The Center for Animal Health in Appalachia (CAHA)

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Lincoln Memorial University
-founded 1897- private non-profit
A college of veterinary medicine—Does it fit?

- 2nd Veterinary School in heart of Central Appalachia
- First one with service to Appalachia in its mission statement
- What is the manifestation of this service?
The mission of CAHA is to improve animal health and public health throughout the Appalachian region.

Goals:
- Increase job opportunities and per capita incomes in Appalachia to reach parity with the nation.
- Strengthen the capacity of the people of Appalachia to compete in the global economy.
- Develop and improve Appalachia’s infrastructure to make the Region economically competitive.
- Build the Appalachian Development Highway System to reduce Appalachia’s isolation.

The mission of CAHA is to improve animal health and public health throughout the Appalachian region.

Economic Advancement
Improvement of Healthcare Outcomes
We had a theory

- Animals were important to Appalachia
- Veterinarians were living and thriving within Appalachia
- Those veterinarians were contributing to their communities economically, socially and professionally
Objectives

- CAHA set out to determine:
  - distribution of veterinarians throughout the footprint of ARC
  - the animal composition and distribution and trends
  - and the impact that veterinarians have on rural communities.
- CAHA partnered and created a **Mixed Animal Practice Model** which projects county level impacts.
- Through existing literature and capacity modeling, the Center estimated the county level need for Large and Mixed Animal Veterinarians within Appalachia.

What we learned

- 7178 in-state practicing veterinarians within the Appalachian footprint
- These veterinarians provide a total employment impact of estimated 8 people per practice*, and their practices serve as economic engines for their communities, providing an estimated 2.3 Billion dollars in economy to the footprint of Appalachia.
- Veterinary practices provide 57,424 jobs to the footprint
- Of the 7,178 licensed veterinarians in Appalachia, an estimated 11% are more than > 60 years of age.

*Includes primary and secondary
The veterinarians within the footprint provide care for an estimated 13.8M small animals and 13.7M large animals with an estimated herd size worth 14.2 billion.

What we learned

- Based upon our modeling it may appear that Appalachia is well served with veterinarians.
- However, **75% of the rural counties within the footprint have an apparent veterinary shortage**, estimated to be 1,907 veterinarians, which translates into an estimated economic loss of $621 million and 15,256 jobs.
Veterinarian Analysis of Appalachian States

Animal Analysis of Appalachia

Unlike the U.S. herd, CATTLE are king in Appalachia.

Cattle are the dominant species in Appalachia. In fact 65% of the large animals within ARC are cattle, whereas cattle comprise only 30% of the large animals in the U.S.
Animal Analysis of Appalachia over past 5 years

Within Appalachia, sheep estimated production increased annually by 2.5% from 2007 to 2012.

Sheep are important to the Appalachian region. Sheep are a small but vastly growing section of the Appalachian large Animal herd.

The Appalachian sheep herd hasn’t experienced the troubles the US sheep herd faced between 2007 and 2012, while the US inventory declined 8.5%, Appalachia saw double digit growth.

Appalachia -3.3% VS. Nation -7.1%
Analysis of Appalachian Sub-regions

Large Animal Species Composition

- The most populous animal species within each ARC sub-region is cattle.

Analysis of Appalachian Sub-regions

Changes in Large Animal Inventory 2007-2012

- North Central region experienced the largest decrease in all species.
- Decrease in the North Central sheep herd were balanced and increased in all other areas of ARC.
- Decline in pig herds in North and North Central were mitigated by increases in the three more southern regions.

Appalachia as a whole
- Cows: 3.3%
- Pig: 0.0%
- Sheep: 1.1%
- Goats: 33.6%
State Analysis of Appalachia - Virginia

2015 Virginia Dog Distribution

2015 Virginia Large Animal Veterinary Need

Total Estimated Number of Dogs = 1,654,415

39% of the FTE need is located in ARC Counties

CAHA

Click for more information on available services and resources.
State Analysis of Appalachia - Virginia

2015 Virginia Cat Distribution
Total Estimated Number of Cats = 1,902,556
11% are located in ARC counties

2015 Virginia Mixed Animal Veterinarian Need*
Total Statewide Veterinarian FTE Need = 1,708
Economic Impact of Need ~ $558 Million (13,564 Jobs)
19% of the total Veterinarian FTE Need is located in ARC Counties
State Analysis of Appalachia - Virginia

2015 Economic Impact of Virginia's Current Mixed Animal* Veterinarian FTE Needs Analysis

- Total Statewide Veterinary FTE Need = 1,708
- Total Statewide Veterinary = 2,028
- Total Statewide Veterinary FTE Surplus = 1,319
- ARC region Veterinary FTE Need = 127
- ARC region Veterinary FTE = 25
- ARC region Veterinary FTE shortage = 102

Mixed Animal FTE Analysis by County

- Greater than 1.5 FTE Veterinarian Shortage
- Meeting Total Veterinarian Needs
- Greater than 1.5 FTE Veterinarian Surplus
- ARC Counties
- VA: College of Veterinary Medicine

Statewide Current Veterinarian Economic Impact:

- $887 Million
- 21,816 Jobs

There is a shortage of 143 Veterinary FTEs in rural Appalachia.

ARC Current Veterinarian Economic Impact:

- $95 Million
- 2,344 Jobs

Total revenue loss in ARC:

- $46,664,224
- 1,147 jobs lost in ARC

10% of veterinarians in state are over 60 years old, of those 8% are located within the ARC counties.

11% located in the ARC counties within the state.
Conclusions

- Veterinarians are indeed important to the economy of Appalachia and RURAL America.
- Our methodology may be applied nationally and could be useful for determining VMLRP/underserved designations.
- Much of Appalachia is underserved by veterinarians; we believe will be the same for many of the rural counties of USA.
- Livestock and pets are important to Appalachia.
- The presence of veterinarians in geographic locales builds capacity for animal agriculture industry.
- Our mixed animal practice model provides conservative estimates of what a veterinary practice brings into a community.
- Excludes industry veterinarians or government.
- Need veterinarians to support these industries.
What’s different about our study

- Licensure data purchased
  - Actively practicing in-state veterinarians
  - Methodology used by NCAHD for over 25 years
- Licensure data cross-checked with AVMA membership data
  - One state had nearly 100% alignment with AVMA membership data and licensure data
  - This state had reported %vet FTE time spent large animal service- used to calculate % of mixed animal vet FTE devoted to large animal services in other states
- IMPLAN data purchased to project economic impact at COUNTY level

Additional information can be found in the 2015 State of Animal Health in Appalachia Report

For more information visit:
- http://vetmed.lmunet.edu/caha/
- Email CAHA@lmunet.edu
Thanks

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- Jordan Green
- Dr Randy Evans
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- Dr John Dascanio

Next Steps

- Output of CAHA conference
  - White paper
  - Several research projects
CAHA Research Project: What are the characteristics of a viable risk mitigation tool for animal owners in Central Appalachia?

- **Task:** Identify customer demand for risk mitigation tools such as wellness subscriptions and pet insurance to minimize and/or contain the financial costs associated with veterinary services in Appalachia.
- **Goal:** Identify the services pet owners in Central Appalachia are willing and able to purchase from veterinarians which could be financed through a risk mitigation tool.
- **Target Population:** Farmers and pet owners in Central Appalachia.
- **Approach:**
  1. Review the literature for previous relevant studies such as the 2011 Bayer veterinary care usage project which indicates pet owners are interested in financial risk mitigation tools for pet health services (Volk & Hartmann, 2015).
  2. Partner with Dr. Gerald A. Doeksen to develop survey questions to see if pet owners in Central Appalachian have an interest in financial risk management. Use a mixed methods survey tool with part of the questions designed to generate a fact base of pet services demand in Appalachia and a qualitative component will be designed to explore the characteristics of risk mitigation tools that engage pet owners.
  3. Test survey instrument, and then execute survey. At this point, I think this would mean developing a tool, training a team of students to execute the survey and then have the students engage in face-to-face interactions with the pet owners.
  4. Analyze the survey results and then describe the elements pet owners in Central Appalachia find useful in a risk mitigation tool.
  5. From the fact-base, develop demand estimates for services. Validate these estimates with 5 veterinarians in Central Appalachia.
- **Time:** 12 months
- **Cost:** $75,000
  1. Personnel: Principal Investigator (Jason Johnson, 5%), CAHA Research Specialist (Kimberly Kertis, 25%), contract with Dr. Doeksen TBD.
  2. Travel: Set up for focus groups and interviews with stakeholders.
  3. Survey: Unclear at this point what will be best, but I am leaning towards in-person interviews and focus groups.
- **Deliverable:** Bundled list of characteristics of risk management tools pet owners in Central Appalachia prefer and an estimate of the size of the demand for these services.

**Impact of Research on Profession:** Veterinarians are needed in rural areas; in fact, measures are in place (i.e.-VMLRP) to attract and retain veterinarians into these communities. And yet, there is still a shortage of veterinarians in rural counties. This study will provide the profession with the characteristics of services and risk mitigation tools that

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**National One Health – Veterinarian Portal**

**Portal Includes:**
- All veterinarians (based upon enhanced state licensure data)
- All physicians with 5 primary care classifications (e.g. family medicine, internal medicine, pediatrics, OB-GYN and general surgery) at the zipcode and county aggregate levels
- Add 5 other national datasets relevant to one health (e.g. local health departments, etc.)
- Add 5 other national datasets relevant to veterinarians (e.g. veterinarian colleges and training sites, etc.)
- Current VMLA underserved areas (with separate designations)
- Current primary care shortage areas
- Healthcare facilities: 2015 hospitals, Rural Health Clinics, FQHC
- 5 Health Outcomes, measures of health and disease prevalence (county level)
- 15 Population demographics or socio-economic datasets (e.g. persistent poverty area, etc.)
- Environmental data: public drinking water supplies, etc.
- Political boundaries: national and state
National One Health – Veterinarian Portal Functions

- View individual points of all veterinarians until region/state view then county and zip code aggregate
- Identify veterinarians and physicians and facilities within political boundaries
- View the herd estimates and small animal estimates by individual herd/small animal type interactively and downloaded data
- View Aging providers in rural and underserved areas
- Analyze providers relative to Health outcomes and environmental factors
- Download data based upon viewer defined service area analysis as a spreadsheet
- Generate maps that can be downloaded in multiple formats or shared to other users

How many veterinarians or primary care providers are in my county?
Healthcare Workforce Needs Assessment – How many providers are in my service area?
CAHA Research Project Idea 5: What data layers are needed to map the veterinary workforce and estimate the demand for veterinary services in an online GIS system?

Task: Document the distribution of veterinary professionals and animal herds.

Goal: Develop tool which maps the concentration of animals and the location of currently active veterinarians.

Target Population: Veterinarians in the United States

Approach:
- Partner with the National Center for the Analysis of Healthcare Data (NCAHD), a center with extensive experience in collecting, processing and mapping human healthcare data, to create a web-based GIS tool. The back-end of the portal will be housed and maintained at the NCAHD.
- Starting with the CAHA Herd Database of food animals in Appalachia and the CAHA estimates of companion animals, CAHA will develop a companion animal and a food animal data layer for the GIS system for the United States.
- Integrate active in-state licensure data with the AVMA Veterinarian Database of individuals with a veterinary degree in the US and the membership database. This will validate the licensure dataset as well as provide an opportunity to assess the potential of this dataset to expand demographic information in the tool. The tool will be designed so that individual’s names are not disclosed.
- Identify additional data sets and variables that can be used to define the demand for veterinary services. For example, layers that indicate service area of a practice, the distance to travel from patient to practice or the time to travel from patient to practice. Estimate the cost to develop additional data layers for the GIS tool.

Time: 12 months
Cost: $75,000
- Personnel: CAHA Primary Investigator, (Jason Johnson, 5%), CAHA Research Specialist, (Kimberly Kertis, 25%) and NCAHD subcontract.
- Data: Licensure data from various states to expand the Appalachia data set to reflect the active in-state licensed veterinarians in the United States.

Deliverable: Web-based GIS tool that contains layers which map the concentration of animals and the distribution of veterinarians in United States. There will be an annual maintenance fee.

Impact of Research on Profession:

Analysis of Appalachian States

1. Veterinary Analysis
   Utilizing state licensure, the geographic distribution of practicing veterinarians was assessed relative to their proximity within the Appalachian Regional Commission Counties as well as to rural areas (as defined by the federal Office of Management and Budget.)

2. Species, Herd, and Farm Analysis
   Animal species were calculated individually by county, then aggregated into two groupings:
   1. Small animal – including cats, dogs, and house birds.
   2. Large animal – including cows, pigs, horses, goats and sheep

3. Veterinarian Need and Economic Impact Analysis
   We created an innovative rural mixed animal (large and small animal) practice model that illustrates the actual economic impact of veterinary practice within their communities and upon the state’s economy.
   Additionally, we gained expert advice from veterinarians, other researchers and educators as we developed the small and large animal needs analysis. We applied our methodology to the Appalachian states to determine not only the current economic impact of veterinarians but also the impact mal-distribution and need-based shortages have upon the state’s economy and labor market.
Analysis of Appalachian States

- Our next step was to generate animal densities for both small and large animals by county. Based upon the USDA 2012 Agriculture Census, we derived the volume of animals in a county needing veterinary care annually.

- Poultry was left out of the estimate as most poultry production is vertically integrated, veterinary services for commercial flocks are included in the commercial contracts and previous workforce studies have agreed there are sufficient veterinarians available to support the industry needs (NRC, 2012, p. 61). We acknowledge the fact that there are a small number of backyard poultry flocks which are served by companion animal veterinarians and avian specialists (private communications, Dr. Karen Burns Grogan, March 2, 2015), however theses were not included in our formulations.

- To generate the small animal densities, we utilized mixed methodology, with the primary data source, U.S. Pet Ownership Demographics Sourcebook (2012 Ed.) and census household data.

- Once the animal densities were generated, the veterinary FTE need was calculated by applying animal ratios identified in the literature and developed through expert interviews and panels, thus deriving a total FTE veterinarian need for each county. Licensure data was utilized to determine the distribution of in state actively practicing veterinarians, which was then compared with the county level need estimate. From there a surplus or shortage was derived.

Veterinarian:Animal ratios

<table>
<thead>
<tr>
<th>Species</th>
<th>Ratio of Veterinarian to Large/Small Animal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dairy</td>
<td>5,000</td>
</tr>
<tr>
<td>Other Cattle</td>
<td>5,000</td>
</tr>
<tr>
<td>Goats and Sheep</td>
<td>7,000</td>
</tr>
<tr>
<td>Swine</td>
<td>25,000</td>
</tr>
<tr>
<td>Poultry</td>
<td>10,000</td>
</tr>
<tr>
<td>Equine</td>
<td>3,350</td>
</tr>
<tr>
<td>Cat</td>
<td>3,350</td>
</tr>
<tr>
<td>Dog</td>
<td>3,350</td>
</tr>
<tr>
<td>Birds</td>
<td>3,350</td>
</tr>
</tbody>
</table>

NRC Workforce Manual, 2011; U.S. Pet Demographics Sourcebook; Banfield
### Table 1
Employment and Income for Typical Established Veterinary Clinic

<table>
<thead>
<tr>
<th>Employee</th>
<th>Full-time equivalent Employees</th>
<th>Estimated Income</th>
</tr>
</thead>
<tbody>
<tr>
<td>Veterinarian</td>
<td>1</td>
<td>$124,051</td>
</tr>
<tr>
<td>Credentialed Technician</td>
<td>1</td>
<td>$31,129</td>
</tr>
<tr>
<td>Non-credentialed Technician</td>
<td>1</td>
<td>$31,116</td>
</tr>
<tr>
<td>Veterinary assistant</td>
<td>1</td>
<td>$22,464</td>
</tr>
<tr>
<td>Other Staff</td>
<td>2</td>
<td>$49,504</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>6</strong></td>
<td><strong>$258,264</strong></td>
</tr>
</tbody>
</table>


### Table 2
Total Economic Impact of a Typical Veterinary Clinic Practice on an Rural County

<table>
<thead>
<tr>
<th>Employment Impact</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jobs from Veterinary Practice</td>
<td>1.32</td>
</tr>
<tr>
<td>Veterinary Sector Employment Multiplier</td>
<td>2</td>
</tr>
<tr>
<td><strong>Secondary Employment Impact</strong></td>
<td><strong>8</strong></td>
</tr>
<tr>
<td><strong>Total Employment Impact</strong></td>
<td><strong>8</strong></td>
</tr>
<tr>
<td><strong>Wage Impact</strong></td>
<td></td>
</tr>
<tr>
<td>Wages from Veterinary Practice</td>
<td>$258,264</td>
</tr>
<tr>
<td>Veterinary Sector Wage Multiplier</td>
<td>1.26</td>
</tr>
<tr>
<td><strong>Secondary Wage Impact</strong></td>
<td><strong>67,149</strong></td>
</tr>
<tr>
<td><strong>Total Wage Impact</strong></td>
<td><strong>$325,413</strong></td>
</tr>
</tbody>
</table>