all breeding or breeding and hunting operation respondents indicated some type of breeding stock purchase. This would include purchases of breeder males, stocker males, bred females, open females, fawns, or semen straws. For whitetail, breeder bucks were the highest dollar expense, costing close to $21,000 each on average.

**Hunting Operations**

Operations with hunting reported other expenses in addition to those of breeding operations. Seventy-six percent of all respondents of operations that reported to be involved in hunting had a lodge on the premises for their clients. In addition to the roughly $170,000 cost of the lodge, these operations also accrued expenses to maintain and supply the lodge. Labor costs were reported to be higher than those of breeding operations due to an overall larger operation, as well as seasonal hunting guides. Food plots in the hunting areas tended to be larger, along with more feeders, waterers, and fencing, all contributing to the higher reported expenses. Although the majority of hunting operations accepted paying clients and corporate clients, 14 percent reported their hunting operation as personal use only. Of the whitetail hunting operations reporting, respondents estimated an average of 49 percent of the deer in their hunting areas are from breeding operations. Of all the respondents, 49 percent reported hiring labor, while 43 percent reported outsourcing labor and/or consulting needs. For breeding operations, those hiring salaried employees reported an annual expense in the mid $20,000 range. This expense increased to the mid $30,000 range for breeding and hunting operations. On the whole, labor hired on an hourly basis tended to be more prevalent than salaried labor.

Feed was the third largest expense category, representing a little over 11 percent of annual expenditures for breeding operations. Although it’s not the largest expense category, feeding is considered to be one of the most important aspects of all operations. From venison production to breeding stock operations, proper nutrition is essential to the physical health, development, and overall well being of all cervid operations. For fawns, 45 percent of respondents indicated bottle feeding their young. Typical products used for bottle feeding ranged from goat’s milk to different brands of milk replacer. On average, adult whitetail males were fed close to 4 pounds of supplemental feed per day, while elk consumed slightly over 6 pounds. Respondents indicated paying a little over $300 per ton for supplemental feed, while hay costs averaged around $240 per ton. In addition to purchased feed, 74 percent of all respondents reported planting food plots on their operations, ranging from half an acre to 500 acres.
Economic Impact

IMPLAN® (Impact Analysis for Planning), an input/output model, was used to estimate the economic impact of the cervid farming industry on the national economy. Originally developed by the USDA Forest Service, the IMPLAN model is now managed and maintained by the Minnesota IMPLAN Group (MIG). The model is, arguably, the most used and cited model for performing economic impact analyses in the United States.

The IMPLAN model is driven by purchases of final goods and services in a certain region, such as a state, a group of states, or the entire nation. These purchases represent the dollar value of the increase in finished goods and services demanded, and create an impact that ripples throughout the economy.

Industries produce goods and services for final use and purchase goods and services from other industries. These other producers and industries buy goods and services as well, which IMPLAN designates as indirect purchases. In addition, each step along the cycle pays wages and salaries to employees, who, in turn, make additional expenditures into the economy of the region.\(^2\)

In determining the overall economic impact of an industry, the IMPLAN model uses a set of multipliers, separated by sector, to estimate the direct, indirect, and induced effects (induced being effects of household spending) of the economic cycle. Over 500 sector codes are included in the IMPLAN model, where each code represents a unique industrial sector that a specific product or category of products is represented by. The multipliers that are derived for each sector quantify the ripple effects of a dollar increase in final demand, thus resulting in an estimation of the economic impact.\(^3\)

Cervid Industry

In determining the economic impact of the cervid farming industry, the categories of the survey were prepared for input into the IMPLAN model. This was accomplished by extrapolating the survey results against the inventory of operations to arrive at total industry expenditures for each category. These totals represent the value of final goods and services demanded by the industry, and were the baseline inputs for the IMPLAN model. Categories from the extrapolated survey results, such as supplemental feed or fencing, are then assigned a sector code according to the underlying industry the category relates to. Table 3 provides an example of category inputs and their multipliers from IMPLAN, with each category belonging to a different sector. Differences between the multipliers for each category demonstrate how dollars move throughout different industries. For instance, a $1 million change in final demand for supplemental feed will generate a total of $2.67 million in total industry output, $1.53 million in value added economic activity, and will support 24.34 jobs. In this example, total industry output would include the output generated by the supplemental feed industry and those industries that supply it. Value added from this industry includes employee compensation, proprietary income, other proprietor income, and indirect business taxes that are generated.\(^4\) The employment multiplier represents the number of jobs that are supported per million dollar change in final demand.


\(^3\) Ibid.

\(^4\) Ibid.

Table 3: Cervid Industry Multipliers.

<table>
<thead>
<tr>
<th>Category</th>
<th>Output</th>
<th>Value Added</th>
<th>Employment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supplemental Feed</td>
<td>2.67</td>
<td>1.53</td>
<td>24.34</td>
</tr>
<tr>
<td>Food plots</td>
<td>3.18</td>
<td>1.72</td>
<td>46.12</td>
</tr>
<tr>
<td>Veterinary</td>
<td>3.43</td>
<td>1.57</td>
<td>31.42</td>
</tr>
<tr>
<td>Utilities</td>
<td>2.04</td>
<td>1.23</td>
<td>8.48</td>
</tr>
<tr>
<td>Insurance</td>
<td>2.35</td>
<td>1.52</td>
<td>18.25</td>
</tr>
<tr>
<td>Maintenance and repair</td>
<td>3.01</td>
<td>1.57</td>
<td>24.68</td>
</tr>
<tr>
<td>Handling facility</td>
<td>2.93</td>
<td>1.61</td>
<td>25.61</td>
</tr>
<tr>
<td>Fencing</td>
<td>3.02</td>
<td>1.61</td>
<td>25.36</td>
</tr>
<tr>
<td>Large equipment</td>
<td>3.02</td>
<td>1.29</td>
<td>15.79</td>
</tr>
<tr>
<td>ATV’s</td>
<td>2.73</td>
<td>1.59</td>
<td>22.96</td>
</tr>
</tbody>
</table>
Hunter Expenditures

An additional component in determining the economic impact of the industry is to evaluate and include the role of hunter expenditures in the consumption of industry products. Not all hunting is related to cervid farming, but some is, therefore it is important to include only that which is related to this industry. In other words, the hunting product of cervid farming is a small part of overall cervid hunting in the United States. Yet the hunting component or economic activity associated with deer farming is an important part of the economic activity generated by the cervid farming industry. While overall hunter numbers in the United States are down, the demand for trophy hunting appears to be increasing. Dollars spent on hunting, assorted gear, and travel continue to grow. Time is increasingly the limiting factor for many industry participants, as they have the money to participate, but not the time to invest in traditional hunting. The growth of this segment of the industry is expected to continue, therefore, it is important to include this aspect of the industry in this study.

In order to determine this impact, the number of hunters per operation was taken from the survey, extrapolated against all hunting operations, and combined with a report that outlines hunting expenditures on a per hunter basis. This report, entitled the “Economic Importance of Hunting in America”5 was based on the 2001 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation survey conducted by the U.S. Fish and Wildlife Service and the U.S. Census Bureau. These retail expenditures were then combined with other hunting related expenditures, such as trophy and processing fees, and assigned sector codes for the IMPLAN model. When totaled, less than 1 percent of the report’s estimated 11 million deer hunters are related to the cervid farming industry. However, this small percentage of hunters account for over 2 percent of the report’s estimated $10 billion in retail, travel, and hunt related expenditures.

Results

Table 4 below provides a summary of the economic impact of the industry. Cervid operations generate an estimated $893.5 million in direct expenditures into the U.S. economy. This value represents the estimated increase in final demand of all goods and services consumed by the industry. As these direct expenditures ripple throughout the economy, the cervid farming industry generates an estimated $2.3 billion of total industry output for all industries that supply the cervid farming industry. These industries include feed suppliers, farm and ranch supply stores, veterinary services, medical and sedation product suppliers, construction, utilities, advertising, insurance, and numerous others. Hunters contribute an additional $241 million in direct economic impacts through retail and hunt related expenditures, which generates a total of $756.9 million of total industry output.

When combined, the cervid farming industry generates $3 billion of economic activity and output in the U.S. economy. The industry provides the economic activity that supports 29,199 jobs in the economy, most of which are located in rural areas of the nation. If this industry were to disappear, these jobs would have to find support from some other sector of the economy. Unfortunately, not every segment of the industry could be analyzed. Insufficient industry and survey data limited analysis to only the operational aspects of both the venison and scent collection industries, as production and retail revenues were excluded from the analysis.

Table 4: Economic Impact of the Cervid Farming Industry.

<table>
<thead>
<tr>
<th></th>
<th>Direct</th>
<th>Output</th>
<th>Value Added</th>
<th>Employment</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Operations</td>
<td>893,501,559</td>
<td>2,333,462,511</td>
<td>1,276,311,405</td>
<td>21,070</td>
</tr>
<tr>
<td>Hunters</td>
<td>241,042,970</td>
<td>756,897,725</td>
<td>358,602,855</td>
<td>8,129</td>
</tr>
<tr>
<td>Total</td>
<td>1,134,544,528</td>
<td>3,090,360,236</td>
<td>1,634,914,260</td>
<td>29,199</td>
</tr>
</tbody>
</table>