



2015 STATE OF ANIMAL HEALTH IN APPALACHIA REPORT



WELCOME to the

Center for Animal Health in Appalachia (CAHA)

2015 State of Animal Health in Appalachia report.

This report represents the first ever comprehensive analysis of animal and veterinary distributions within the footprint of Appalachia. In total, CAHA has analyzed 13 states and 420 counties in order to further elucidate the economic impact that veterinarians bring into rural Appalachia, and further describing veterinary distributions therein. Moving forward, CAHA will continue to focus its efforts on veterinary economics, advocacy, and public and animal health within the Appalachian region and beyond to rural America.

Around the world, access to veterinary care is crucial for both animal and human health; veterinarians are instrumental in public health, food safety, food security, stem cell research, gene therapy, vaccinology, zoonotic disease prevention and research, bioterrorism protection, and general animal practice, just to mention a few. In rural settings in the USA, veterinarians are the guardians of animal health, and oftentimes the most highly trained and revered in-residence professionals. However, there may be rural areas of the country that lack access to veterinarians. *(2013 US Veterinary Workforce Study: Modeling Capacity Utilization, Implications of the 2013 Workforce Study and Recommendations for Further Actions.)*

Access to veterinary care, as with human medical care, is a complex concept with many contributing factors, one of which is geography. In 1965, the federal government created the Appalachian Regional Commission (ARC), bound geographically by the footprint of the

Appalachian Mountains, bound culturally with a fierce sense of self sufficiency, and bound by poor infrastructure, poor health metrics, and little access to healthcare. The central mission of the ARC was to bring the Appalachian region to parity with the rest of the nation.



Two of the pillars to advance the Appalachian region are economic advancement and improving health care outcomes, of which veterinarians contribute to both.

In fact, there are several veterinarians practicing in rural Appalachia who provide a significant economic impact to these rural communities, serve as the safeguards for animal and public health, and invest both personally and professionally into community advancement. However, there is a paucity of relevant and specific data and analysis regarding the impact that the distribution of veterinarians has upon rural Appalachia. Therefore the Center for Animal Health in Appalachia decided to conduct research to further elucidate the animal densities, veterinary distribution, and subsequent economic impact and/or loss to communities within the federally designated Appalachian footprint.

Veterinarians are out there- on the hills, in the valleys, and are important to advancing Appalachia.

Sincerely,

Jason W. Johnson, DVM, MS, DACT
Executive Director
Center for Animal Health in Appalachia
Medical Director DeBusk Veterinary Teaching Center
Associate Professor of Theriogenology
Lincoln Memorial University



PRIMARY INITIATIVES OF THE CENTER FOR ANIMAL HEALTH IN APPALACHIA

The mission of CAHA is to improve animal health and public health in the Appalachian region through five initiatives:



1. CAHA will provide veterinary students from LMU-CVM and other schools with the opportunity to earn a Rural Animal Practice Certificate, combining: (1) in-house and hands-on training in mixed animal medicine, surgery, veterinary business practices and communications; (2) public health training in one health; (3) clinical placements in private and public practices in Appalachia; and (4) focused training in mixed animal veterinary business practices.



2. Conferences, workshops and training programs to raise awareness and advance knowledge of animal and public health issues, featuring key veterinarians, physicians, public health officials, scientists, researchers and policymakers with interests in Appalachian health issues.



3. Community educational programs for Appalachian residents, farmers, veterinarians and others using LMU-CVM facilities and online.



4. Public education and advocacy on animal health and public health issues affecting the Appalachian region.



5. Research and research funding support related to Appalachian Animal Health and Public Health, including annual publication of the State of Animal Health in Appalachia.



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ICON LEGEND



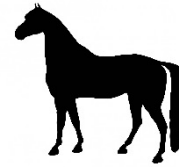
ALABAMA



CANINE



CATTLE



EQUINE



FELINE



GEORGIA



GOAT



KENTUCKY



MARYLAND



MISSISSIPPI



NEW YORK



NORTH CAROLINA



OHIO



PENNSYLVANIA



PORCINE



POULTRY



SHEEP



SOUTH CAROLINA



TENNESSEE



VETERINARIAN



VIRGINIA



WEST VIRGINIA

DEFINITIONS

Annual Growth Rate

Compound Annual Growth Rate (CAGR)

ARC

Appalachian Regional Commission
definition of Appalachia

Equine

This includes horses, burros and
donkeys

Estimated Herd Size

Estimated number of animals in the
state during the year. This is calculated
as the current inventory plus an
estimated production factor derived
from slaughter data of the relevant
year.

Farms

Number of farms derived from the
USDA Agricultural Census

Farmland

Number of acres of Land in Farms
derived from the USDA Agricultural
Census

Inventory

Number derived from the USDA
Agricultural Census Inventory

Large Animals

Unless otherwise stated, includes cattle,
swine, sheep and lambs, goats and kids,
horses, burros and donkeys.



ARC's mission is to be a strategic partner and advocate for sustainable community and economic development in Appalachia.

The Appalachian Regional Commission (ARC) is a regional economic development agency that represents a partnership of federal, state, and local government. Established by an act of Congress in 1965, ARC is composed of the governors of the 13 Appalachian states and a federal co-chair, who is appointed by the president. Local participation is provided through multi-county local development districts.

ARC funds projects that address the four goals identified in the Commission's strategic plan:

1. Increase job opportunities and per capita income in Appalachia to reach parity with the nation.
2. Strengthen the capacity of the people of Appalachia to compete in the global economy.
3. Develop and improve Appalachia's infrastructure to make the Region economically competitive.
4. Build the Appalachian Development Highway System to reduce Appalachia's isolation.

A WORD ON ARC

Each year ARC provides funding for several hundred projects in the Appalachian Region, in areas such as business development, education and job training, telecommunications, infrastructure, community development, housing, and transportation. These projects create thousands of new jobs; improve local water and sewer systems; increase school readiness; expand access to health care; assist local communities with strategic planning; and provide technical and managerial assistance to emerging businesses.

The Appalachian Region

The Appalachian Region, as defined in ARC's authorizing legislation, is a 205,000 square-mile region that follows the spine of the Appalachian Mountains from southern New York to northern Mississippi. It includes all of West Virginia and parts of 12 other states: Alabama, Georgia, Kentucky, Maryland, Mississippi, New York, North Carolina, Ohio, Pennsylvania, South Carolina, Tennessee, and Virginia. Forty-two percent of the Region's population is rural, compared with 20 percent of the national population.

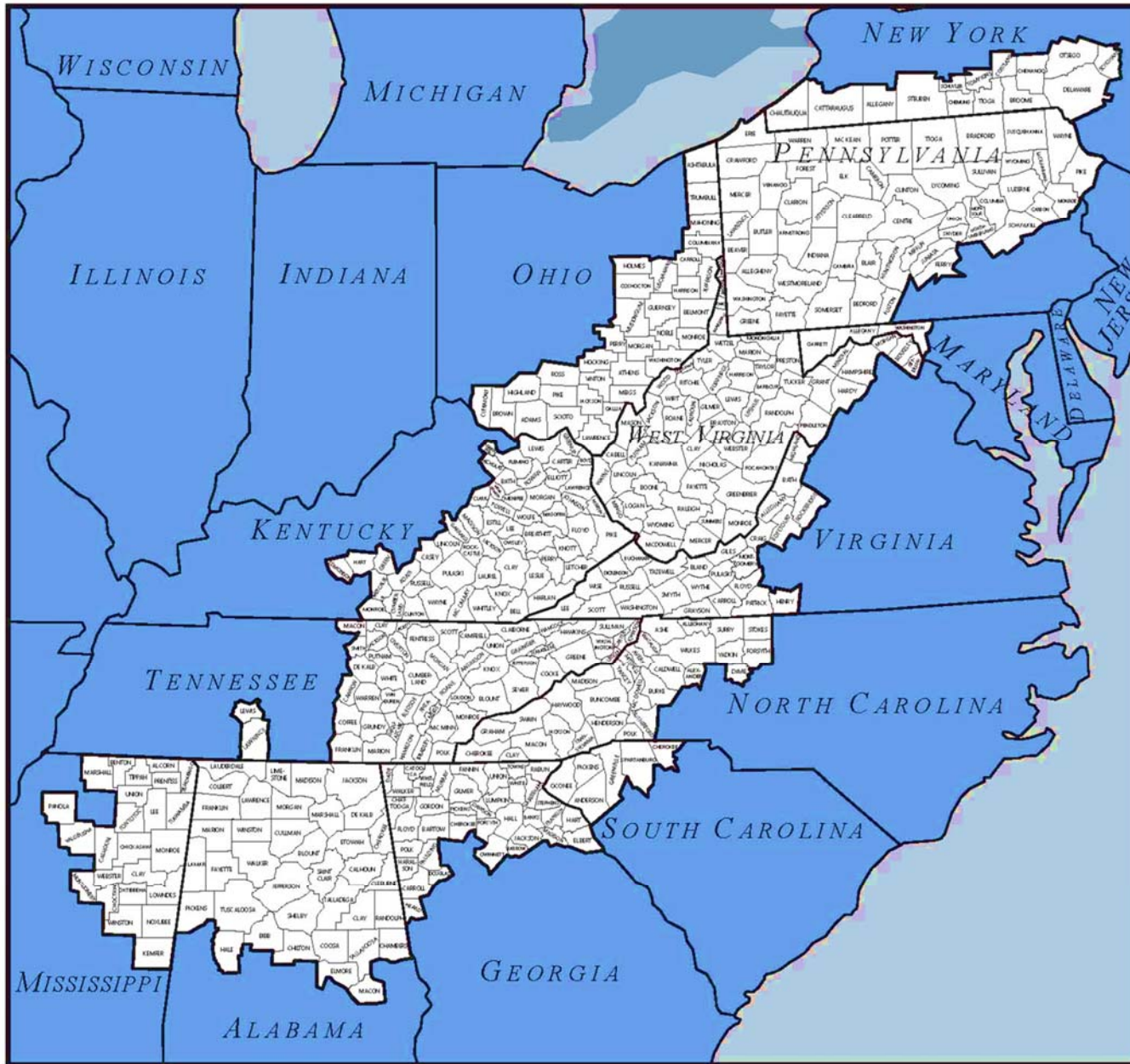
The Appalachian Region's economy, once highly dependent on mining, forestry, agriculture, chemical industries, and heavy industry, has become more diversified in recent times, and now includes manufacturing

and professional service industries. Appalachia has come a long way in the past five decades: its poverty rate, 31 percent in 1960, was 17 percent over the 2009–2013 period. The number of high-poverty counties in the Region (those with poverty rates more than 1.5 times the U.S. average) declined from 295 in 1960 to 90 over the 2009–2013 period.

These gains have transformed the Region from one of widespread poverty to one of economic contrasts: some communities have successfully diversified their economies, while others still require basic infrastructure such as roads and water and sewer systems. The contrasts are not surprising in light of the Region's size and diversity. The Region includes 420 counties in 13 states. It extends more than 1,000 miles, from southern New York to northeastern Mississippi, and is home to more than 25 million people.

Retrieved from the Appalachian Regional Commission website. <http://www.arc.gov/>

FEDERAL ARC MAP



Appalachian Region

Fast Facts

203,023 Square miles

Population: 25,337,616

7,178 instate, actively licensed
Veterinarians

13 States, 420 Counties

- Alabama (37 counties)
- Georgia (37 counties)
- Kentucky (54 counties)
- Maryland (3 counties)
- Mississippi (24 counties)
- New York (14 counties)
- North Carolina (29 counties)
- Ohio (32 counties)
- Pennsylvania (52 counties)
- South Carolina (6 counties)
- Tennessee (52 counties)
- Virginia (25 counties, 8 independent cities)
- West Virginia (55 counties)

October 8, 2008

VETERINARIANS IN APPALACHIA

CAHA set out to determine the distribution of veterinarians throughout the footprint of ARC, the animal composition and distribution, and the impact that veterinarians have on rural communities. The Center partnered with the Center for Rural Health Works and developed a Mixed Animal Practice Model and 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.

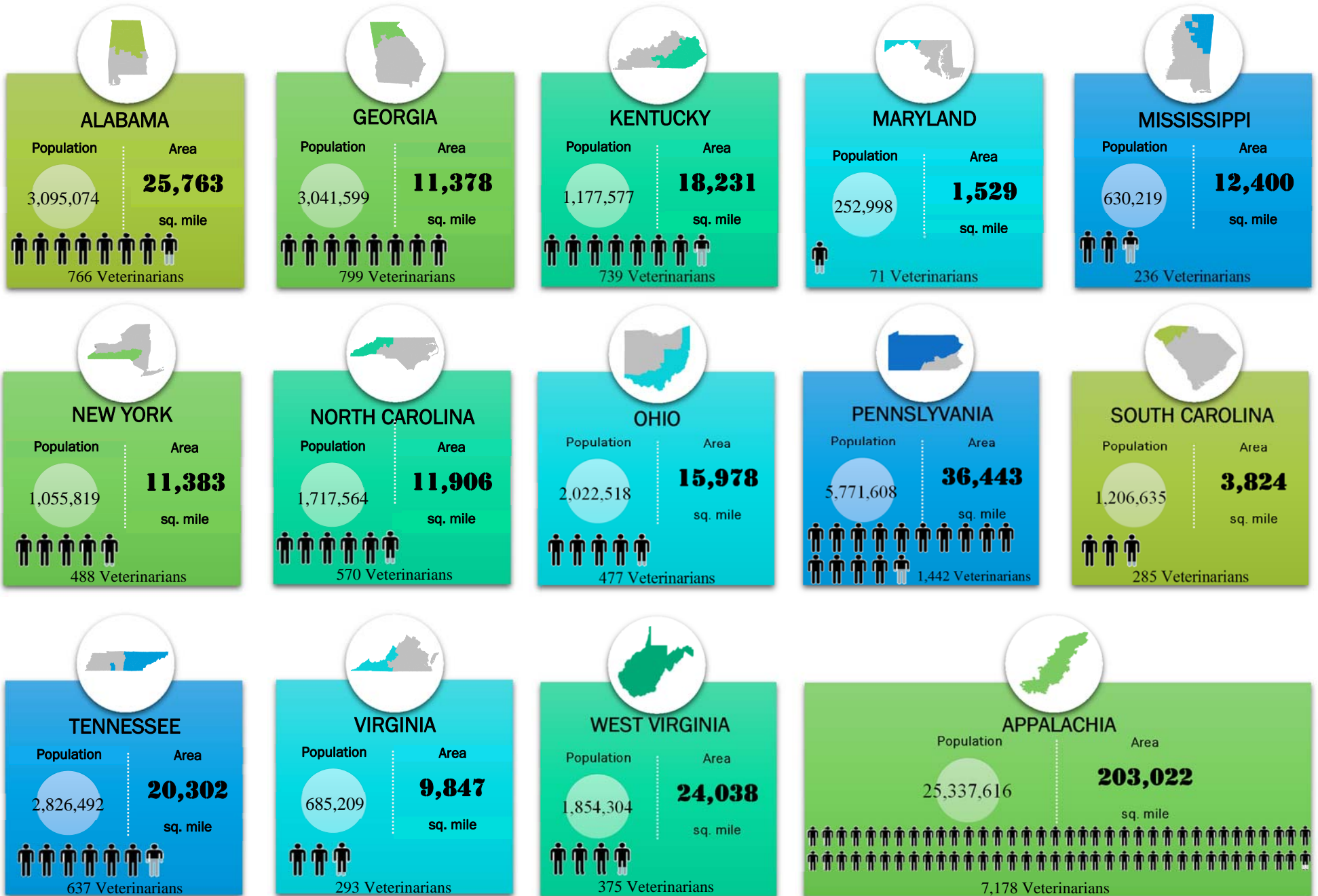
There are 7,178 instate, actively practicing veterinarians within the Appalachian footprint that provide support to an estimated 13.8 million companion animals and 13.7 million large animals with an estimated herd size worth 14.2 billion. These veterinarians employ an estimated 8 people per practice, and their practices serve as economic engines for their communities, providing an estimated 2.3 billion dollars in economy to the footprint of Appalachia.

Based upon our modeling, there is an overall excess of 264 veterinary FTE's within the whole Appalachian footprint.

Interestingly, when analyzed on a county level 75% of the rural ARC counties have an apparent veterinary shortage, estimated to be 1907 veterinarians which translates into an estimated economic loss of \$621 million and 15,256 jobs.

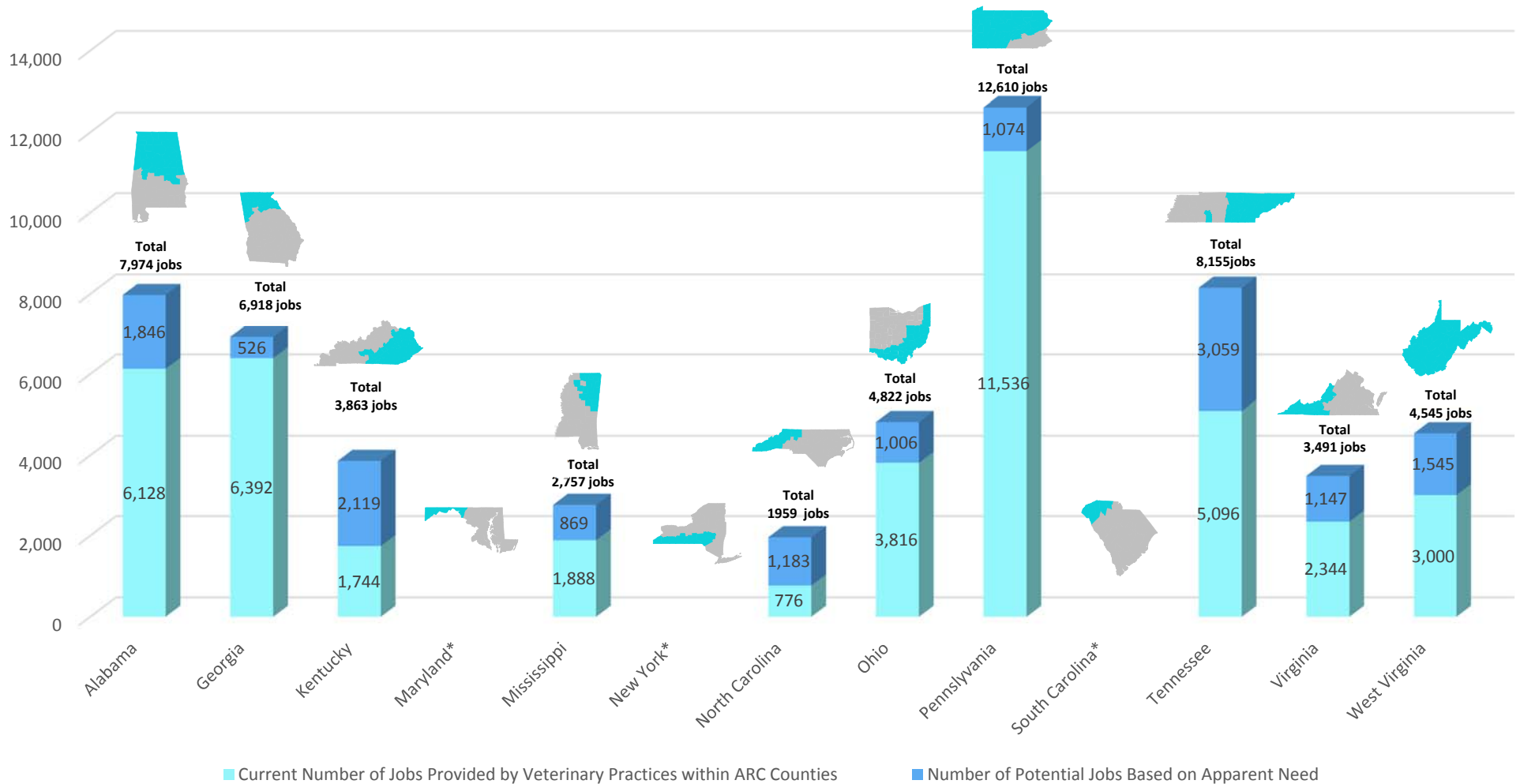


VETERINARIAN ANALYSIS OF APPALACHIA



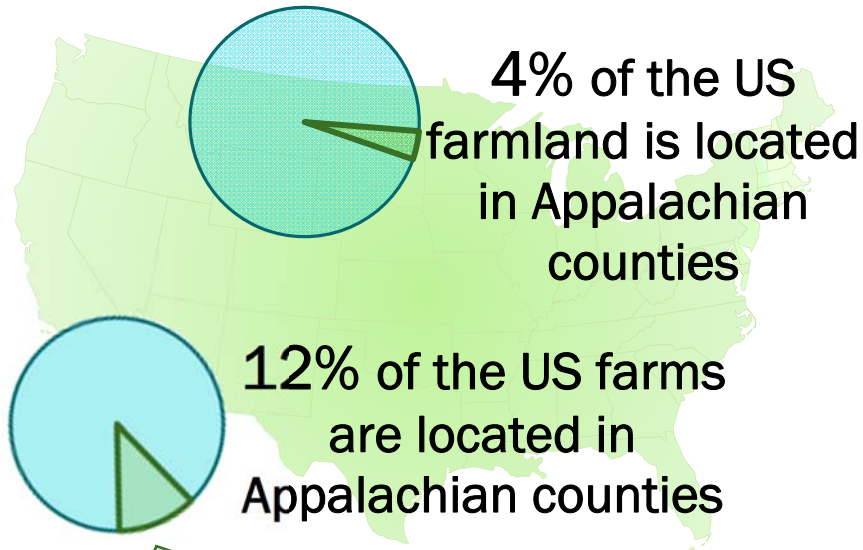
VETERINARIAN ANALYSIS OF APPALACHIA

Current Veterinary Jobs + Impact of Veterinary Need = Potential ARC Veterinary Jobs

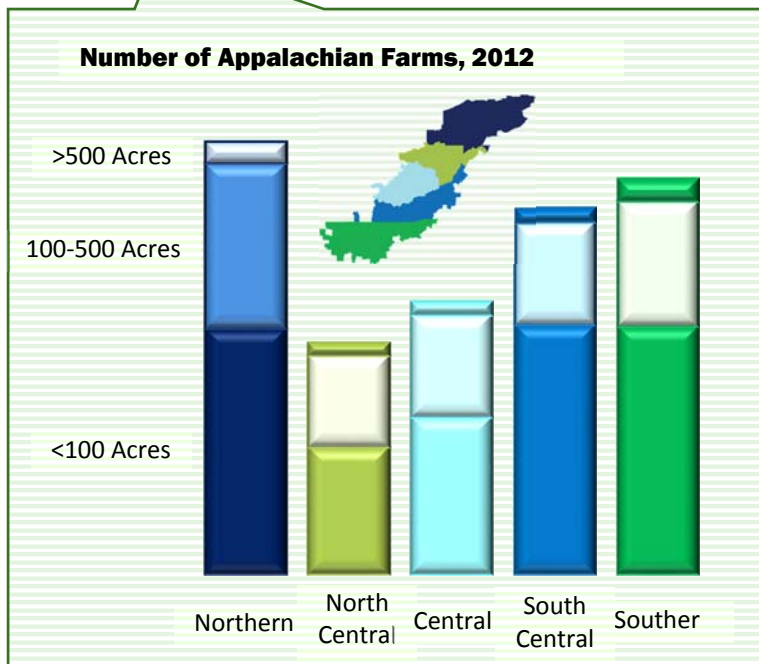


*State not analyzed this year.

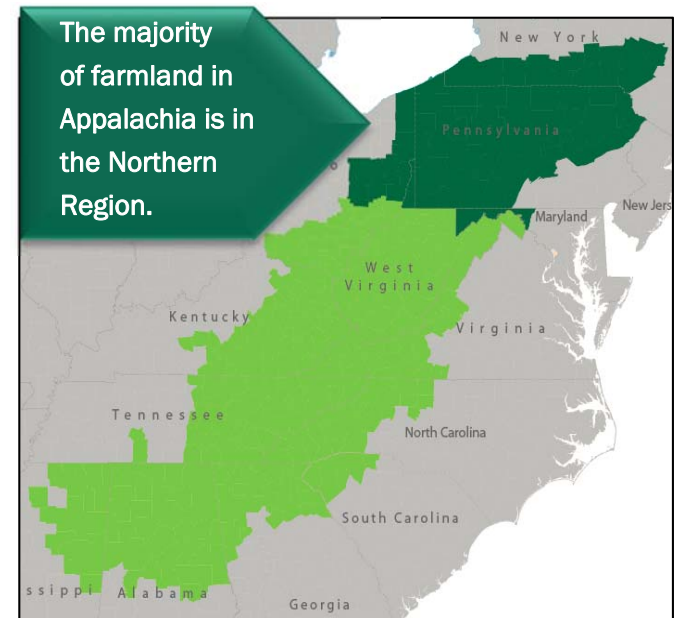
FARM ANALYSIS OF APPALACHIAN FARMS



- There are a total of 2.1 million farms in the USA, of which 12% are within Appalachia.
- Small scale livestock farms are important to Appalachia.
- Small farms dominate Appalachia, with over 95% of them consisting of holdings less than 100 acres.
- This is in contrast the average farm in the US, which is 434 acres in size.
- The majority of dedicated farmland in the footprint is in the northern region.



- There are an estimated 130 million acres in the Appalachia, about 29% (37 million acres) are farmland.
- Of the 2.1 million farms in the US, 12% are located in Appalachia. 60% of these are smaller farms more than half of them have less than 50 acres.



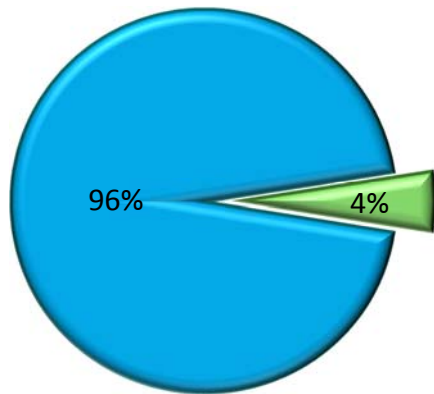
ANIMAL ANALYSIS OF APPALACHIA

As reported in Dunaways's book *The First American Frontier: Transition to Capitalism in Southern Appalachia, 1700-1860* and in Ellers *Miners, Millhands and Mountaineers: Industrialization of the Appalachian South 1880-1930*, animals were absolutely vital in establishing and maintaining the Appalachian economy. Since the mid- 1900s, portions of the market share of livestock holdings within the Appalachian footprint became displaced by holdings in the Western USA, keeping and maintaining livestock and companion animals was engrained in Appalachian culture (Walters, 2012), and remains an important part of the Appalachian culture and economy.

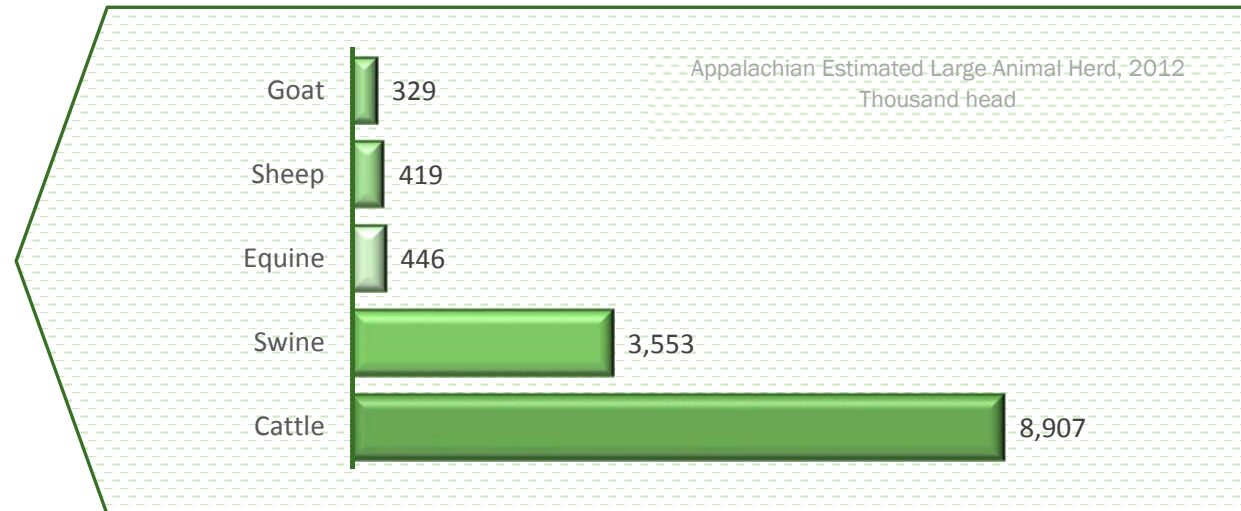


ANIMAL ANALYSIS OF APPALACHIA

4.3% of the USA Estimated Large Animal Herd are in Appalachia.



USA Estimated Large Animal Herd, 2012
Percent, n= 318 Million head



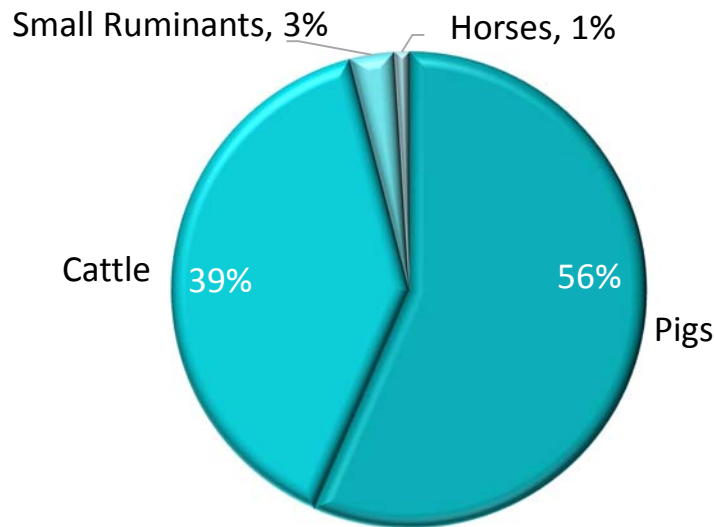
Appalachia Estimated Herd Facts:

- The dominant herd animal in Appalachia is cattle. Over the past 5 years, Appalachia's cattle herd did not decline as severely as the US herd.
- 26% of large animals are swine.
- Small ruminants are 5% of the herd.
- Sheep and swine are a growing portion of the herd.
- Unlike the rest of the US, the goat herd is a decreasing share of the herd.
- Sheep numbers increased greatly over the past 5 years.

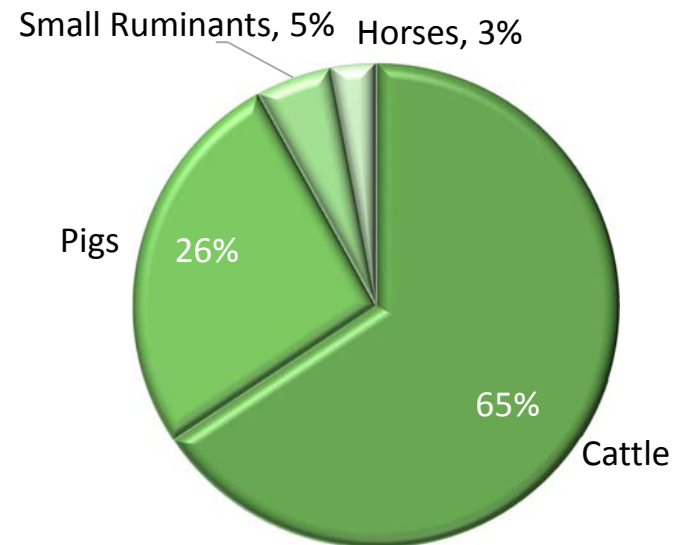


ANIMAL ANALYSIS OF APPALACHIA

Comparison of US vs. ARC Large Animal Herd Mix, 2012



318 Million USA Herd



13.7 Million Appalachia Herd

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 36% of the large animals in the U.S.

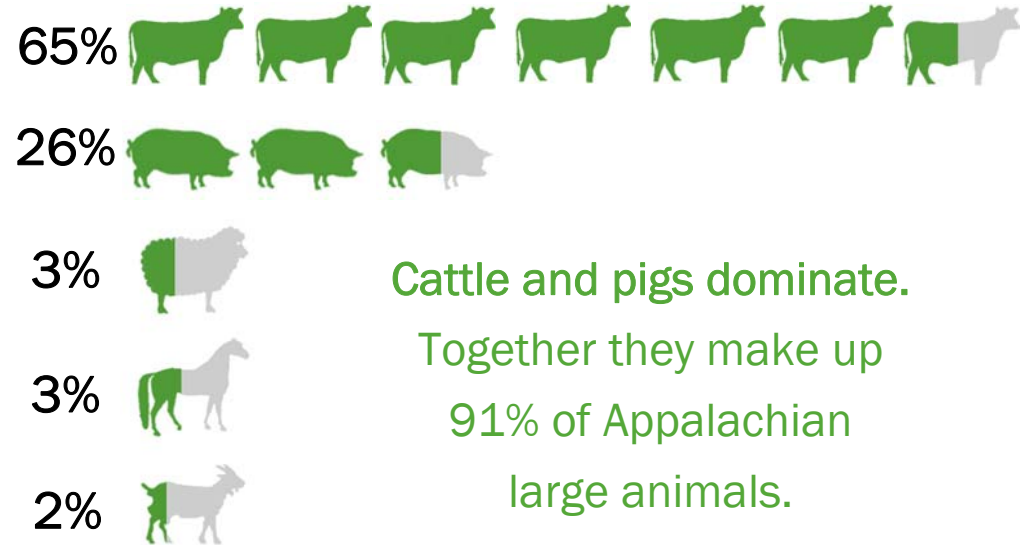
Estimated large animal is the inventory plus a production factor. Considering this factor, we estimate the mix of the Appalachian large animal herd does not reflect the US herd.

- 7.2% of the US cattle herd resides in Appalachia
- 2% of the US swine herd resides in Appalachia
- 5.5% of the US sheep flock resides in Appalachia
- 7.5% of the US goat herd resides in Appalachia

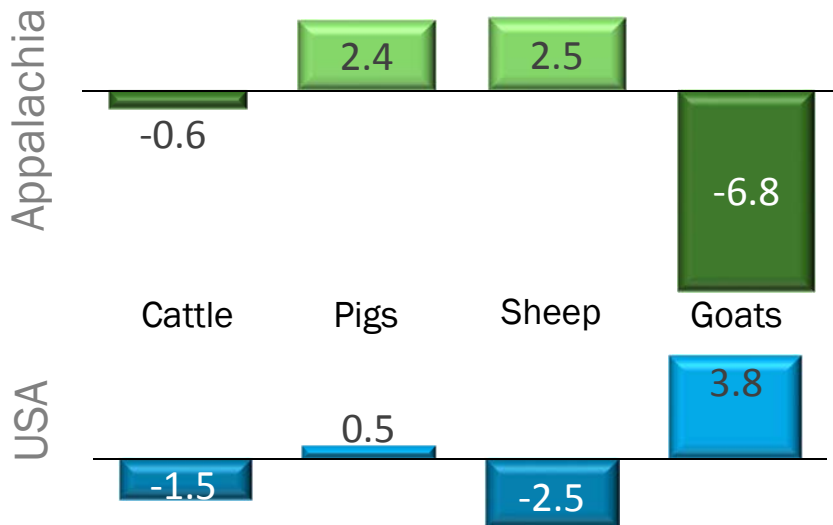
ANIMAL ANALYSIS OF APPALACHIA

An analysis was completed on the USDA Ag Census inventory reports of 2007 and 2012. For the USA as a whole, goats and pigs were the only species that saw an increase in overall inventory.

ARC Animal Population Summary



Annual Growth Rate of estimated herd size



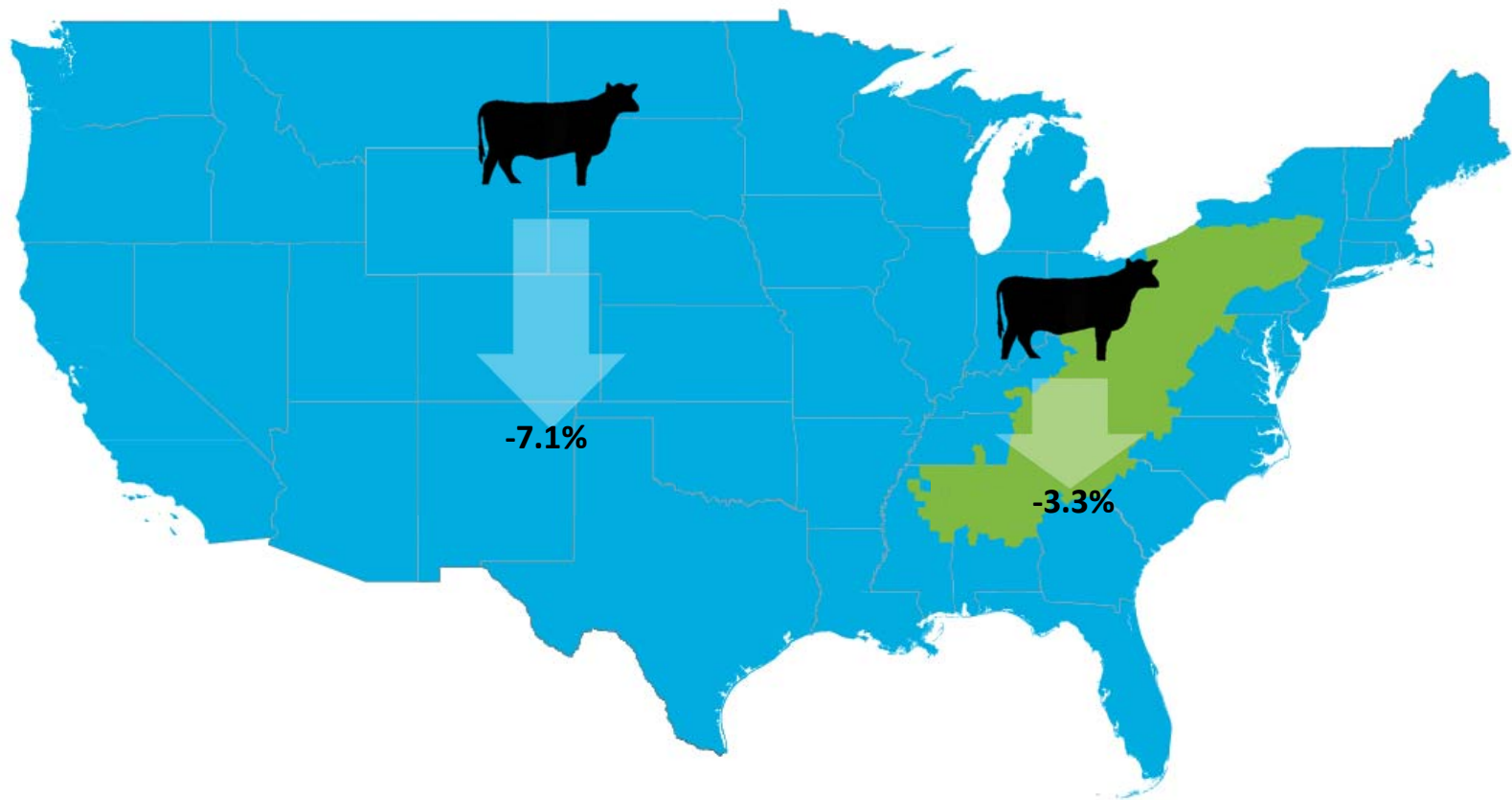
Pigs and sheep increased within the Appalachian footprint, while cattle and goats decreased in number. Goats increased quite dramatically in the USA, while declining by almost twice that amount in Appalachia.

Cattle are the dominant species in Appalachia, and seem to be holding strong. In fact, over the past 5 years cattle inventory numbers in the USA dropped by more than double the amount they did within ARC region.

ANIMAL ANALYSIS OF APPALACHIA

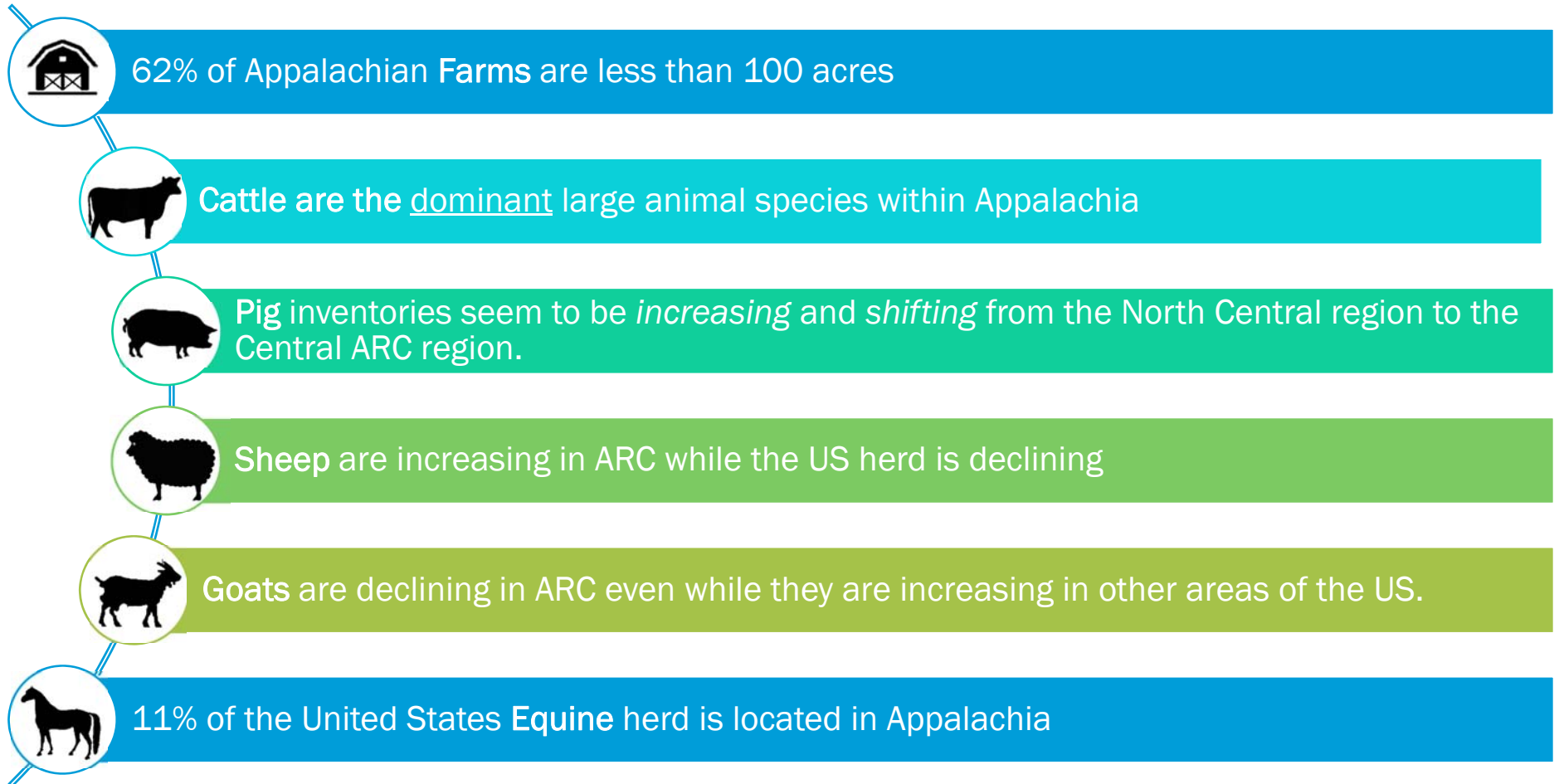
While Appalachia mimics the national decline in cattle inventory, the magnitude of the decrease in the Appalachian cattle herd *inventory* was not as severe.

Appalachia -3.3% VS. Nation -7.1%



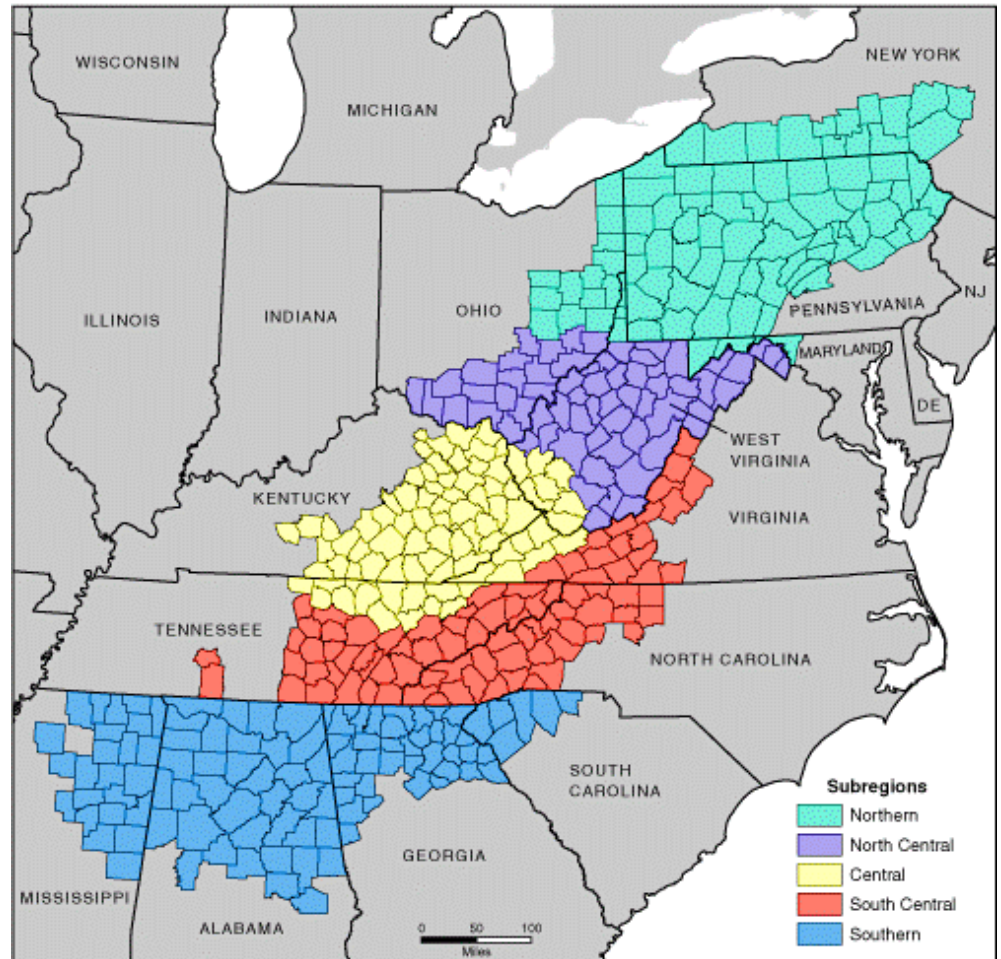
ANALYSIS OF APPALACHIA

Appalachian Herd Dynamics at a Glance



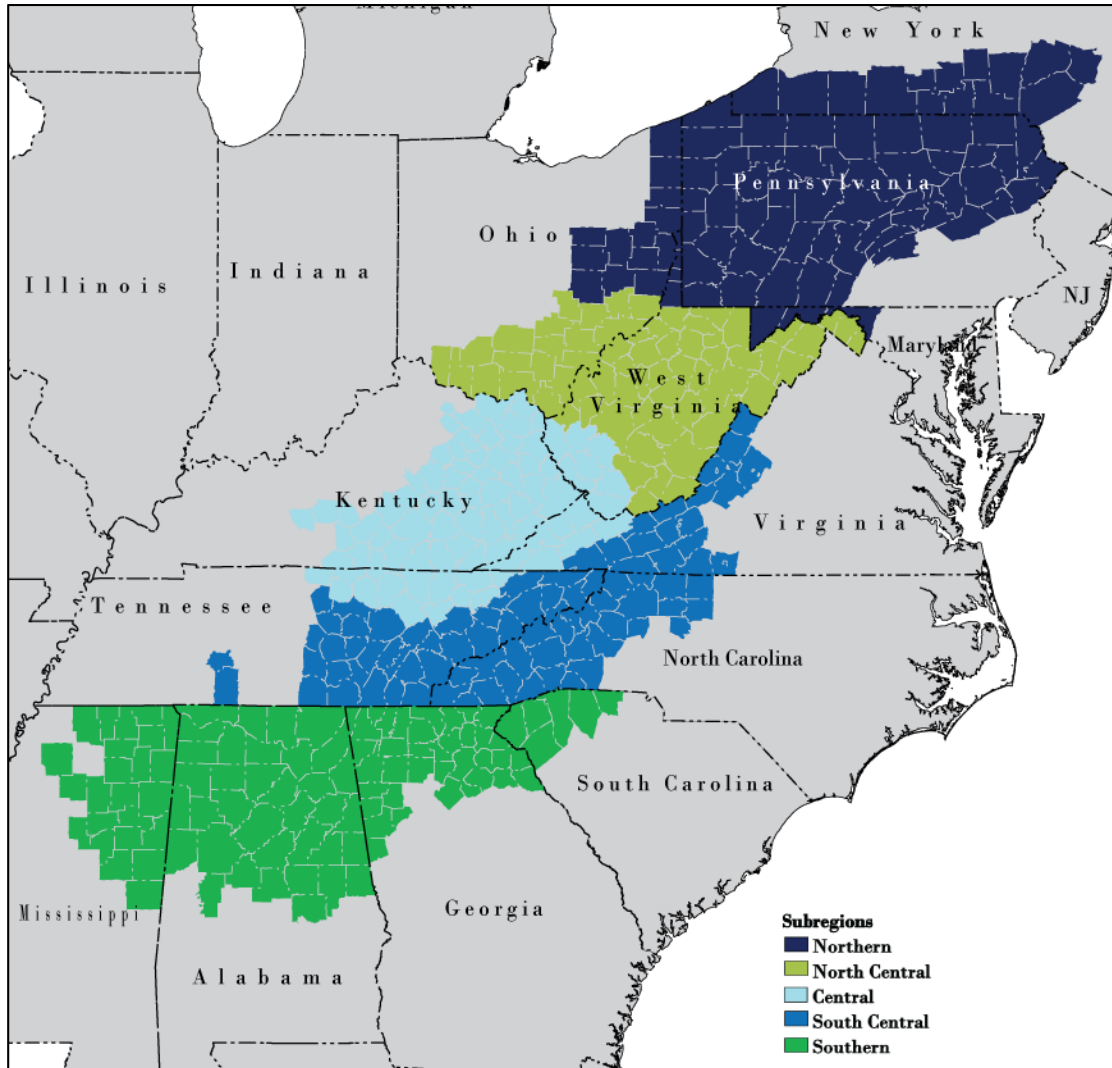
FEDERAL ARC SUBREGION ANALYSIS

While similar in geography, ARC has divided the Appalachian footprint into five ARC Sub regions, and each has unique educational, economic, and transportation compositions. What follows is an analysis of sub region trends associated with animal agriculture and veterinary distribution and economic impact therein.



Map by: Appalachian Regional Commission, November 2009.

FEDERAL ARC SUBREGIONS MAP



Counties in Appalachia

Alabama: Bibb, Blount, Calhoun, Chambers, Cherokee, Chilton, Clay, Cleburne, Colbert, Coosa, Cullman, De Kalb, Elmore, Etowah, Fayette, Franklin, Hale, Jackson, Jefferson, Lamar, Lauderdale, Lawrence, Limestone, Macon, Madison, Marion, Marshall, Morgan, Pickens, Randolph, St. Clair, Shelby, Talladega, Tallapoosa, Tuscaloosa, Walker, and Winston

Georgia: Banks, Barrow, Bartow, Carroll, Catoosa, Chattooga, Cherokee, Dade, Dawson, Douglas, Elbert, Fannin, Floyd, Forsyth, Franklin, Gilmer, Gordon, Gwinnett, Habersham, Hall, Haralson, Hart, Heard, Jackson, Lumpkin, Madison, Murray, Paulding, Pickens, Polk, Rabun, Stephens, Towns, Union, Walker, White, and Whitfield

Kentucky: Adair, Bath, Bell, Boyd, Breathitt, Carter, Casey, Clark, Clay, Clinton, Cumberland, Edmonson, Elliott, Estill, Fleming, Floyd, Garrard, Green, Greenup, Harlan, Hart, Jackson, Johnson, Knott, Knox, Laurel, Lawrence, Lee, Leslie, Letcher, Lewis, Lincoln, McCreary, Madison, Magoffin, Martin, Menifee, Metcalfe, Monroe, Montgomery, Morgan, Nicholas, Owsley, Perry, Pike, Powell, Pulaski, Robertson, Rockcastle, Rowan, Russell, Wayne, Whitley, and Wolfe

Maryland: Allegany, Garrett, and Washington

Mississippi: Alcorn, Benton, Calhoun, Chickasaw, Choctaw, Clay, Itawamba, Kemper, Lee, Lowndes, Marshall, Monroe, Montgomery, Noxubee, Oktibbeha, Panola, Pontotoc, Prentiss, Tippah, Tishomingo, Union, Webster, Winston, and Yalobusha

New York: Allegany, Broome, Cattaraugus, Chautauqua, Chemung, Chenango, Cortland, Delaware, Otsego, Schoharie, Schuyler, Steuben, Tioga, and Tompkins

North Carolina: Alexander, Alleghany, Ashe, Avery, Buncombe, Burke, Caldwell, Cherokee, Clay, Davie, Forsyth, Graham, Haywood, Henderson, Jackson, McDowell, Macon, Madison, Mitchell, Polk, Rutherford, Stokes, Surry, Swain, Transylvania, Watauga, Wilkes, Yadkin, and Yancey

Ohio: Adams, Ashtabula, Athens, Belmont, Brown, Carroll, Clermont, Columbiana, Coshocton, Gallia, Guernsey, Harrison, Highland, Hocking, Holmes, Jackson, Jefferson, Lawrence, Mahoning, Meigs, Monroe, Morgan, Muskingum, Noble, Perry, Pike, Ross, Scioto, Trumbull, Tuscarawas, Vinton, and Washington

Pennsylvania: Allegheny, Armstrong, Beaver, Bedford, Blair, Bradford, Butler, Cambria, Cameron, Carbon, Centre, Clarion, Clearfield, Clinton, Columbia, Crawford, Elk, Erie, Fayette, Forest, Fulton, Greene, Huntingdon, Indiana, Jefferson, Juniata, Lackawanna, Lawrence, Luzerne, Lycoming, McKean, Mercer, Mifflin, Monroe, Montour, Northumberland, Perry, Pike, Potter, Schuylkill, Snyder, Somerset, Sullivan, Susquehanna, Tioga, Union, Venango, Warren, Washington, Wayne, Westmoreland, and Wyoming

South Carolina: Anderson, Cherokee, Greenville, Oconee, Pickens, and Spartanburg

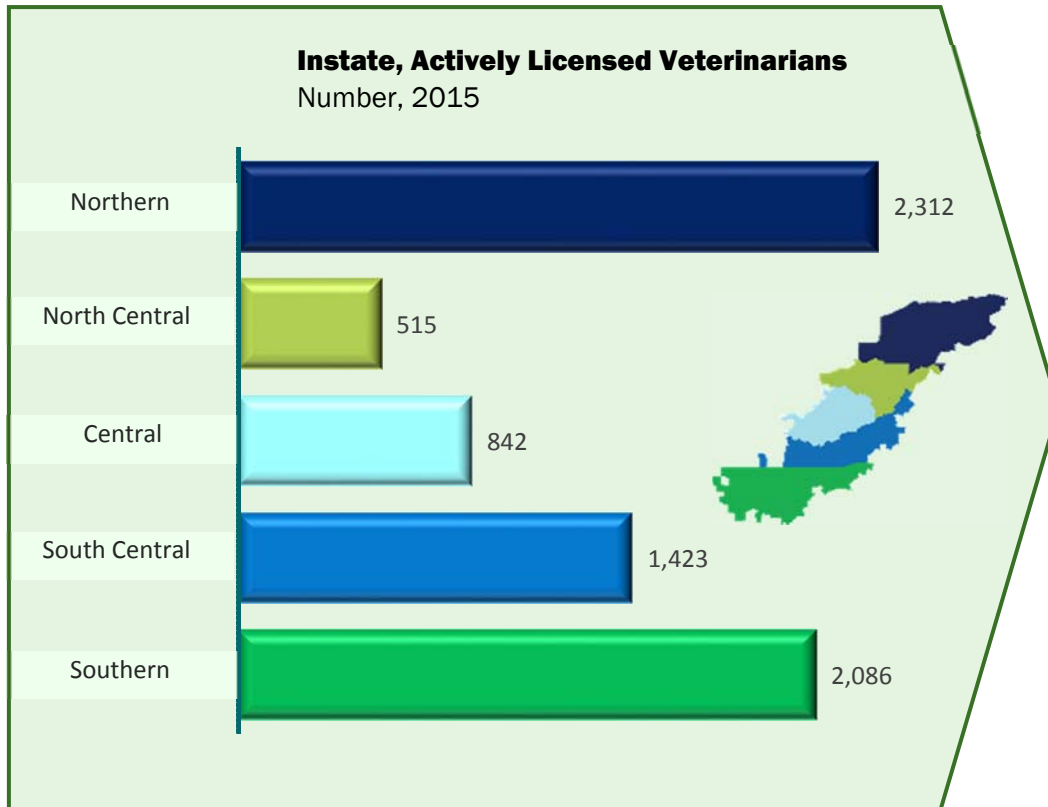
Tennessee: Anderson, Bledsoe, Blount, Bradley, Campbell, Cannon, Carter, Claiborne, Clay, Cocke, Coffee, Cumberland, De Kalb, Fentress, Franklin, Grainger, Greene, Grundy, Hamblen, Hamilton, Hancock, Hawkins, Jackson, Jefferson, Johnson, Knox, Lawrence, Lewis, Loudon, McMinn, Macon, Marion, Meigs, Monroe, Morgan, Overton, Pickett, Polk, Putnam, Rhea, Roane, Scott, Sequatchie, Sevier, Smith, Sullivan, Unicoi, Union, Van Buren, Warren, Washington, and White

Virginia: Alleghany, Bath, Bland, Botetourt, Buchanan, Carroll, Craig, Dickenson, Floyd, Giles, Grayson, Henry, Highland, Lee, Montgomery, Patrick, Pulaski, Rockbridge, Russell, Scott, Smyth, Tazewell, Washington, Wise, and Wythe

The following independent cities in Virginia are also within the Appalachian Region: Bristol, Buena Vista, Covington, Galax, Lexington, Martinsville, Norton, and Radford.

West Virginia: All counties: Barbour, Berkeley, Boone, Braxton, Brooke, Cabell, Calhoun, Clay, Doddridge, Fayette, Gilmer, Grant, Greenbrier, Hampshire, Hancock, Hardy, Harrison, Jackson, Jefferson, Kanawha, Lewis, Lincoln, Logan, Marion, Marshall, Mason, McDowell, Mercer, Mineral, Mingo, Monongalia, Monroe, Morgan, Nicholas, Ohio, Pendleton, Pleasants, Pocahontas, Preston, Putnam, Raleigh, Randolph, Ritchie, Roane, Summers, Taylor, Tucker, Tyler, Upshur, Wayne, Webster, Wetzel, Wirt, Wood, and Wyoming

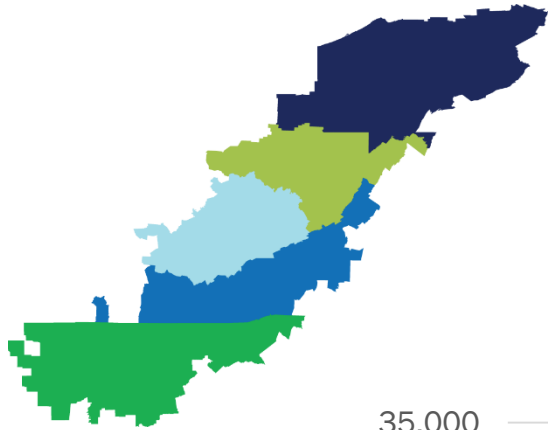
VETERINARIAN ANALYSIS OF APPALACHIAN SUBREGIONS



Veterinary Services are limited in Appalachia

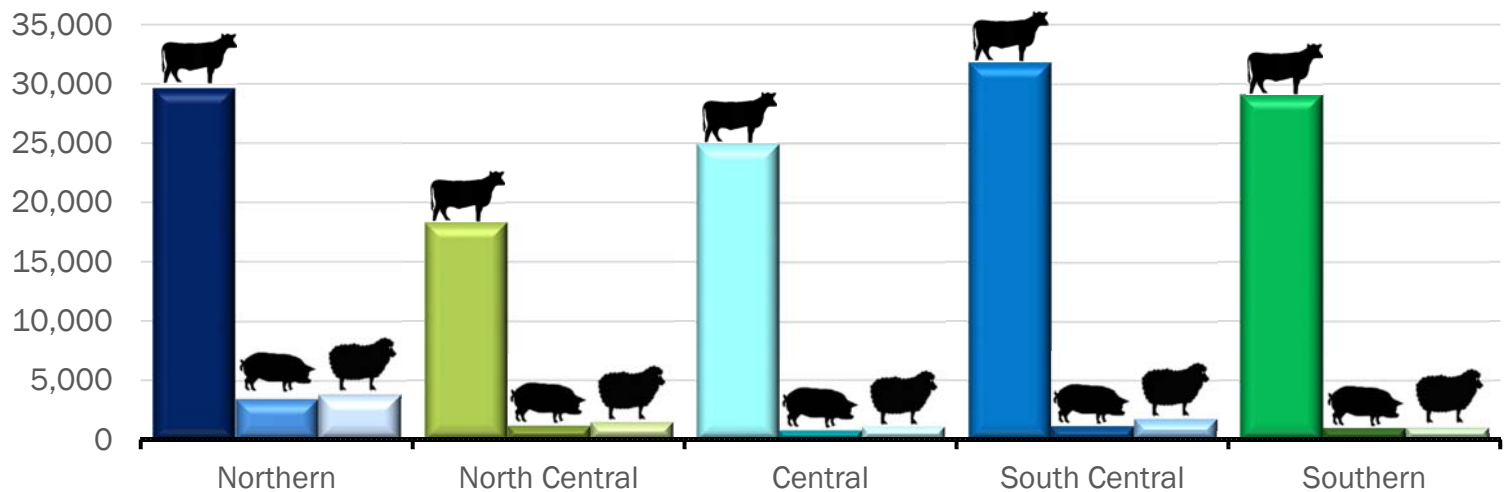
- According to the AVMA, there are 102,583 veterinarians in the US.
- There are 7,178 in-state, actively licensed veterinarians in Appalachia, and based upon our research an apparent need for 6,914 FTE of veterinarians.
- Of the 7,178 licensed veterinarians in Appalachia, we estimate 11% are more than >60 years of age.
- While it appears an overall surplus exists for the footprint, interestingly, at a sub-regional level North Central and South Central were found to have a shortage of 165 and 92 FTEs, respectively.
- Even more interesting, when analyzed on a county level, 75% of the ARC counties have a veterinary shortage, to the tune of 1,907 vets.

FARM ANALYSIS OF APPALACHIAN SUBREGIONS

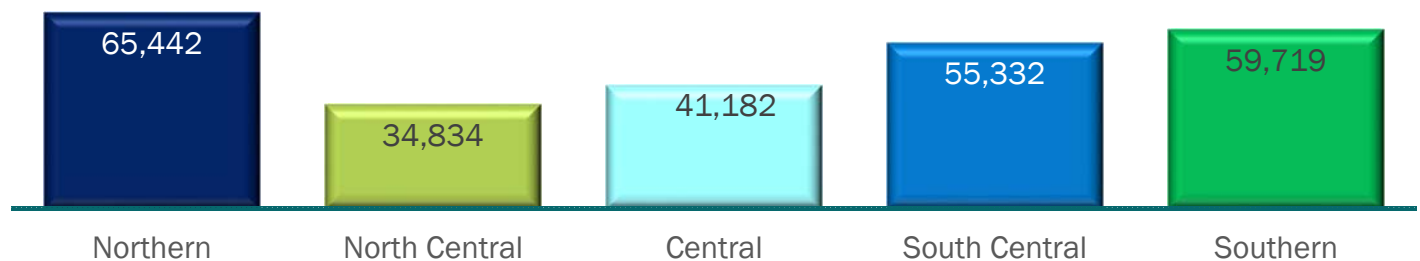


There are over 13 Million large animals within the Appalachian footprint. Northern Appalachia has the most large animals, followed by Southern Appalachia, South Central, Central, and North Central regions. The average cattle herd sizes are smaller within North Central region, 36 head on average. In the rest of Appalachia herds are 51 cows. Pig herds are twice as large in the Northern and Southern regions, 75 head vs. 28 head in the rest of the area. The average size for a sheep flock throughout Appalachia is 43 animals.

Species of Farms

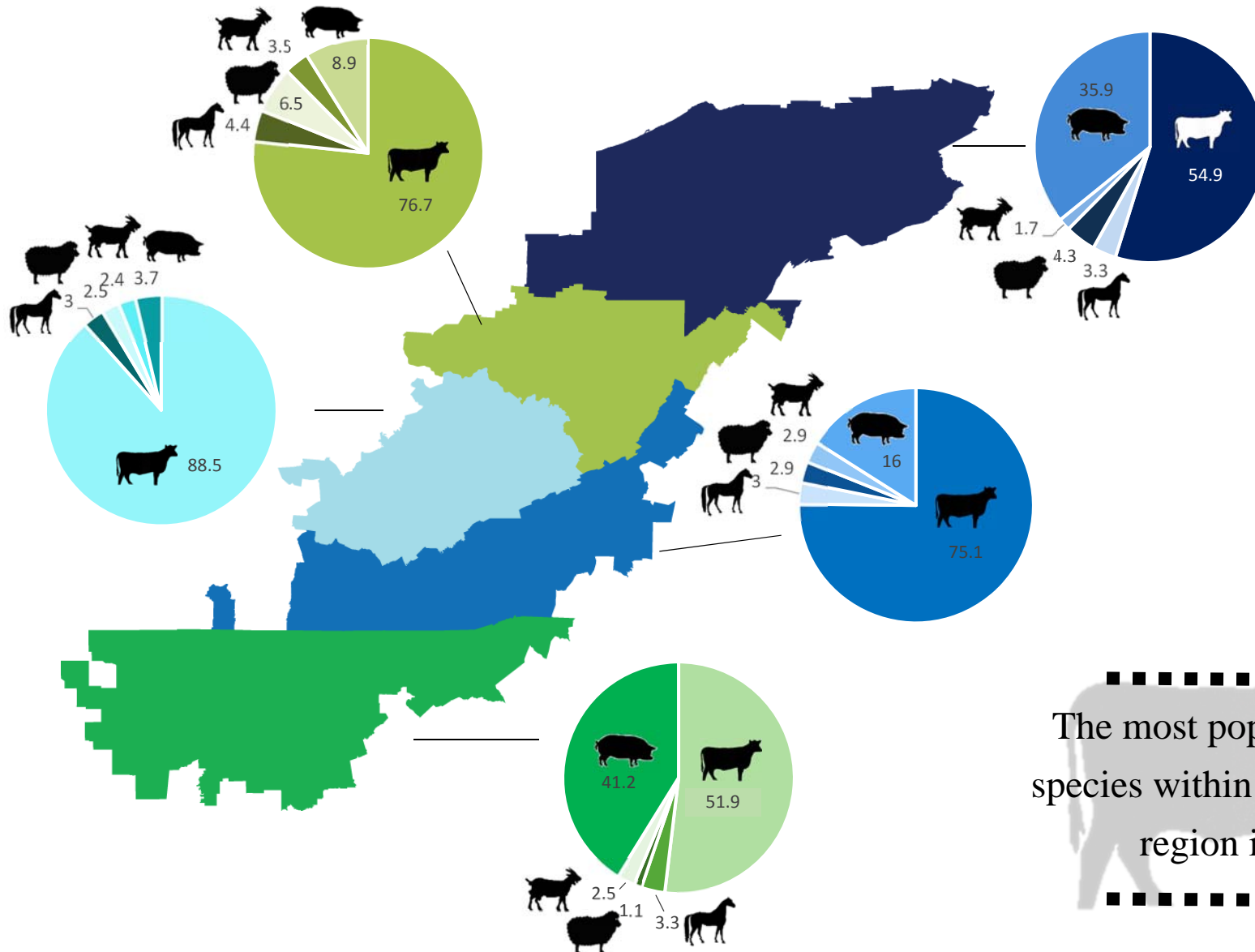


Number of Farms



ANIMAL ANALYSIS OF APPALACHIAN SUBREGIONS

Large Animal Species Composition

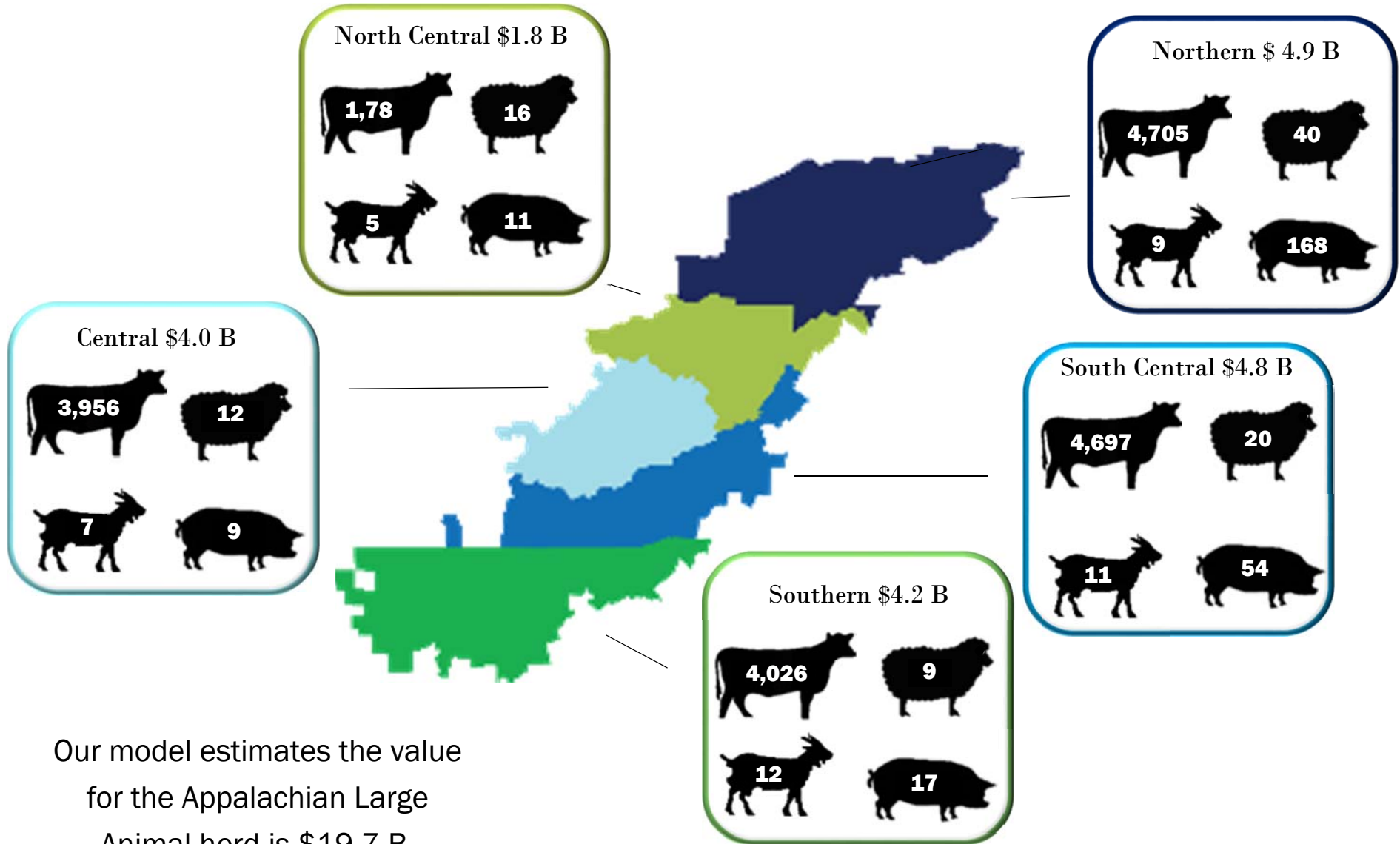


■■■■■■■■■■■■■■■■■■■■
 The most populous animal species within each ARC sub region is cattle.
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ANALYSIS OF APPALACHIAN SUBREGIONS

Appalachian Estimated Large Animal Herd Value (excludes equine), 2012

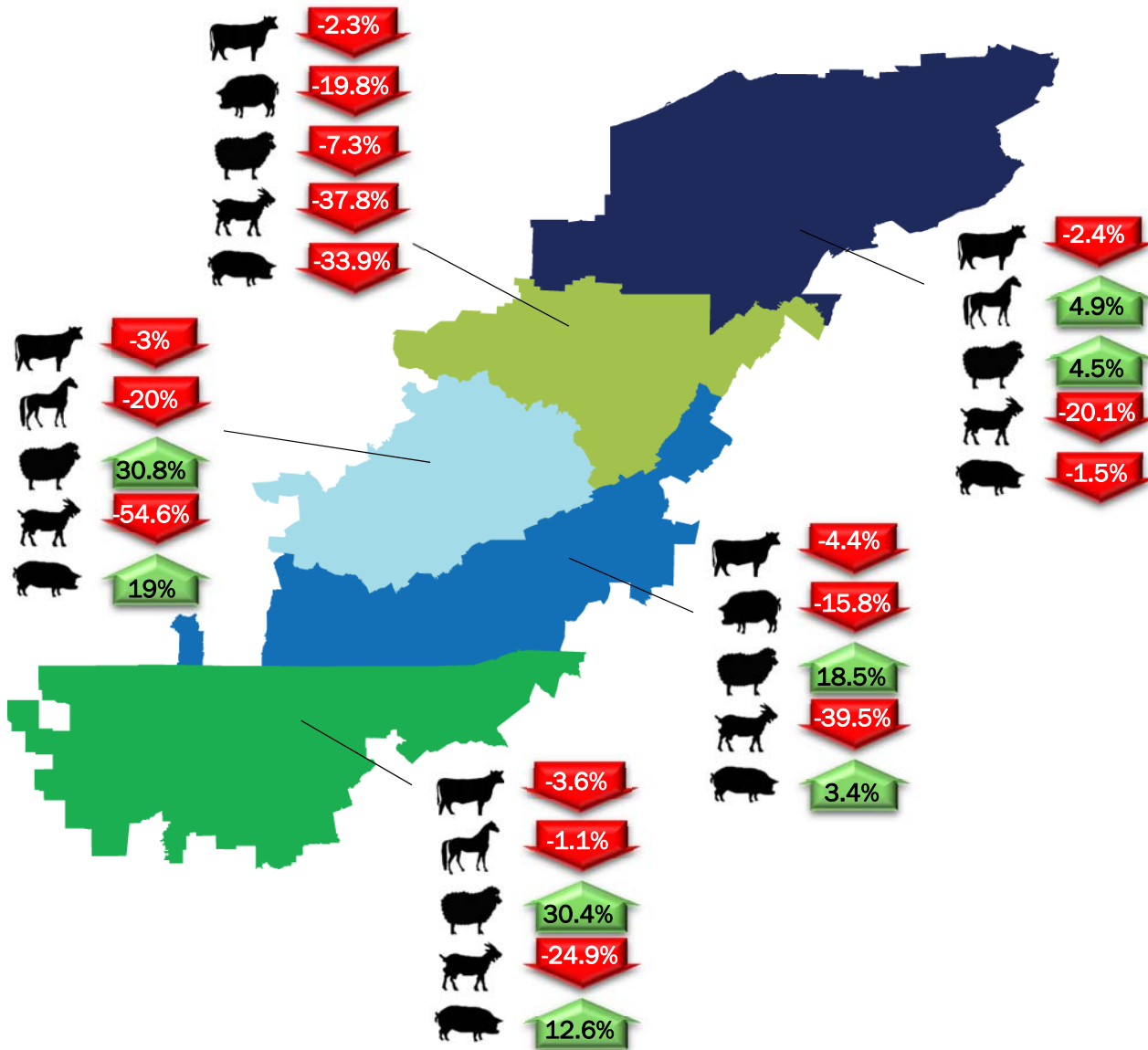
Thousand head



Our model estimates the value for the Appalachian Large Animal herd is \$19.7 B.

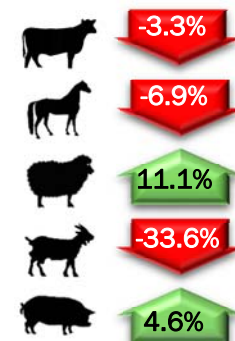
ANIMAL ANALYSIS OF APPALACHIAN SUBREGIONS

Changes in Large Animal Inventory 2007-2012



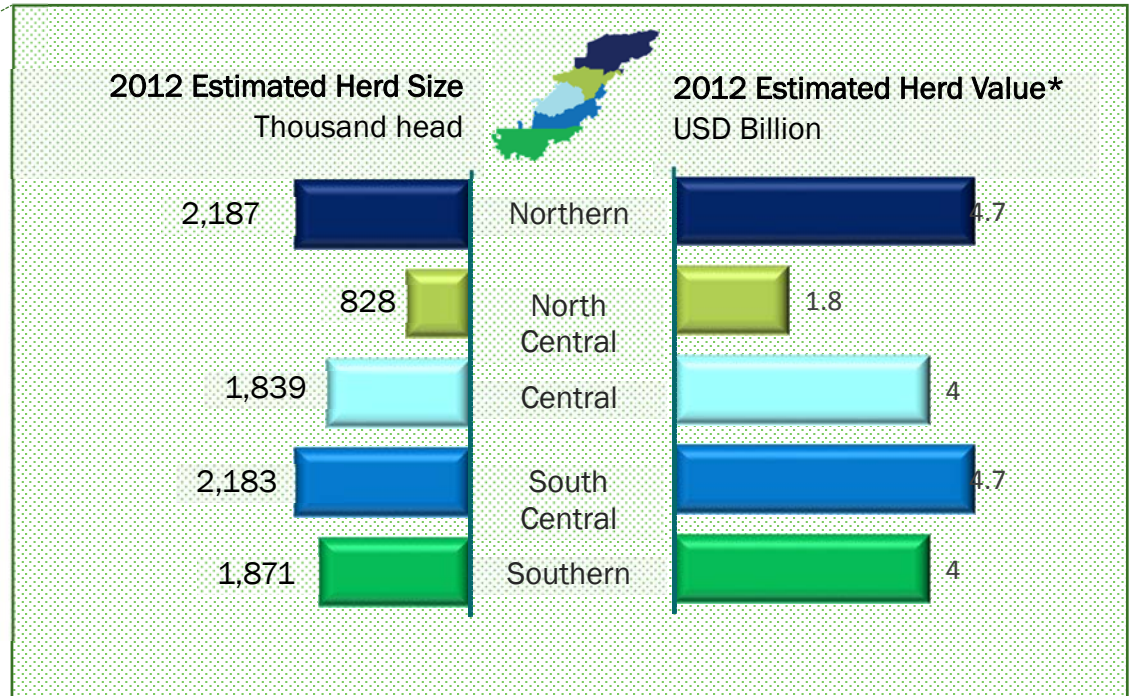
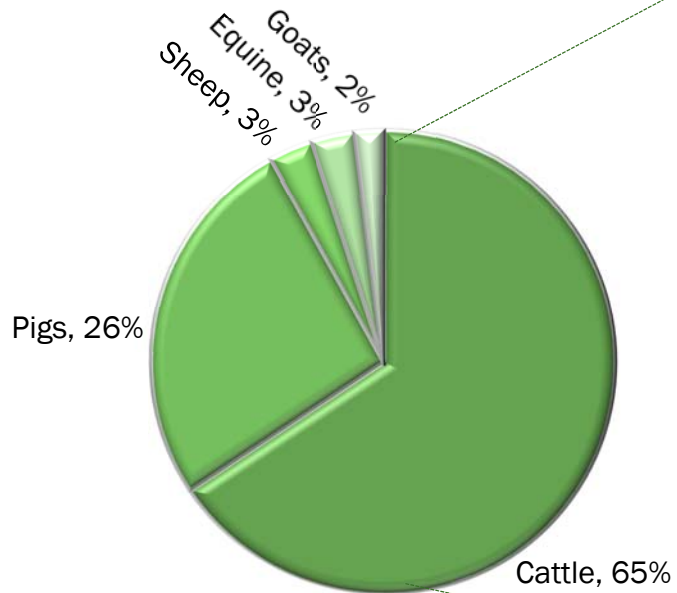
- North Central region experienced the largest decrease in all species
- Decrease in the North Central sheep herd were balanced and increased in all other areas of ARC
- Decline in pig herds in North and North Central were mitigated by increases in the three more southern regions.

Appalachia as a whole



ANIMAL ANALYSIS OF APPALACHIAN SUBREGIONS SPECIES – BOVINE

Appalachian 2012 Large Animal Estimated Herd Size
Percent, n=13.7 Million head.

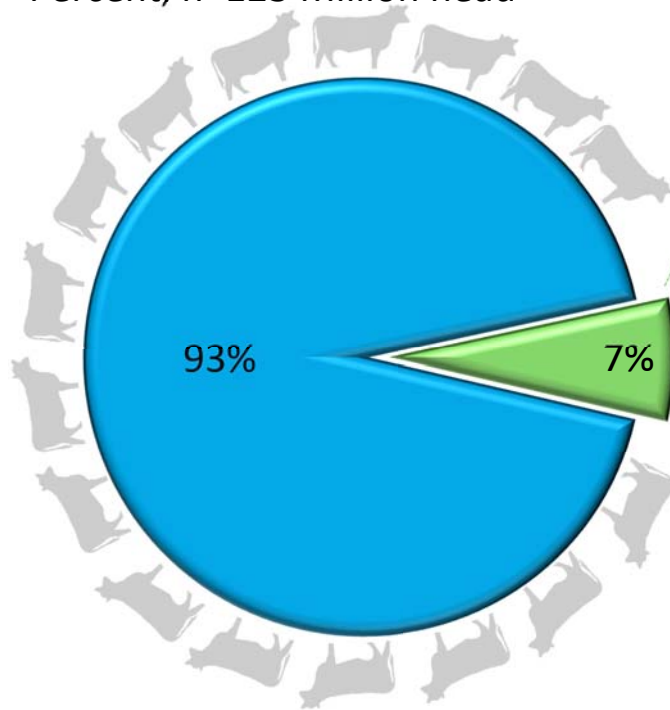


Estimated Herd Size data indicates that over 8.9 million cattle are located within Appalachia. These animals valued at \$19 M for the whole of the ARC footprint. The Northern and South Central regions contribute the most to the cattle value.

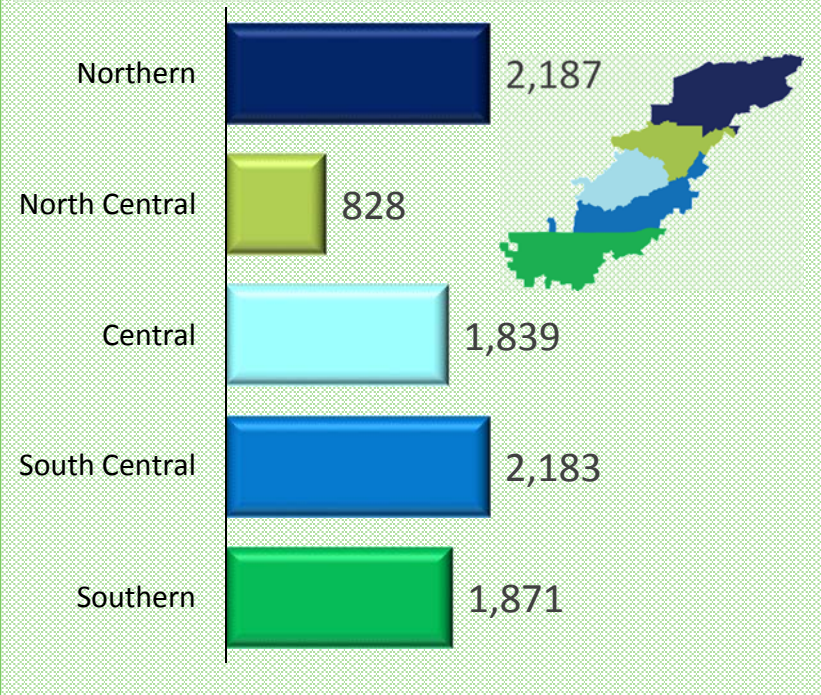
ANIMAL ANALYSIS OF APPALACHIAN SUBREGIONS SPECIES – BOVINE

Comparison of US and Appalachian Cattle Herd Size vs. Distribution of Cattle by Region

US 2012 Cattle Estimated Herd Size
Percent, n=123 Million head

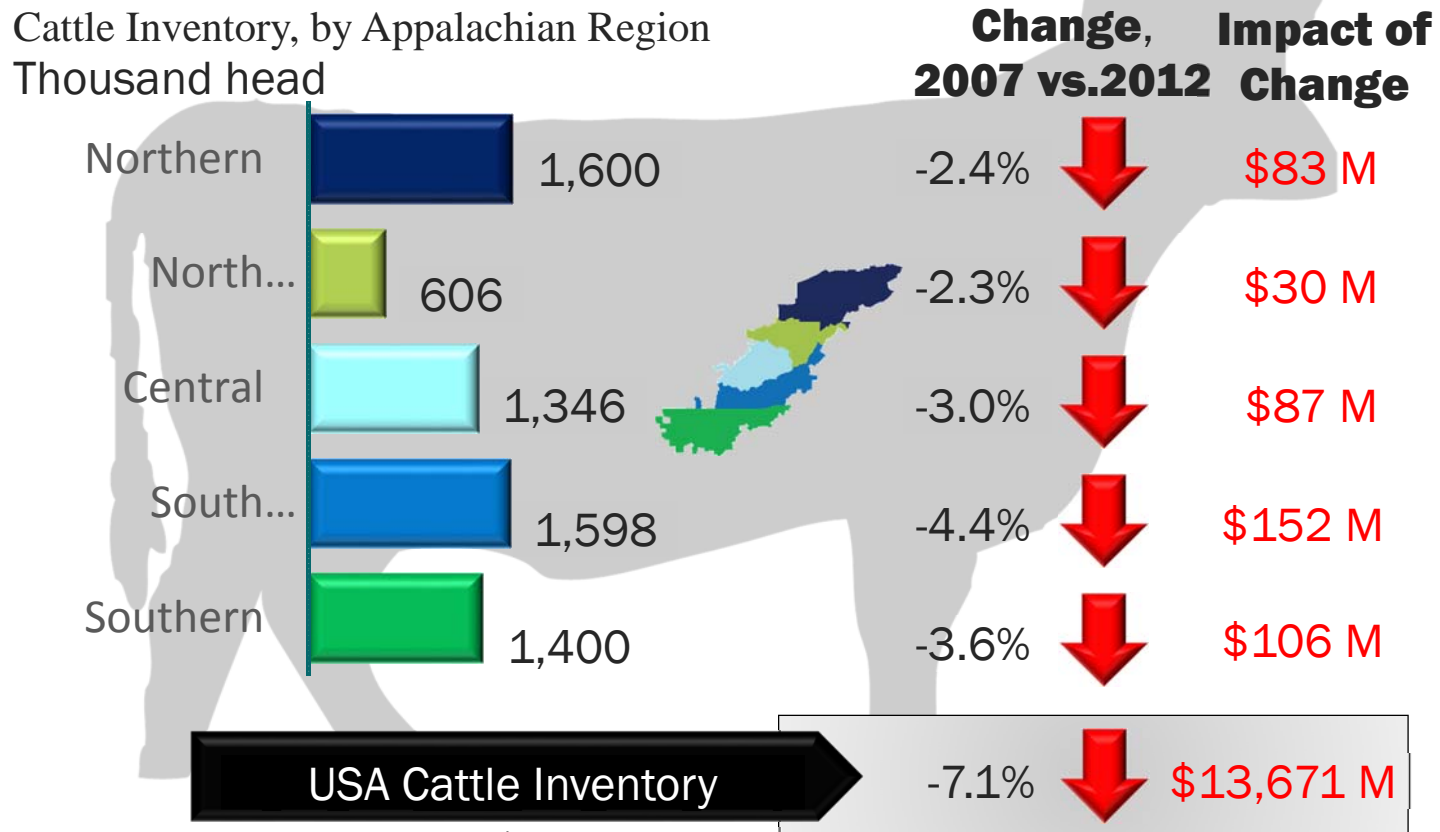


2012 Estimated Cattle Herd, by Region
Thousand head



There are 133,763 farms with cattle in Appalachia. These farms are spread fairly evenly across the region. This is particularly true in the North Central region where 85% of the herds are less than 50 head. Over the past 5 years the number of large size herds (≥ 500 herd) have increased, however 76% of the herds are less than 50 head.

ANIMAL ANALYSIS OF APPALACHIAN SUBREGIONS SPECIES – BOVINE

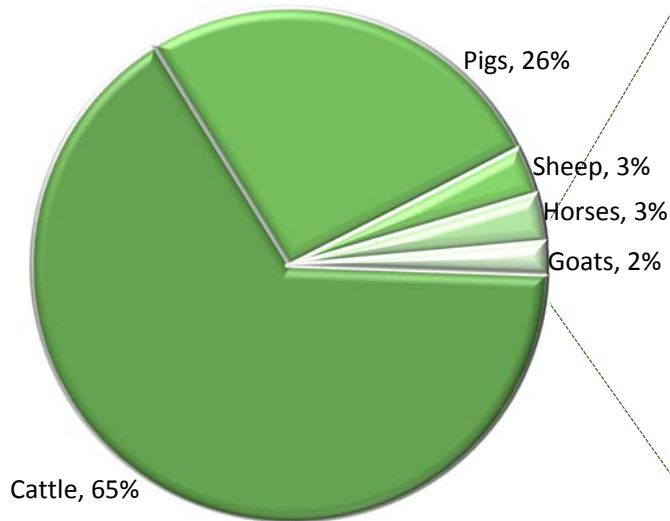


*Assumes 1,425 lb cow, \$151 cwt, live FOB
Source: CAHA Large Animal Model, August 2015

- In Appalachia the cattle herd estimated value is \$19B
- Estimated production decreased annually by -0.6% from 2007 to 2012
- Estimated value decreased \$497 MM
- From 2017-2012 the US cattle inventory decreased by 7.1% while it only decreased by 3.3% in Appalachia

ANIMAL ANALYSIS OF APPALACHIAN SUBREGIONS SPECIES – CAPRINE

Appalachian 2012 Large Animal Estimated Herd Size
Percent, n=13.7 Million head

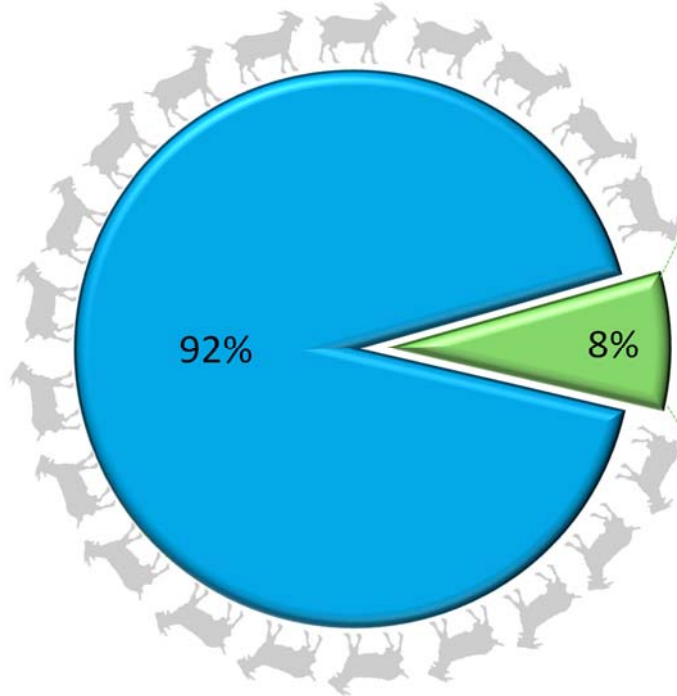


Estimated Herd Size data indicates that over 328,899 goats are valued at 44 million for the whole of the ARC footprint. The Northern and South Central regions contribute the most to the goat value.

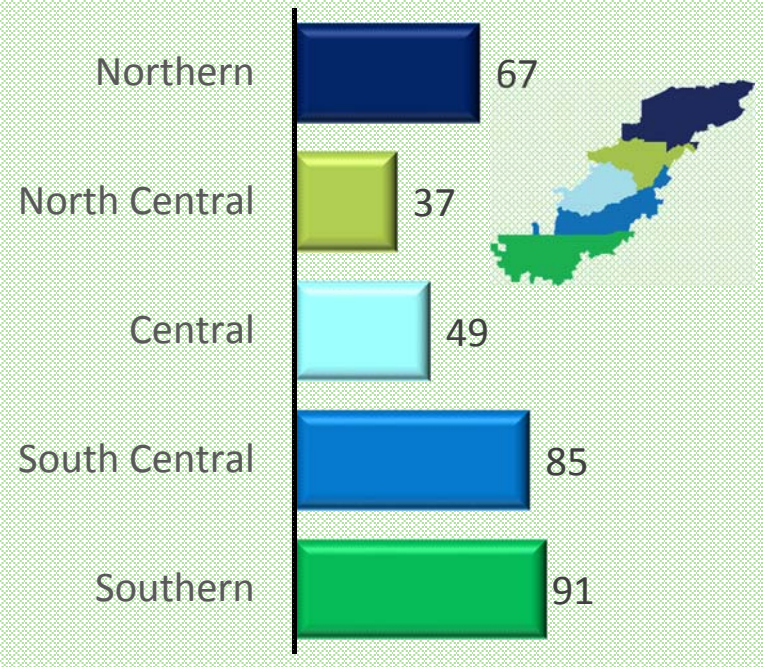
ANIMAL ANALYSIS OF APPALACHIAN SUBREGIONS SPECIES – CAPRINE

Comparison of US and Appalachian Goat Inventory vs. Distribution of Goat by Region

US 2012 Goat Estimated Herd
Percent, n=4.4 Million head



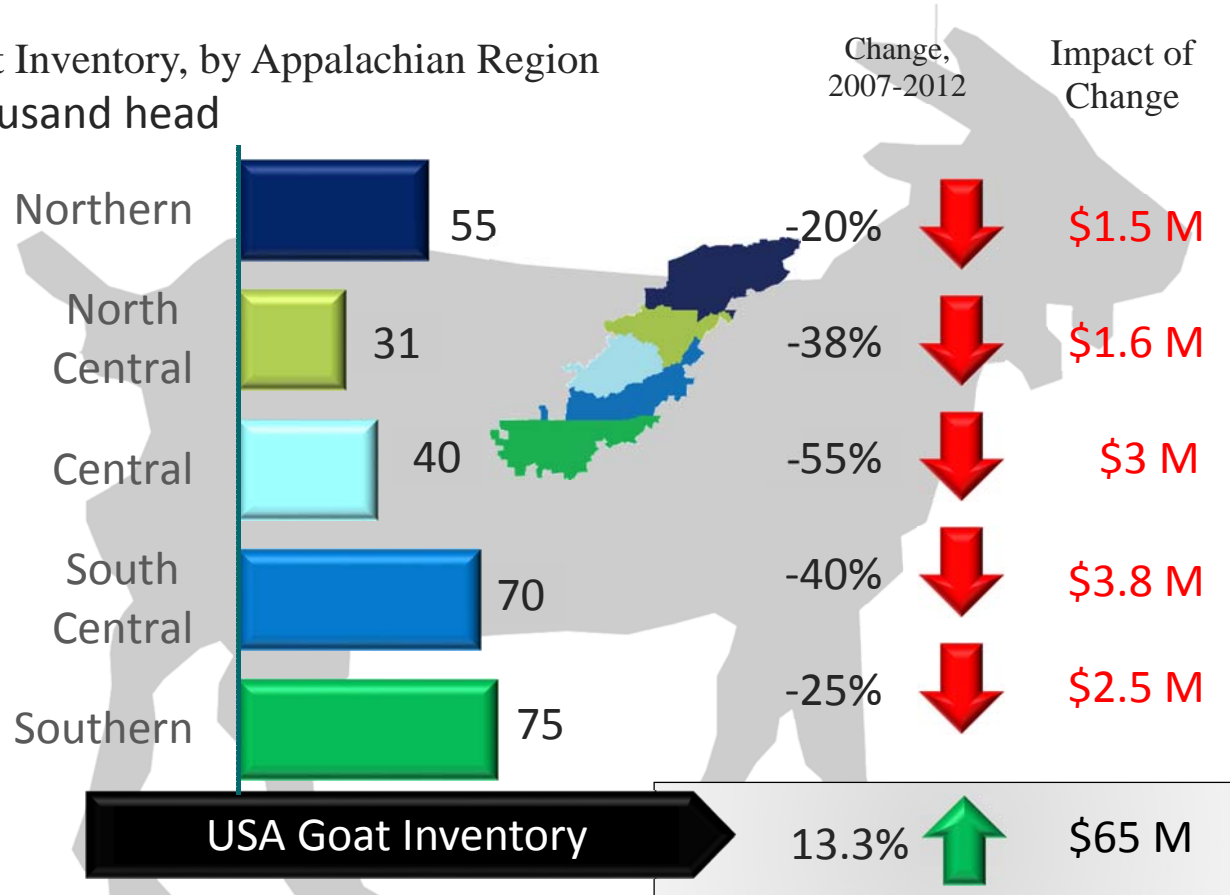
2012 Estimated Goat Herd, by Region
Thousand head



There are 18,171 farms with goats in Appalachia; the vast majority are small herds. Goat herds raised for meat, on average are 14 head, while herds which produce fiber and milk appear to be half this size.

ANIMAL ANALYSIS OF APPALACHIAN SUBREGIONS SPECIES – CAPRINE

Goat Inventory, by Appalachian Region
Thousand head

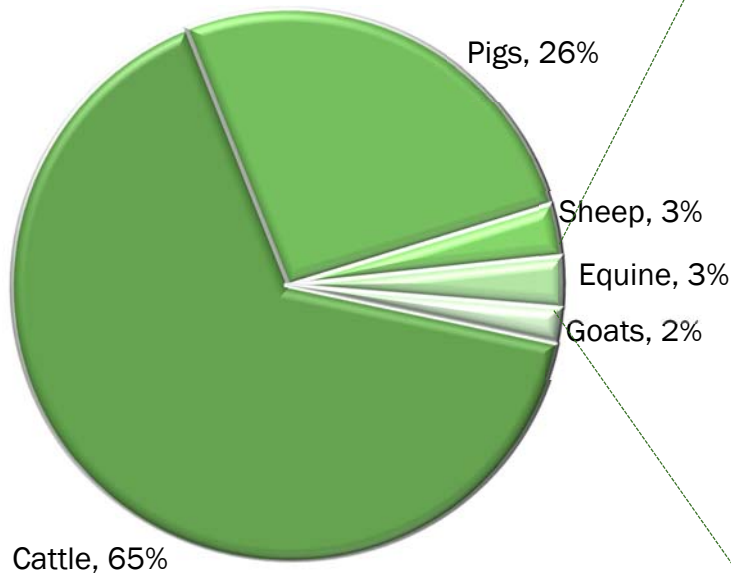


*Assumes 72 lb goat, \$187.67 cwt, spot
Source: CAHA Large Animal Model, August 2015

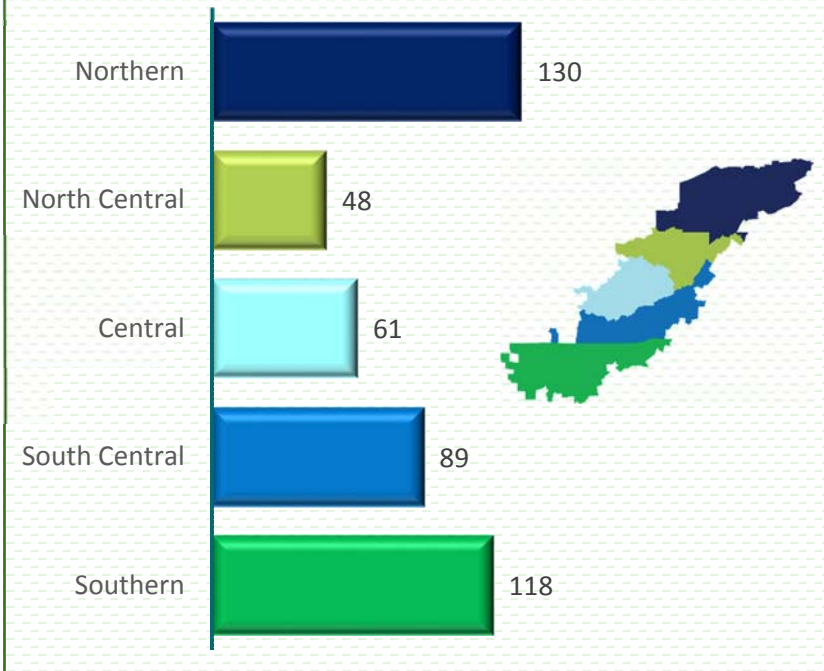
- 7.5% of the US goat herd is located in Appalachia.
- The Appalachia goat herd is valued at \$44 MM.
- Estimated production decreased annually by -6.8% and the inventory decrease by -33.6% between 2007 and 2012 which resulted in an estimated decrease in value of \$14 MM

ANIMAL ANALYSIS OF APPALACHIAN SUBREGIONS SPECIES – EQUINE

Appalachian 2012 Large Animal Estimated Herd
Percent, n=13.2 Million head

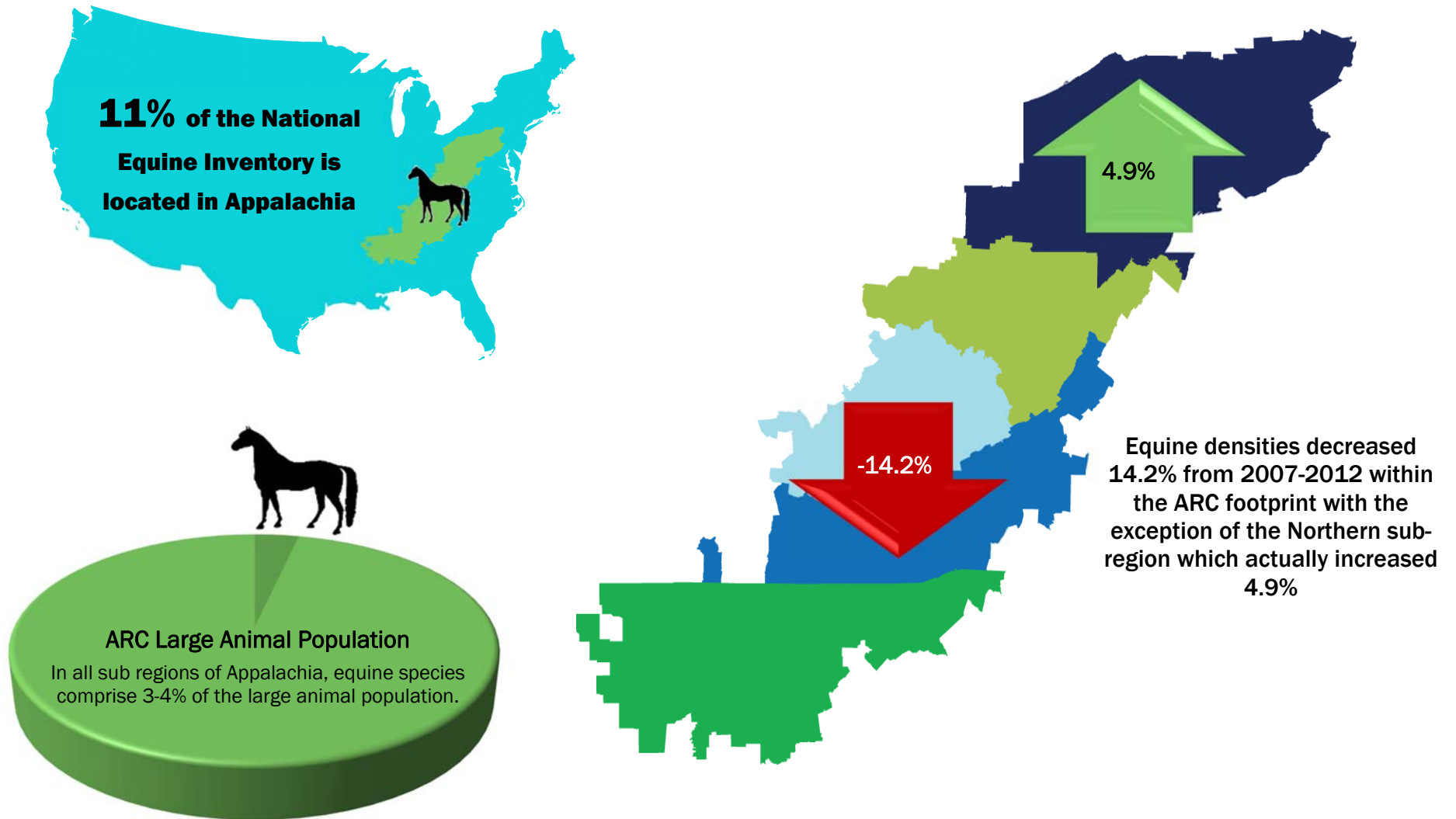


2012 Equine Inventory, by Region
Thousand head



Since the US Agricultural Census focuses on farm-based animals, it significantly under represents horses, ponies, mules, donkeys and burros in Appalachia. Comparable state surveys in Maryland and Kentucky found the equine herd to be 2.65 and 1.57 times, respectively, larger than the Agricultural census (Maryland Horse Industry Board, 2011; Kentucky Horse Council and University of Kentucky, 2013). However there isn't enough evidence to develop an estimating factor. Therefore equine inventory from the 2012 Census was used to estimate the Appalachian equine herd size and Large Animal herd size.

ANIMAL ANALYSIS OF APPALACHIAN SUBREGIONS SPECIES – EQUINE



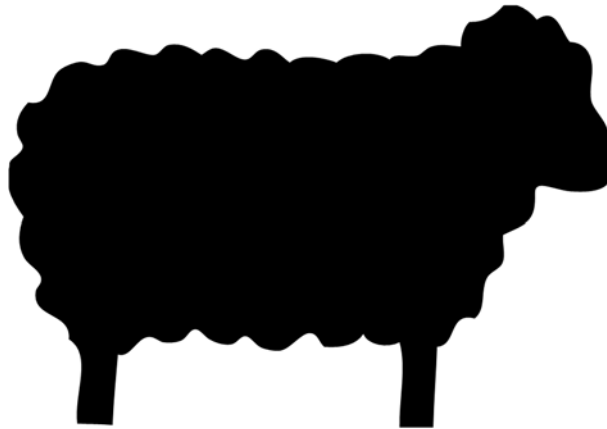
ANIMAL ANALYSIS OF APPALACHIAN SUBREGIONS SPECIES – OVINE

ESTIMATED HERD SIZE

2007-2012

USA  -2.5%

ARC  2.5%

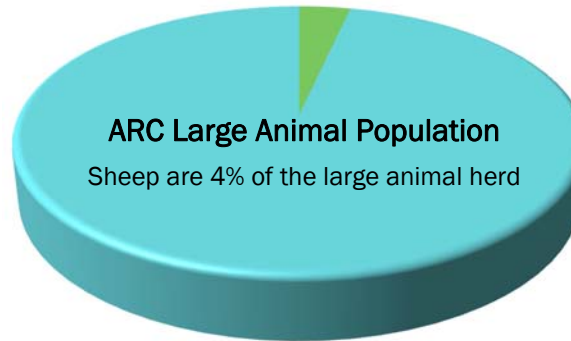


INVENTORY

2007-2012

USA  -8.5%

ARC  11.1%



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.

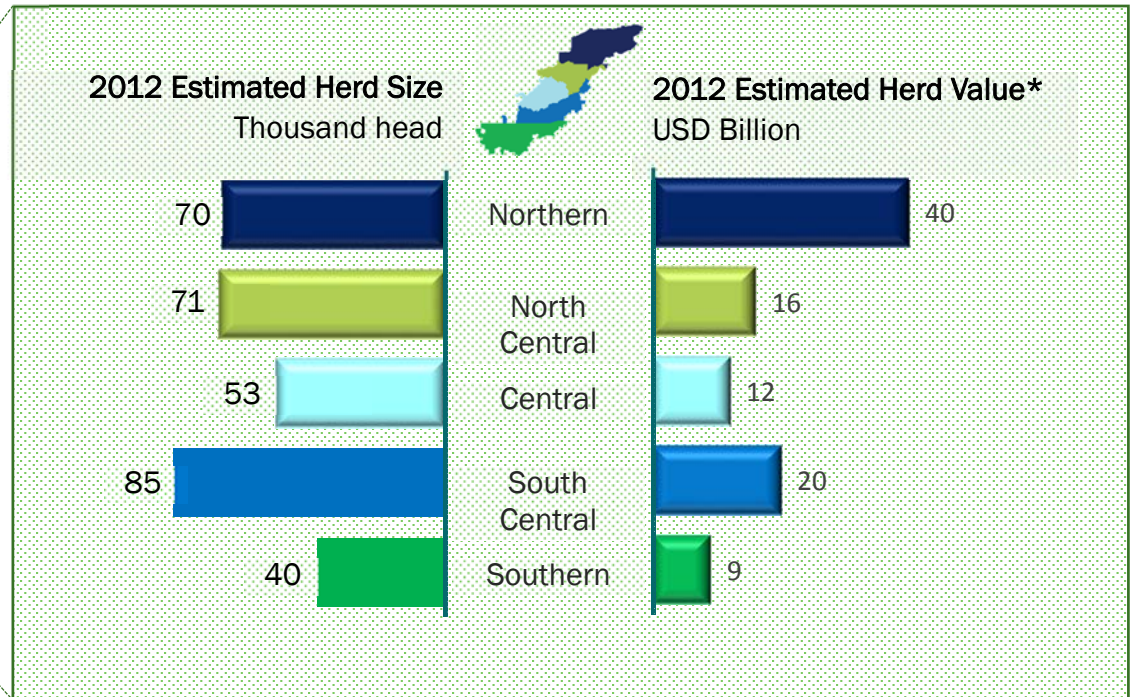
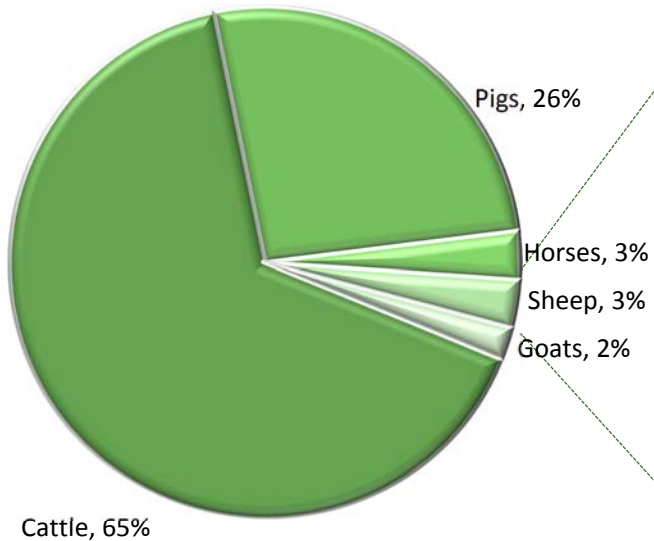
Within Appalachia, sheep estimated production increased annually by 2.5% from 2007 to 2012

In Northern Appalachia Sheep estimated value increased \$1 MM from 2007 to 2012.



ANIMAL ANALYSIS OF APPALACHIAN SUBREGIONS SPECIES – OVINE

Appalachian 2012 Large Animal Estimated Herd Size
Percent, n=13.7 Million head

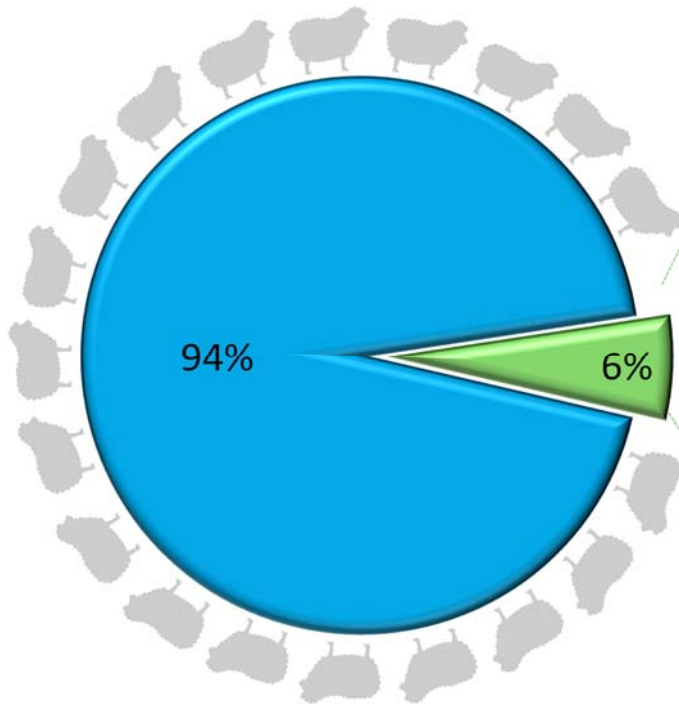


SHEEP ARE IMPORTANT. Estimated Herd Size data indicate that over 418,519 sheep are valued at \$97.7 million for the whole ARC footprint. The Northern and South Central regions contribute the most to the sheep flock value.

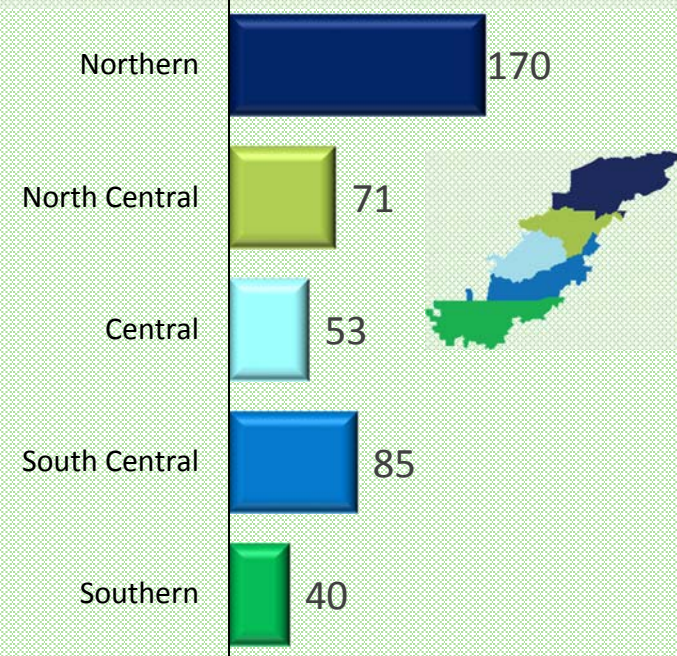
ANIMAL ANALYSIS OF APPALACHIAN SUBREGIONS SPECIES – OVINE

Comparison of US and Appalachian Sheep Inventory vs. Distribution of Sheep by Region

US 2012 Sheep Estimated Herd
Percent, n=7.5 Million head

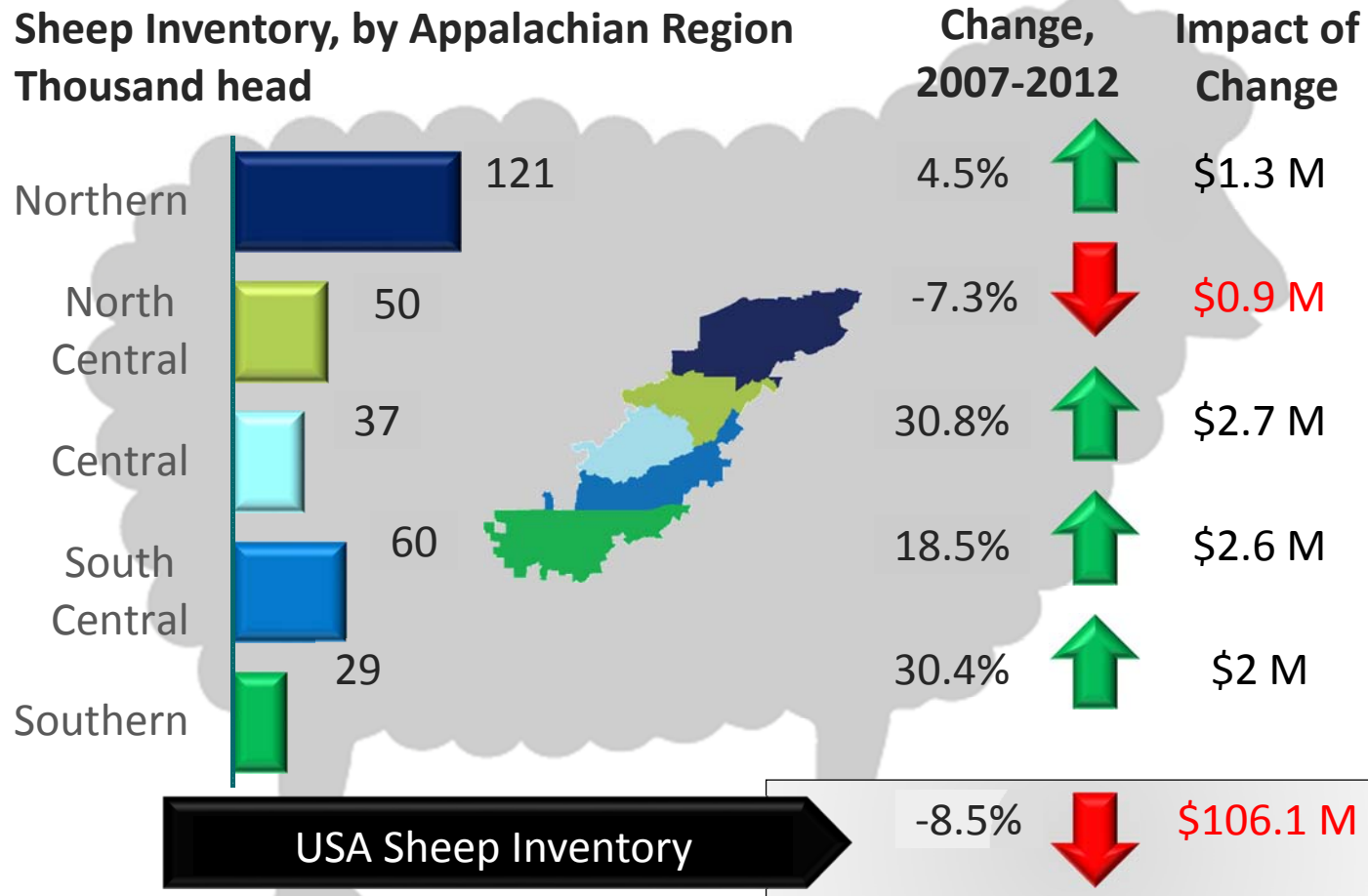


2012 Estimated Sheep Herd, by Region
Thousand head



- There are 9,362 farms with flocks of sheep in Appalachia.
- 41% of the sheep flocks which are located in the Northern region. The number and size of the flocks are growing in Appalachia. There are 7 very large (<1000) flocks, but most of them (94%) are less than 100 head; 68% have less than 50 animals.

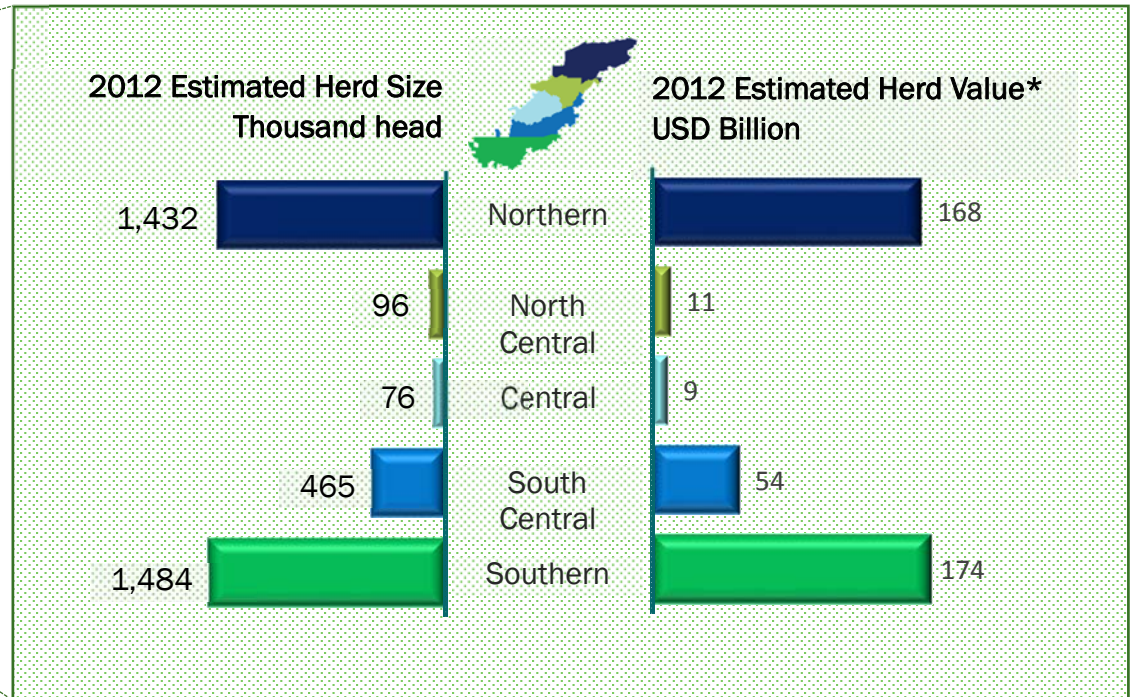
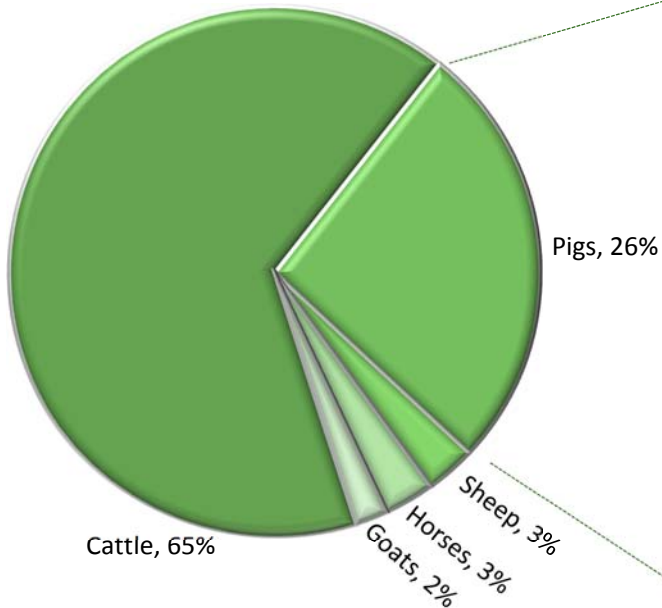
ANIMAL ANALYSIS OF APPALACHIAN SUBREGIONS SPECIES – OVINE



- 5.5% of the US sheep herd is located in Appalachia
- The Appalachia herd is valued at \$98 MM. Between 2007 and 2012, the inventory increased by 11.1%. We estimate production increased by an estimated 2.5% annually and the value increased \$9 MM during the same period.

ANIMAL ANALYSIS OF APPALACHIAN SUBREGIONS SPECIES – PORCINE

Appalachian 2012 Large Animal Estimated Herd Size
Percent, n=13.7 Million head

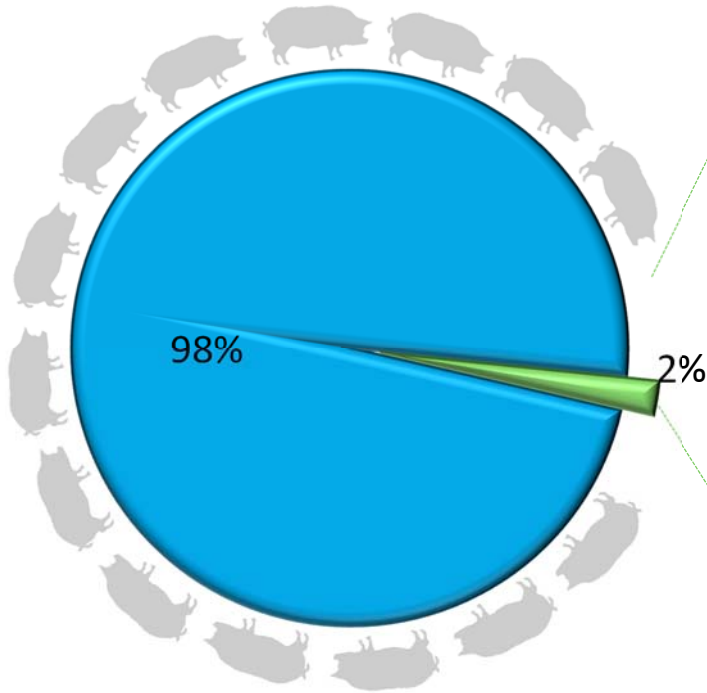


- Pigs are important to Appalachia
- n estimates 3.5 million pigs are located in Appalachian counties at an estimated value of \$415 million.
- 82% of the Appalachia pigs are within the Northern and Southern subregions.

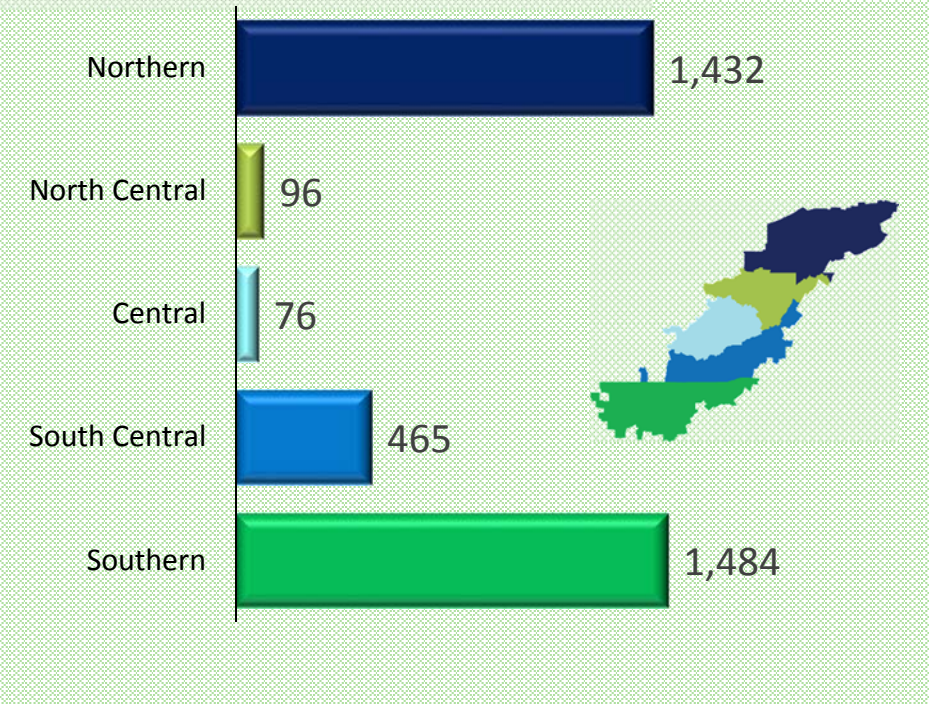
ANIMAL ANALYSIS OF APPALACHIAN SUBREGIONS SPECIES – PORCINE

Comparison of US and Appalachian Pig Inventory vs. Distribution of Pig by Region

US 2012 Pig Estimated Herd
Percent, n=179 Million head



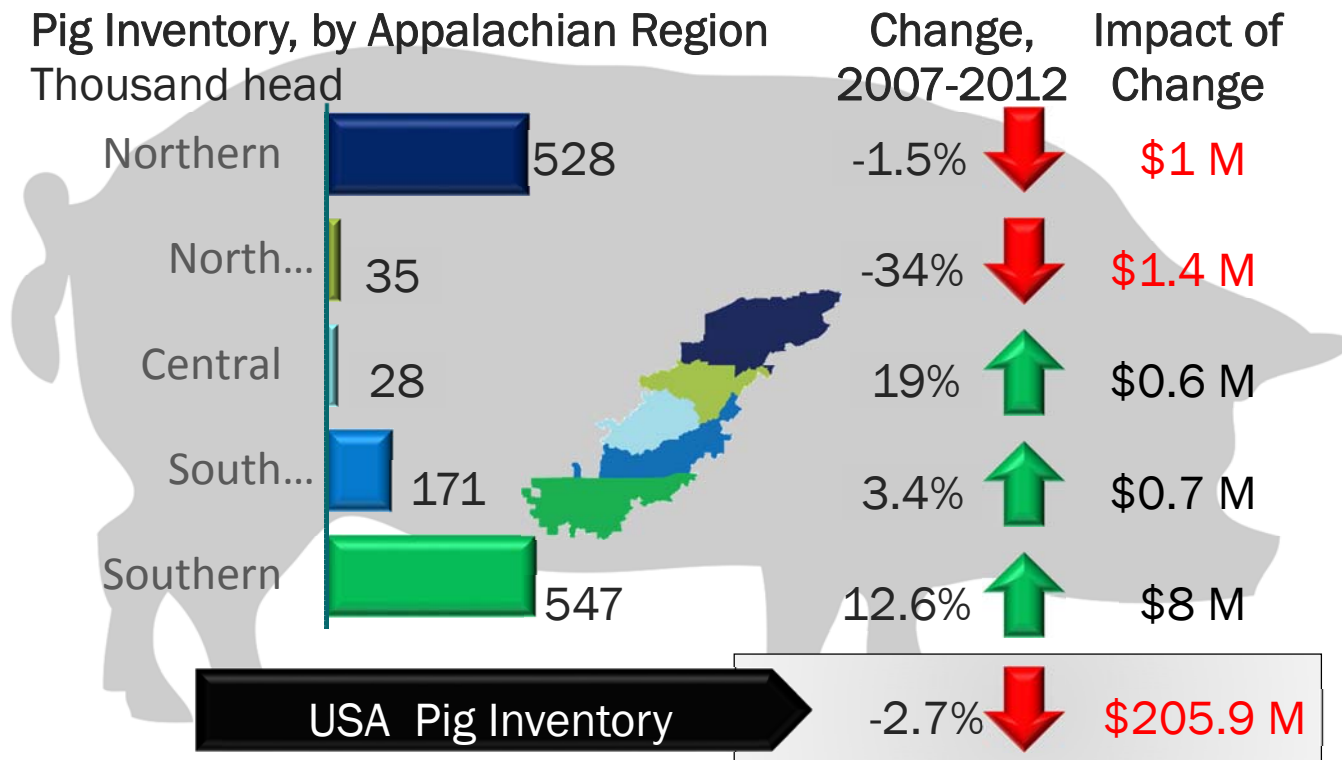
2012 Estimated Pig Herd, by Region
Thousand head



There are 7,771 farms raising pigs in Appalachia, 45% of which are located in the Northern region. Only 230 farms manage more than 1,000 head; most herds (86%) have less than 24 swine.

ANIMAL ANALYSIS OF APPALACHIAN SUBREGIONS SPECIES – PORCINE

Comparison of US and Appalachian Pig Inventory, Change in Inventory and Estimated Impact of Change



*Assumes 300 lb hog, \$39 cwt, contract
Source: CAHA Large Animal Model, August 2015

- 2% of the US pig herd is located in Appalachia
- US pig inventory decreased 2.7% over the past 5 years. In Appalachia pig inventory increased 4.6% over the past 5 years.
- The Appalachian pig herd is valued at \$7.7 B. Between 2007 and 2012, estimated production increased annually by 2.4% resulting in an inventory increase of 4.6%, and value increase of \$686

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

CAHA partnered with two nationally recognized research centers, the National Center for the Analysis of Healthcare Data (NCAHD), which is affiliated with the Virginia College of Osteopathic Medicine and the National Center for Rural Works, which is on the campus of Oklahoma State University. Together, we created an innovative rural mixed animal (large and small animal) practice model that illustrates the actual economic impact of veterinary practices within their communities and upon the state's economy. Additionally, we garnered 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 unique methodology may be applied to other rural areas in the USA. Additionally, our economic model reflects not only the direct impacts a veterinarian (e.g. financial and employment) but also the secondary impacts resulting from his practice.

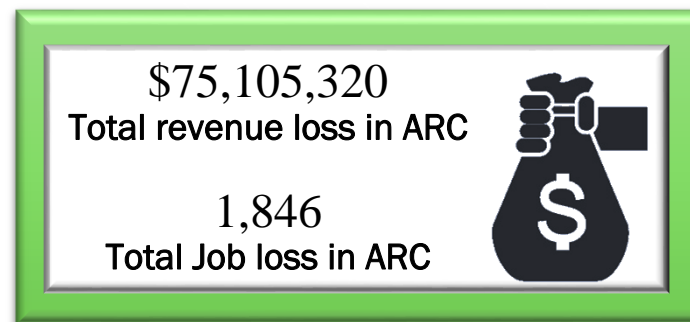
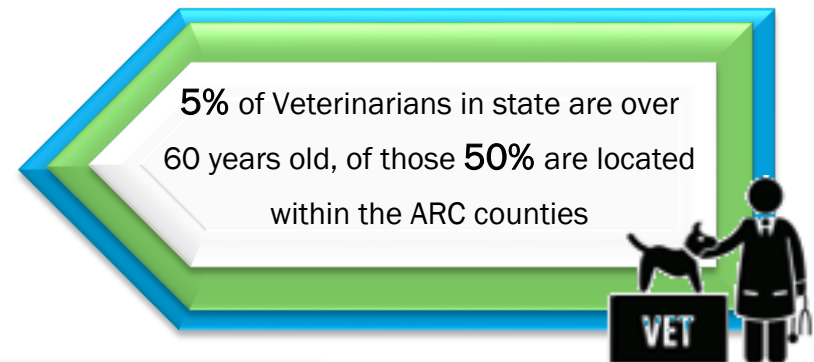
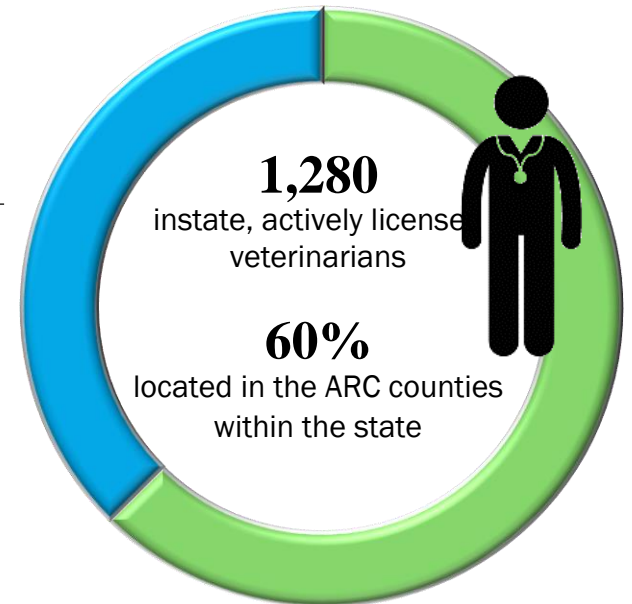
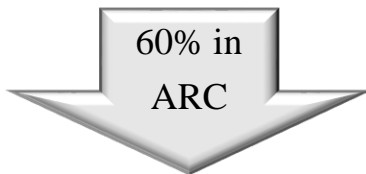
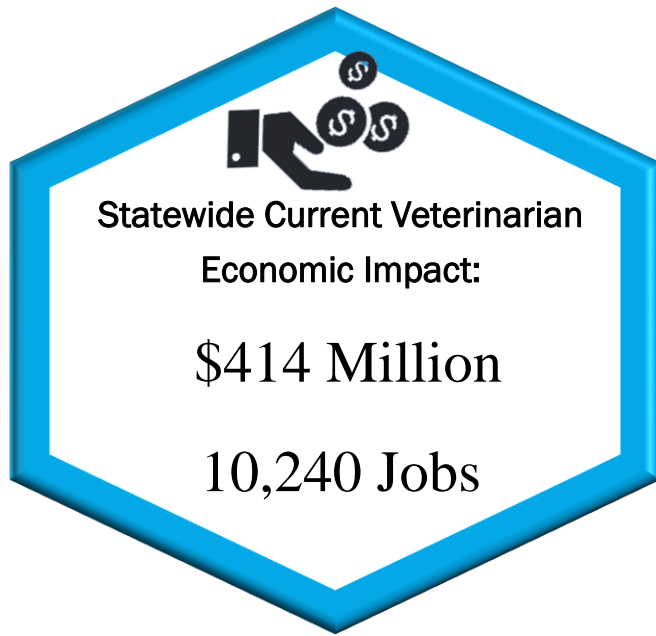
Our next step was to generate animal densities for both small and large animals by county. Based upon the USDA 2012 Agriculture Census, we derived the volume of animals in a county needing veterinary care annually.

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 these 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.

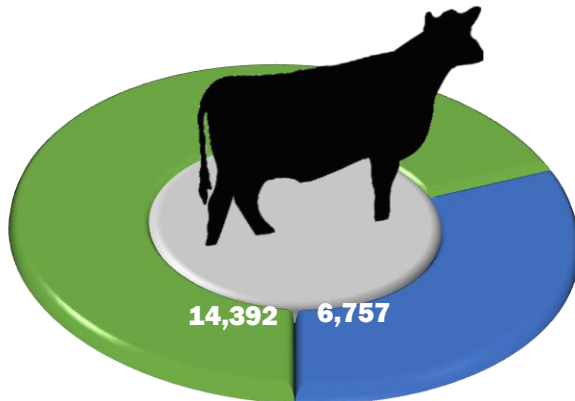
Once the animal densities were generated, the veterinary FTE need was calculated by applying animal ratios identified in the literature and developed through expert interviews and panels, thus deriving a total FTE veterinarian need for each county. Licensure data was utilized to determine the distribution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

STATE ANALYSIS OF APPALACHIA- ALABAMA

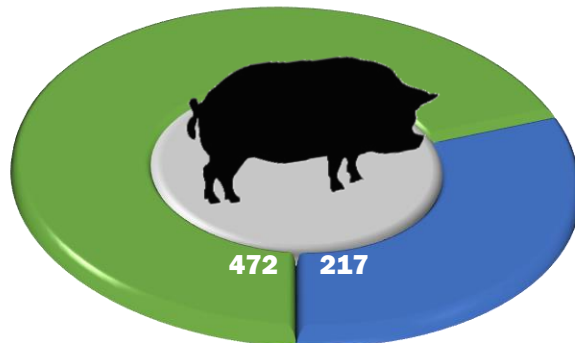


STATE ANALYSIS OF APPALACHIA – ALABAMA

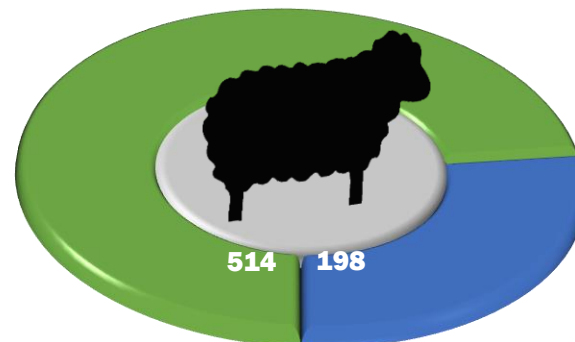
Alabama Farms by Type of Herd 2012



Total # of farms = 21,149



Total # of farms = 689

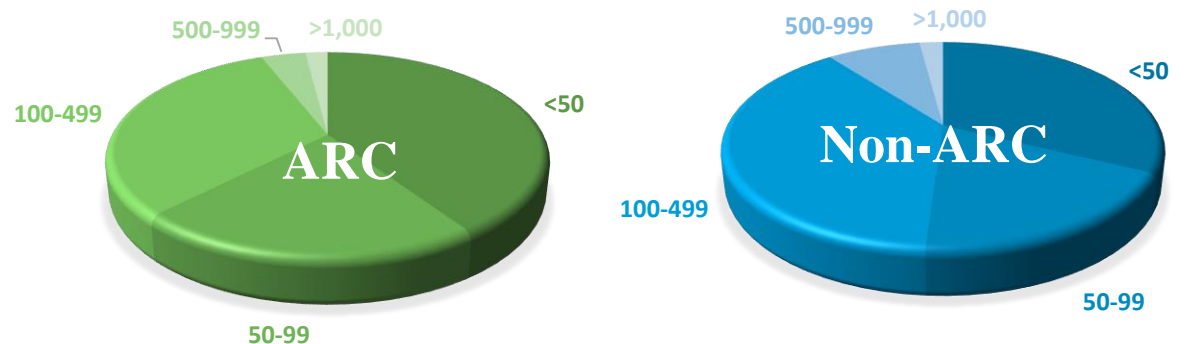


Total # of farms = 712

FARMS and FARMLAND

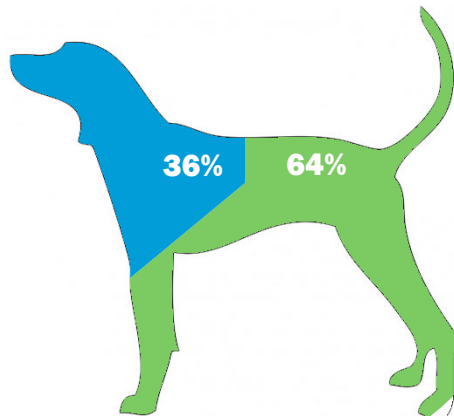
- Alabama ARC has the majority of farms and livestock for the state.
- Alabama covers about 32 million acres, 51% of this falls within ARC; 27% of that is land in farms.
- There are more than 43 thousand farms in Alabama, 64% are located in ARC; 41% of those farms are less than 50 acres.
- From 2007-2012 the average size of individual cattle herds in Alabama ARC grew larger, still 75% of the farms have herds ≤ 50 head
- 472 farms in ARC maintain a pig herd, 81% of which run less than 25 head.
- Of the 514 farms with sheep in Alabama ARC, 94% manage less than 100 animals.
- Within ARC counties, farms tend to be smaller than those located in non-ARC counties.

Alabama Farms by Number of Acres (Percent)

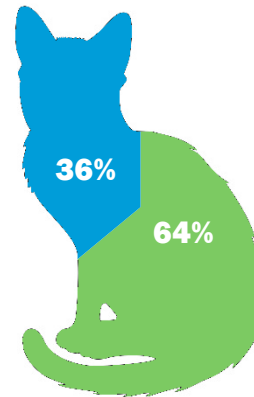


STATE ANALYSIS OF APPALACHIA- ALABAMA

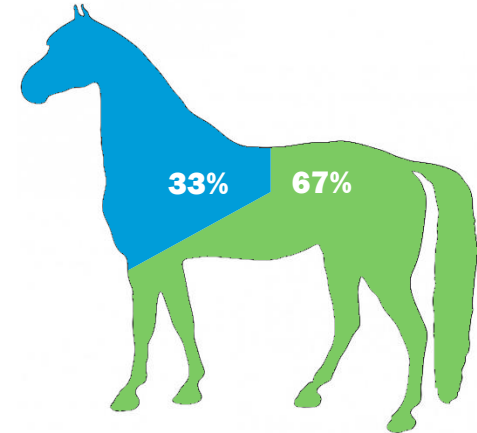
Species Distributions



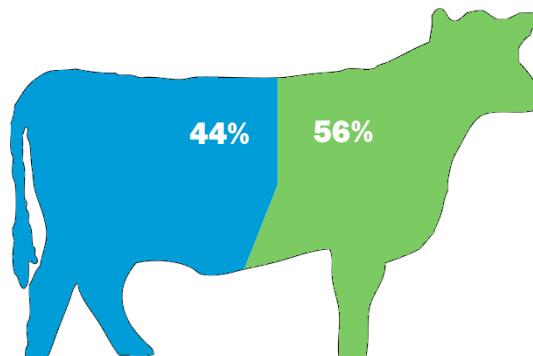
Total Estimated Number of Dogs =
1,450,519



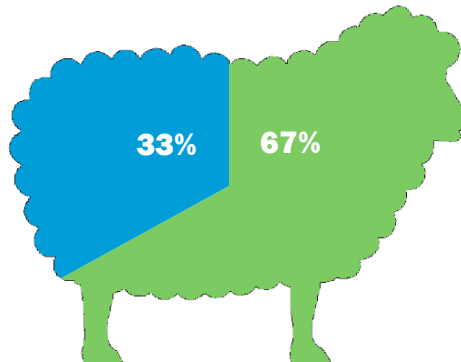
Total Estimated Number of Cats =
1,280,978



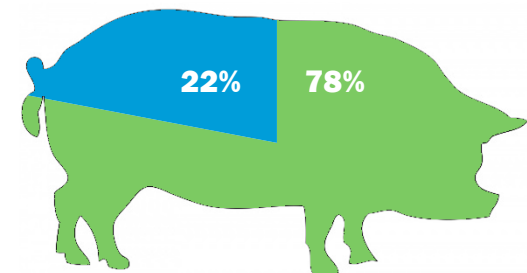
Total Estimated Number of Horse,
Mule & Donkey = 75,108



Total Estimated Number of
Cattle* = 1,689,189



Total Estimated Number of Sheep
& Goat* = 93,680



Total Estimated Number of Pig* =
386,880

 Non-ARC  ARC

*estimated herd size

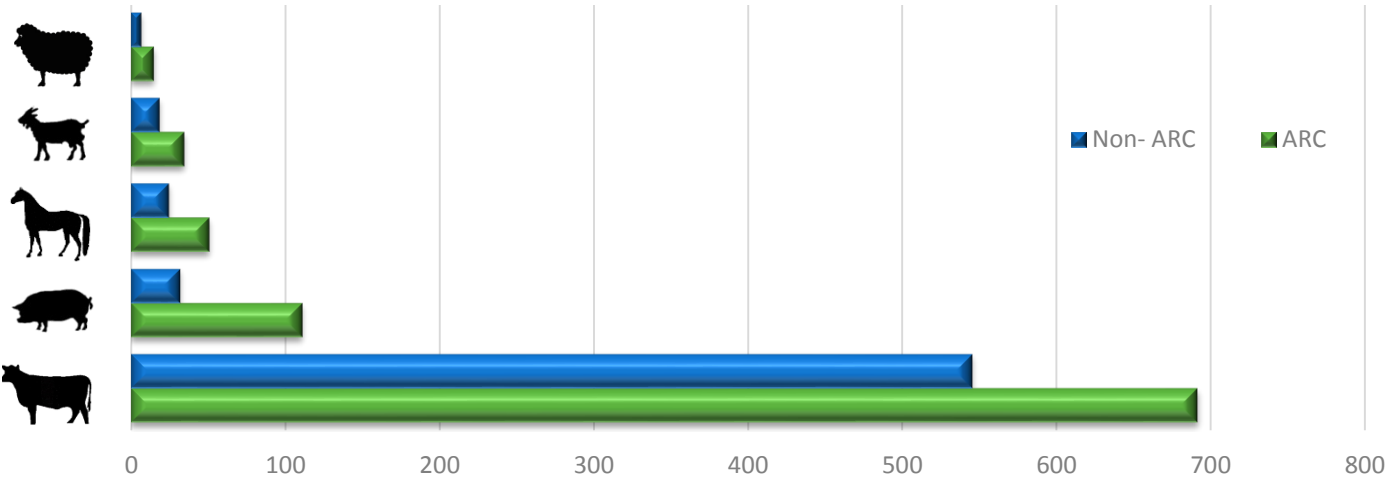
STATE ANALYSIS OF APPALACHIA – ALABAMA

State LA Inventory
CAGR,
2007-12



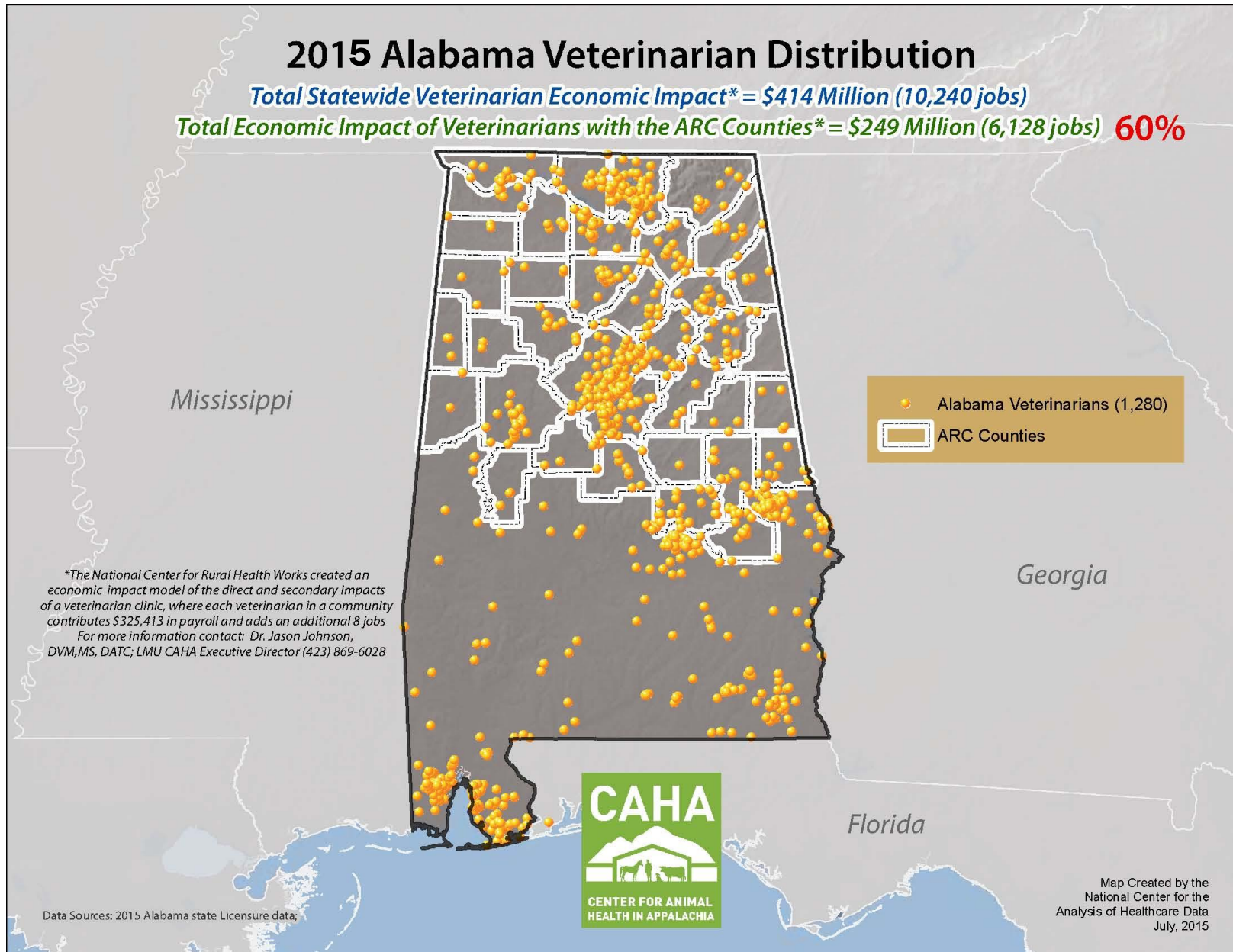
Alabama Large Animal Inventory 2012

Thousand head

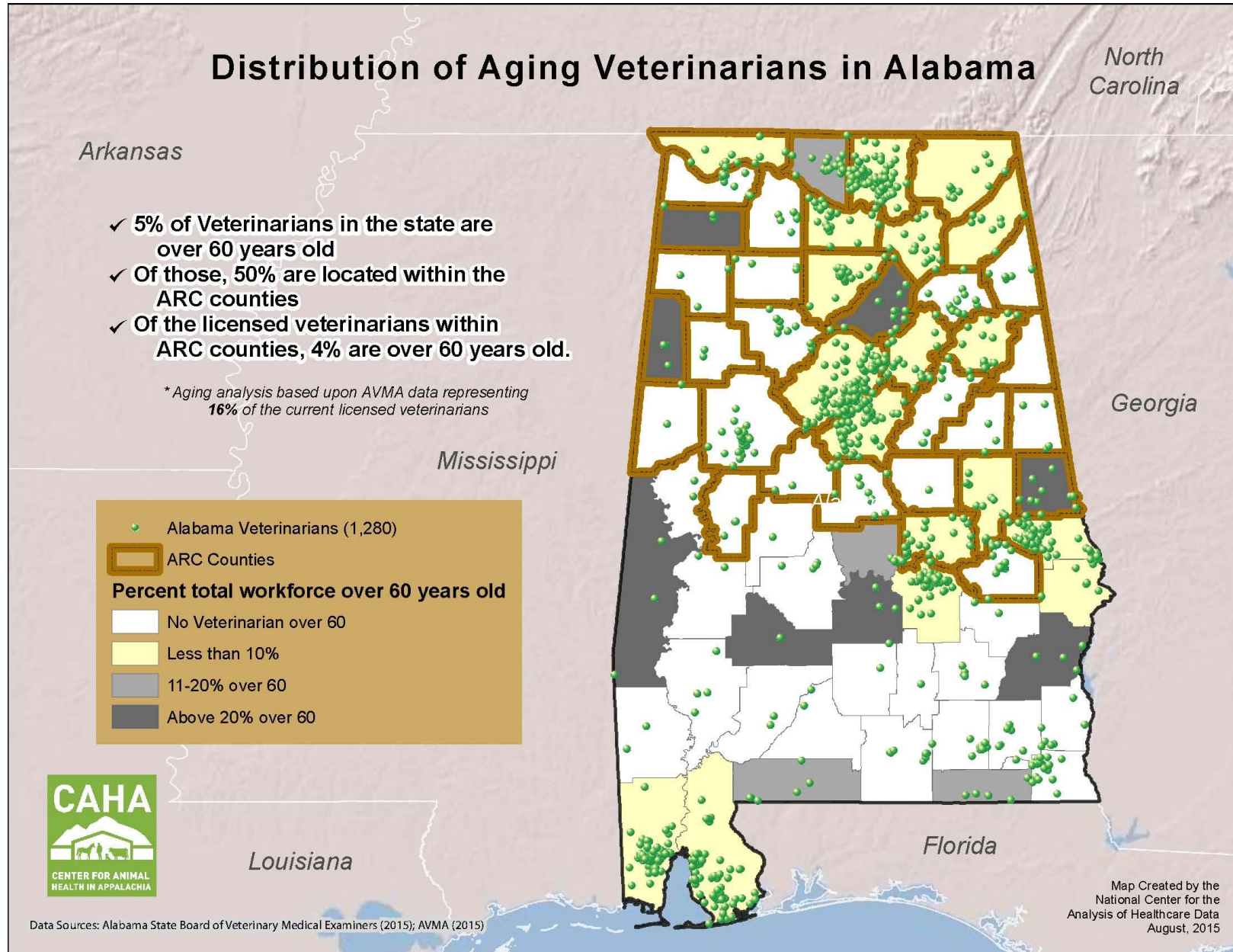


- Large animals are important to Alabama ARC.
- 59% of the large animal inventory is located in Alabama ARC.
- Cattle are growing faster outside of Alabama ARC than inside (CAGR 1.2% vs 0.9%).
- 78% of the swine are located in ARC counties; the decline in the pig inventory was stronger in non-ARC counties (CAGR -8.3% vs -4.5%).
- Nearly 70% of the sheep herd is located in ARC counties; this portion is growing faster (CAGR 8.9%) than the rest of the state (CAGR -0.1%).
- 65% of the goat herd is located in ARC counties and it was hit harder by the decline in goats than the rest of the state (CAGR -10.6% vs. -8.9%).

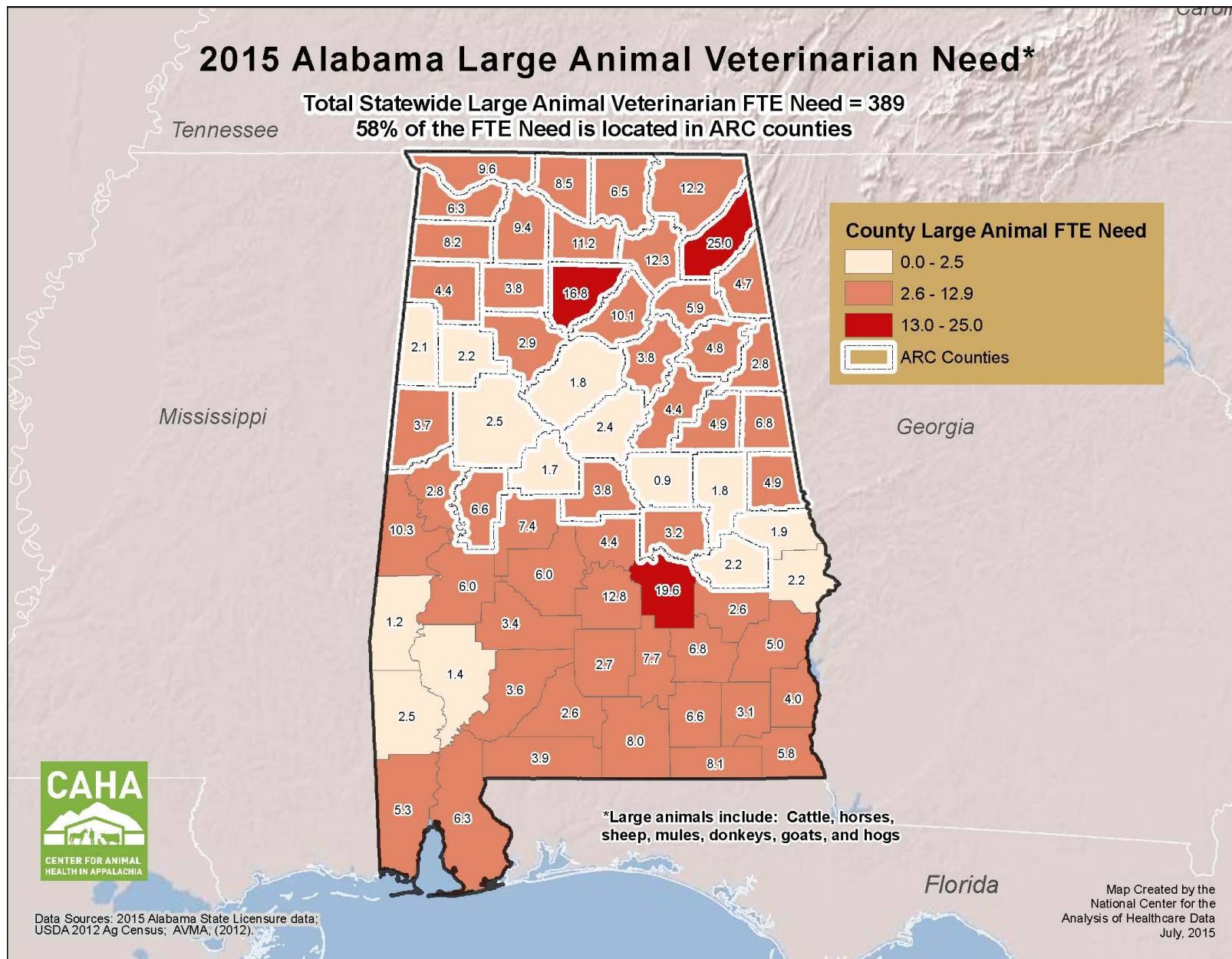
STATE ANALYSIS OF APPALACHIA- ALABAMA



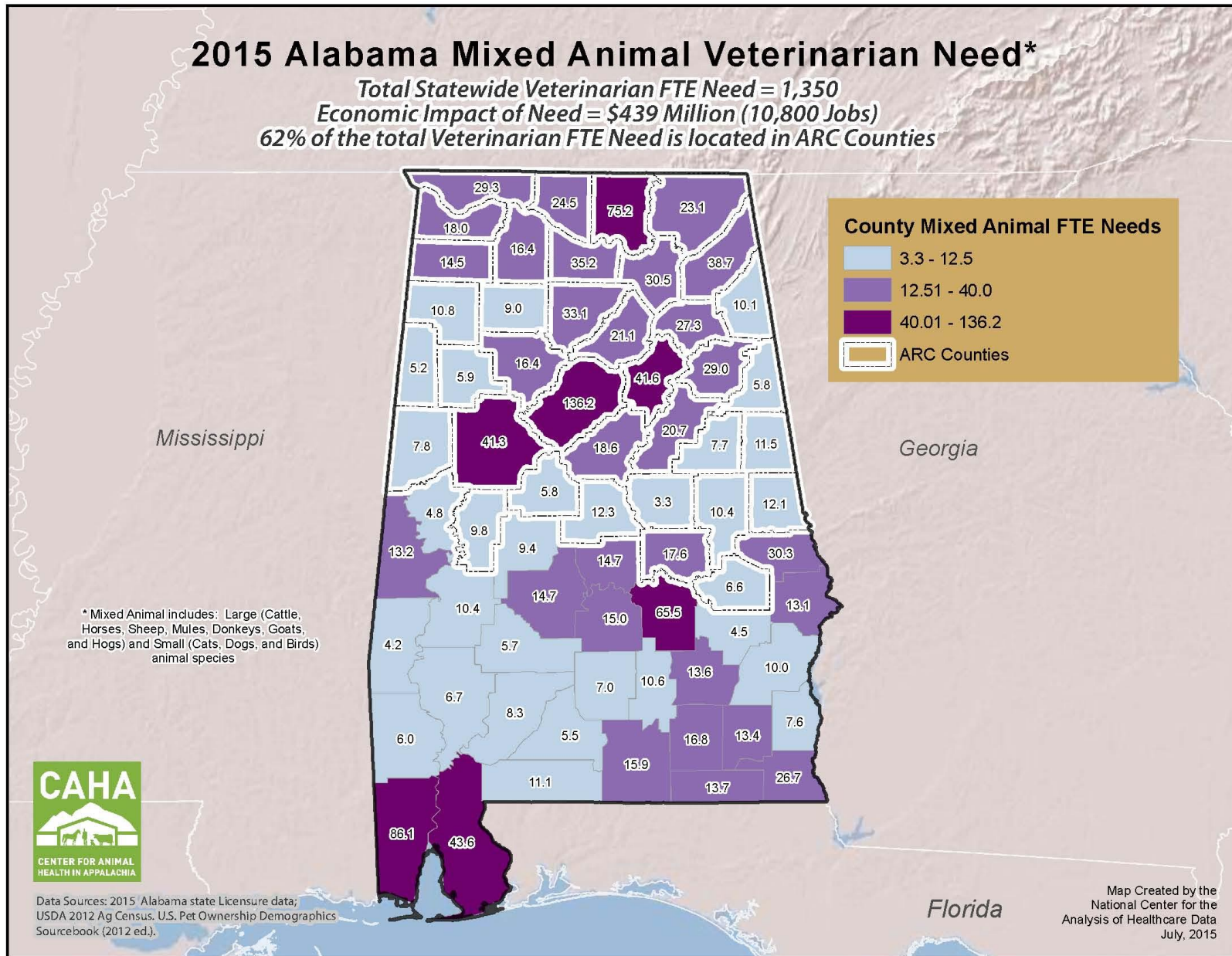
STATE ANALYSIS OF APPALACHIA – ALABAMA



STATE ANALYSIS OF APPALACHIA – ALABAMA



STATE ANALYSIS OF APPALACHIA – ALABAMA



STATE ANALYSIS OF APPALACHIA – ALABAMA

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

- ✓ Total Statewide Veterinarian FTE Need = 1,350
- ✓ Total Practicing Veterinarians = 1,280
- ✓ Total Statewide Veterinarian FTE Shortage = 70

- ✓ ARC region Veterinarian FTE Need = 842
- ✓ ARC region Practicing Veterinarians = 766
- ✓ ARC region Veterinarian FTE Shortage = 76

The economic impact of the state's shortage of veterinarians is**:

Total Revenue loss = \$22.8 Million (Total Veterinarian shortage times average payroll**
70 X \$325,413)

AND

Total Job Loss = 560 (70 X 8 jobs**)

Mixed Animal FTE Analysis by County

- Greater than 1.0 FTE Veterinarian Shortage
- Meeting Total Veterinarian Needs
- Greater than 1.0 FTE Veterinarian Surplus
- ARC Counties

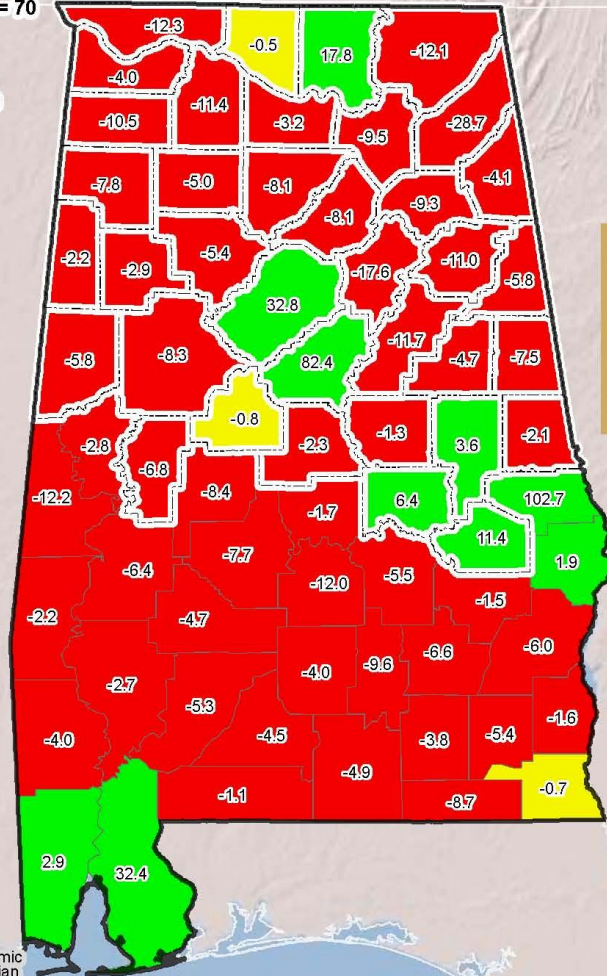
* Mixed Animal includes: Large (Cattle, Horses, Sheep, Mules, Donkeys, Goats, and Hogs) and Small (Cats, Dogs, and Birds) animal species



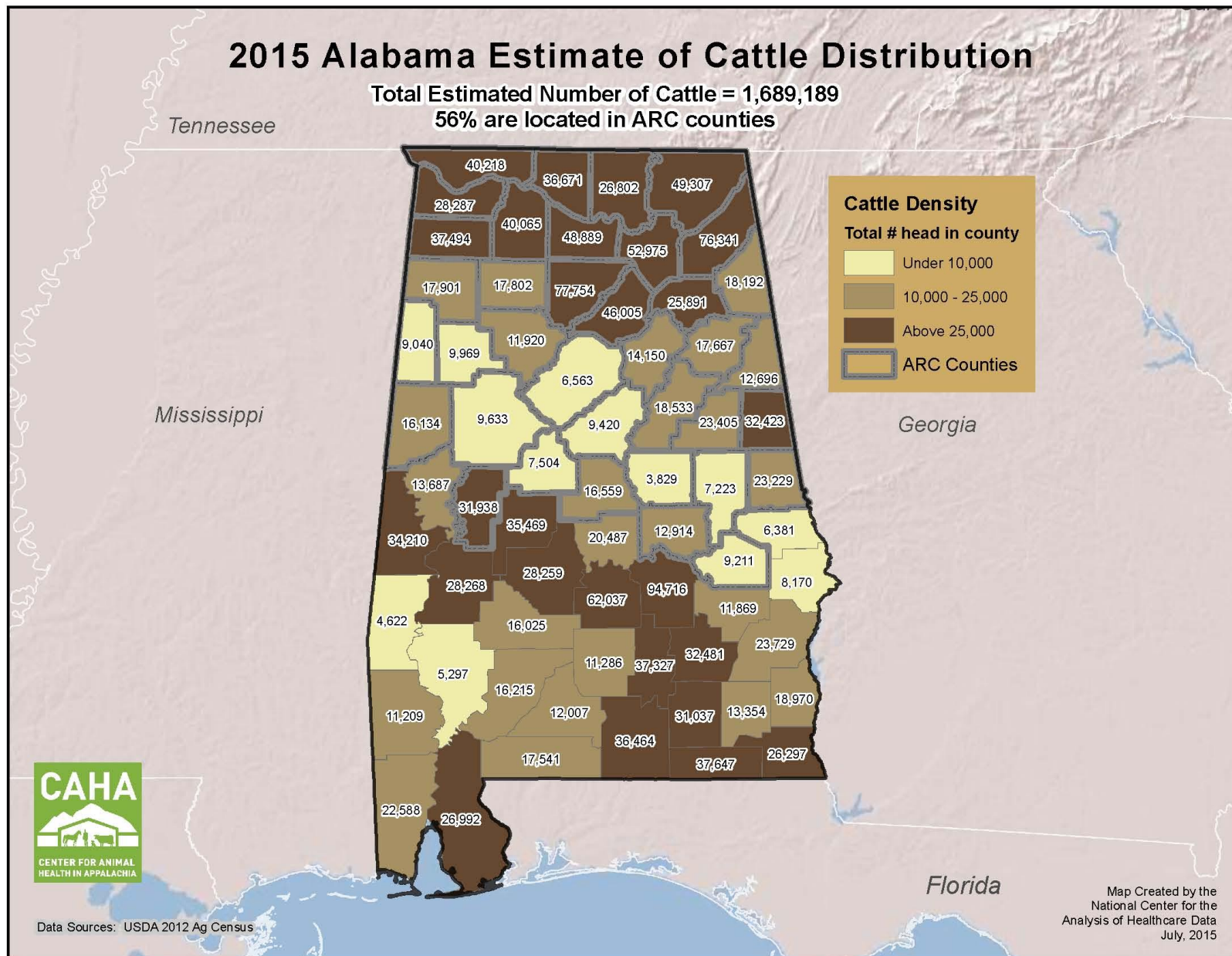
Data Sources: 2015 Alabama State Licensure data; USDA 2012 AgCensus; AVMA, (2012). U.S. Pet Ownership Demographics Sourcebook (2012 ed.).

**The National Center for Rural Health Works created an economic impact model of the direct and secondary impacts of a veterinarian clinic. For more information contact: Dr. Jason Johnson, DVM, MS, DTAC; CAHA Executive Director (423) 869-6028

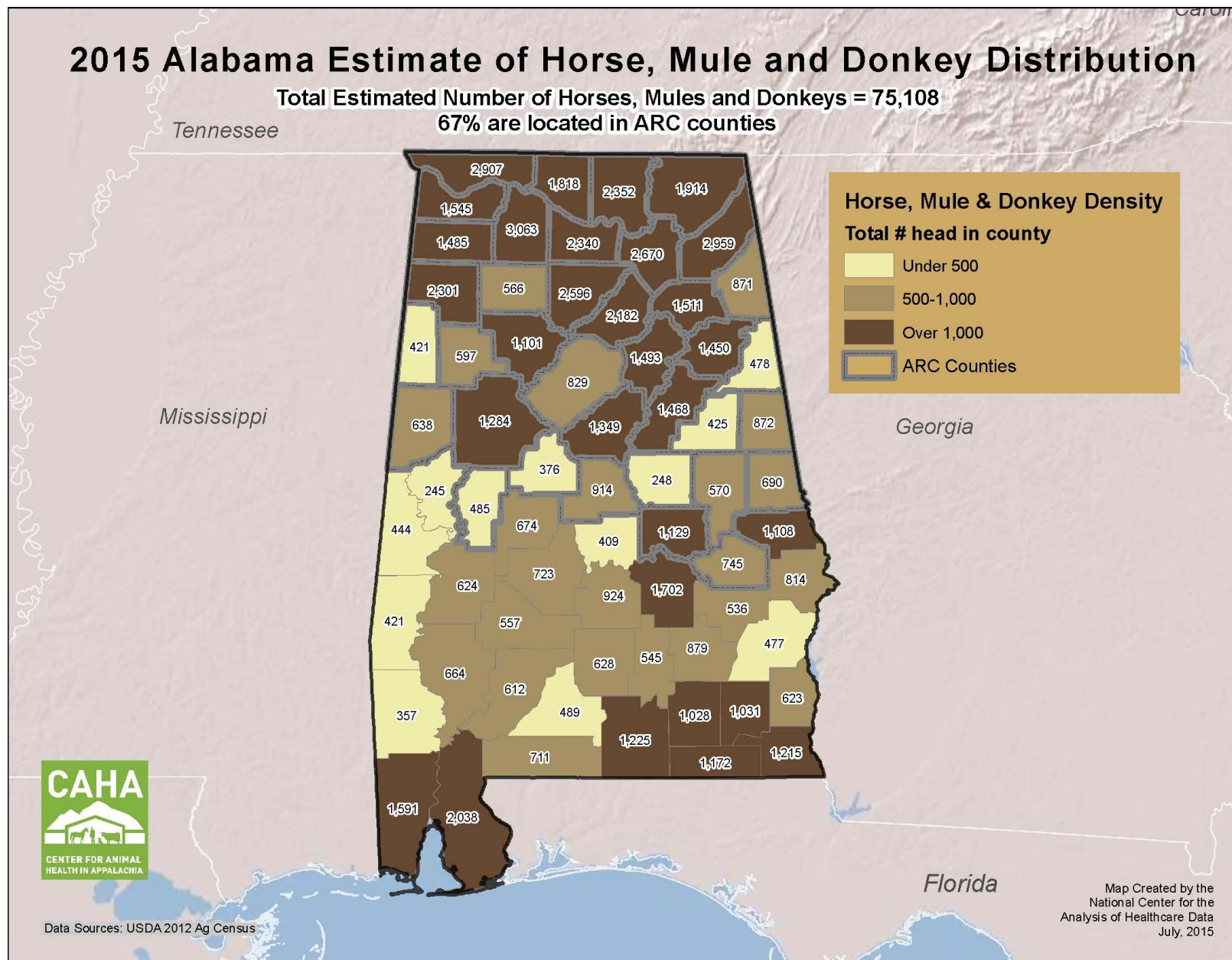
Map Created by the National Center for the Analysis of Healthcare Data July, 2015



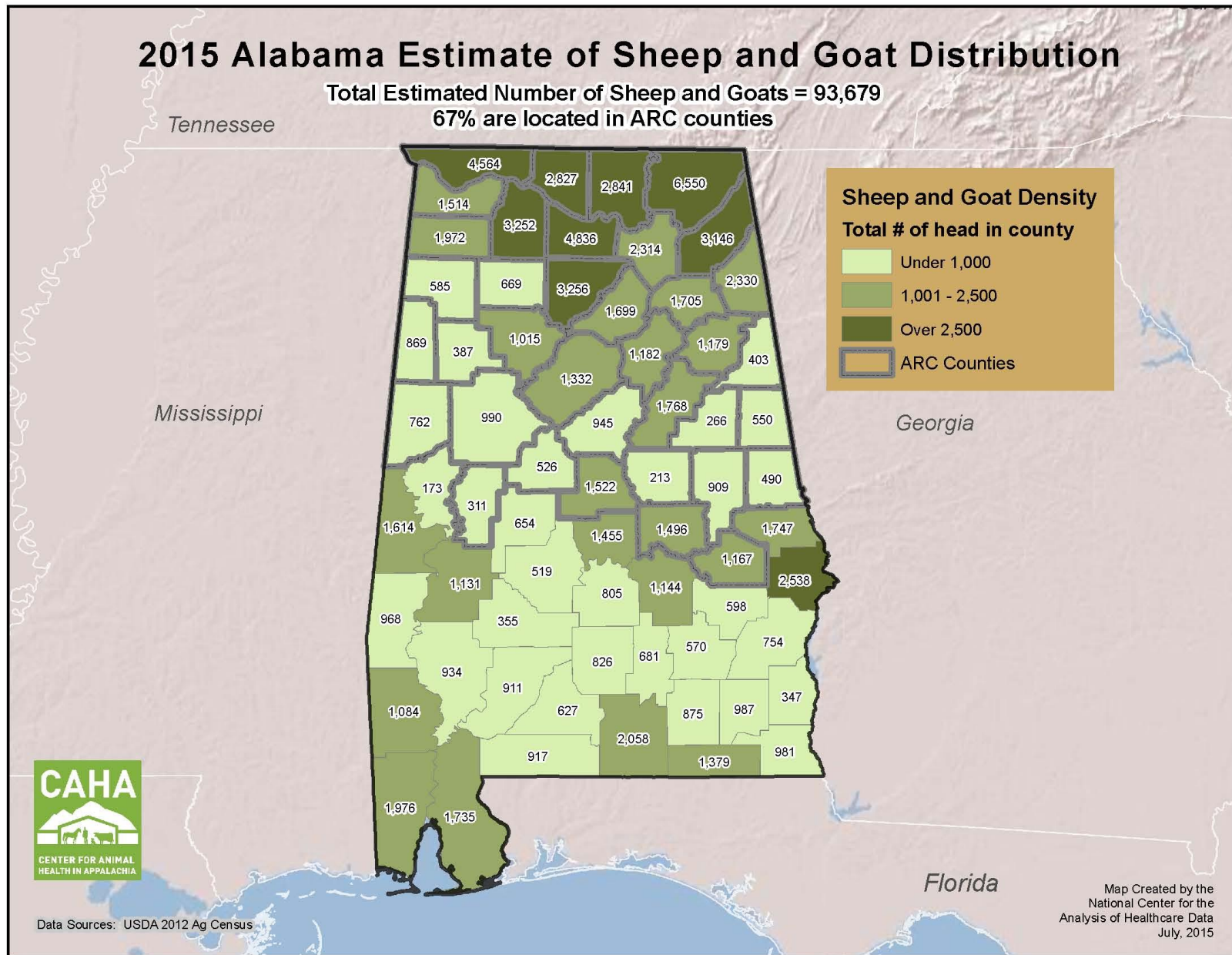
STATE ANALYSIS OF APPALACHIA – ALABAMA



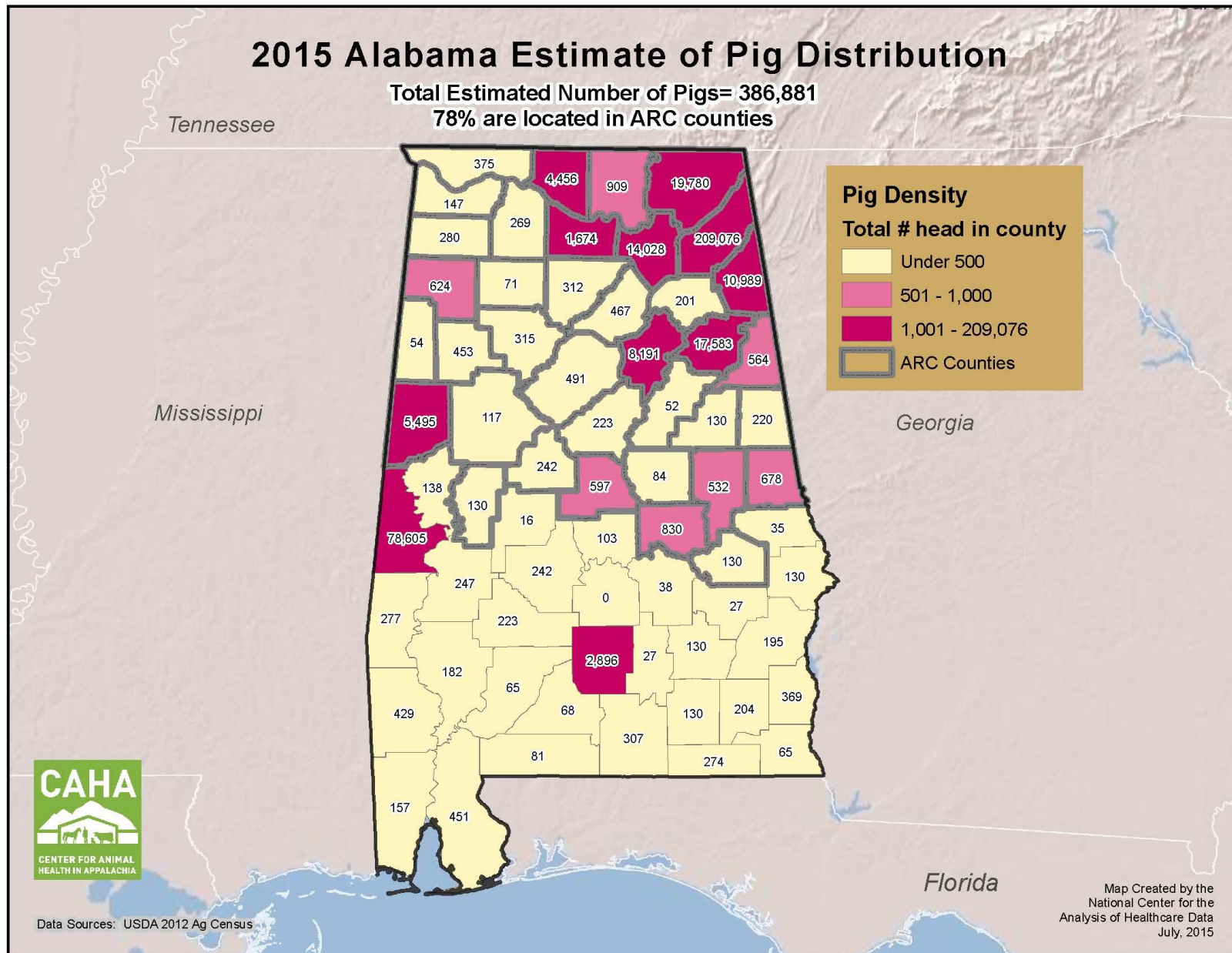
STATE ANALYSIS OF APPALACHIA – ALABAMA



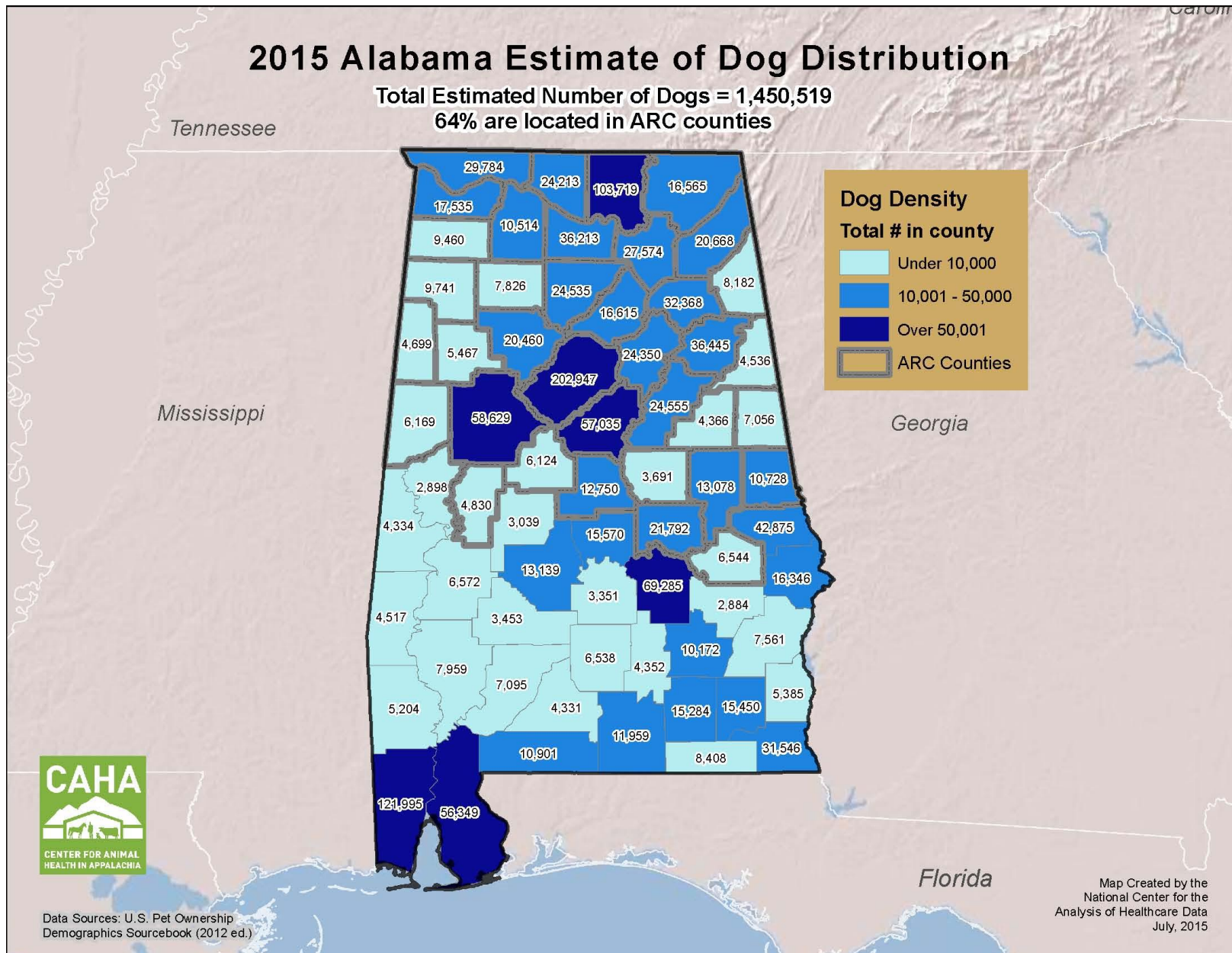
STATE ANALYSIS OF APPALACHIA – ALABAMA



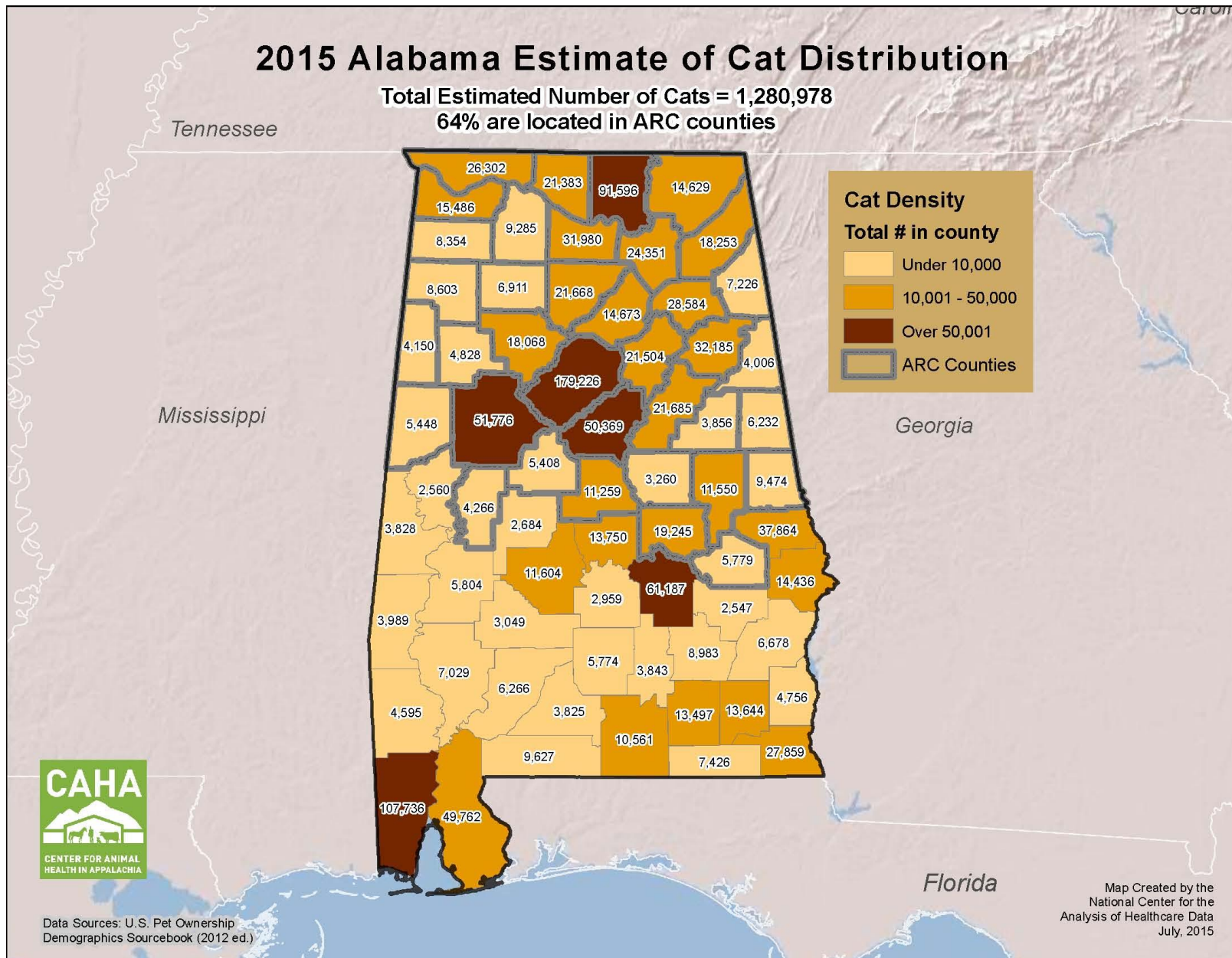
STATE ANALYSIS OF APPALACHIA – ALABAMA



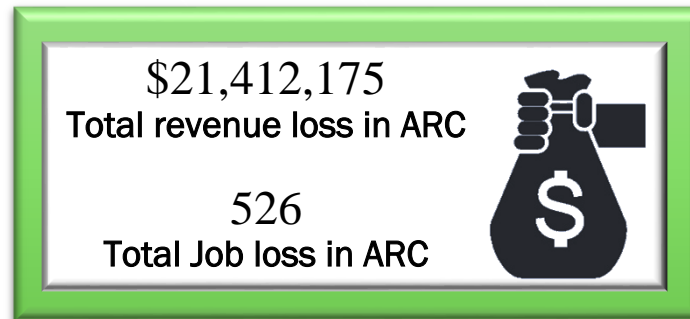
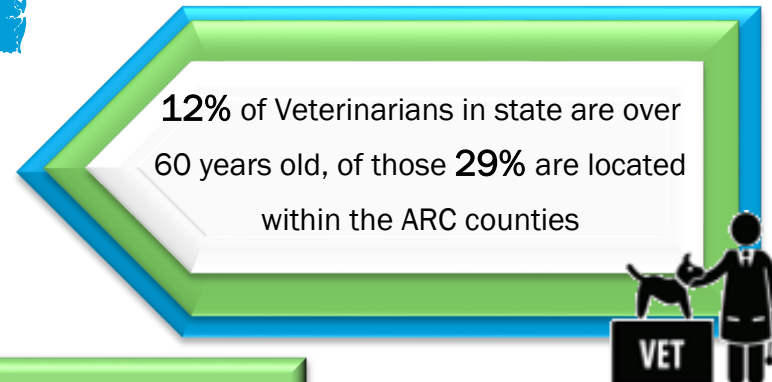
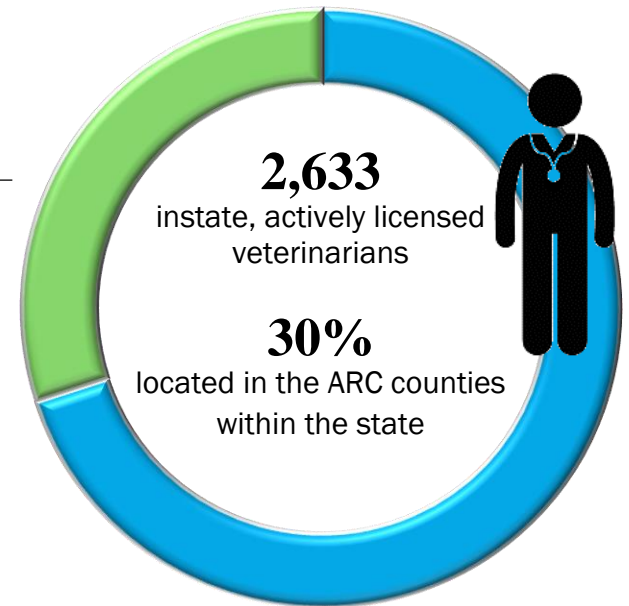
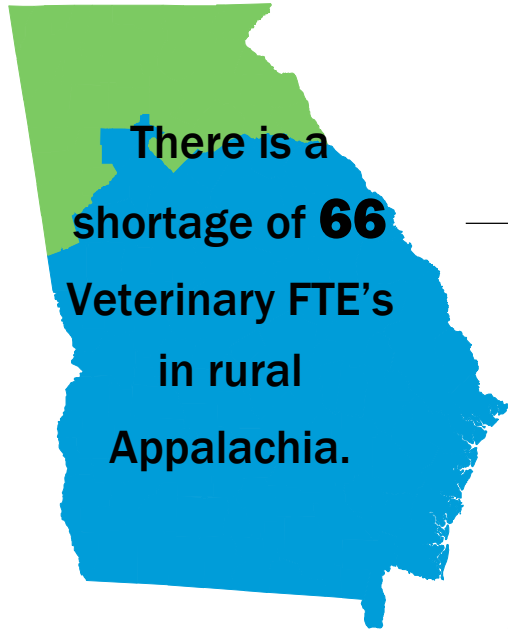
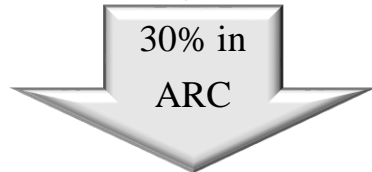
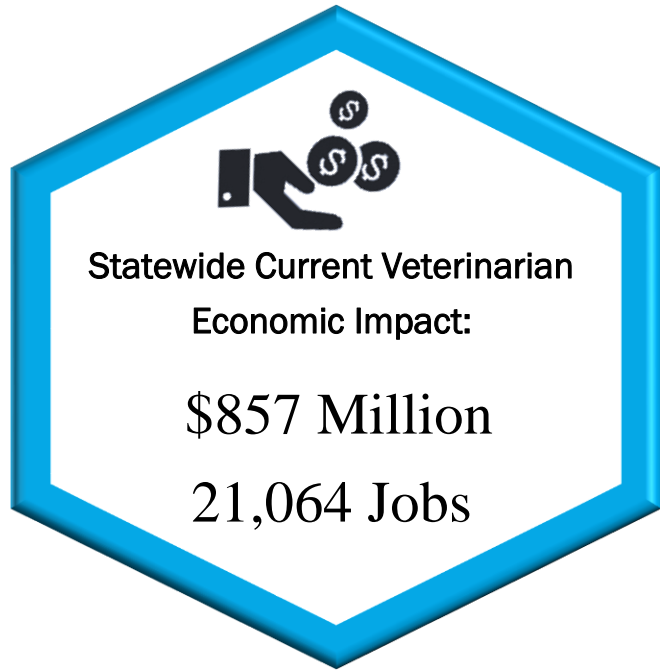
STATE ANALYSIS OF APPALACHIA – ALABAMA



STATE ANALYSIS OF APPALACHIA – ALABAMA

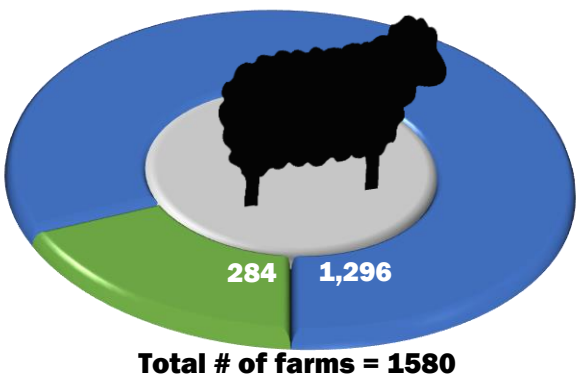
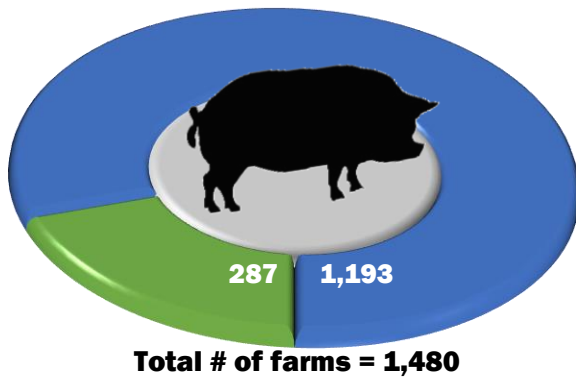
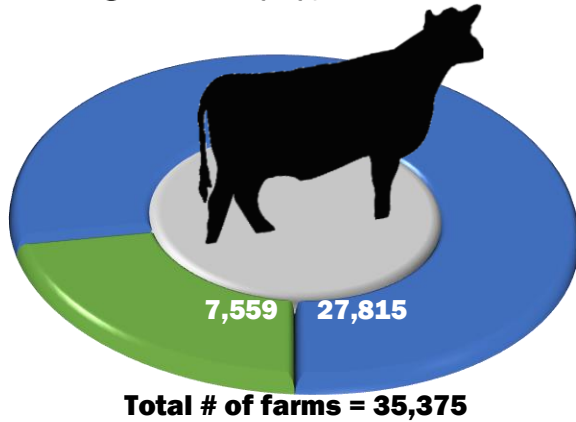


STATE ANALYSIS OF APPALACHIA- GEORGIA



STATE ANALYSIS OF APPALACHIA – GEORGIA

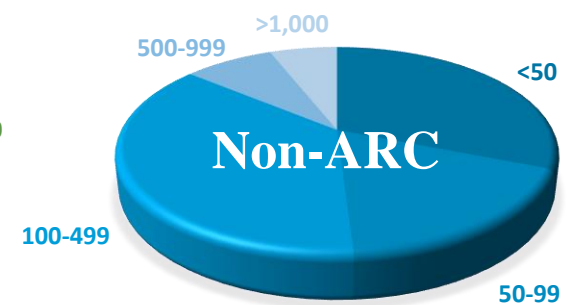
Georgia Farms by Type of Herd 2012



FARMS and FARMLAND

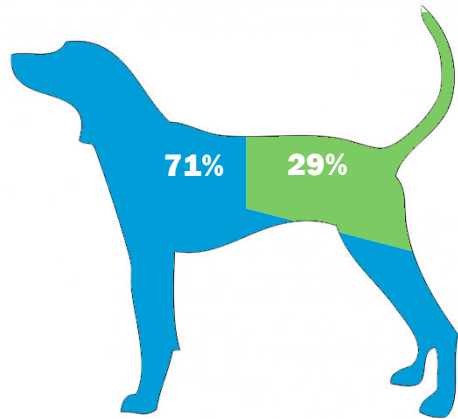
- Georgia covers about 37 million acres, 20% of this falls within ARC - 26% is land in farms.
- There are more than 77 thousand farms in Georgia, 18% are located in ARC; 50% of those farms are less than 50 acres.
- 35 thousand farms have cattle herds, 21% are located in ARC.
- From 2007-2012 the size and number of cattle herds in Georgia decreased, however in ARC the size of the herds are increasing.
- There are 1,480 farms in which maintain a pig herd, 69% are located in ARC, 89% of which run less than 24 head.
- Of the 284 farms with sheep herds in ARC, 76% manage less than 25 animals.

Georgia Farms by Number of Acres (Percent)

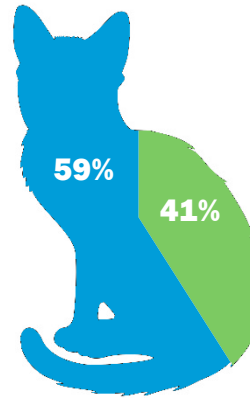


STATE ANALYSIS OF APPALACHIA – GEORGIA

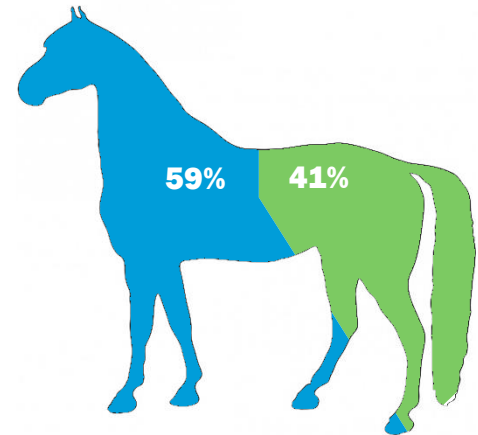
Species Distributions



Total Estimated Number of Dogs =
2,330,630



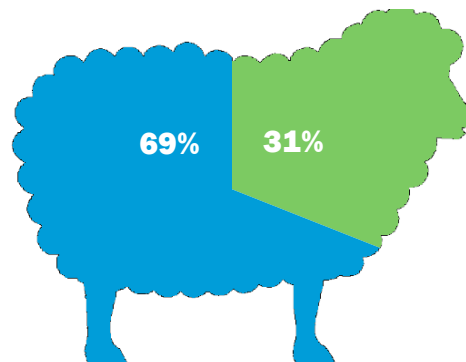
Total Estimated Number of Cats =
2,043,783



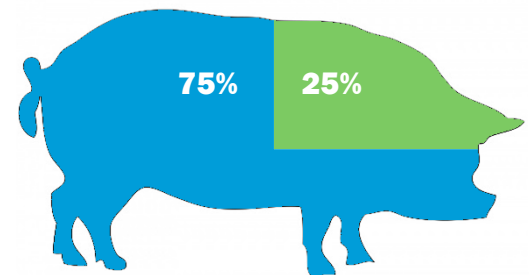
Total Estimated Number of Horse,
Mule & Donkey = 78,724




Total Estimated Number of
Cattle* = 1,412,204



Total Estimated Number of Sheep
& Goat* = 117,637



Total Estimated Number of Pig* =
417,216

 Non-ARC

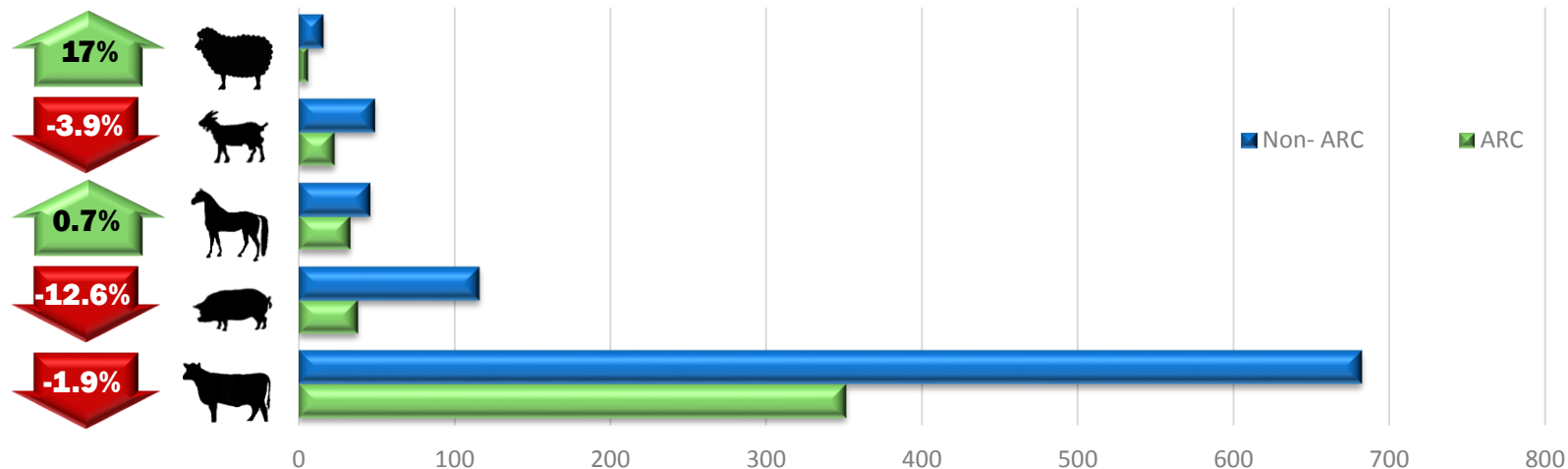
 ARC

*estimated herd size

STATE ANALYSIS OF APPALACHIA – GEORGIA

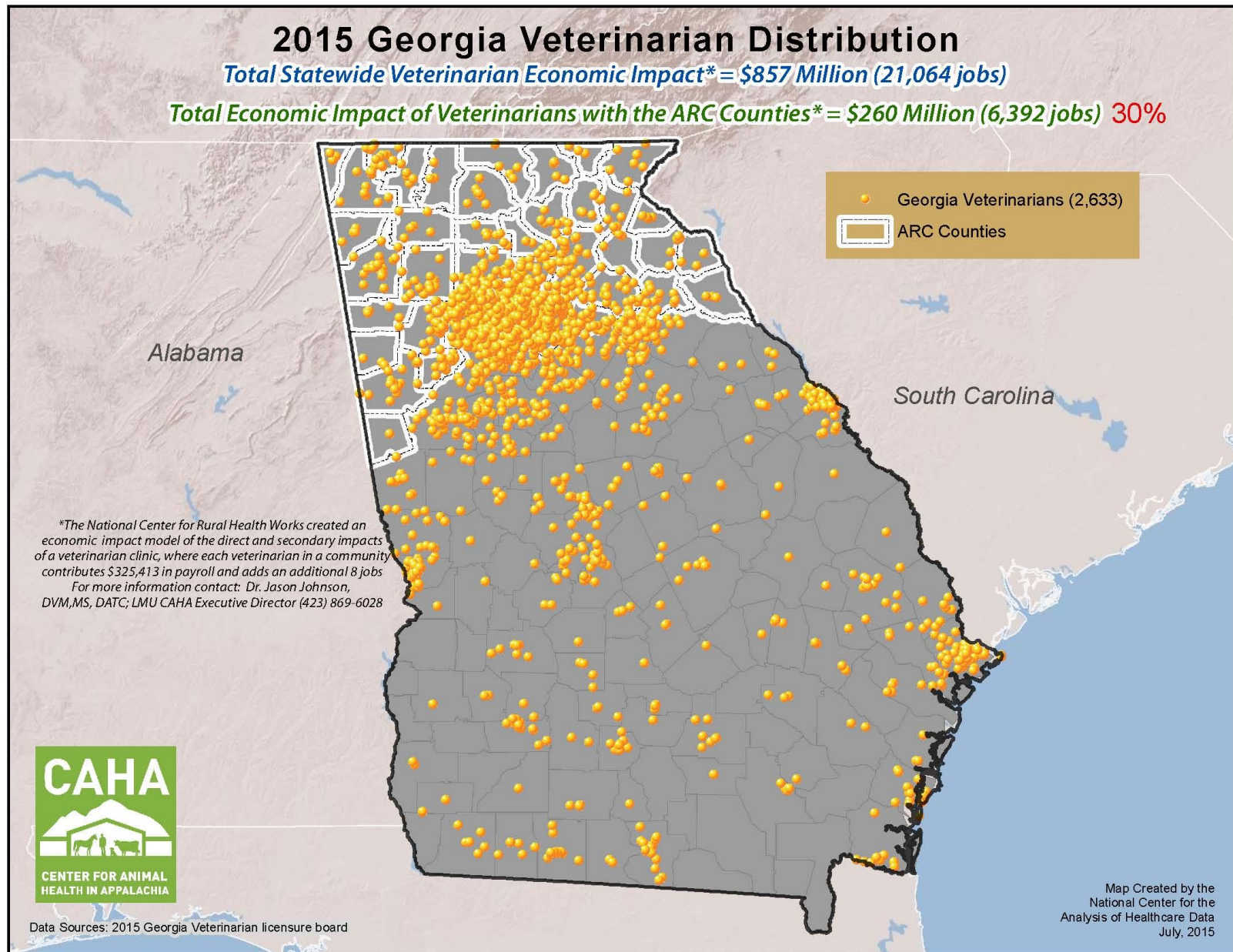
Georgia Large Animal Inventory 2012

State LA Inventory CAGR,
2007-12

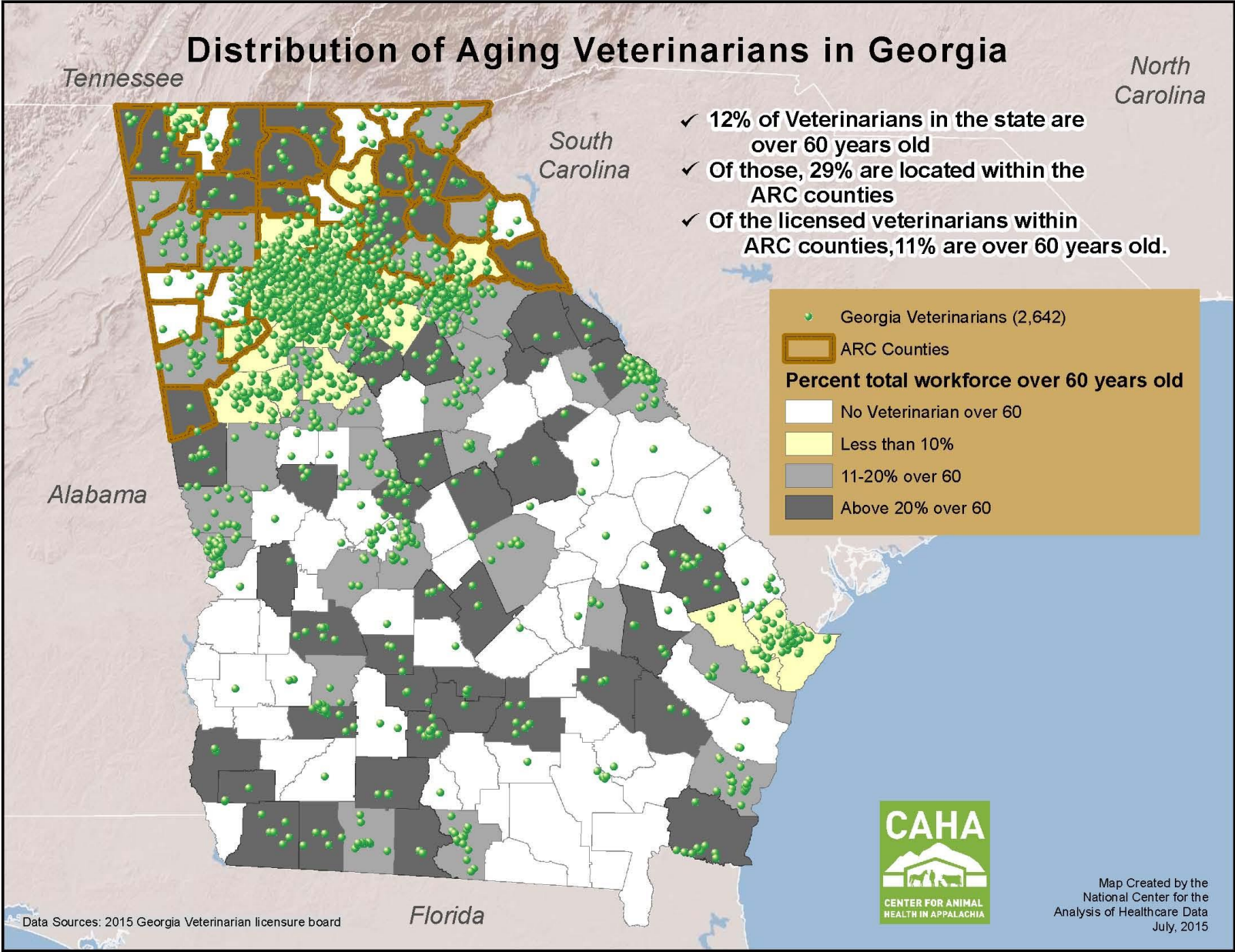


- 33% of the large animal inventory is located in Georgia ARC.
- Cattle are increasing in Georgia ARC and declining in non-ARC counties (CAGR 0.3% vs -3%).
- 25% of the swine are located in ARC; the decline in the pig inventory was consistent with non-ARC.
- More than 70% of the sheep herd is located in non-ARC counties; this portion is growing faster (CAGR 20.9%) than the ARC counties (CAGR 8.9%).
- 32% of the goat herd is located in ARC counties. Goats are growing in ARC while the rest of the state is facing a decline (CAGR 8.9% vs. -6.2%).

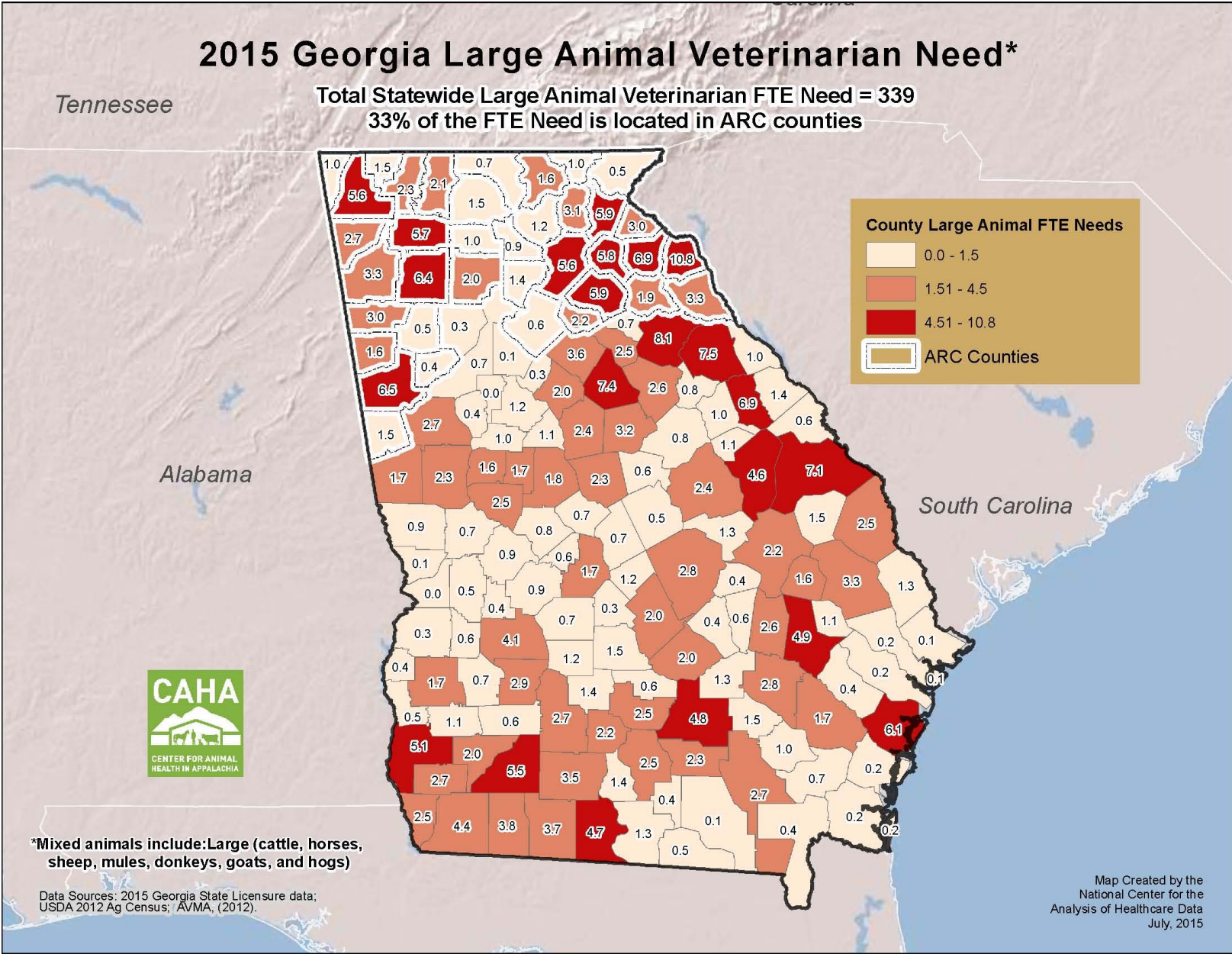
STATE ANALYSIS OF APPALACHIA- GEORGIA



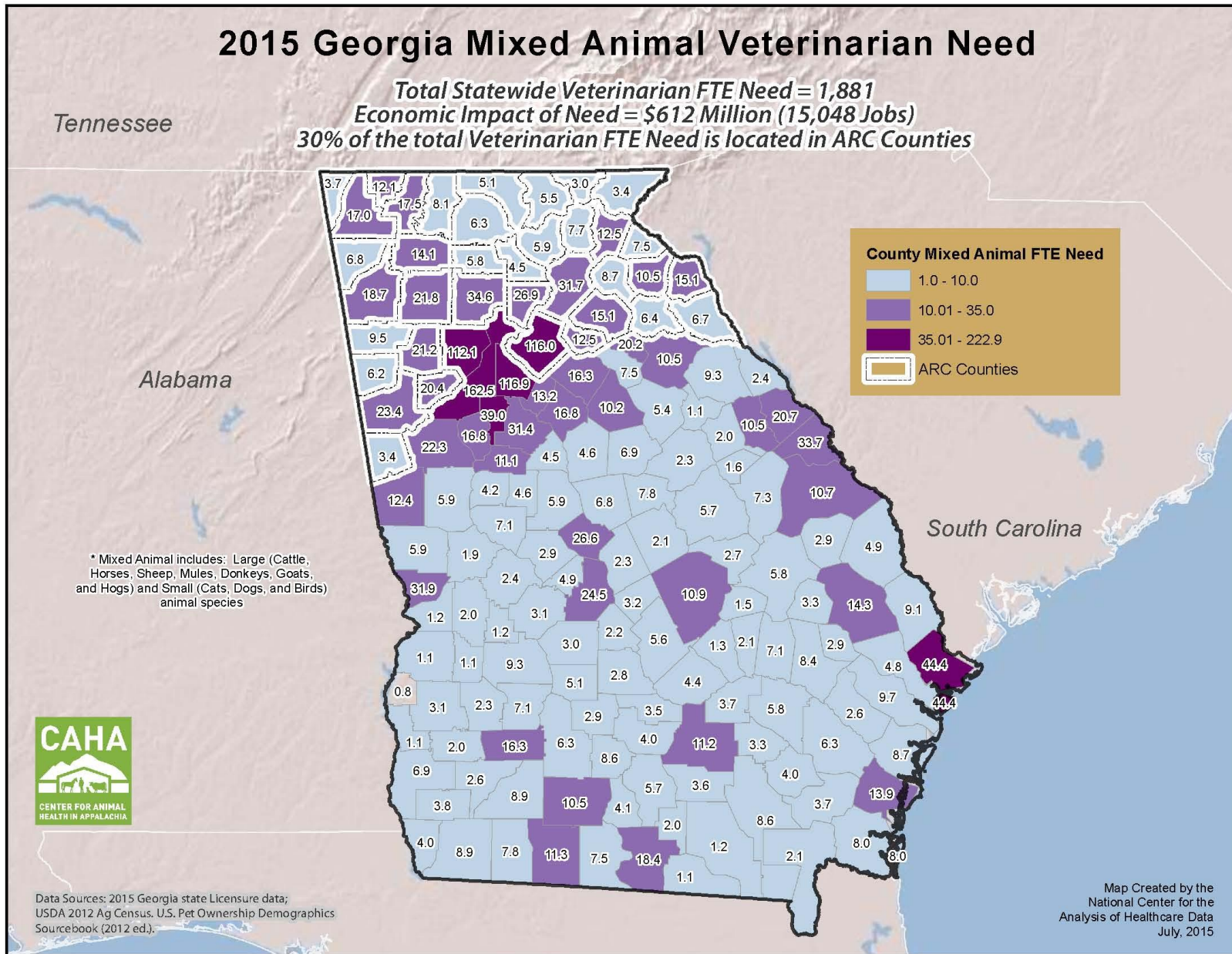
STATE ANALYSIS OF APPALACHIA – GEORGIA



STATE ANALYSIS OF APPALACHIA – GEORGIA



STATE ANALYSIS OF APPALACHIA – GEORGIA



STATE ANALYSIS OF APPALACHIA – GEORGIA

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

Tennessee

The economic impact to those counties (in red) with shortages caused by maldistribution of veterinarians is**:

Total Revenue loss = \$97.0 Million Total Veterinarian shortage times average payroll**
 298 X \$325,413
AND
Total Job Loss = 2,384 (298 X 8 jobs**)

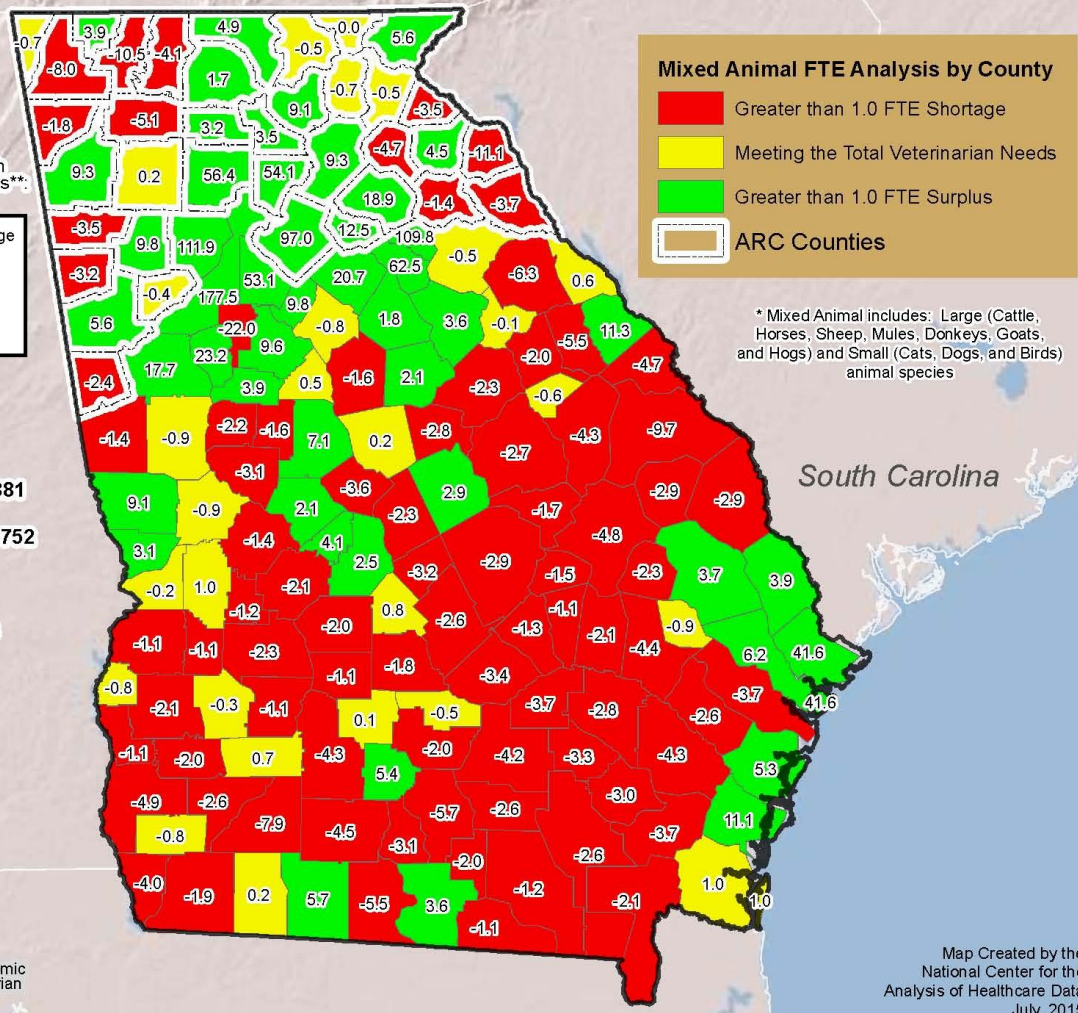
Alabama

- ✓ Total Statewide Veterinarian FTE Need = 1,881
- ✓ Total Practicing Veterinarians = 2,633
- ✓ Total Statewide Veterinarian FTE Surplus = 752
- ✓ ARC region Veterinarian FTE Need = 556
- ✓ ARC region Practicing Veterinarians = 799
- ✓ ARC region Veterinarian FTE Surplus = 243



Data Sources: 2015 Georgia State Licensure data; USDA 2012 AgCensus; AVMA, (2012). U.S. Pet Ownership Demographics Sourcebook (2012 ed.).

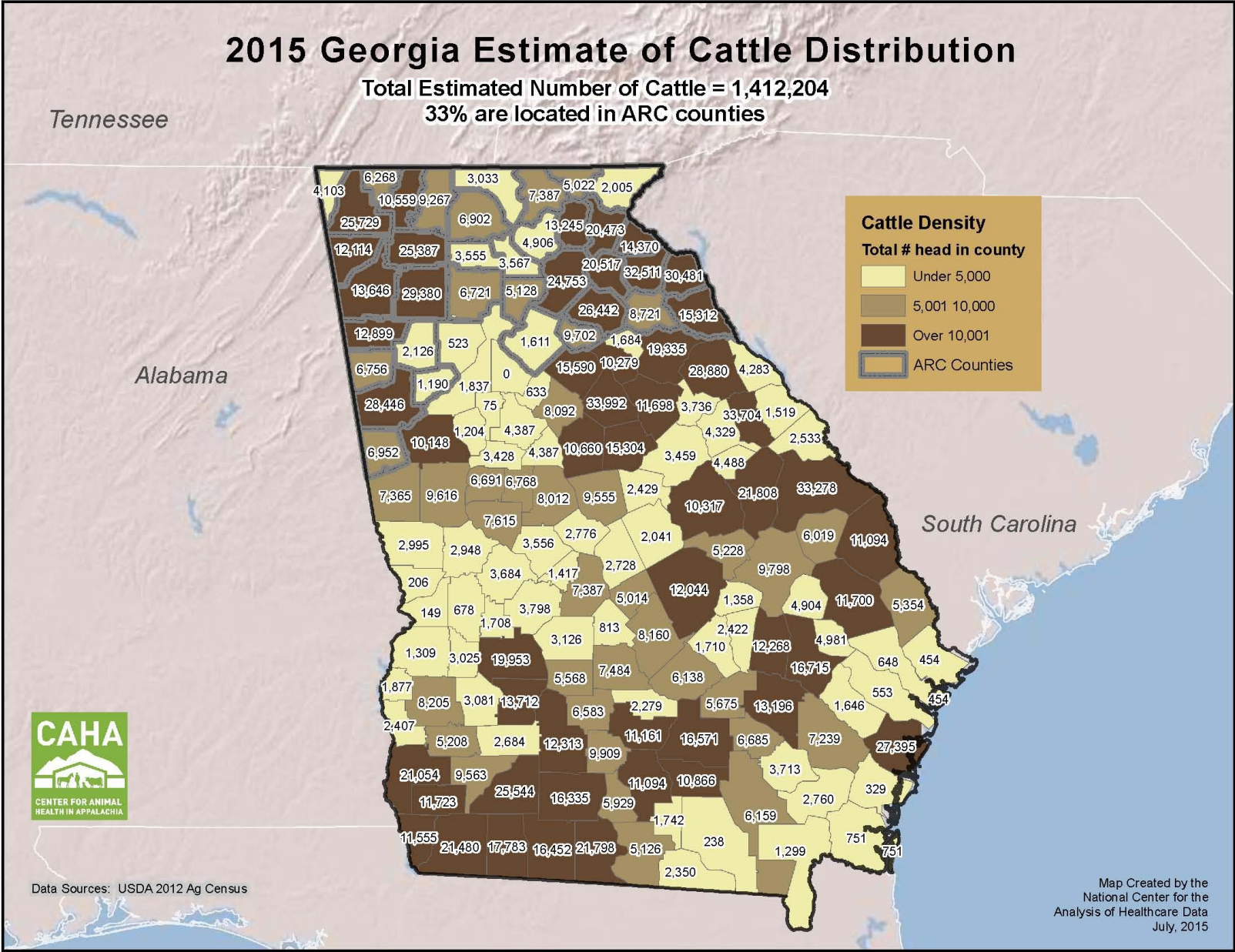
**The National Center for Rural Health Works created an economic impact model of the direct and secondary impacts of a veterinarian clinic. For more information contact: Dr. Jason Johnson, DVM, MS, DTAC; CAHA Executive Director (423) 869-6028



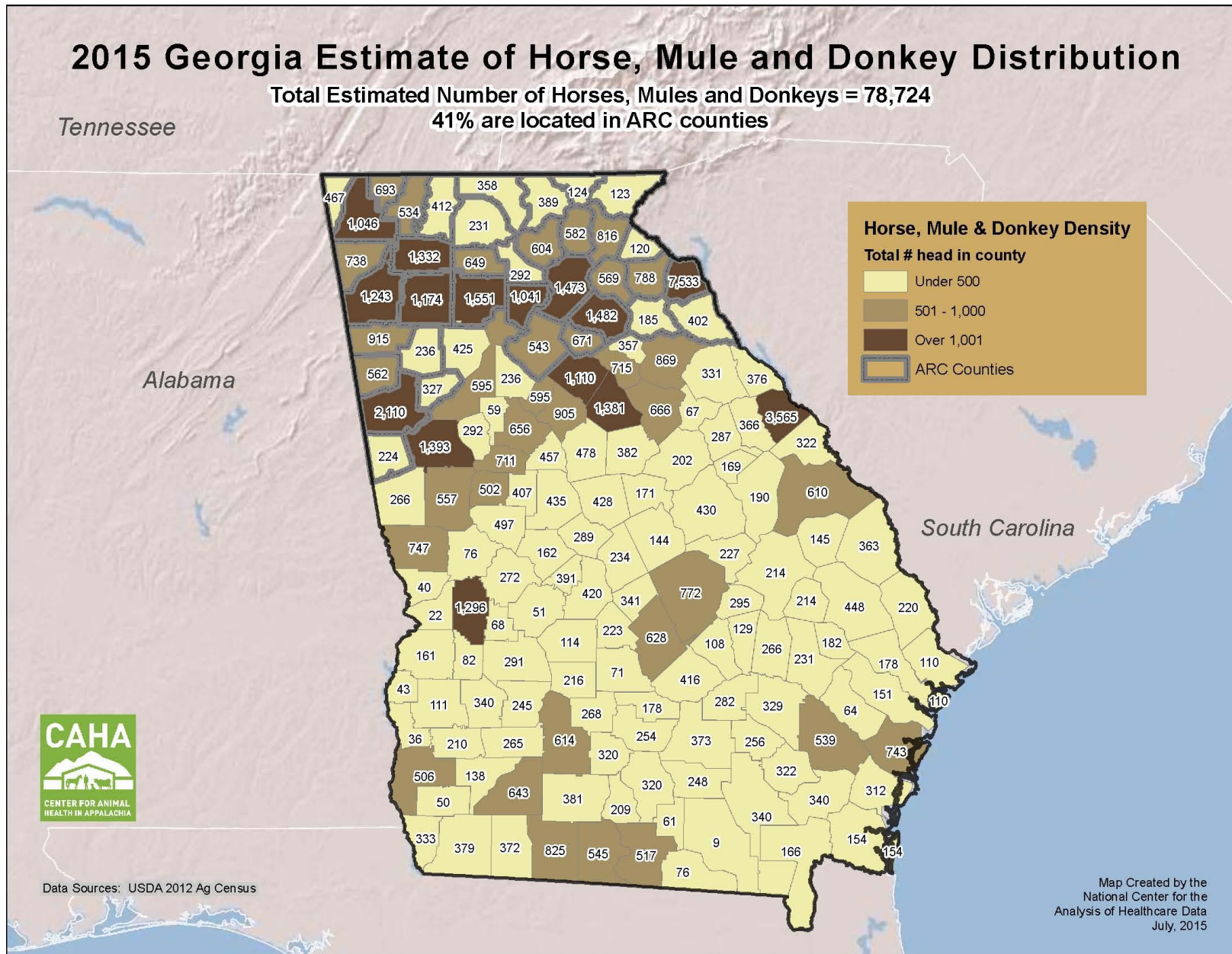
Map Created by the National Center for the Analysis of Healthcare Data July, 2015

South Carolina

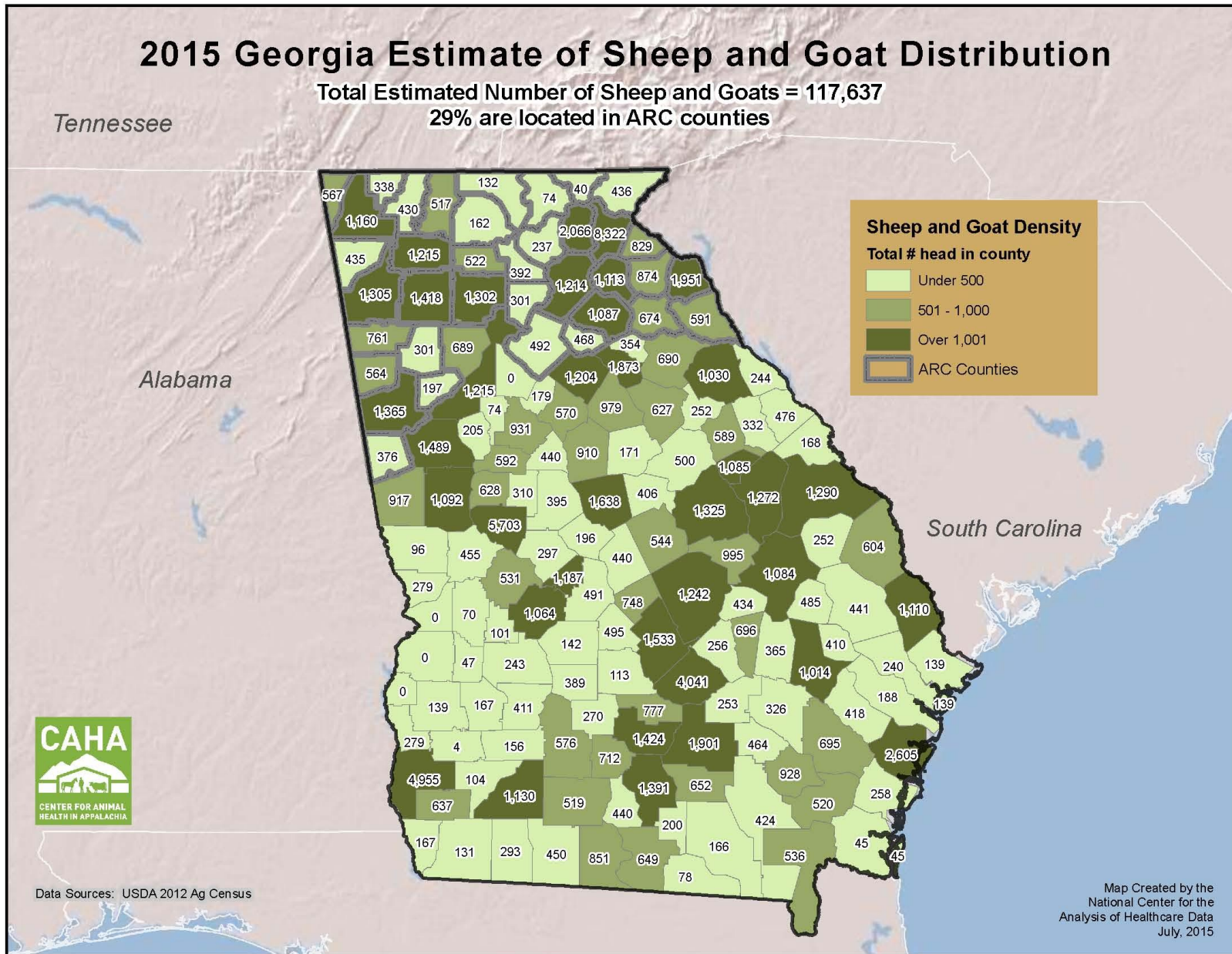
STATE ANALYSIS OF APPALACHIA – GEORGIA



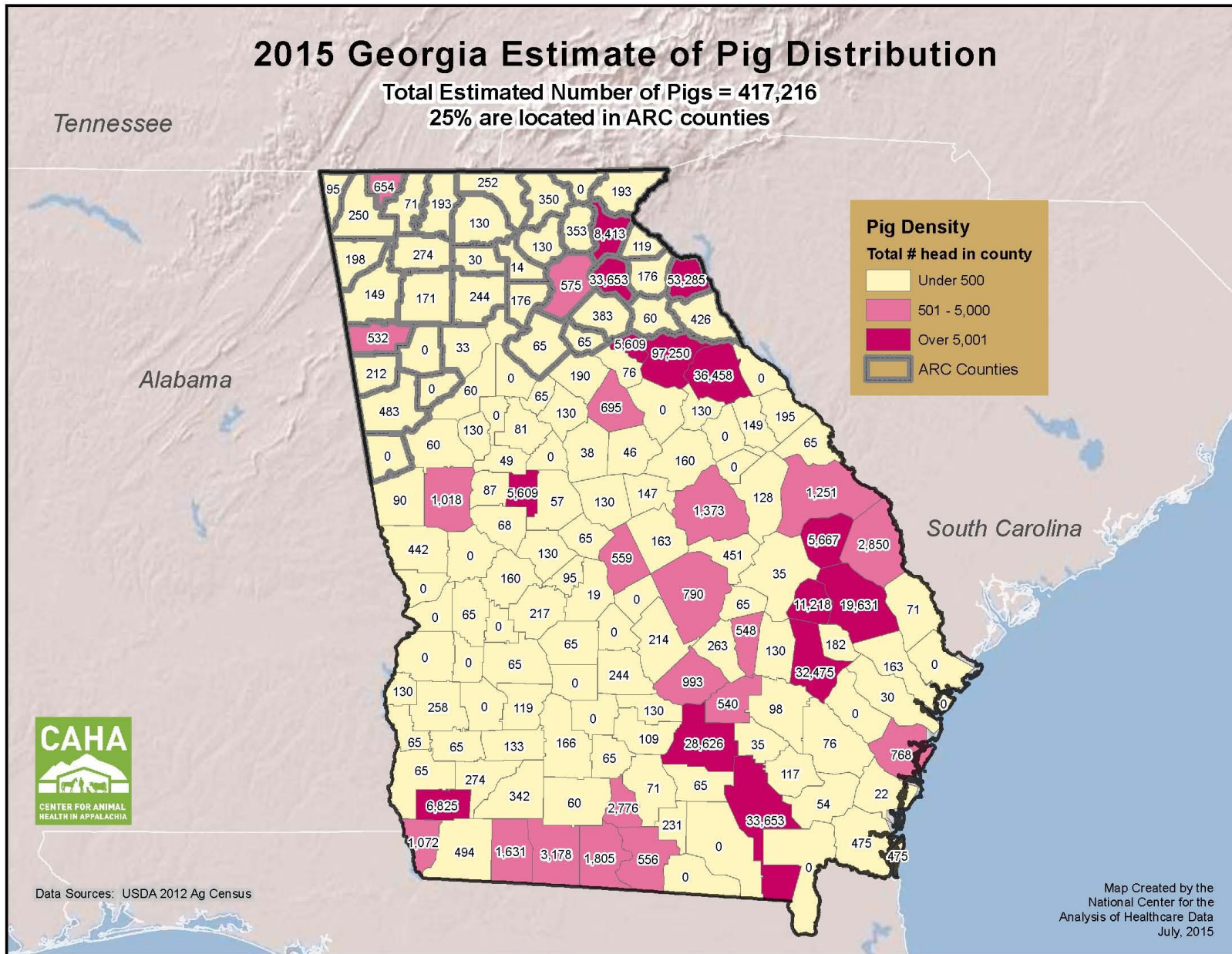
STATE ANALYSIS OF APPALACHIA – GEORGIA



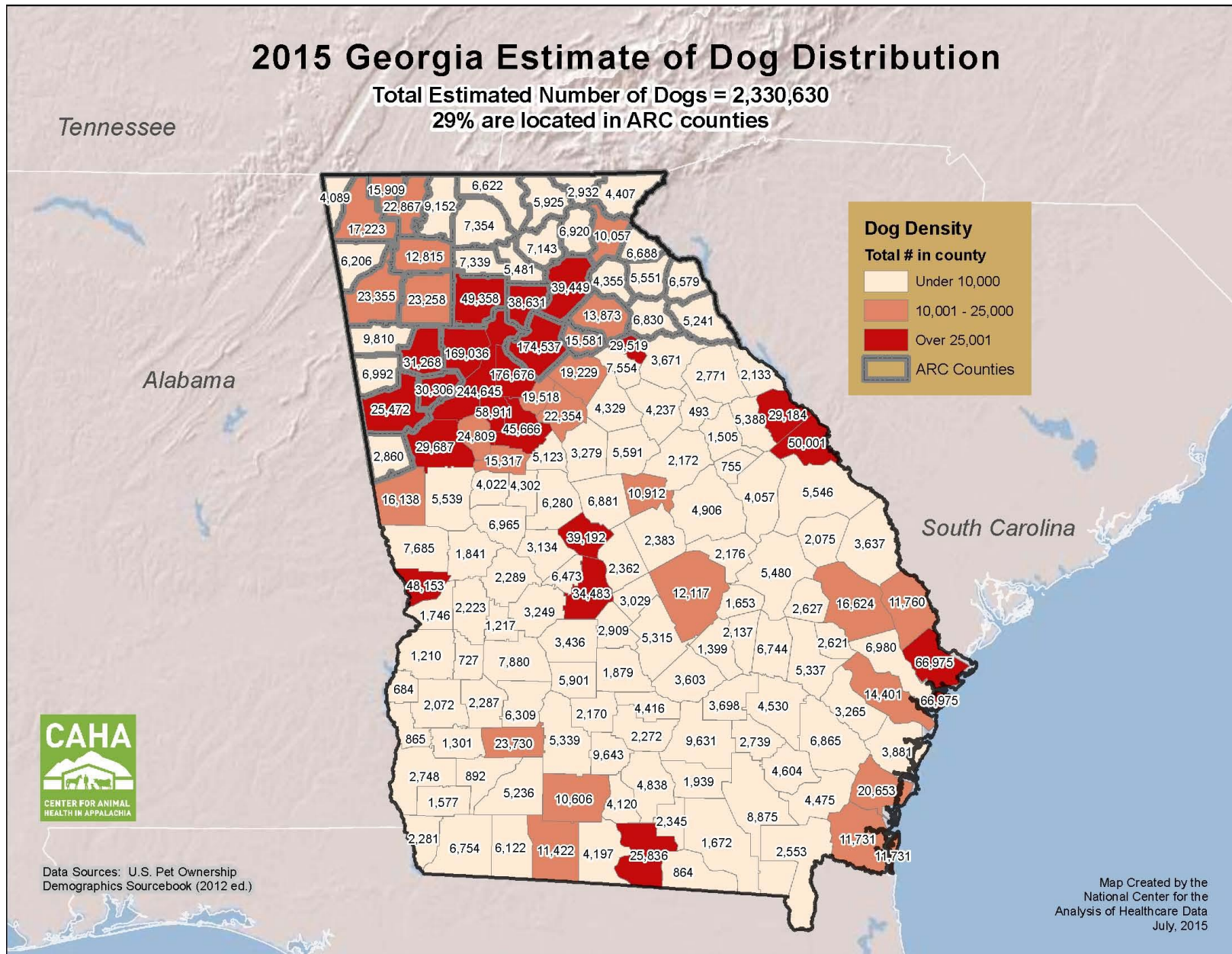
STATE ANALYSIS OF APPALACHIA – GEORGIA



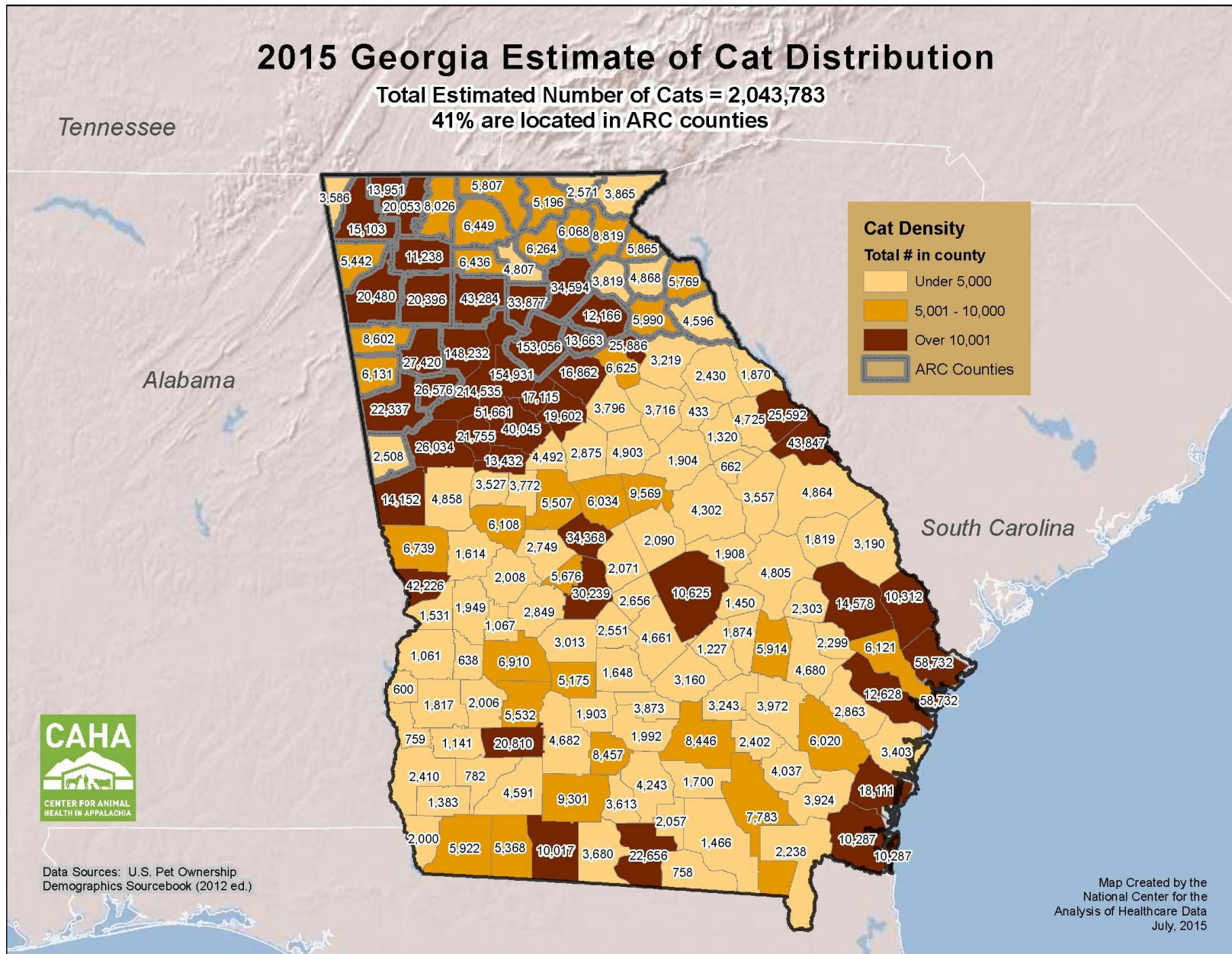
STATE ANALYSIS OF APPALACHIA – GEORGIA



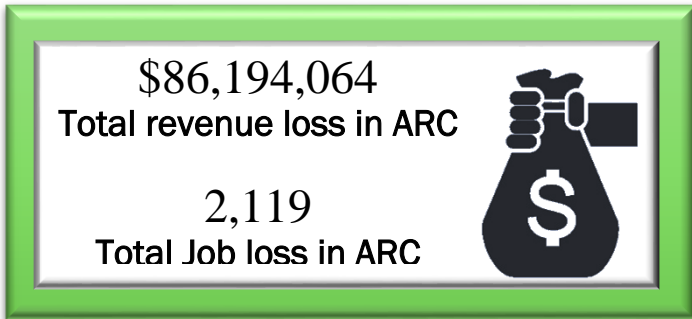
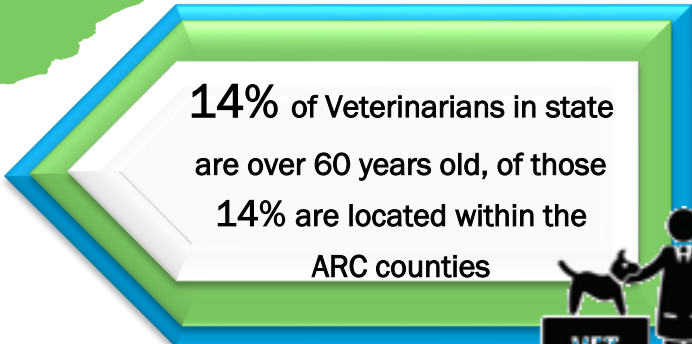
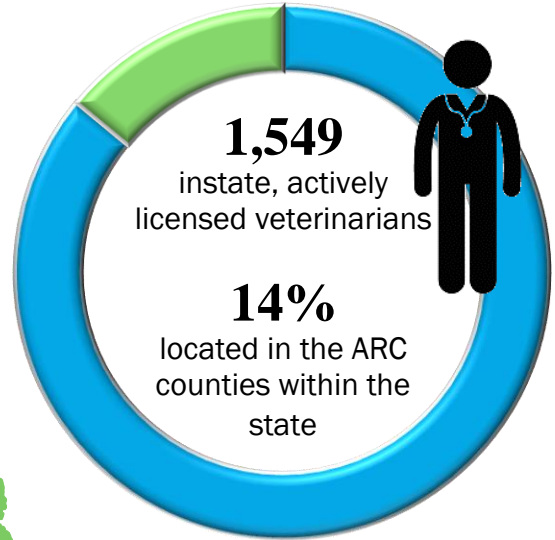
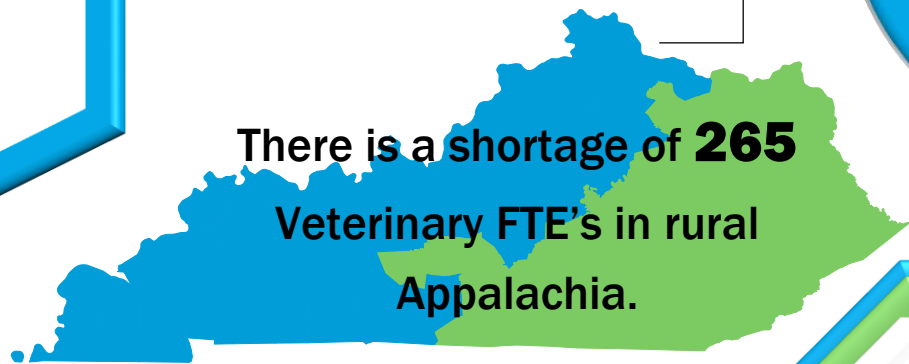
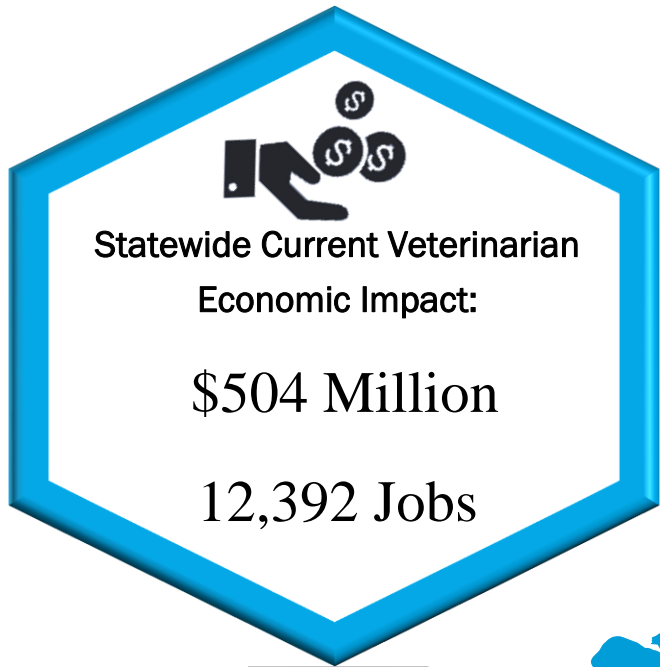
STATE ANALYSIS OF APPALACHIA – GEORGIA



STATE ANALYSIS OF APPALACHIA – GEORGIA

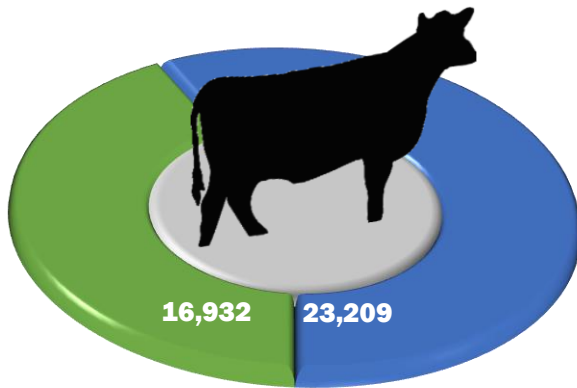


STATE ANALYSIS OF APPALACHIA- KENTUCKY

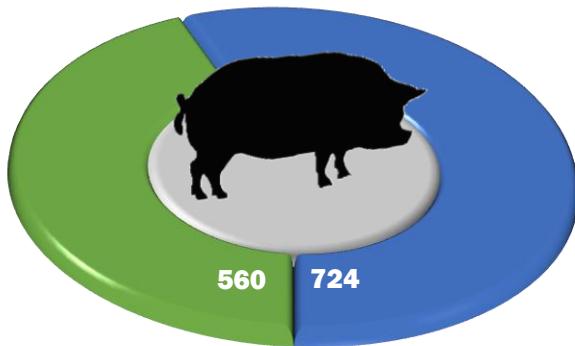


STATE ANALYSIS OF APPALACHIA – KENTUCKY

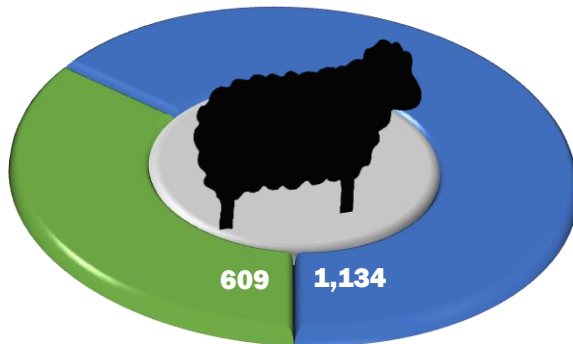
Kentucky Farms by Type of Herd 2012



Total # of farms = 40,141



Total # of farms = 1,284

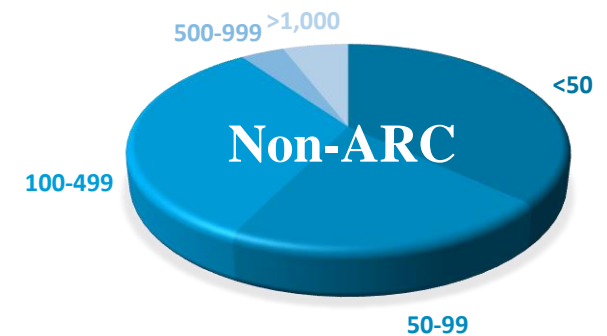


Total # of farms = 1,743

FARMS and FARMLAND

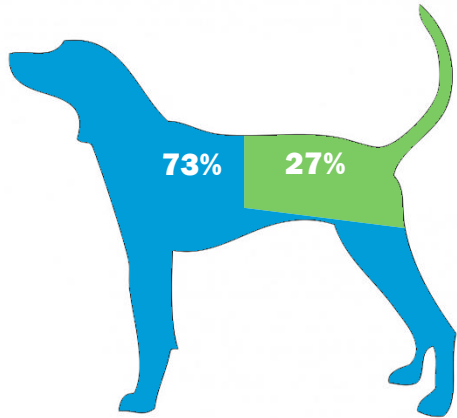
- Kentucky covers about 25 million acres, 46% of this falls within ARC counties; 52% is land in farms.
- There are more than 77 thousand farms in Kentucky, 37% are located in ARC; 56% of the farms in ARC counties are less than 100 acres.
- 42% of the more than 40 thousand farms running cattle are located in ARC. From 2007-2012 the number of medium sized cattle herds in ARC increased, still 71% of the farms run fewer than 50 head
- Kentucky has 1,284 farms with pig herds. 44% are located in ARC, 86% of which run less than 25 head.
- 1,743 sheep flocks are located in Kentucky. 35% of the sheep flocks are located in ARC counties, the number flocks are growing, but the flock size is decreasing.

Kentucky Farms by Number of Acres (Percent)

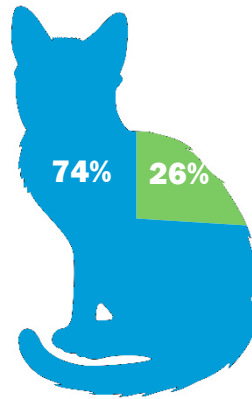


STATE ANALYSIS OF APPALACHIA – KENTUCKY

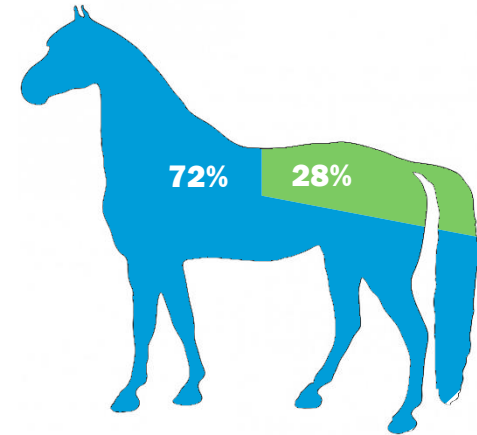
Species Distribution



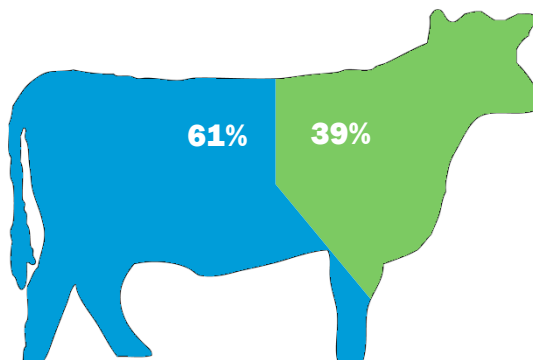
Total Estimated Number of Dogs =
1,530,769



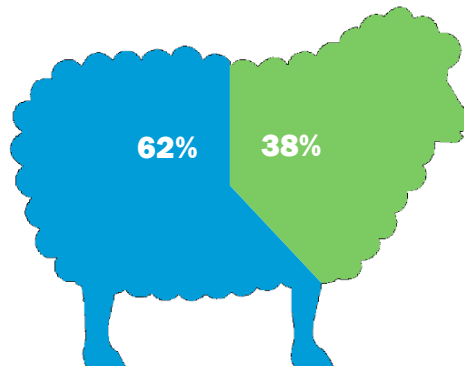
Total Estimated Number of Cats =
1,289,974



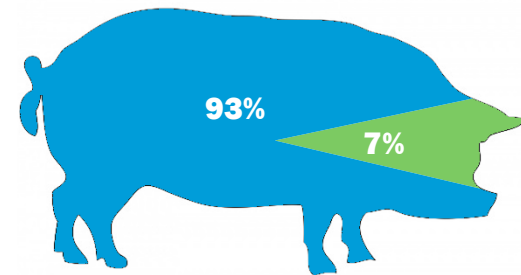
Total Estimated Number of Horse,
Mule & Donkey = 154,483



Total Estimated Number of
Cattle* = 3,102,332



Total Estimated Number of Sheep
& Goat* = 77,763



Total Estimated Number of Pig* =
850,428

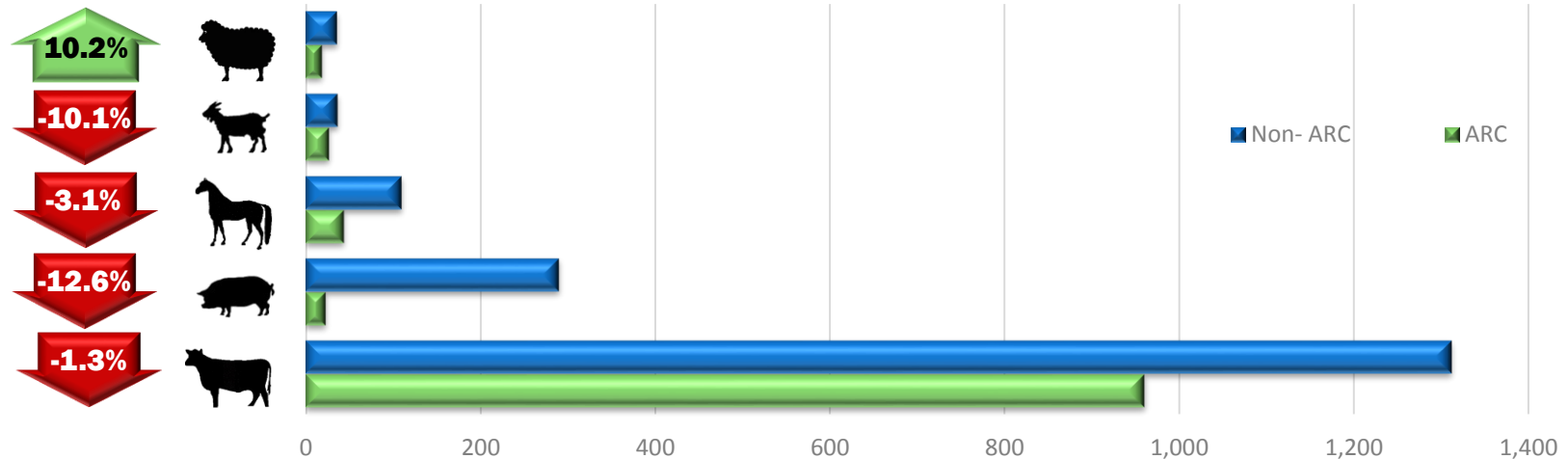
 Non-ARC  ARC *estimated herd size

STATE ANALYSIS OF APPALACHIA – KENTUCKY

Kentucky Large Animal Inventory 2012

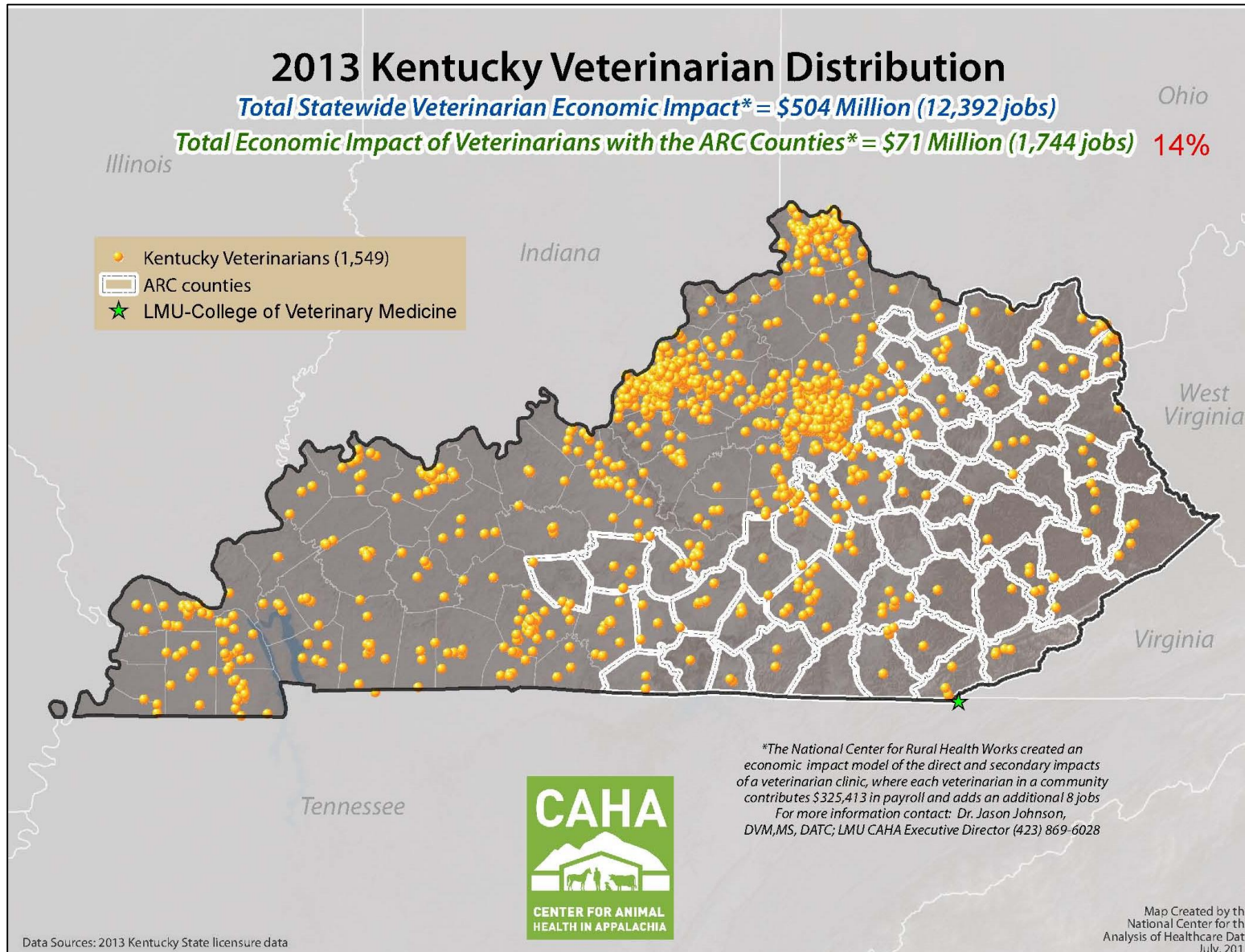
Thousand head

State LA Inventory CAGR,
2007-12

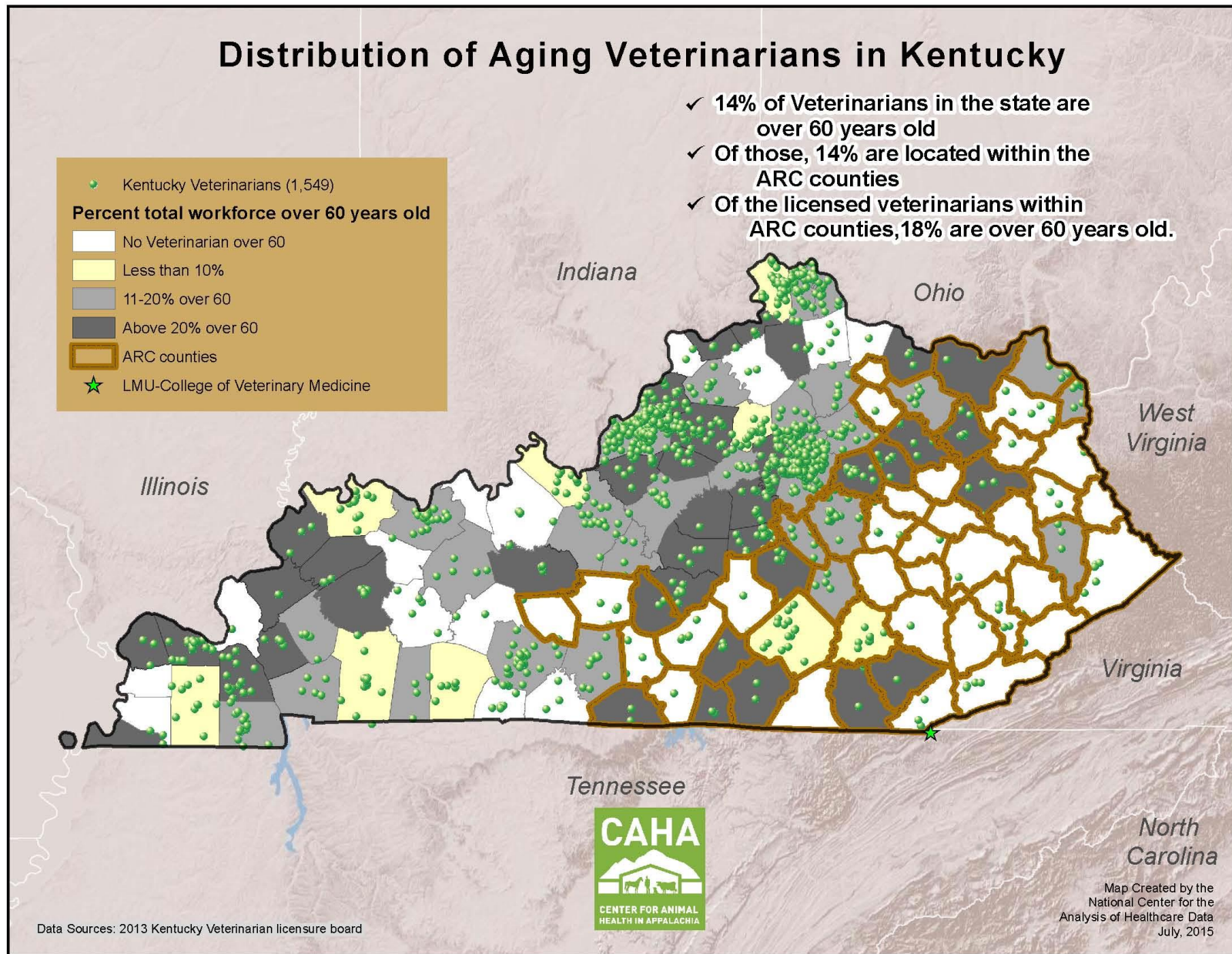


- 38% of the large animal inventory is located in Kentucky ARC.
- Cattle are not declining at the same rate in Kentucky ARC as outside of it (CAGR -0.6% vs -1.8%).
- 7% of the swine are located in ARC; the decline in the pig inventory is focused in non-ARC counties (CAGR 8.5% vs -3.3%).
- 42% of the goat herd is located in ARC counties, but it was not hit as hard by the decline in goats as the rest of the state (CAGR -9.6 vs. -10.4).
- Only 34% of the sheep flock is located in ARC. Yet ARC is leading the growth, CAGR16.9% vs. the rest of the state (CAGR 7.4%).

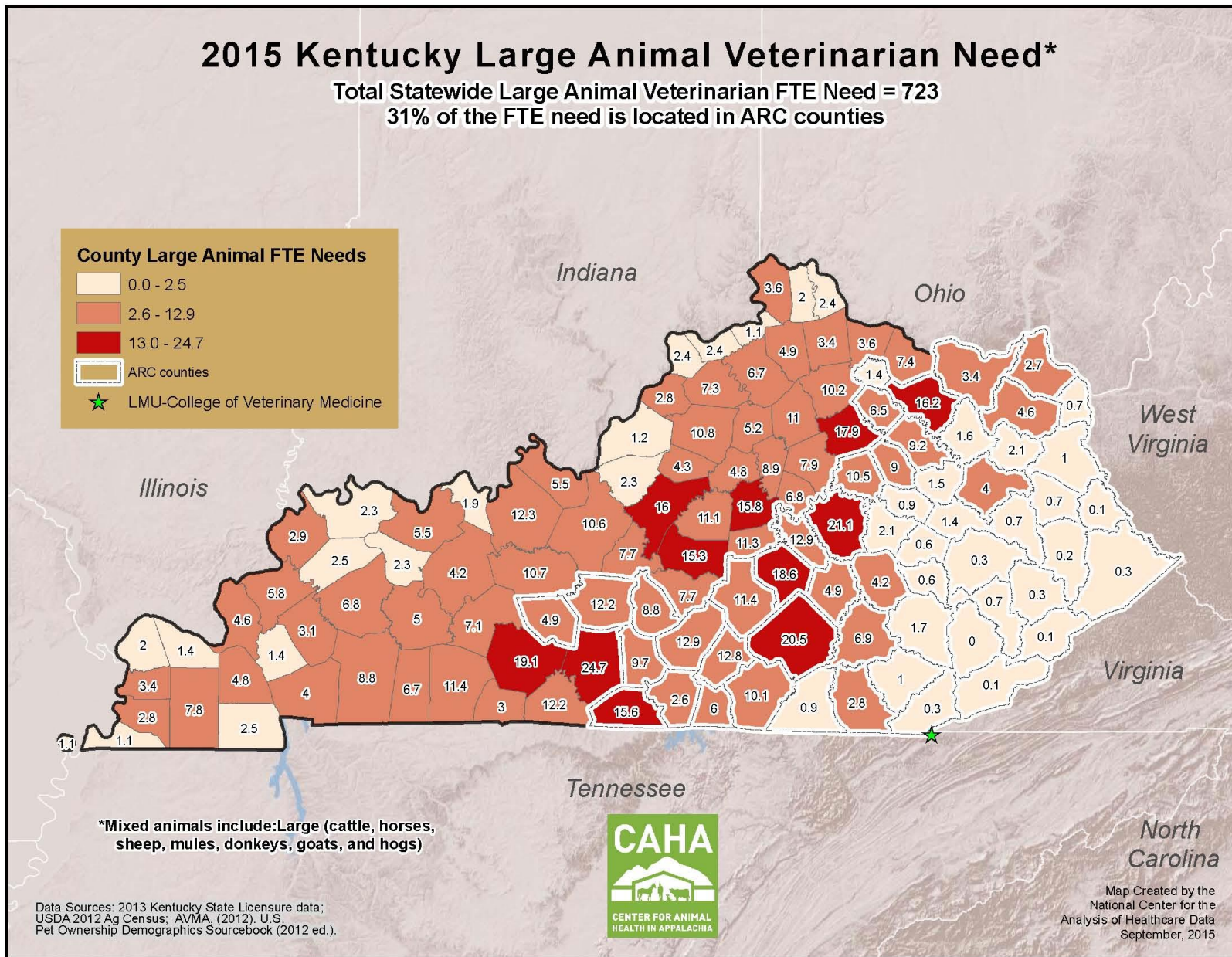
STATE ANALYSIS OF APPALACHIA- KENTUCKY



STATE ANALYSIS OF APPALACHIA – KENTUCKY



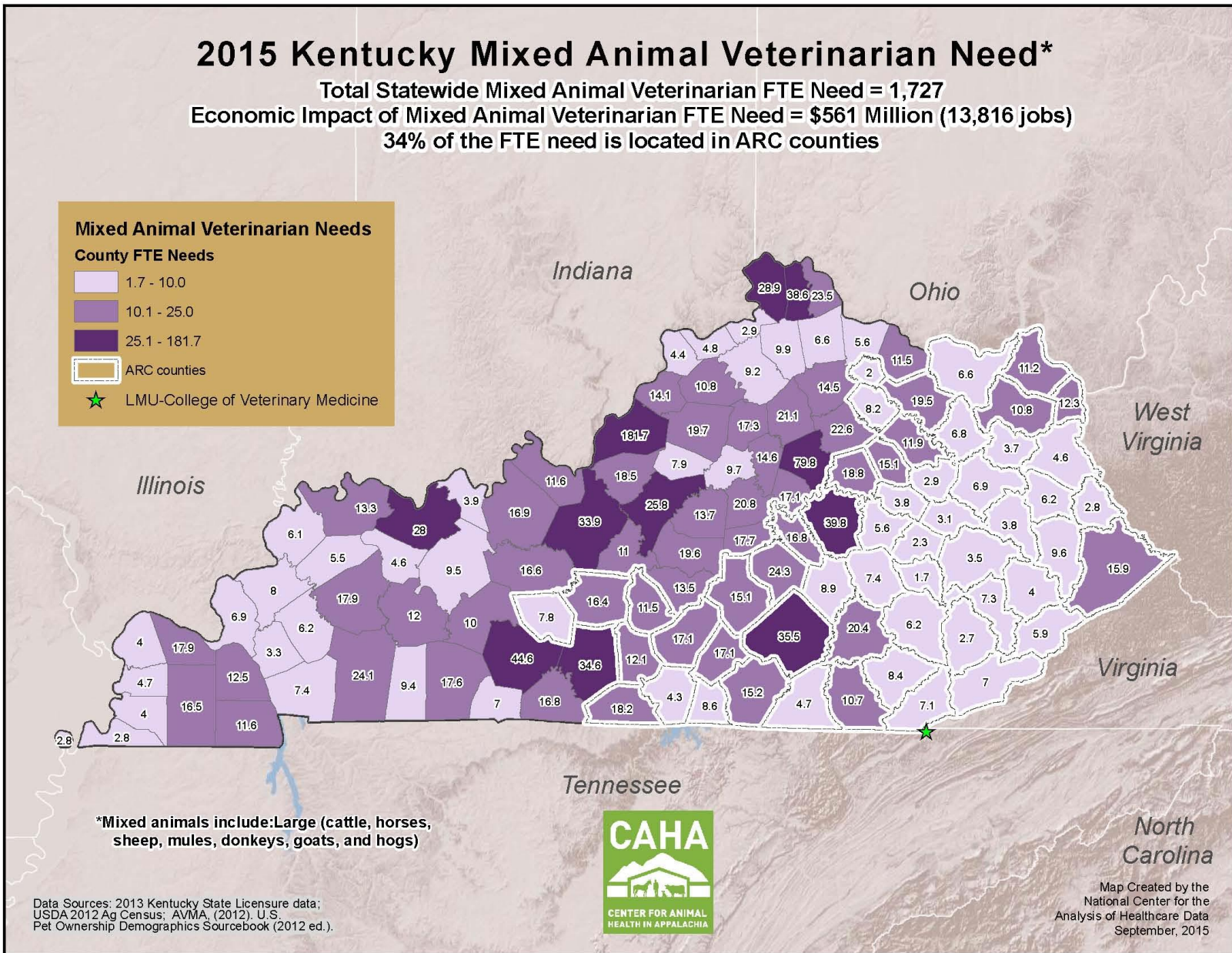
STATE ANALYSIS OF APPALACHIA – KENTUCKY



STATE ANALYSIS OF APPALACHIA – KENTUCKY

2015 Kentucky Mixed Animal Veterinarian Need*

Total Statewide Mixed Animal Veterinarian FTE Need = 1,727
 Economic Impact of Mixed Animal Veterinarian FTE Need = \$561 Million (13,816 jobs)
 34% of the FTE need is located in ARC counties



STATE ANALYSIS OF APPALACHIA – KENTUCKY

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

- ✓ Total Statewide Veterinarian FTE Need = 1,727
- ✓ Total Practicing Veterinarians = 1,549
- ✓ Total Statewide Veterinarian FTE Shortage = 178

- ✓ ARC region Veterinarian FTE Need = 544
- ✓ ARC region Practicing Veterinarians = 218
- ✓ ARC region Veterinarian FTE Shortage = 325

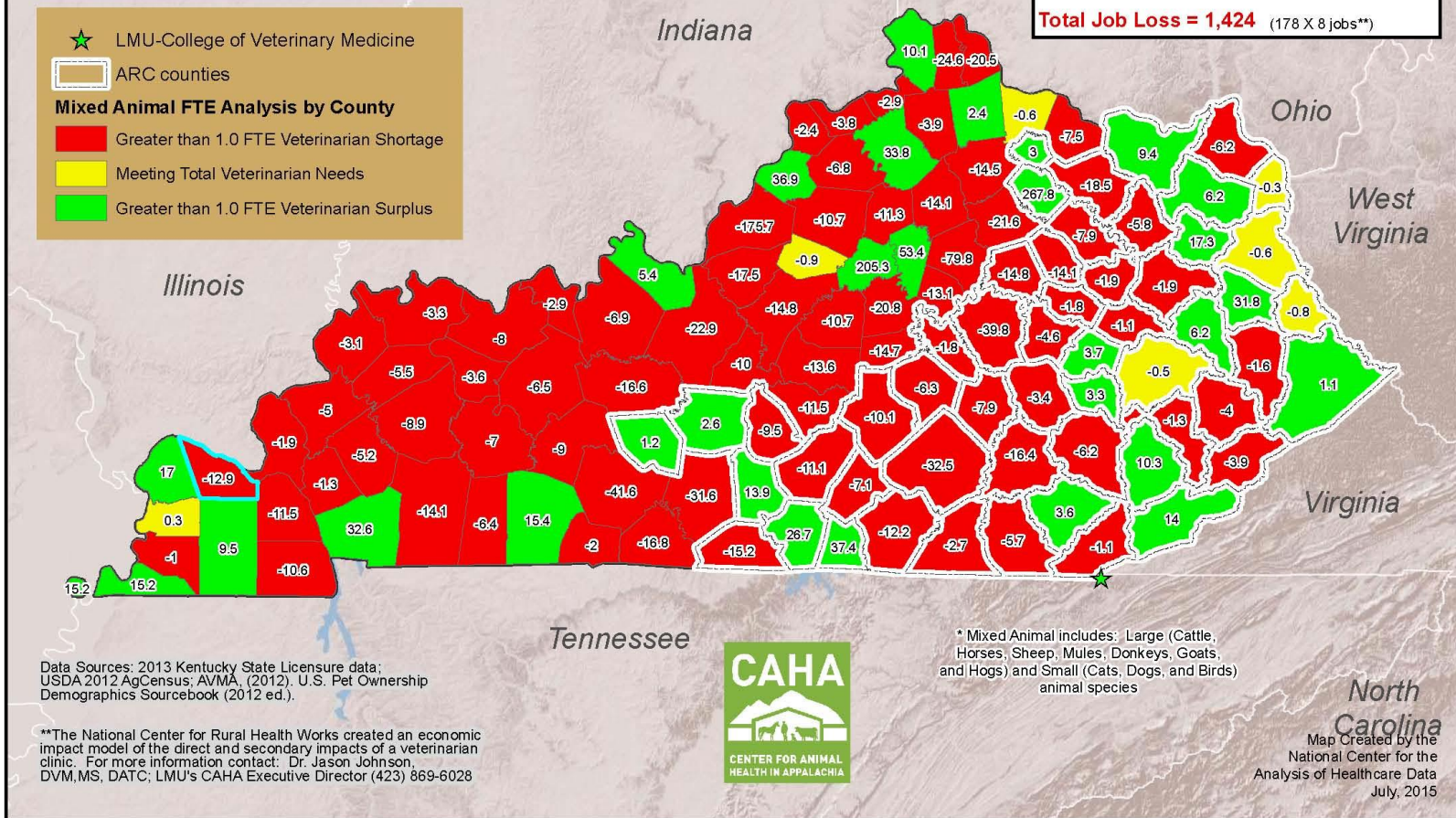
The economic impact to those counties with shortages caused by maldistribution of veterinarians is**:

Total Revenue loss = \$57.9 Million
 Total Veterinarian shortage times average payroll**
 178 X \$325,413

AND

Total Job Loss = 1,424 (178 X 8 jobs**)

- ★ LMU-College of Veterinary Medicine
 - ▭ ARC counties
- Mixed Animal FTE Analysis by County**
- Red Greater than 1.0 FTE Veterinarian Shortage
 - Yellow Meeting Total Veterinarian Needs
 - Green Greater than 1.0 FTE Veterinarian Surplus



Data Sources: 2013 Kentucky State Licensure data; USDA 2012 AgCensus; AVMA, (2012). U.S. Pet Ownership Demographics Sourcebook (2012 ed.).

**The National Center for Rural Health Works created an economic impact model of the direct and secondary impacts of a veterinarian clinic. For more information contact: Dr. Jason Johnson, DVM, MS, DATC; LMU's CAHA Executive Director (423) 869-6028

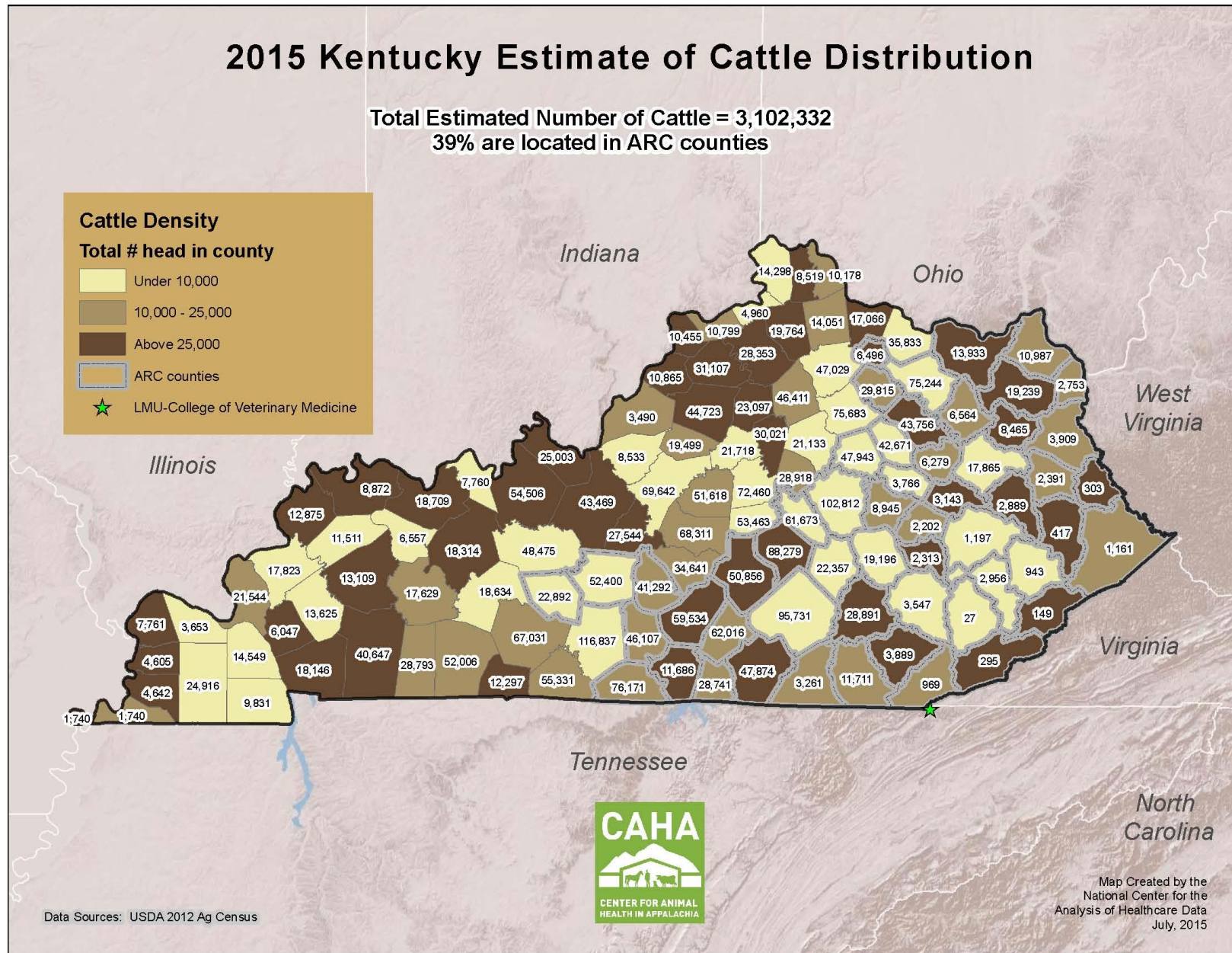
* Mixed Animal includes: Large (Cattle, Horses, Sheep, Mules, Donkeys, Goats, and Hogs) and Small (Cats, Dogs, and Birds) animal species

North Carolina
 Map Created by the
 National Center for the
 Analysis of Healthcare Data
 July, 2015

STATE ANALYSIS OF APPALACHIA – KENTUCKY

2015 Kentucky Estimate of Cattle Distribution

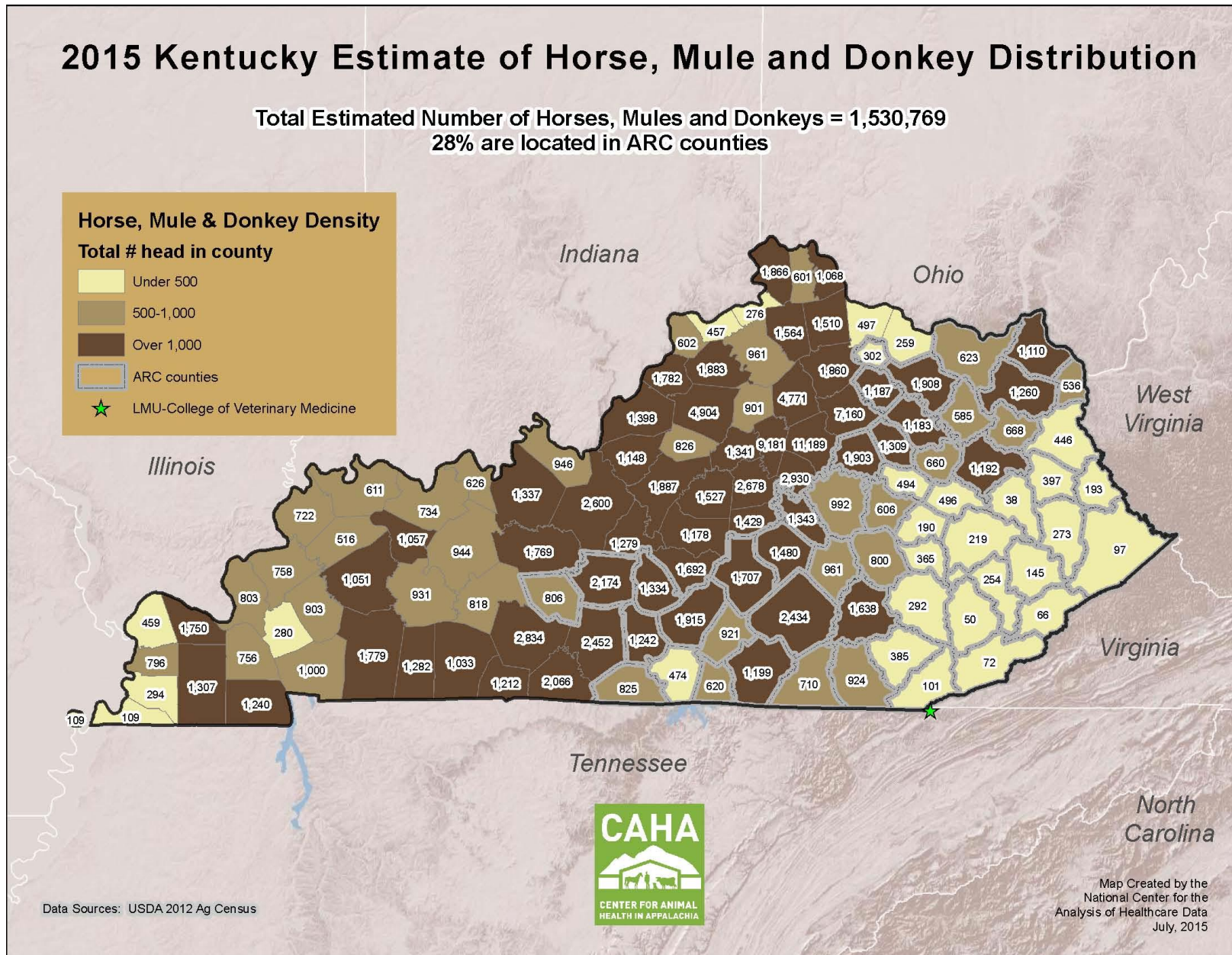
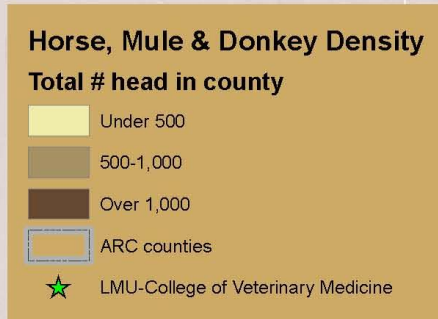
Total Estimated Number of Cattle = 3,102,332
39% are located in ARC counties



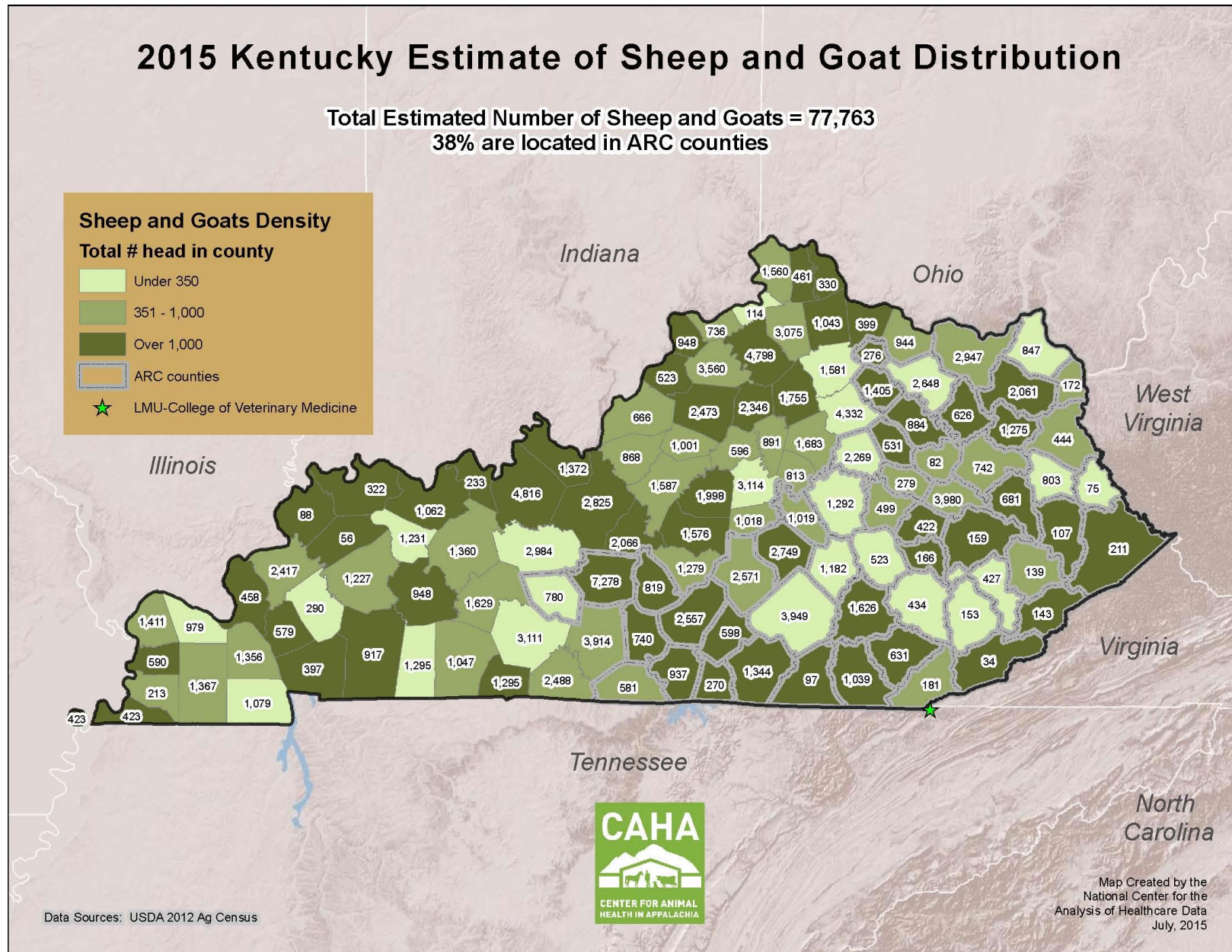
STATE ANALYSIS OF APPALACHIA – KENTUCKY

2015 Kentucky Estimate of Horse, Mule and Donkey Distribution

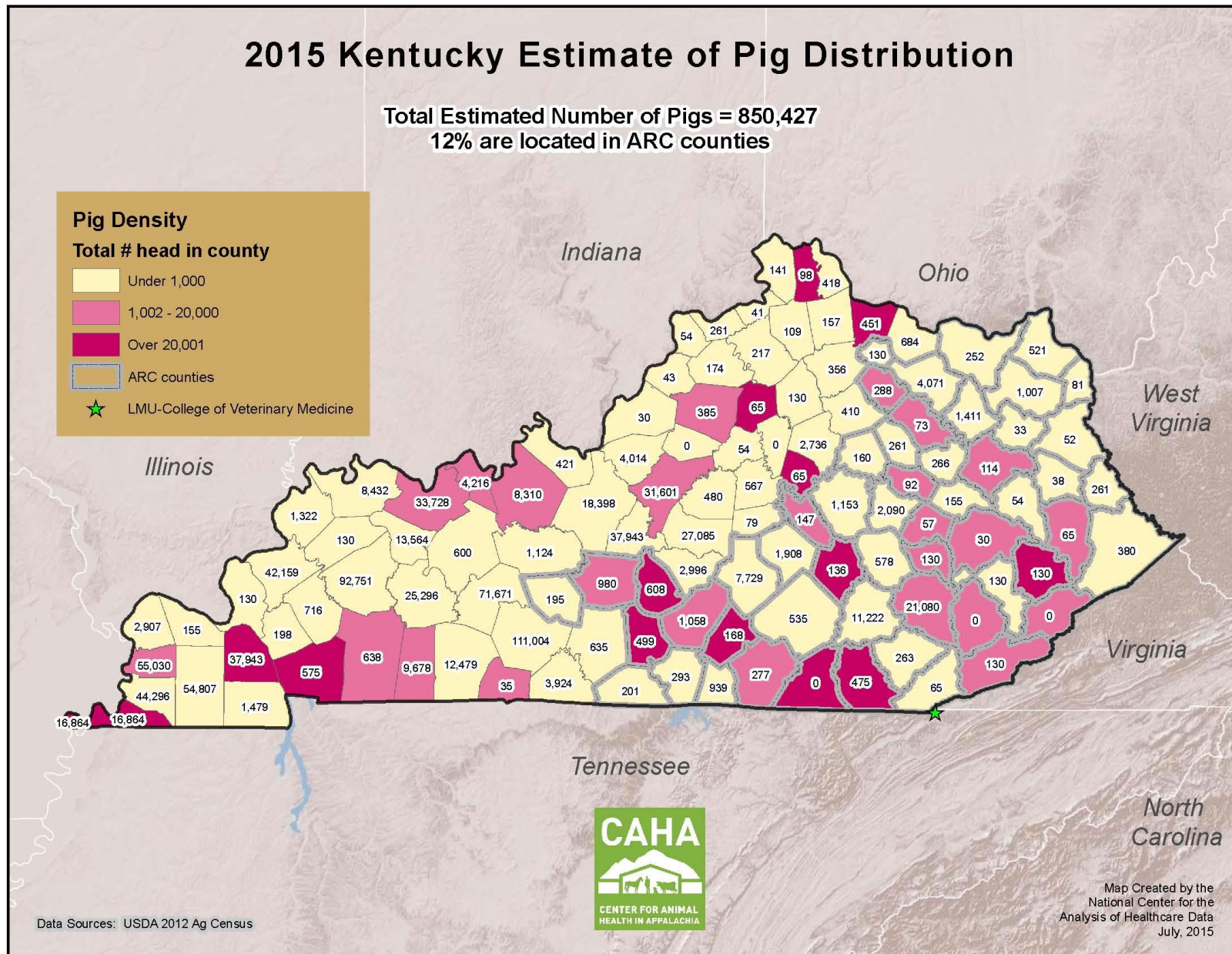
Total Estimated Number of Horses, Mules and Donkeys = 1,530,769
28% are located in ARC counties



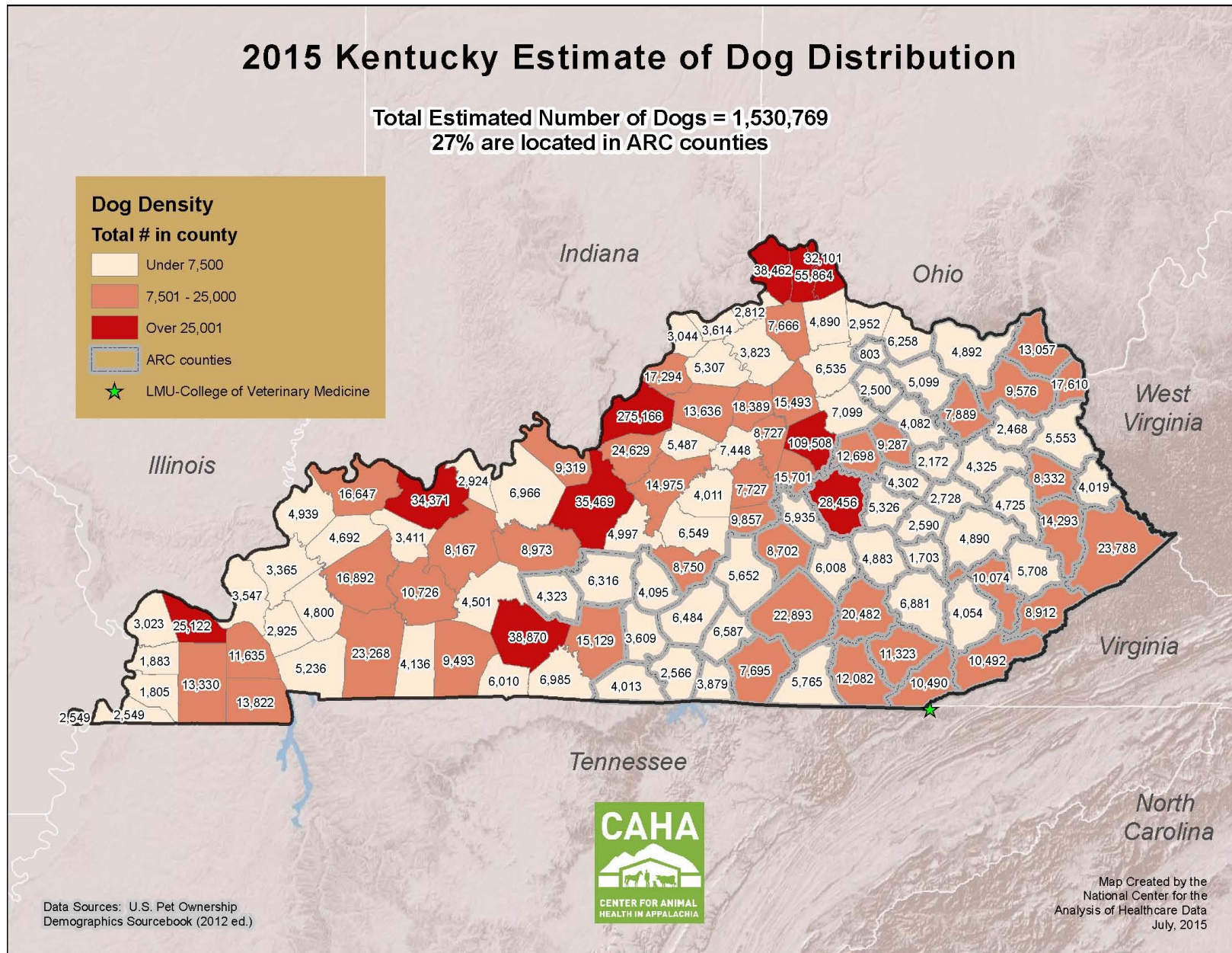
STATE ANALYSIS OF APPALACHIA – KENTUCKY



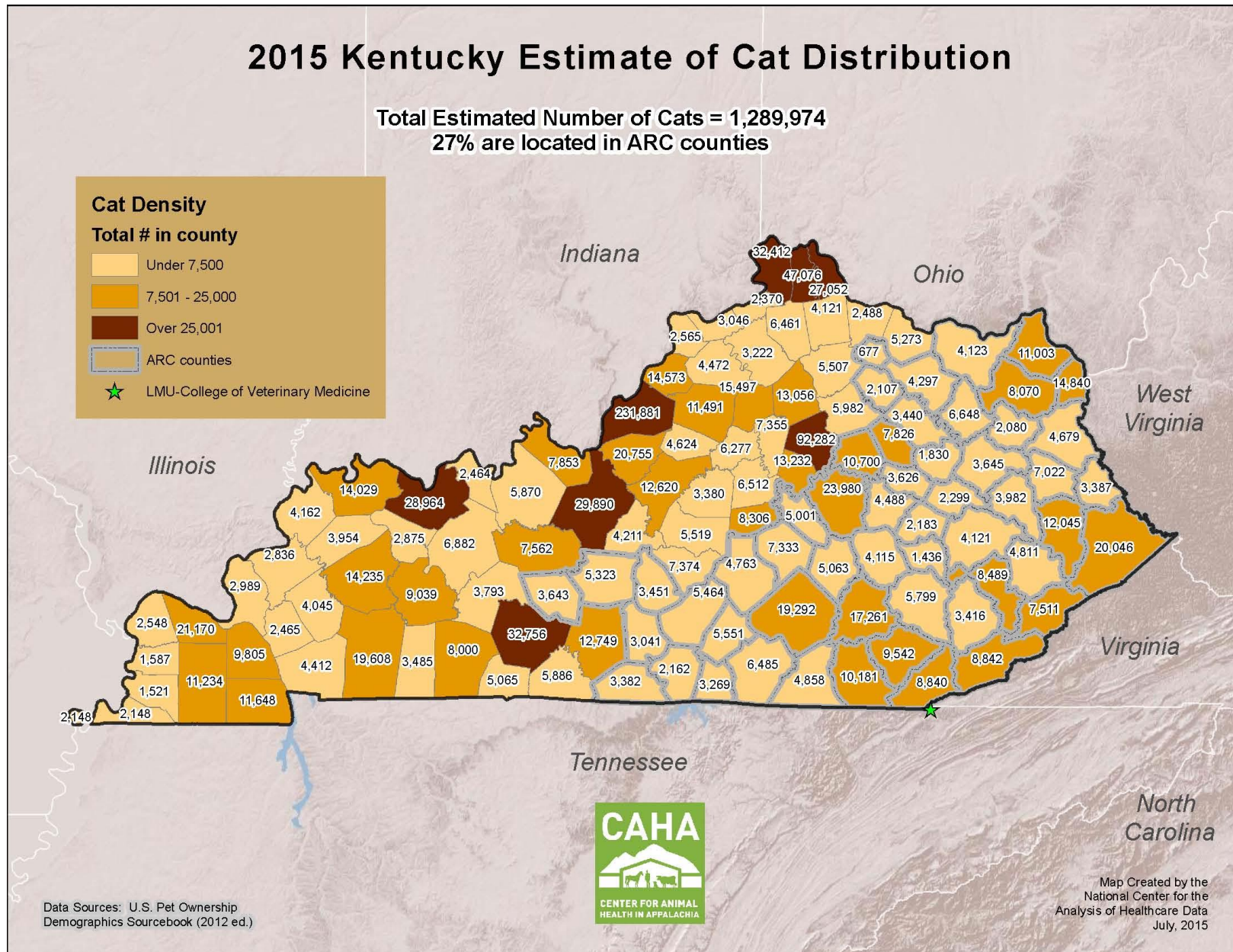
STATE ANALYSIS OF APPALACHIA – KENTUCKY



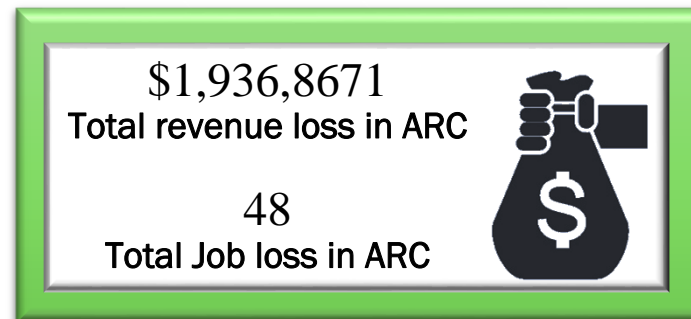
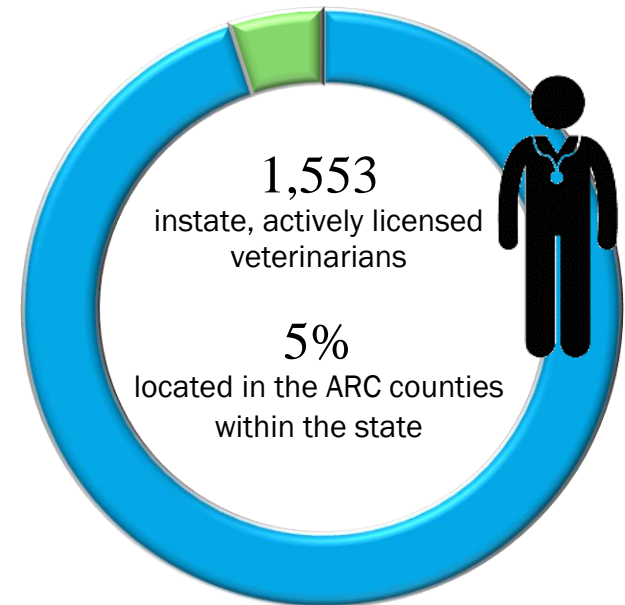
STATE ANALYSIS OF APPALACHIA – KENTUCKY



STATE ANALYSIS OF APPALACHIA – KENTUCKY



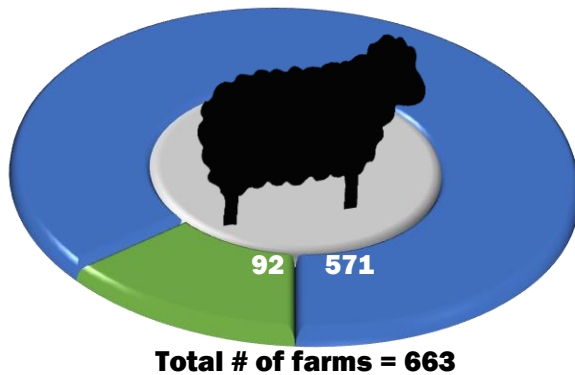
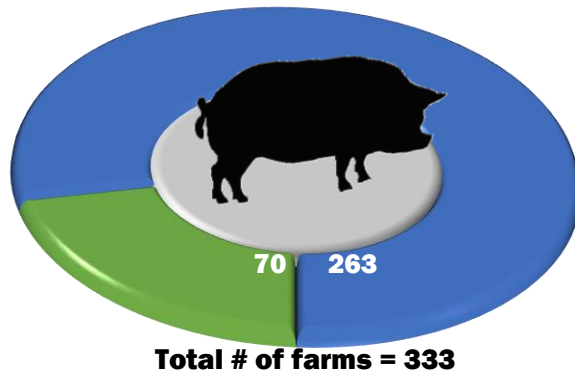
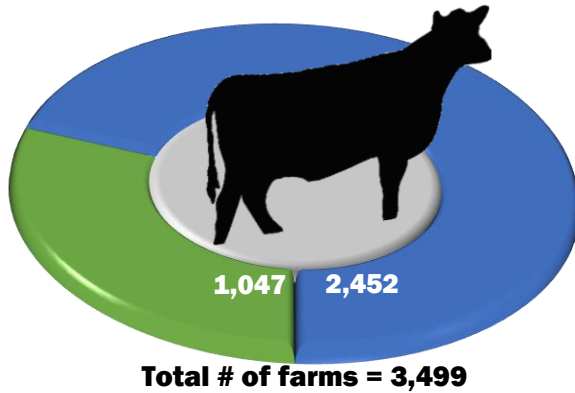
ANALYSIS OF APPALACHIA- MARYLAND



*State not analyzed in further detail

STATE ANALYSIS OF APPALACHIA – MARYLAND

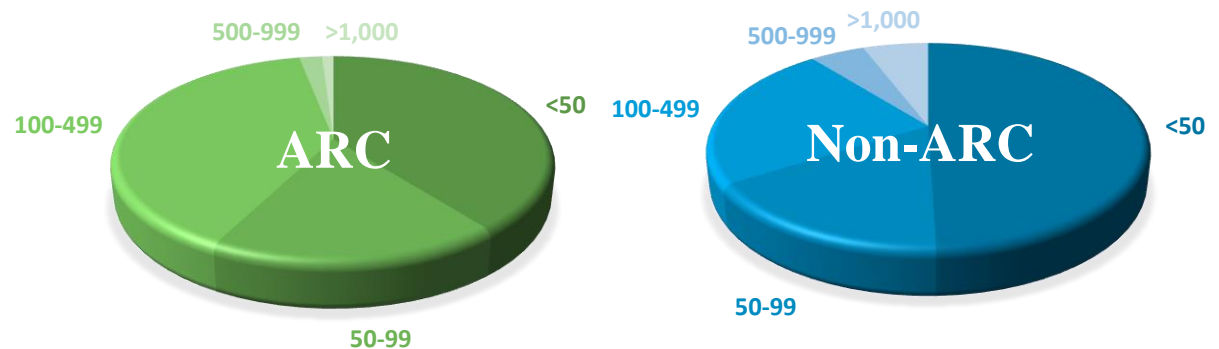
Maryland Farms by Type of Herd 2012



FARMS and FARMLAND

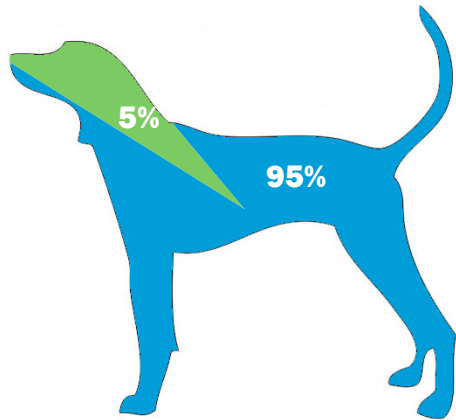
- Maryland covers about 6 million acres, 16% of this falls within ARC; 32% of that is land in farms.
- There are more than 12 thousand farms in Maryland, 15% are located in ARC; 39% of those farms in ARC counties are less than 50 acres.
- 1,818 farms have cattle, 15% are located in ARC. The number and size of cattle herds in ARC counties grew between 2007 and 2012.
- 333 farms in Maryland maintain a pig herd, 84% of which run less than 25 head. 21% of pig herds are located in ARC.
- 663 farms have sheep, 76% have flocks with less a 25 head. 14% of the flocks are in ARC counties.

Maryland Farms by Number of Acres (Percent)

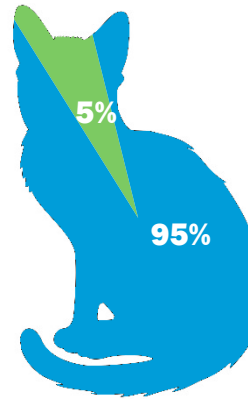


STATE ANALYSIS OF APPALACHIA – MARYLAND

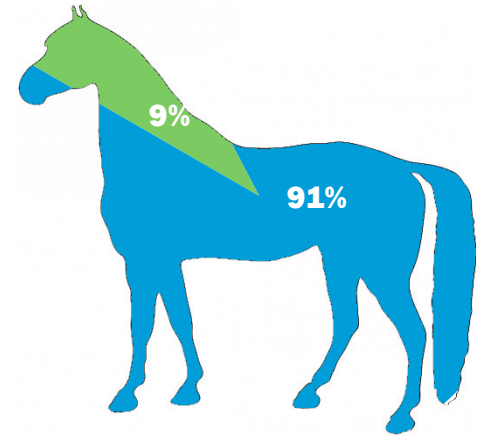
Species Distributions



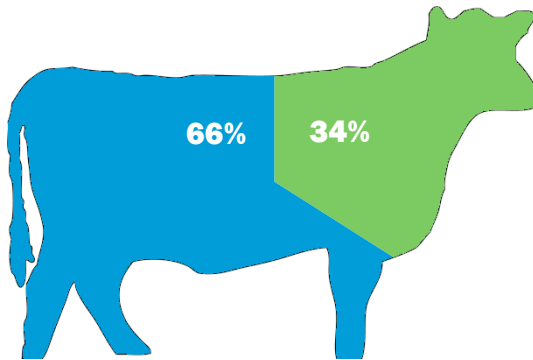
Total Estimated Number of Dogs =
1,696,792



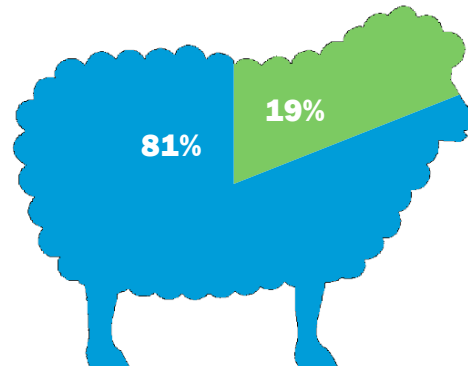
Total Estimated Number of Cats =
1,429,881



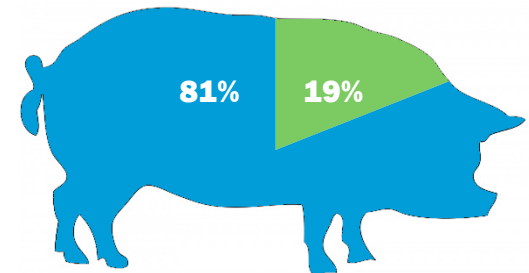
Total Estimated Number of Horse,
Mule & Donkey = 29,842



Total Estimated Number of Cattle*
= 265,747



Total Estimated Number of Sheep
& Goat* = 40,135



Total Estimated Number of Pig* =
53,922

 Non-ARC  ARC

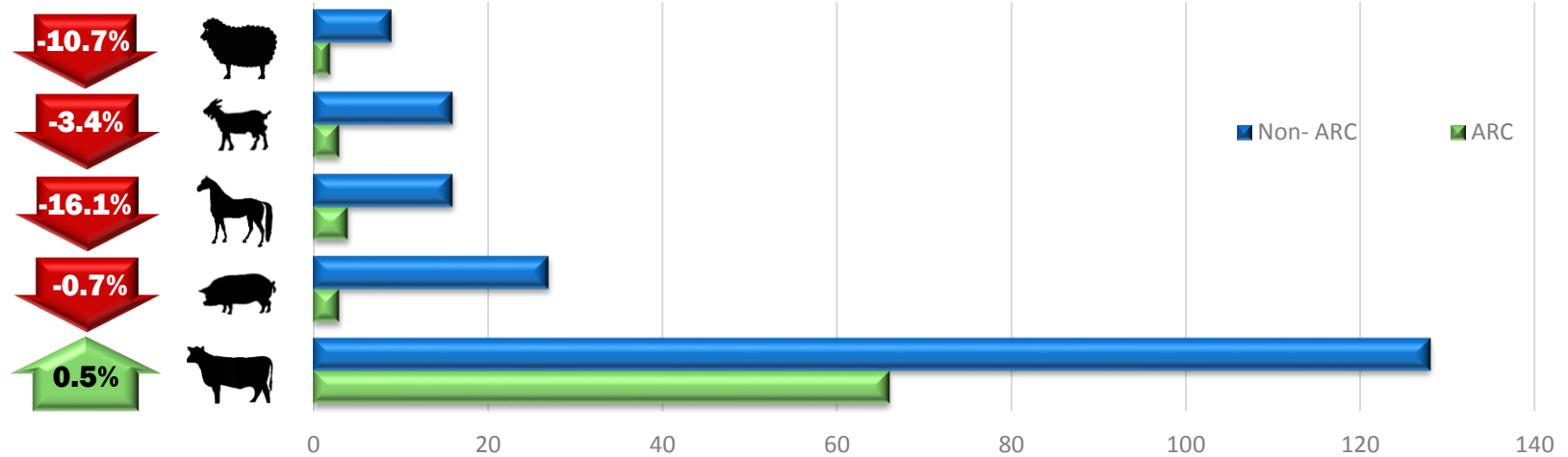
*estimated herd size

STATE ANALYSIS OF APPALACHIA – MARYLAND

Maryland Large Animal Inventory 2012

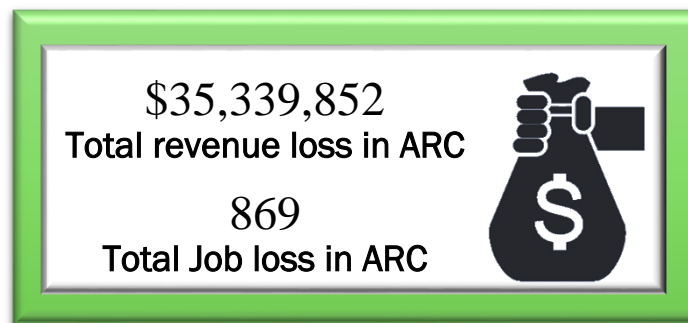
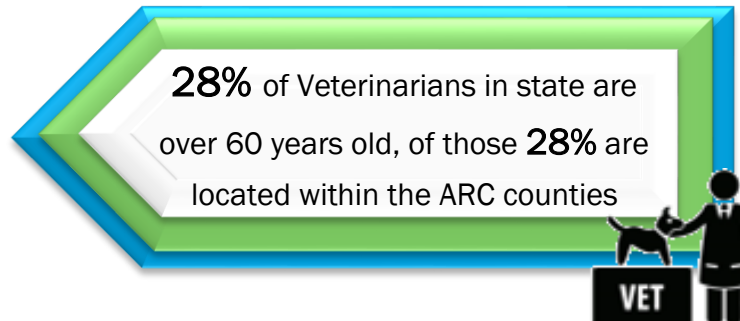
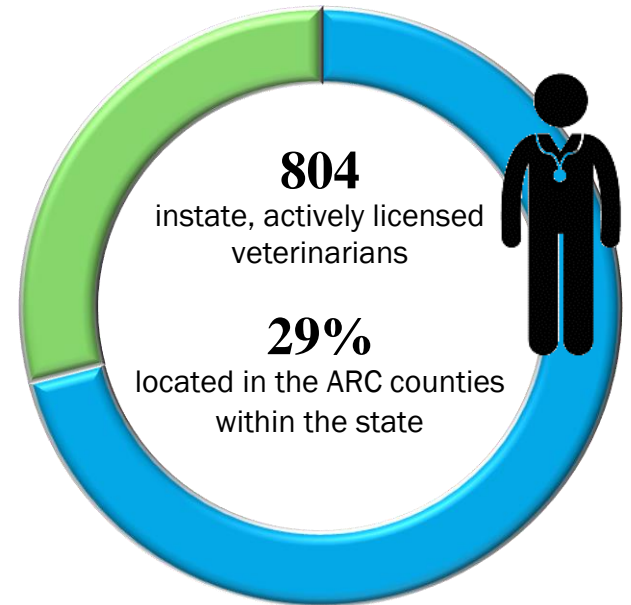
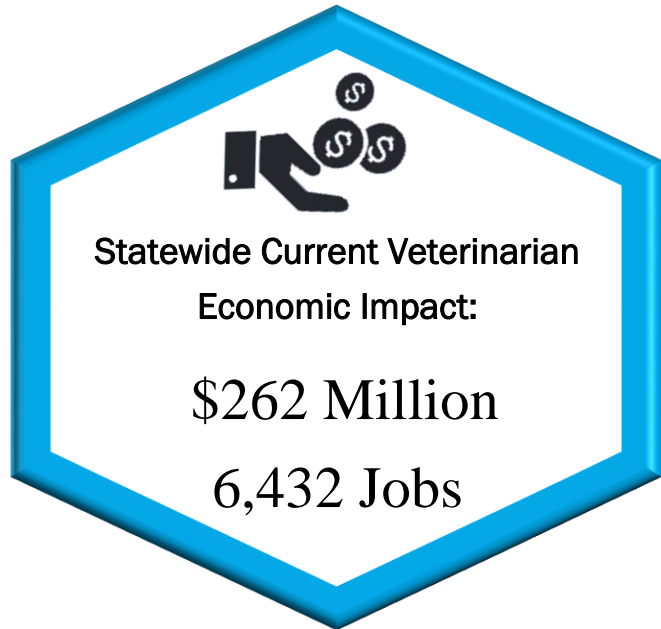
State LA Inventory CAGR,
2007-12

Thousand head



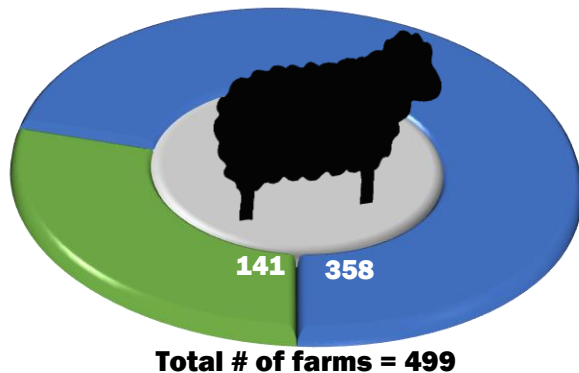
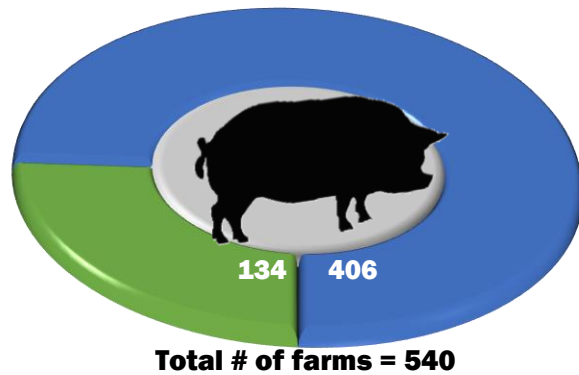
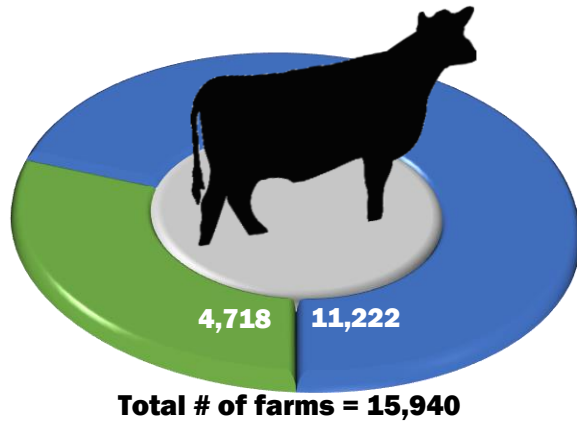
- 28% of the large animal inventory is located in Maryland ARC.
- Cattle are growing faster inside of Maryland ARC than outside (CAGR 3.2% vs -0.7%).
- 19% of the swine are located in ARC counties; the decline in the pig inventory was stronger in non-ARC counties (CAGR -14.5% vs -16.5%).
- Only 18% of the sheep flock is located in ARC counties; this portion is growing (CAGR 1.6%) while the rest of the state is contracting (CAGR -4.4%).
- 20% of the goat herd is located in ARC counties; it was not hit as hard by the decline in goats than the rest of the state (CAGR -5.8% vs. -11.7%).

STATE ANALYSIS OF APPALACHIA- MISSISSIPPI



STATE ANALYSIS OF APPALACHIA – MISSISSIPPI

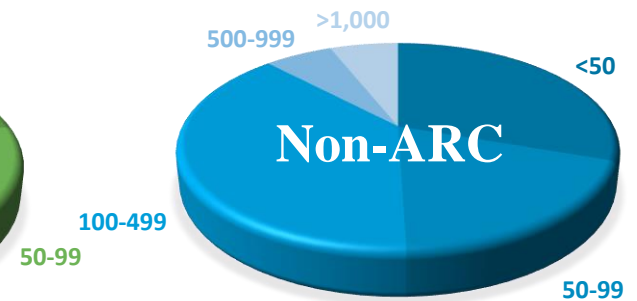
Mississippi Farms by Type of Herd 2012



FARMS and FARMLAND

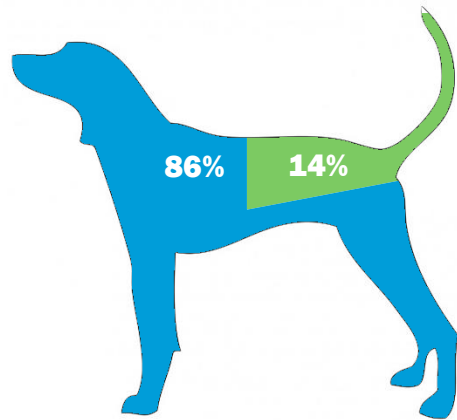
- Mississippi covers about 30 million acres, 26% of this falls within ARC counties; 36% is land in farms.
- There are more than 38 thousand farms in Mississippi, 32% are located in ARC counties. There is not a typical size of farm as 46% of the farms <100 acres, 44% are 100-499 acres and 6% are >500 acres.
- There are 15,940 farms with cattle; 30% are located in ARC counties. 74% of the farms run fewer than 50 head
- 540 farms maintain a pig herd, 25% of which are located in ARC counties. While 38 herds in ARC are more than 500 head, 66% run less than 25 head.
- The flock size and number of sheep flocks are growing in Mississippi, 96% are less than 100 head. Of the 499 farms running sheep, 28% are in ARC counties.

Mississippi Farms by Number of Acres (Percent)

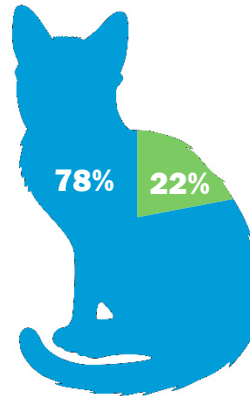


STATE ANALYSIS OF APPALACHIA – MISSISSIPPI

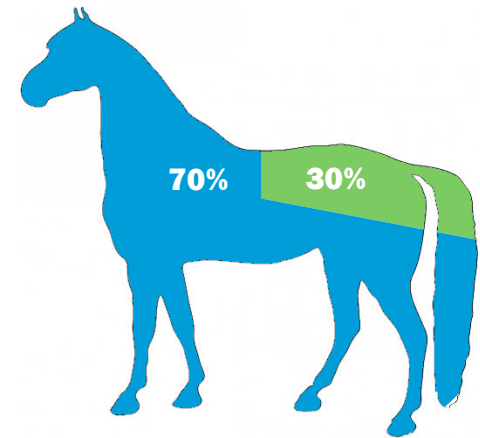
Species Distributions



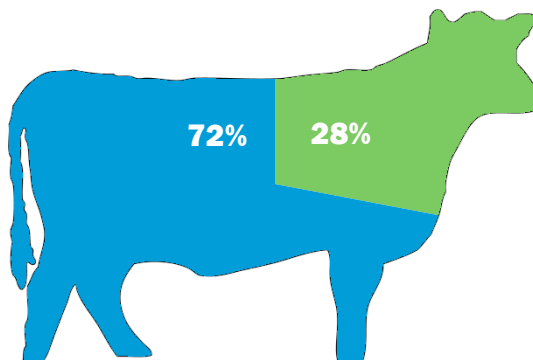
Total Estimated Number of Dogs =
847,984



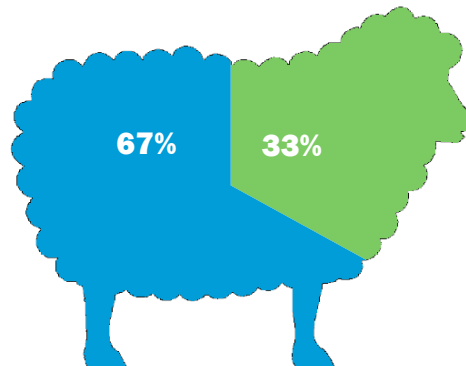
Total Estimated Number of Cats =
669,461



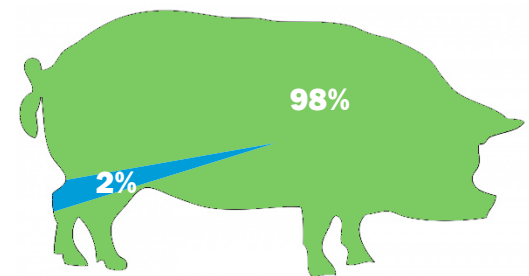
Total Estimated Number of Horse,
Mule & Donkey = 19,891



Total Estimated Number of Cattle*
= 1,258,911



Total Estimated Number of Sheep
& Goat* = 48,015



Total Estimated Number of Pig* =
1,090,711

 Non-ARC  ARC *estimated herd size

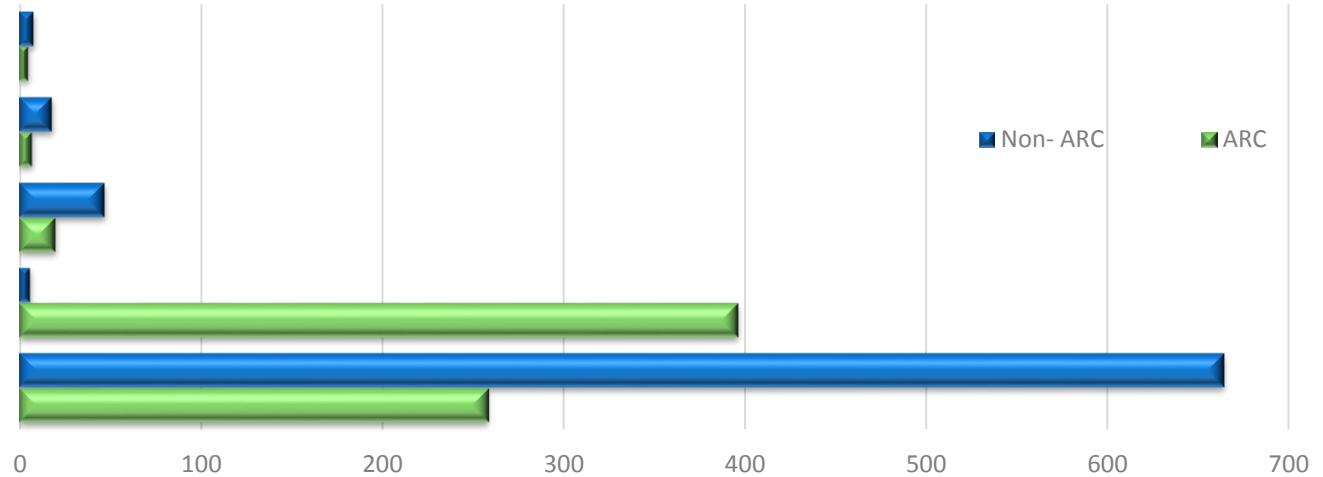
STATE ANALYSIS OF APPALACHIA – MISSISSIPPI

State LA Inventory CAGR,
2007-12



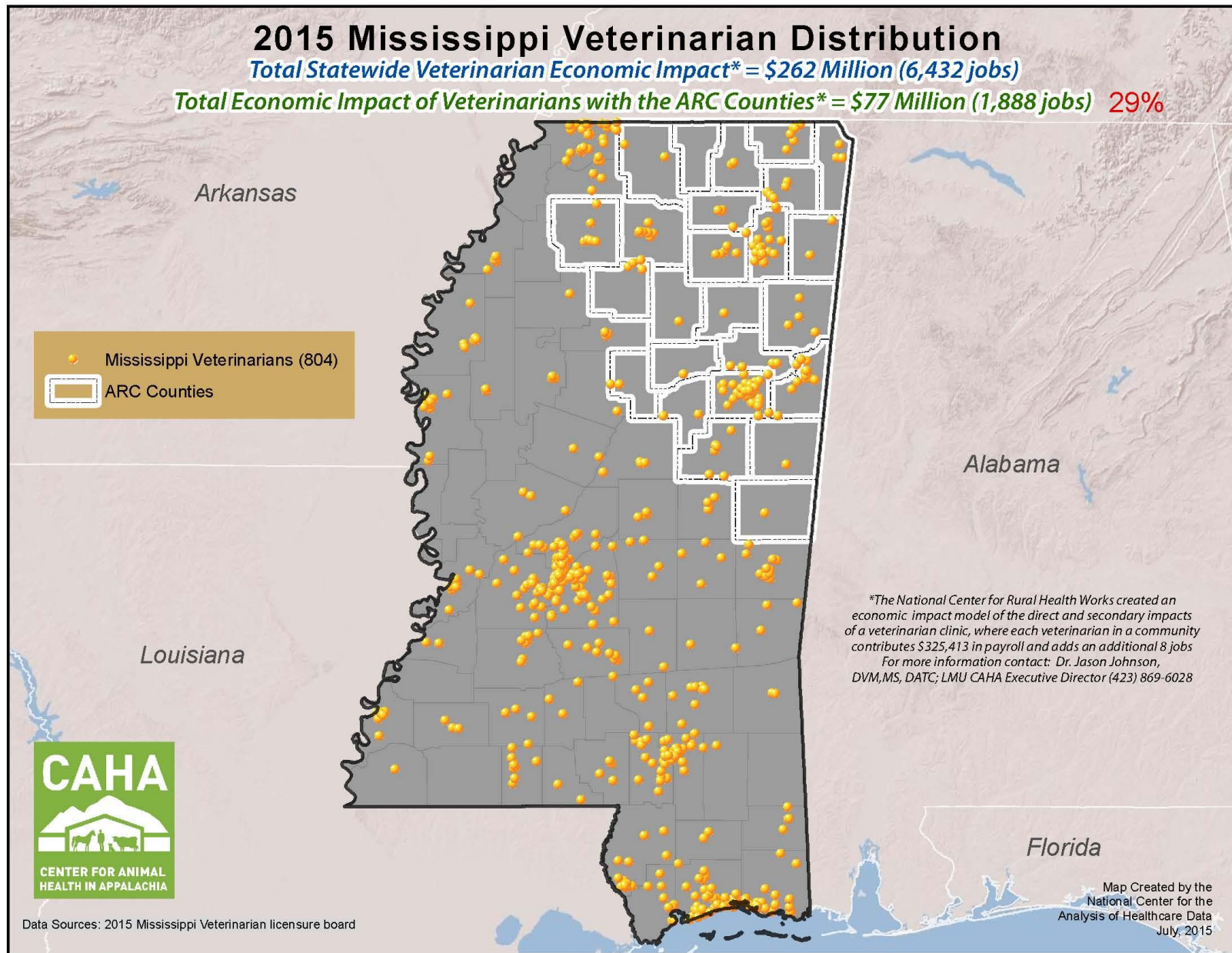
Mississippi Large Animal Inventory 2012

Thousand head

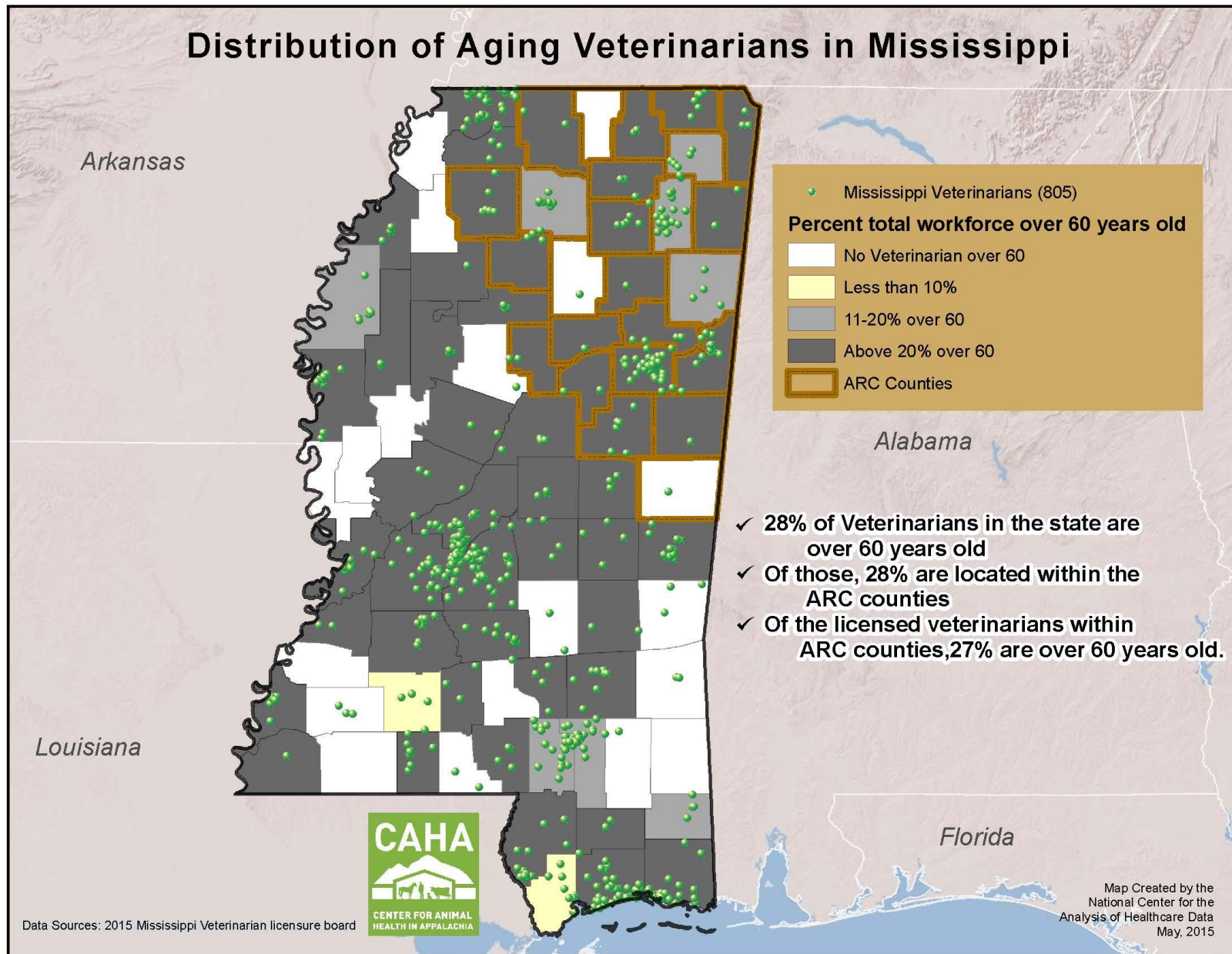


- 48% of the large animal inventory is located in ARC counties.
- The statewide decline in Cattle was worse in ARC counties than the rest of the state (CAGR -4.9% vs -0.3%)
- 98% of the swine are located in ARC. The 9.5% growth within ARC did not occur outside ARC (CAGR -44%)
- Nearly 58% of the sheep herd is located outside ARC counties. However, the growth in ARC is stronger (CAGR 14.1%) than the rest of the state (CAGR 8.2%).
- 72% of the goat herd is located outside ARC counties. ARC wasn't hit as hard by the decline in goats as the rest of the state (CAGR -1.1% vs. -6.9%).

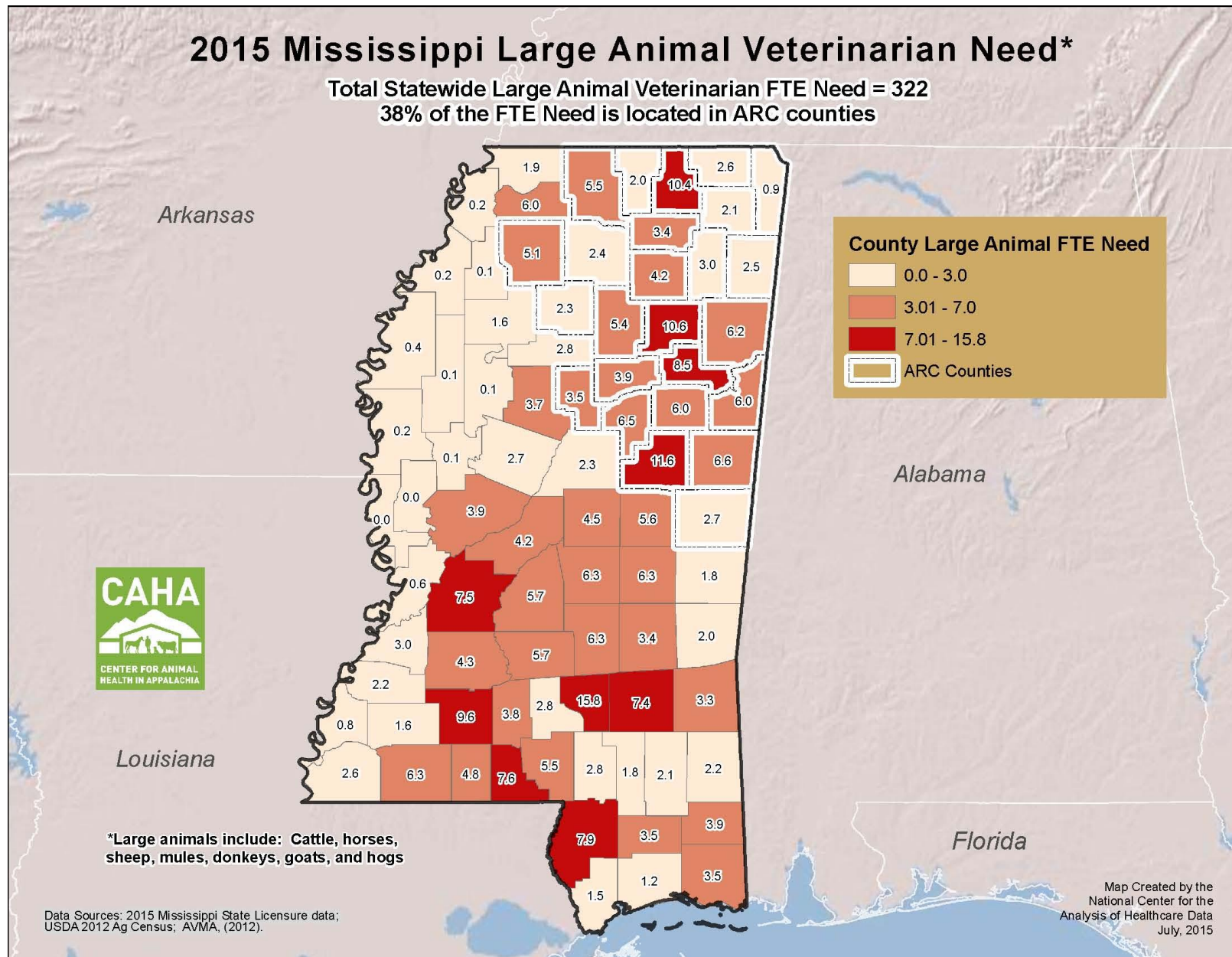
STATE ANALYSIS OF APPALACHIA – MISSISSIPPI



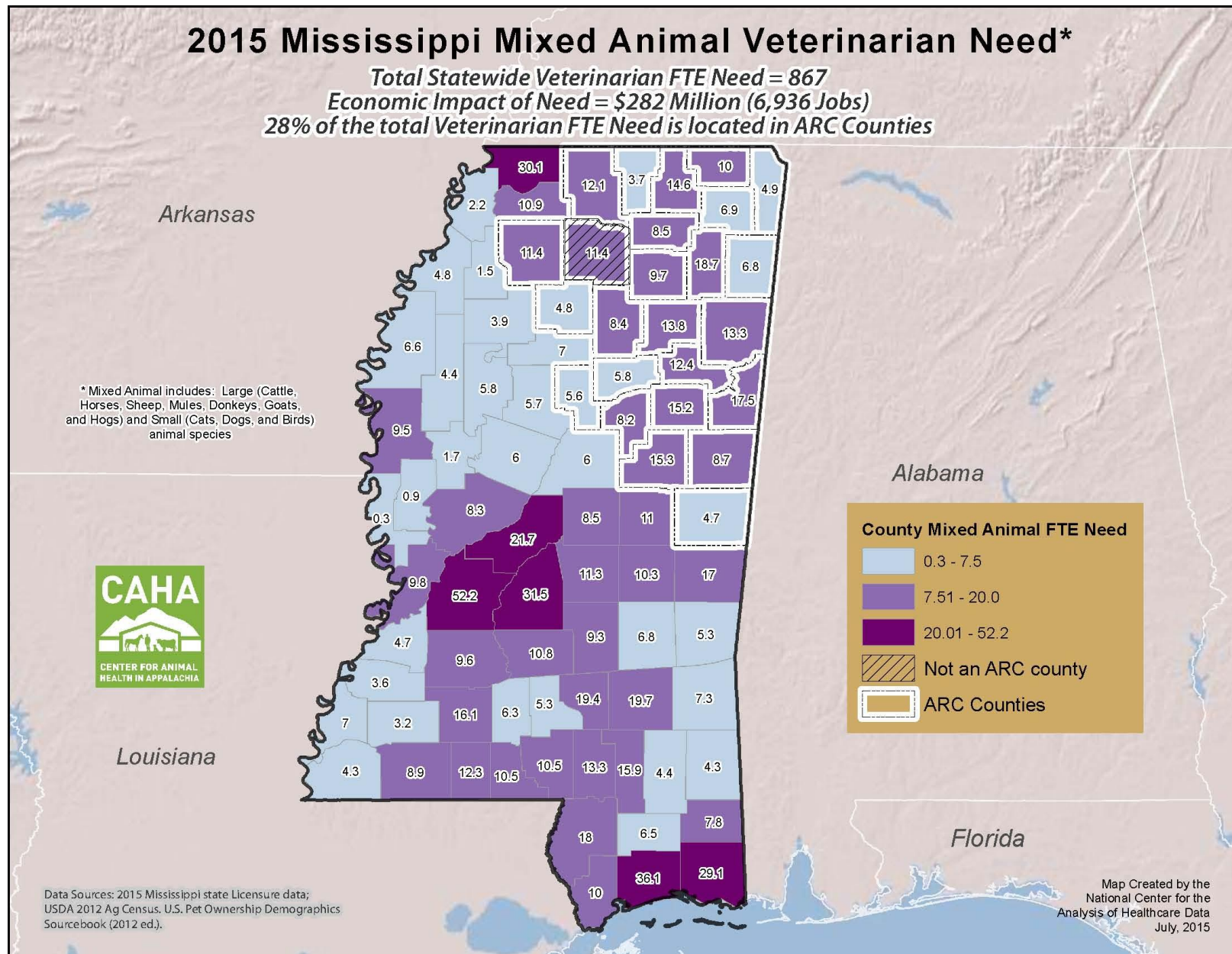
STATE ANALYSIS OF APPALACHIA – MISSISSIPPI



STATE ANALYSIS OF APPALACHIA – MISSISSIPPI



STATE ANALYSIS OF APPALACHIA – MISSISSIPPI



STATE ANALYSIS OF APPALACHIA – MISSISSIPPI

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

The economic impact of the state's shortage of veterinarians is**:

Total Revenue loss = \$20.5 Million Total Veterinarian shortage times average payroll**
 63 X \$325,413
AND
Total Job Loss = 504 (63 X 8 jobs**)

* Mixed Animal includes: Large (Cattle, Horses, Sheep, Mules, Donkeys, Goats, and Hogs) and Small (Cats, Dogs, and Birds) animal species

- ✓ Total Statewide Veterinarian FTE Need = 867
- ✓ Total Practicing Veterinarians = 804
- ✓ Total Statewide Veterinarian FTE Shortage = 63
- ✓ ARC region Veterinarian FTE Need = 241
- ✓ ARC region Practicing Veterinarians = 236
- ✓ ARC region Veterinarian FTE Surplus = 5

Arkansas



Louisiana

Mixed Animal FTE Analysis by County

- Greater than 1.0 FTE Veterinarian Shortage
- Meeting the Total Veterinarian Needs
- Greater than 1.0 FTE Veterinarian Surplus
- ARC Counties

Alabama

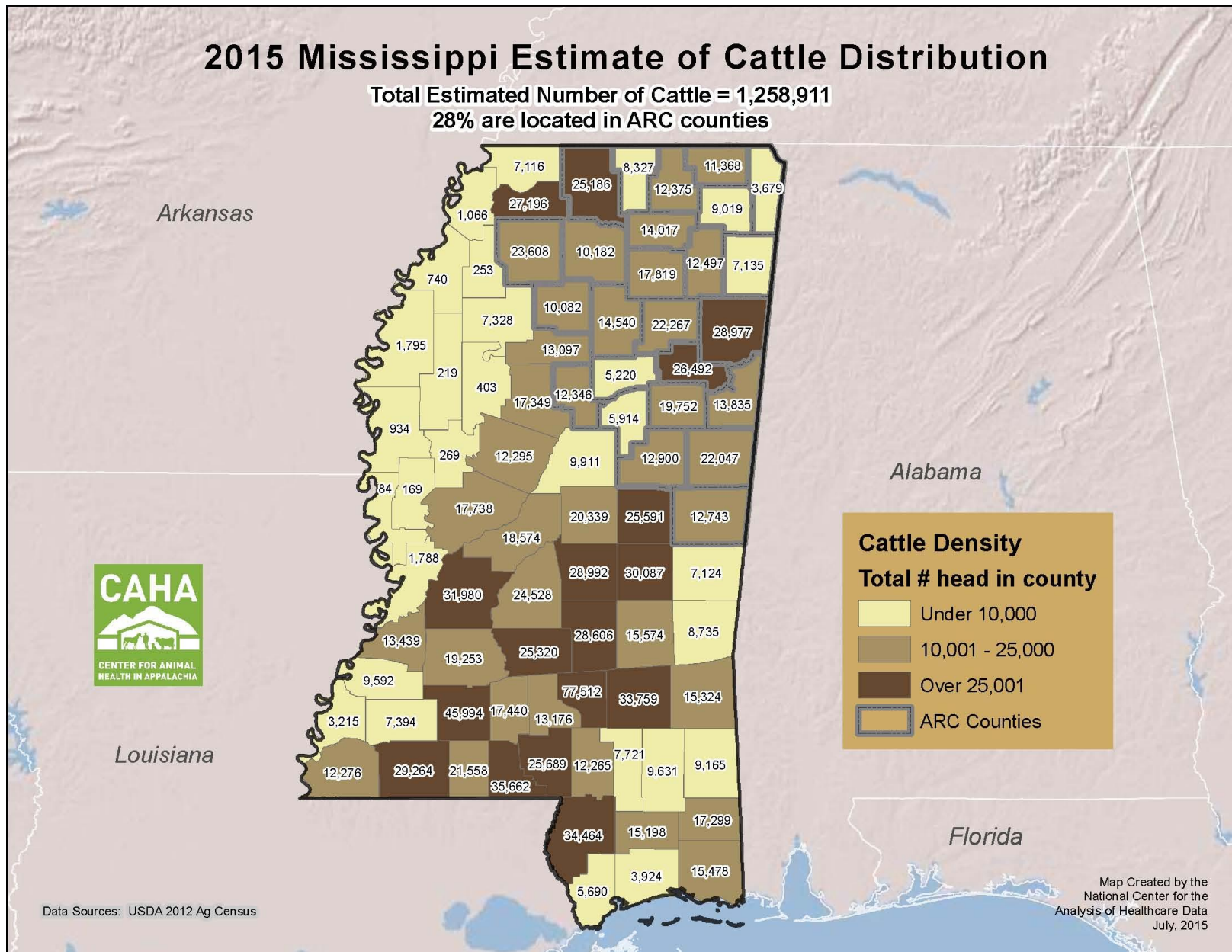
Florida

Data Sources: 2015 Mississippi State Licensure data; USDA 2012 AgCensus; AVMA, (2012). U.S. Pet Ownership Demographics Sourcebook (2012 ed.).

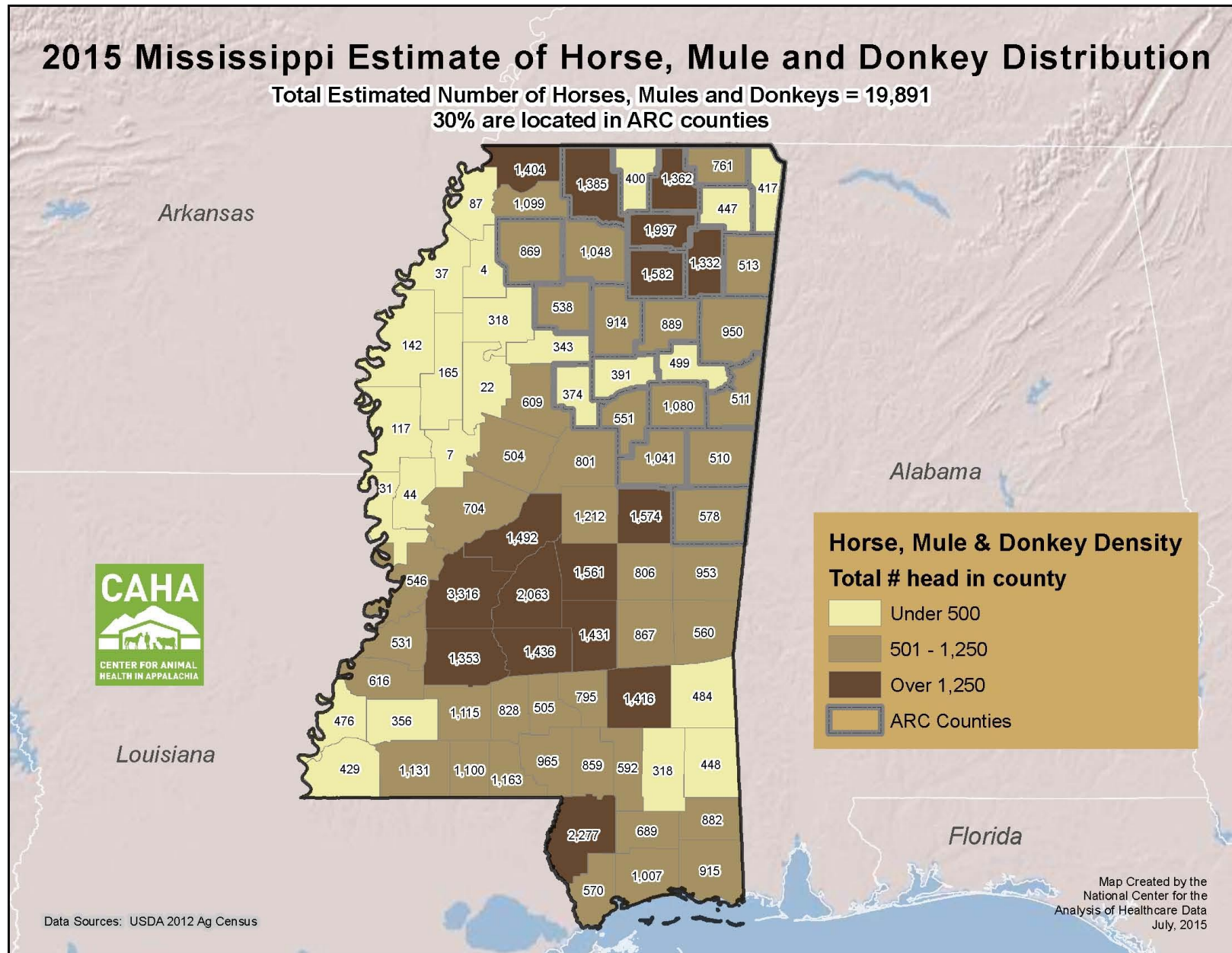
**The National Center for Rural Health Works created an economic impact model of the direct and secondary impacts of a veterinarian clinic. For more information contact: Dr. Jason Johnson, DVM, MS, DTAC; CAHA Executive Director (423) 869-6028

Map Created by the National Center for the Analysis of Healthcare Data July, 2015

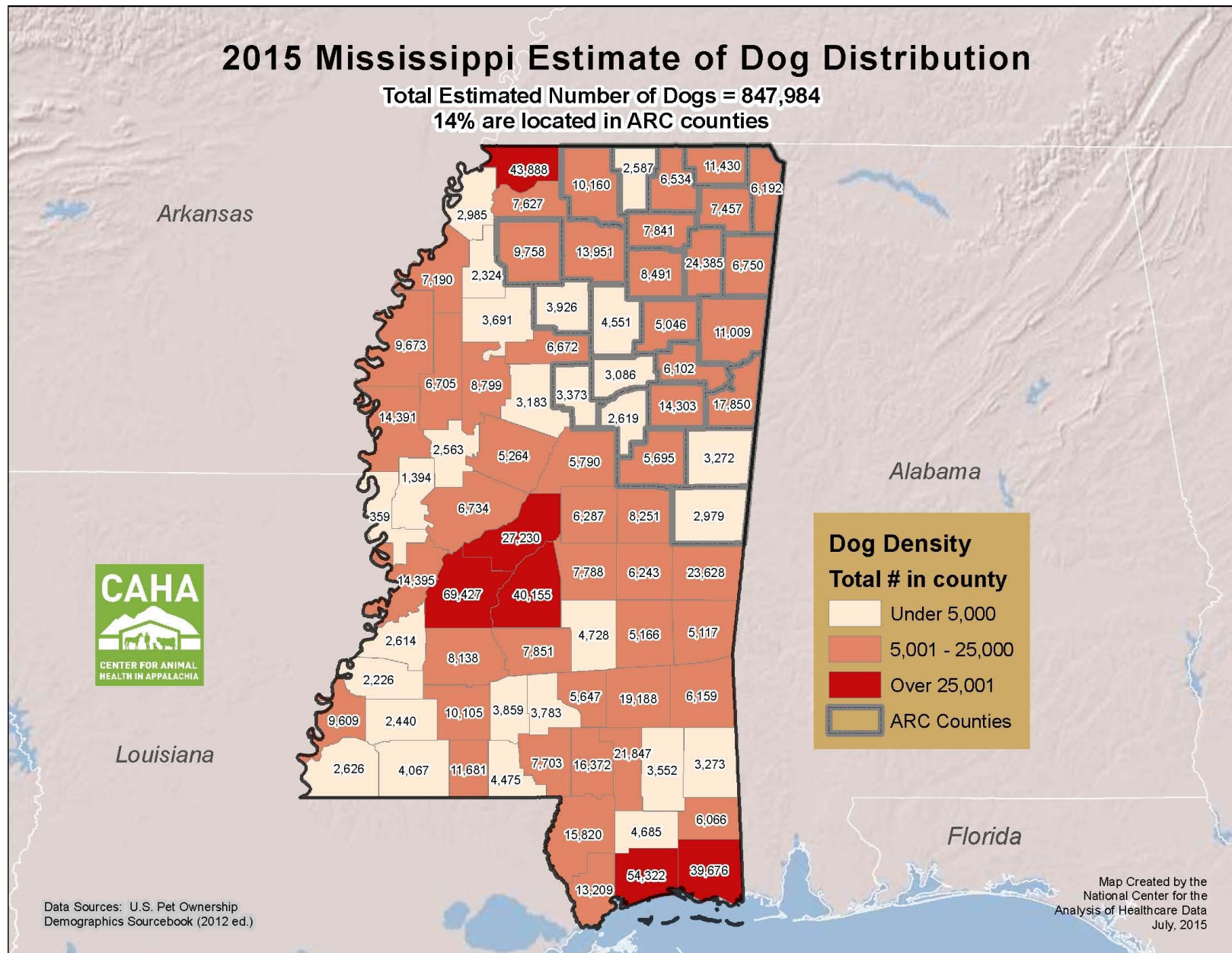
STATE ANALYSIS OF APPALACHIA – MISSISSIPPI



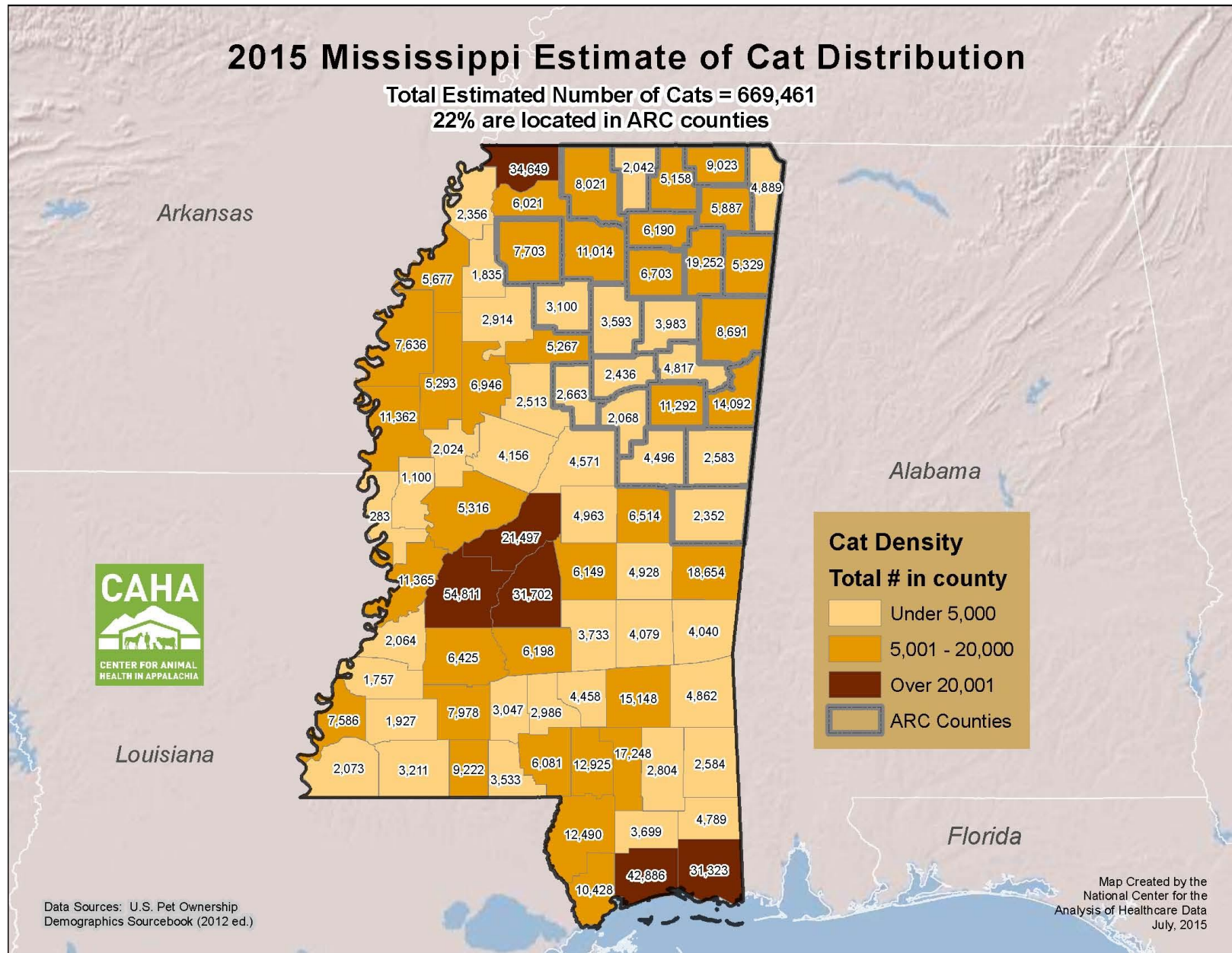
STATE ANALYSIS OF APPALACHIA – MISSISSIPPI



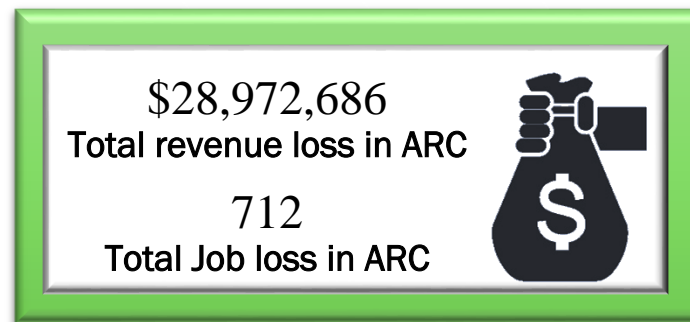
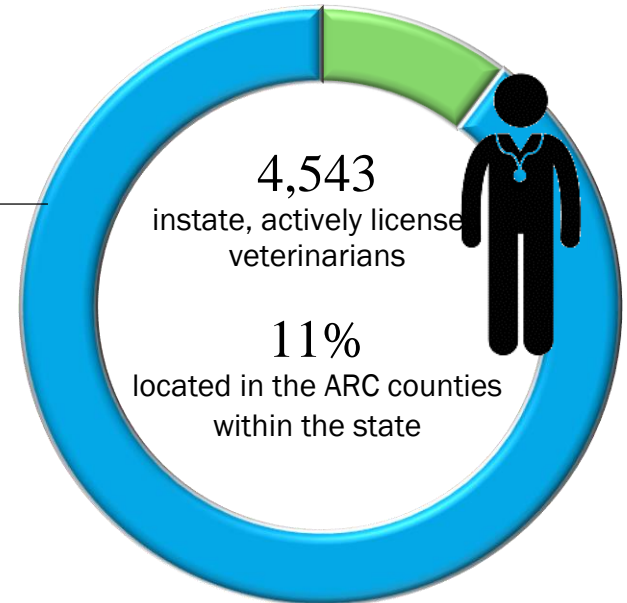
STATE ANALYSIS OF APPALACHIA – MISSISSIPPI



STATE ANALYSIS OF APPALACHIA – MISSISSIPPI



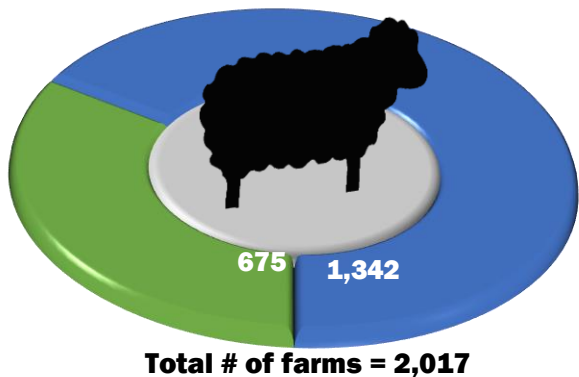
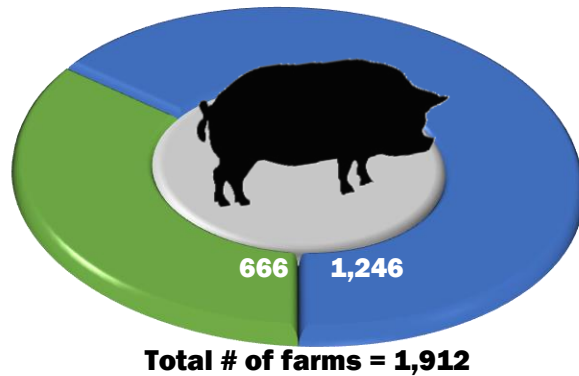
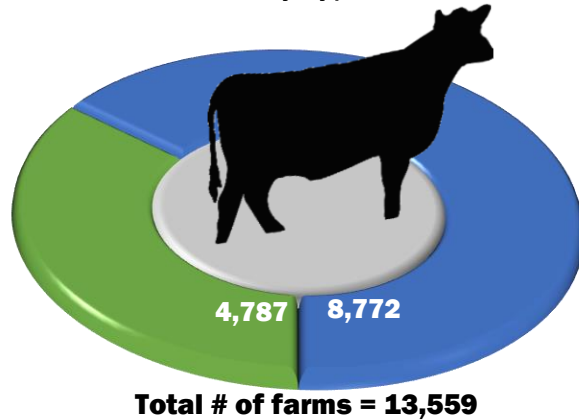
ANALYSIS OF APPALACHIA- NEW YORK



*State not analyzed

STATE ANALYSIS OF APPALACHIA – NEW YORK

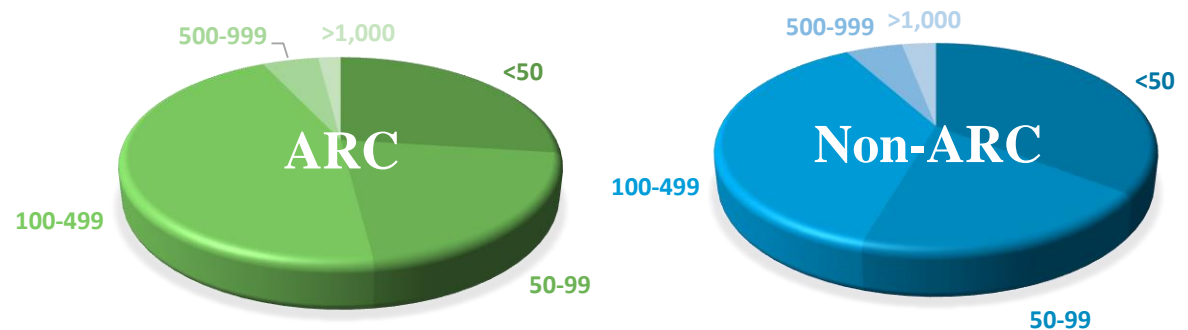
New York Farms by Type of Herd 2012



FARMS and FARMLAND

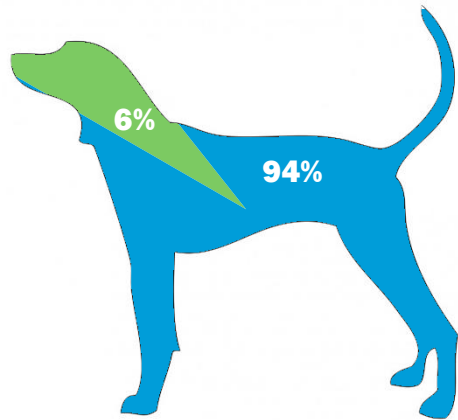
- New York covers about 30 million acres, 24% of this falls within ARC counties; 24% is land in farms.
- There are more than 36 thousand farms in New York, 31% are located in ARC counties. There is not a typical size of farm as 48% of the farms <100 acres, 45% are 100-499 acres and 7% are >500 acres
- 13,559 farms have cattle, 35% are located in ARC counties. Overall the number of herds are declining, but herds less than 50 are growing.
- 1,871 farms have pigs, 34% are located in ARC counties, 91% of which run less than 25 head.
- 2,017 farms maintain sheep in ARC, flocks with 50-100 head are growing by double digits.

New York Farms by Number of Acres (Percent)

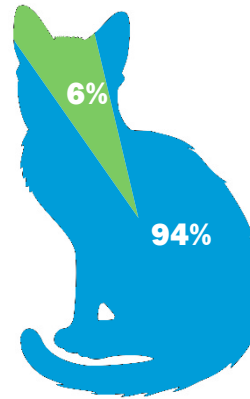


STATE ANALYSIS OF APPALACHIA – NEW YORK

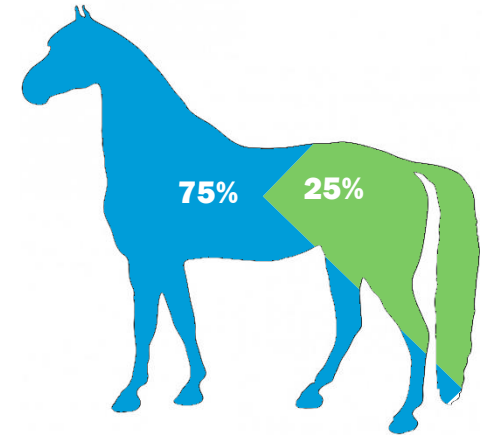
Species Distributions



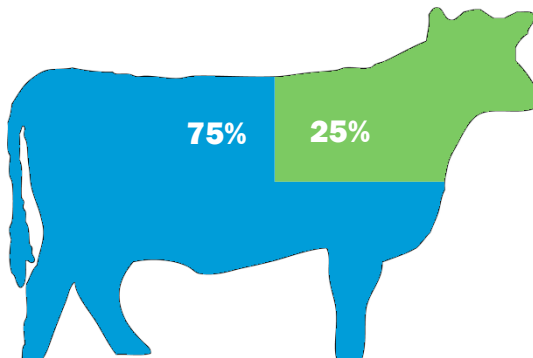
Total Estimated Number of Dogs =
6,512,802



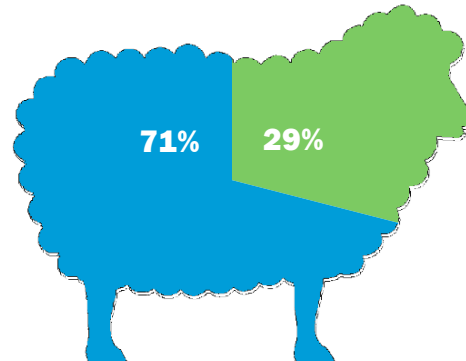
Total Estimated Number of Cats =
5,488,316



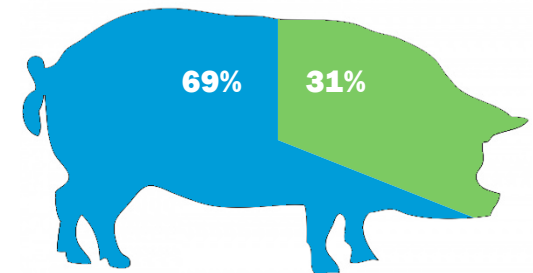
Total Estimated Number of Horse,
Mule & Donkey = 93,600



Total Estimated Number of Cattle*
= 1,939,054



Total Estimated Number of Sheep
& Goat* = 165,591



Total Estimated Number of Pig* =
202,650

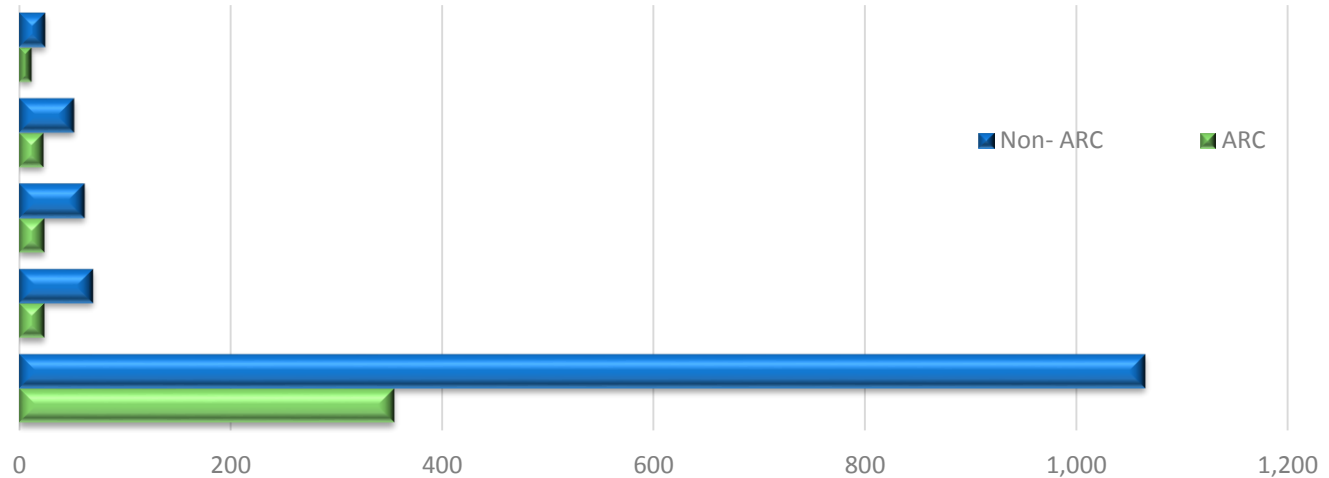
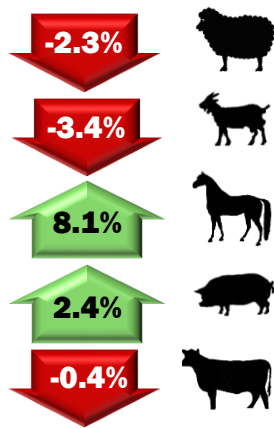
 Non-ARC  ARC *estimated herd size

STATE ANALYSIS OF APPALACHIA – NEW YORK

New York Large Animal Inventory 2012

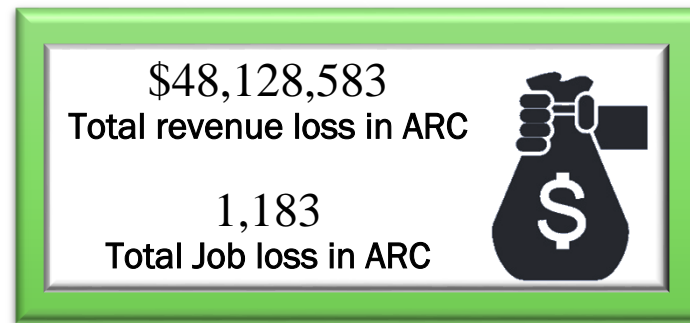
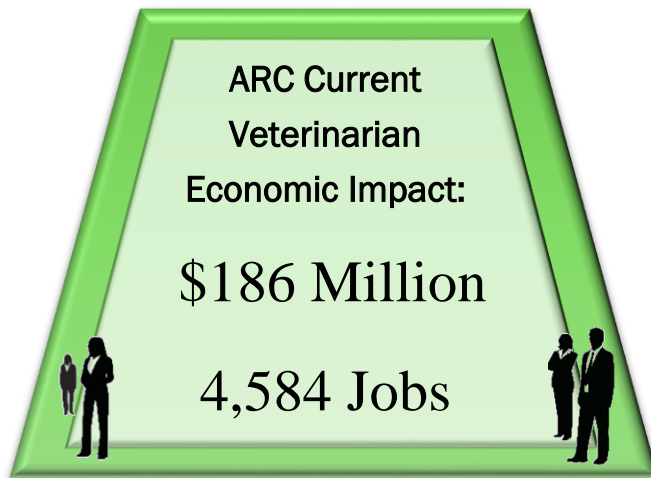
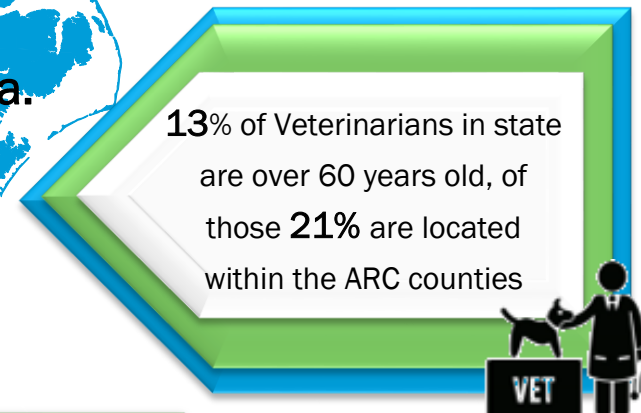
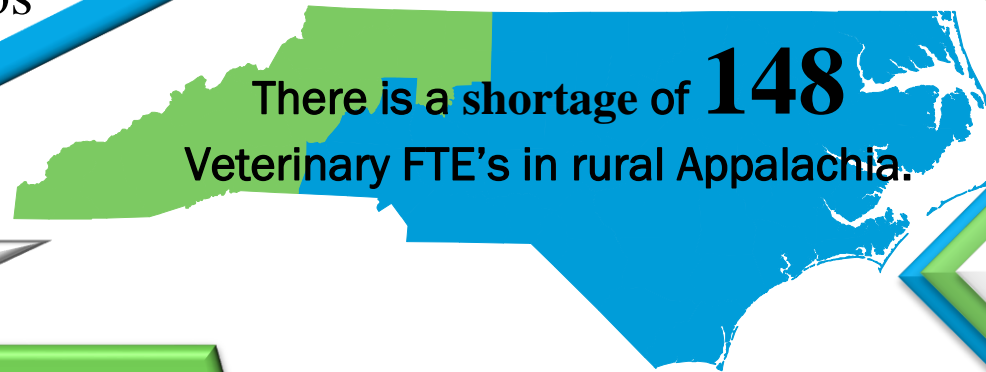
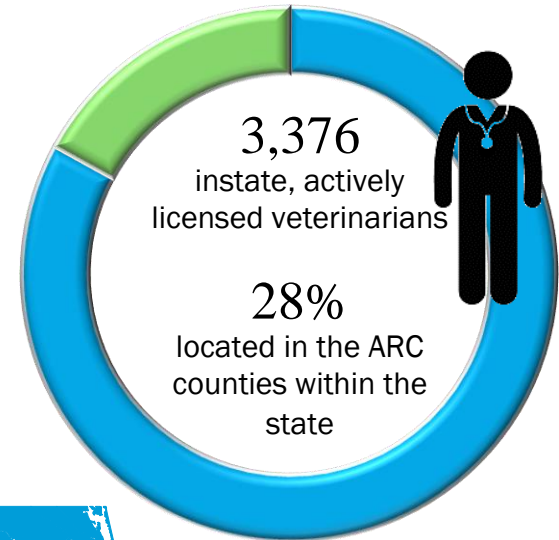
Thousand head

State LA Inventory CAGR,
2007-12



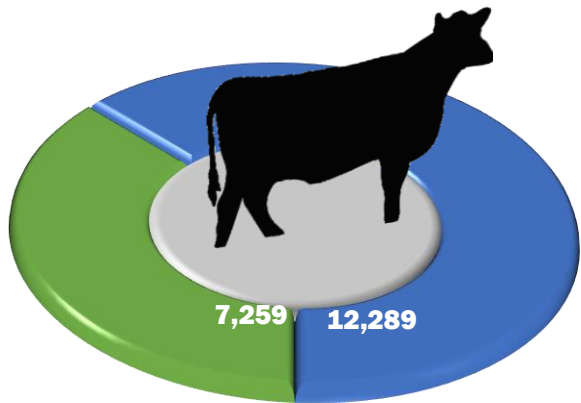
- 26% of the large animal inventory is located in ARC counties.
- Cattle are declining in New York, a decline hitting ARC counties harder than the rest of the state (CAGR -1.1% vs -0.2%).
- Nearly 70% of the swine are located outside ARC counties; the decline in the pig inventory not as stronger in ARC counties than outside (CAGR -2.8% vs -3.7%).
- More than 72% of the sheep herd is located outside ARC counties. Most of the growth is outside of ARC (CAGR 3.6% vs 10.1%).
- 32% of the goat herd is located in ARC counties and it was hit harder by the decline in goats than the rest of the state (CAGR -3.8% vs. -1.5%).

STATE ANALYSIS OF APPALACHIA- NORTH CAROLINA

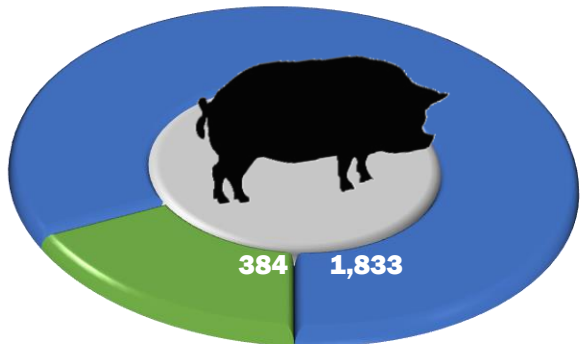


STATE ANALYSIS OF APPALACHIA – NORTH CAROLINA

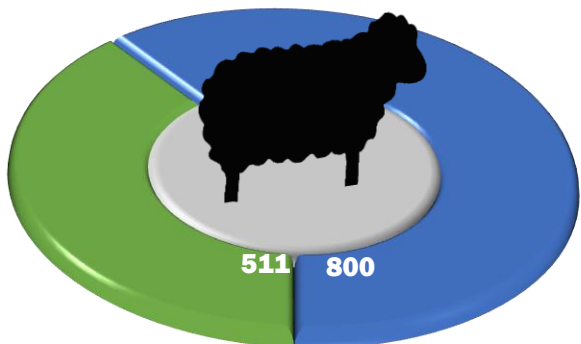
North Carolina Farms by Type of Herd 2012



Total # of farms = 19,548



Total # of farms = 2,217

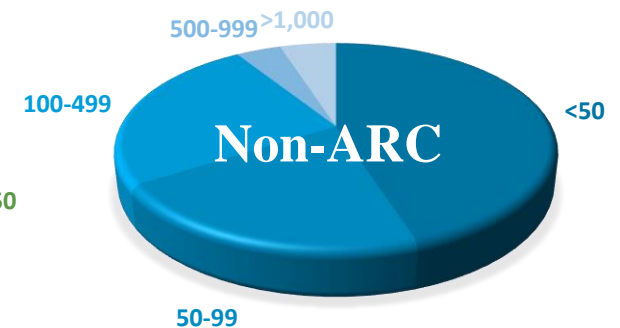


Total # of farms = 1,311

FARMS and FARMLAND

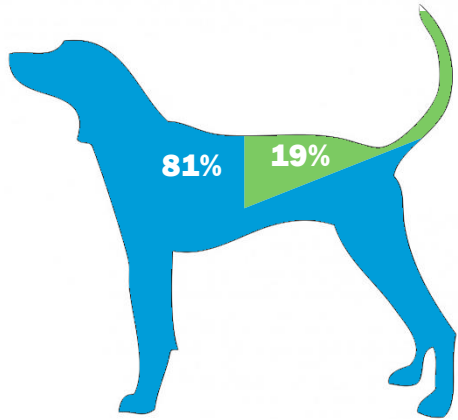
- North Carolina covers about 31 million acres, 24% of this falls within ARC counties; 27% is land in farms.
- There are more than 50 thousand farms in North Carolina, 32% are located in ARC counties; 54% of those farms are less than 50 acres.
- 38% of the cattle herds are located in ARC counties. From 2007-2012 the number of farms with cattle herds grew. Non-ARC county herd growth occurred in small herds whereas, ARC growth occurred in medium and very large herds.
- 17% of the 2,217 NC pig farms are located in ARC counties, 95% of which run less than 25 head.
- Of the 1311 farms with sheep in North Carolina, 39% are located in ARC counties, 71% with less than 25 animals.

North Carolina Farms by Number of Acres (Percent)

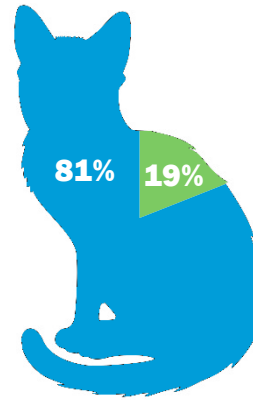


STATE ANALYSIS OF APPALACHIA – NORTH CAROLINA

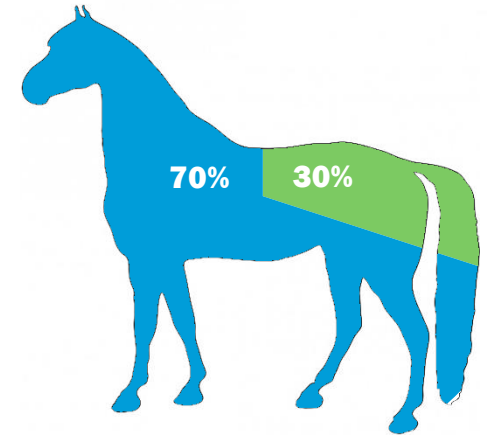
Species Distributions



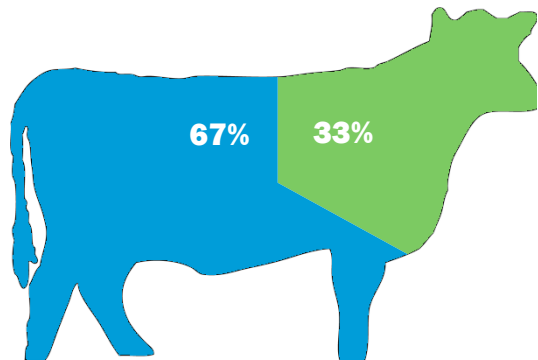
Total Estimated Number of Dogs =
2,546,705



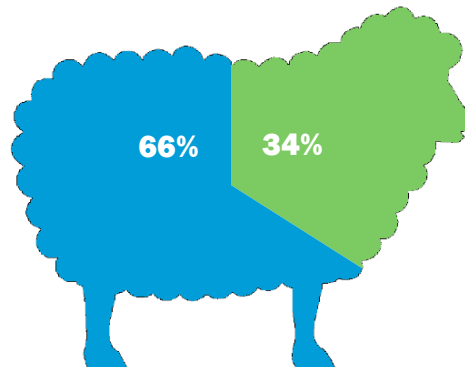
Total Estimated Number of Cats =
2,209,641



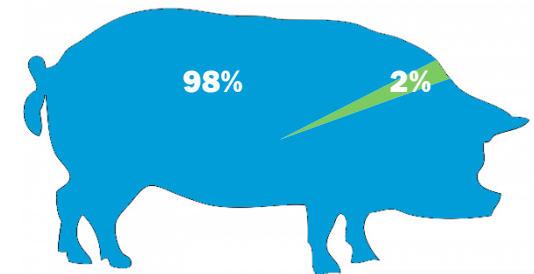
Total Estimated Number of Horse,
Mule & Donkey = 75,953



Total Estimated Number of Cattle*
= 1,133,511



Total Estimated Number of Sheep
& Goat* = 121,606



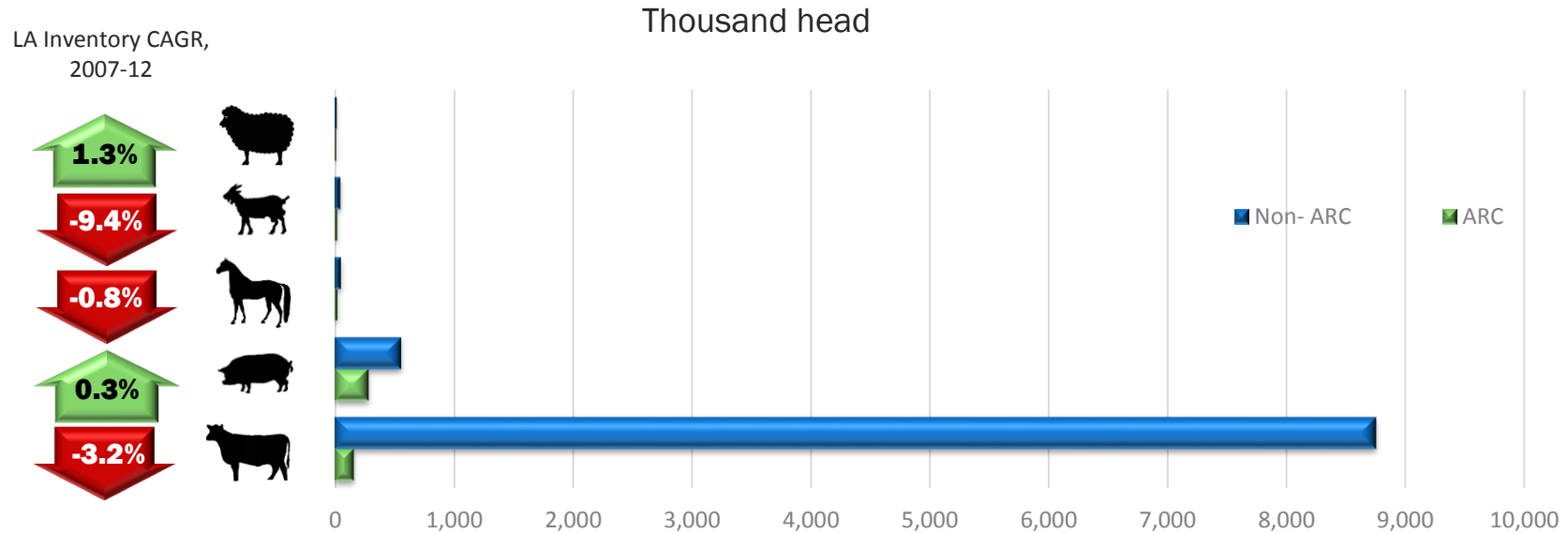
Total Estimated Number of Pig* =
24,157,601

 Non-ARC  ARC

*estimated herd size

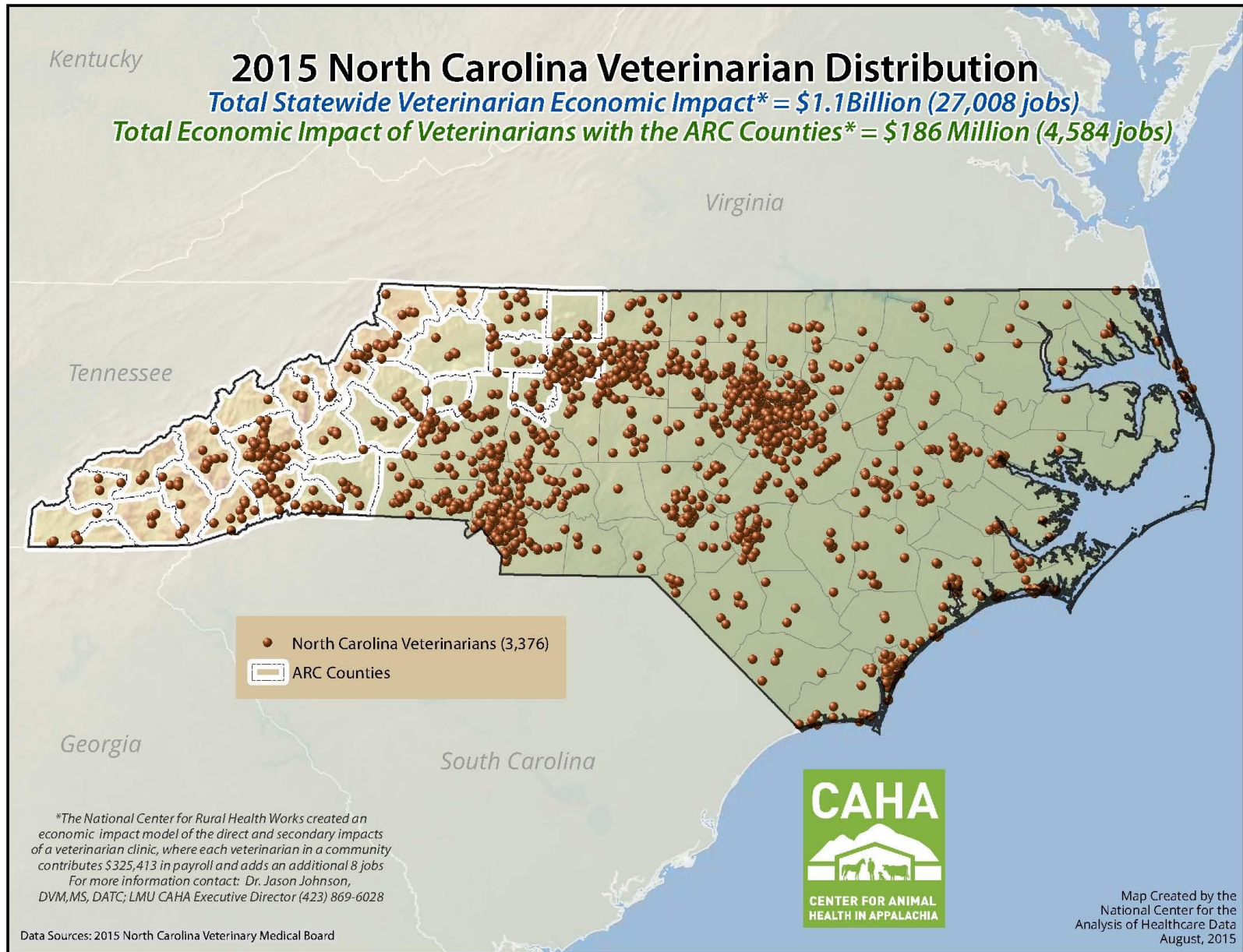
STATE ANALYSIS OF APPALACHIA – NORTH CAROLINA

North Carolina Large Animal Inventory 2012

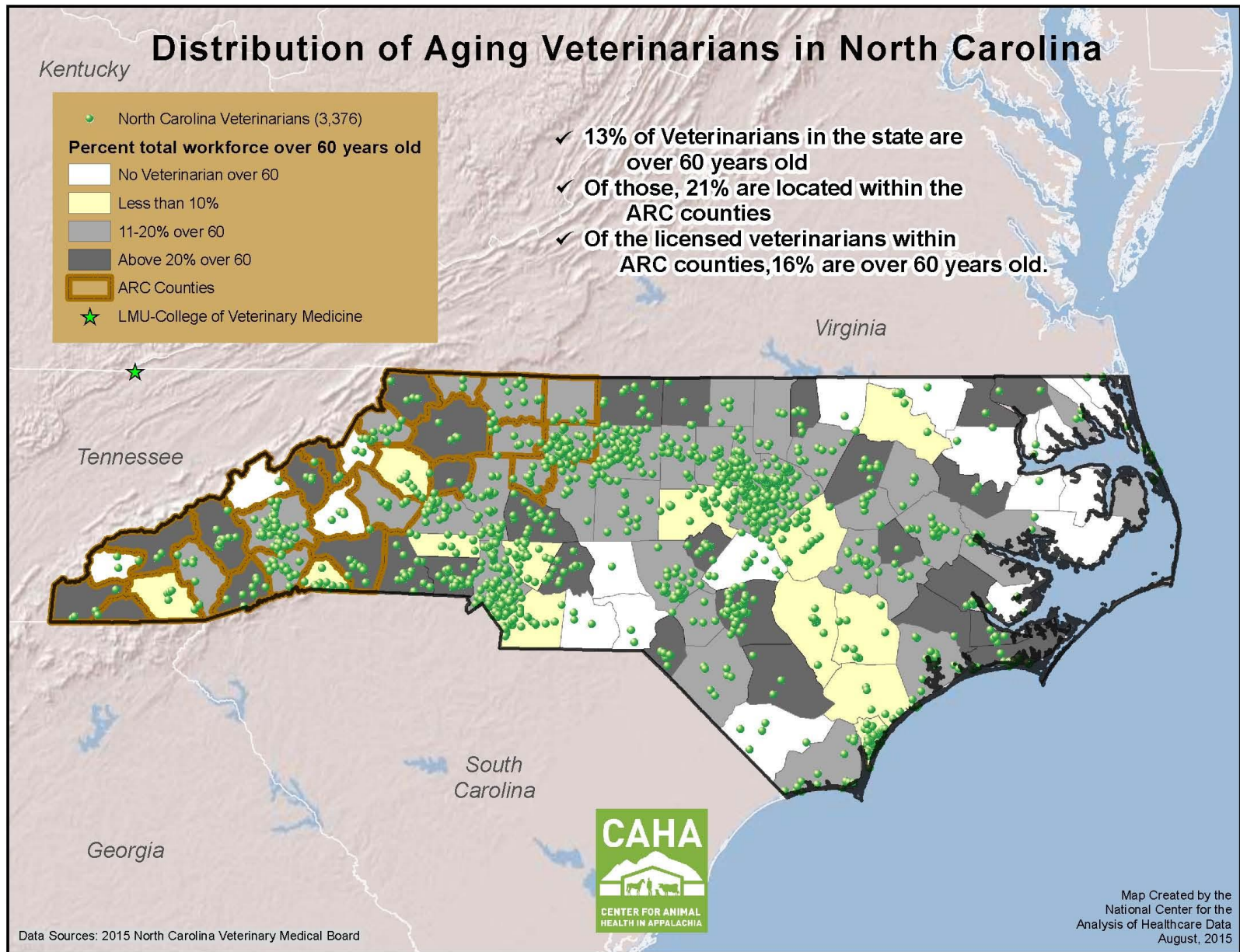


- 5% of the large animal inventory is located in ARC counties.
- Most of the swine herd is located outside ARC. The growth in ARC counties couldn't offset the decline outside ARC (CAGR 10% vs -3.4%).
- Cattle are growing in ARC counties, a growth that offset the decline in the rest of the state (CAGR 1.1% vs -0.1%).
- 31% of the goat herd is located in ARC counties. It was not hit as hard by the decline in goats as the rest of the state (CAGR -8.8% vs. -9.6%).
- Nearly 40% of the sheep herd is located in ARC; this portion is growing while the rest of the state is in decline (CAGR 4.6% vs -0.5%).

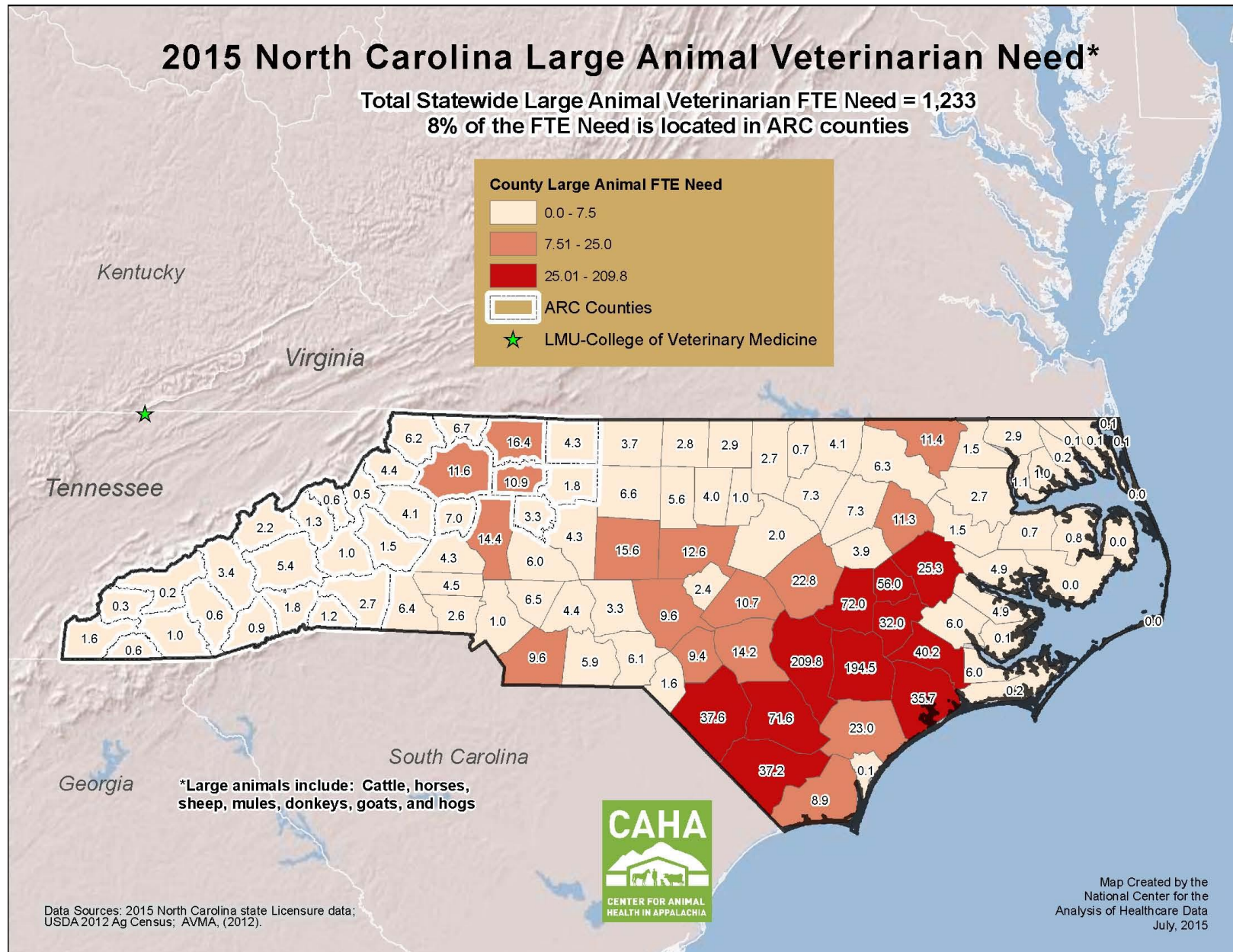
STATE ANALYSIS OF APPALACHIA- NORTH CAROLINA



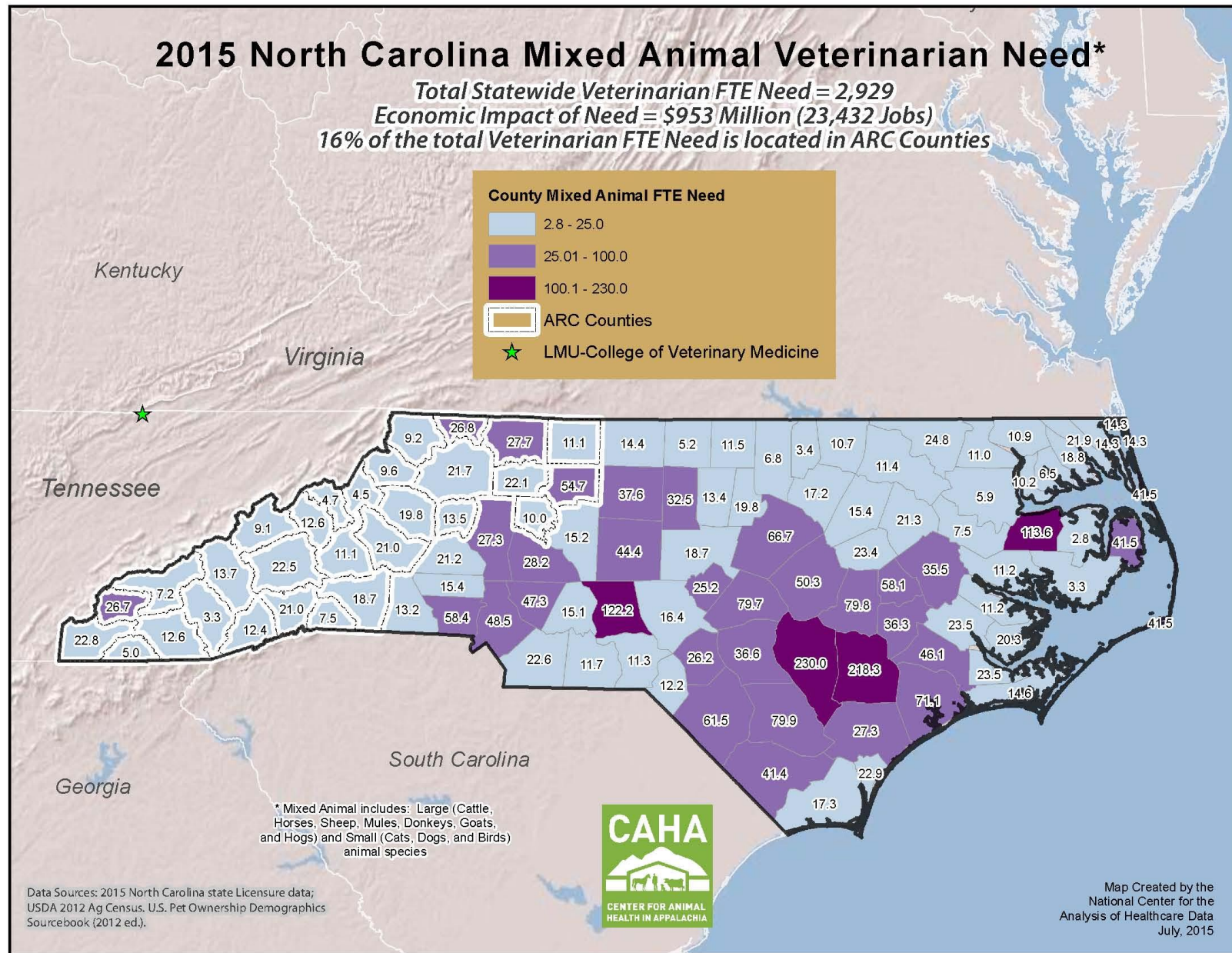
STATE ANALYSIS OF APPALACHIA – NORTH CAROLINA



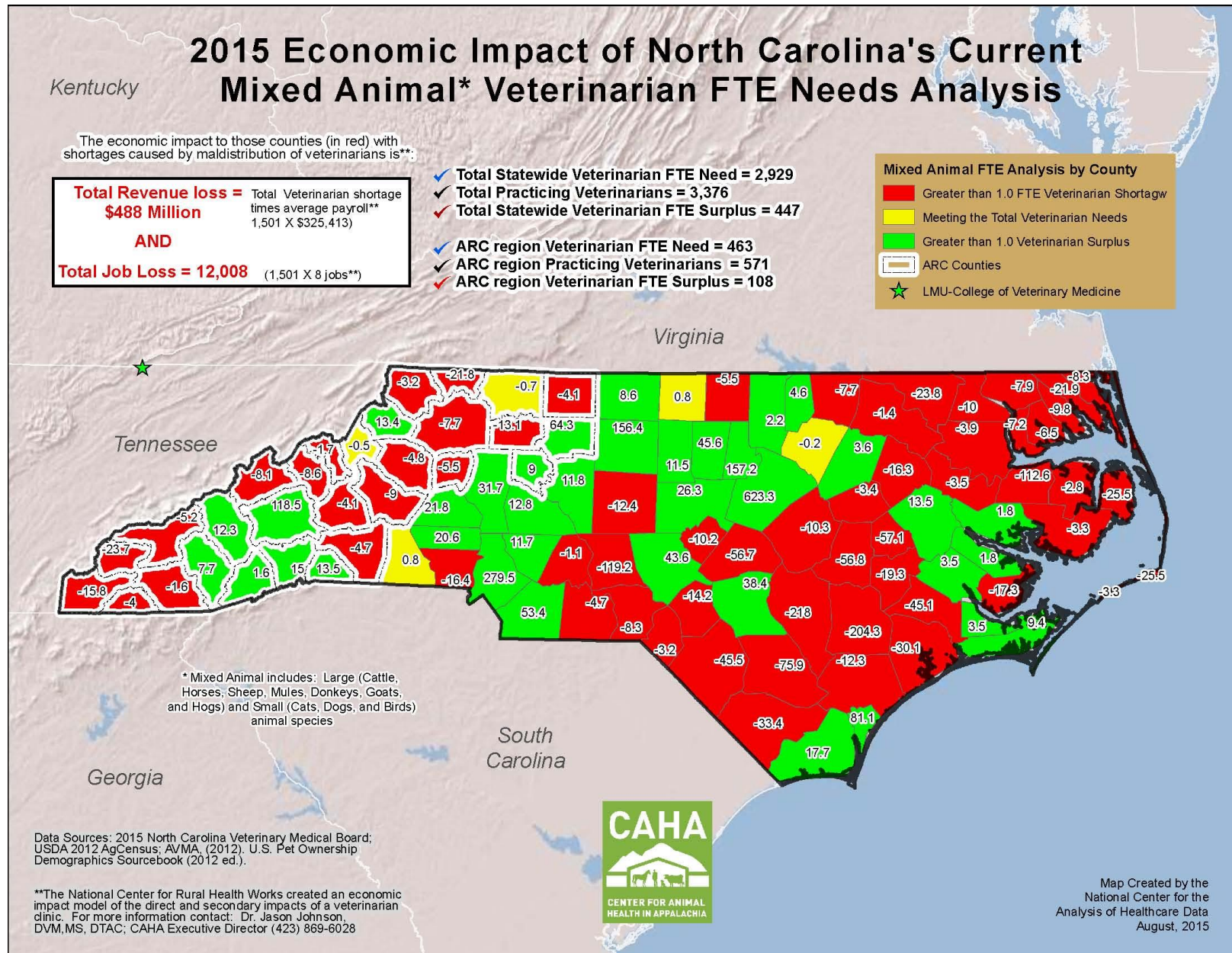
STATE ANALYSIS OF APPALACHIA – NORTH CAROLINA



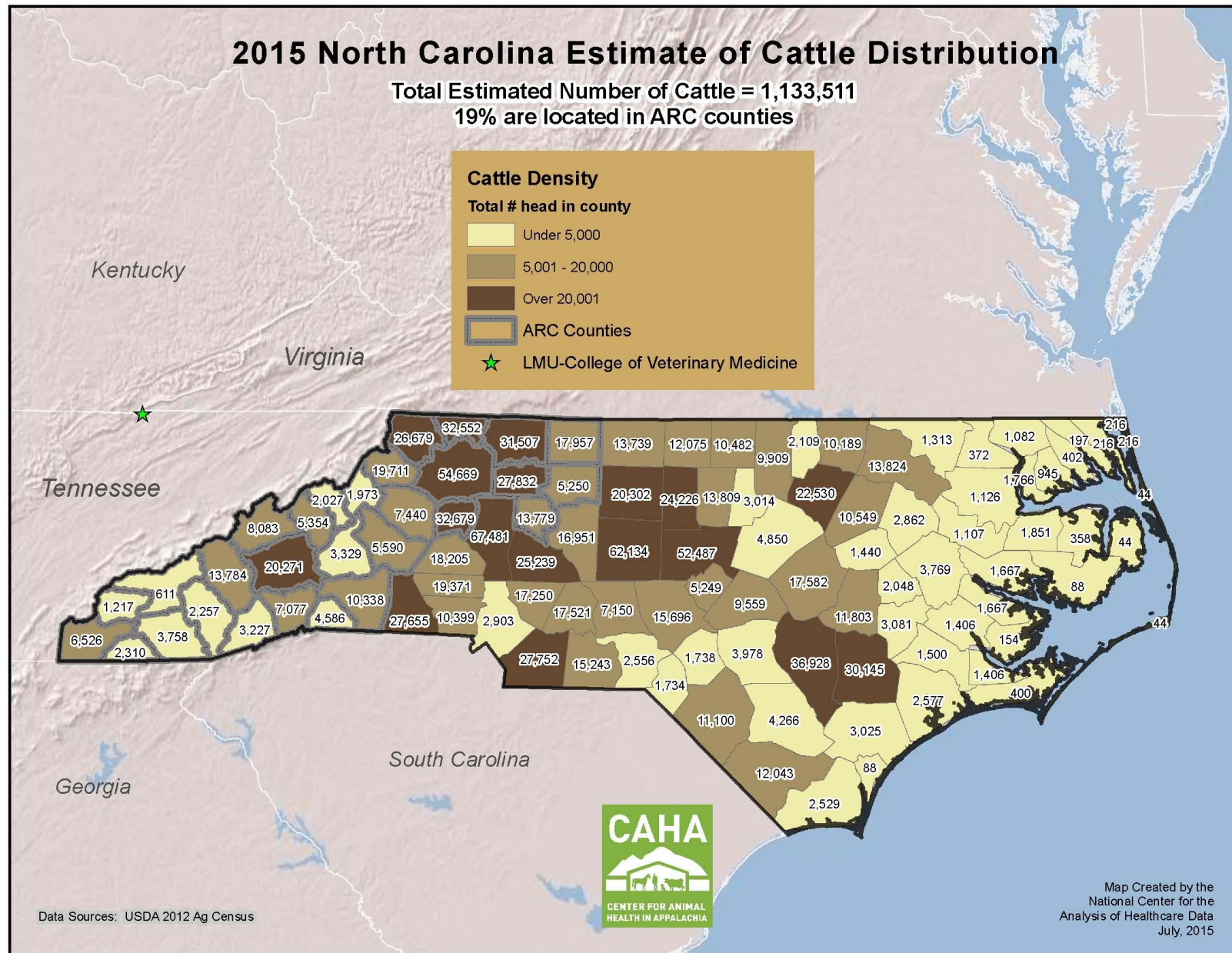
STATE ANALYSIS OF APPALACHIA – NORTH CAROLINA



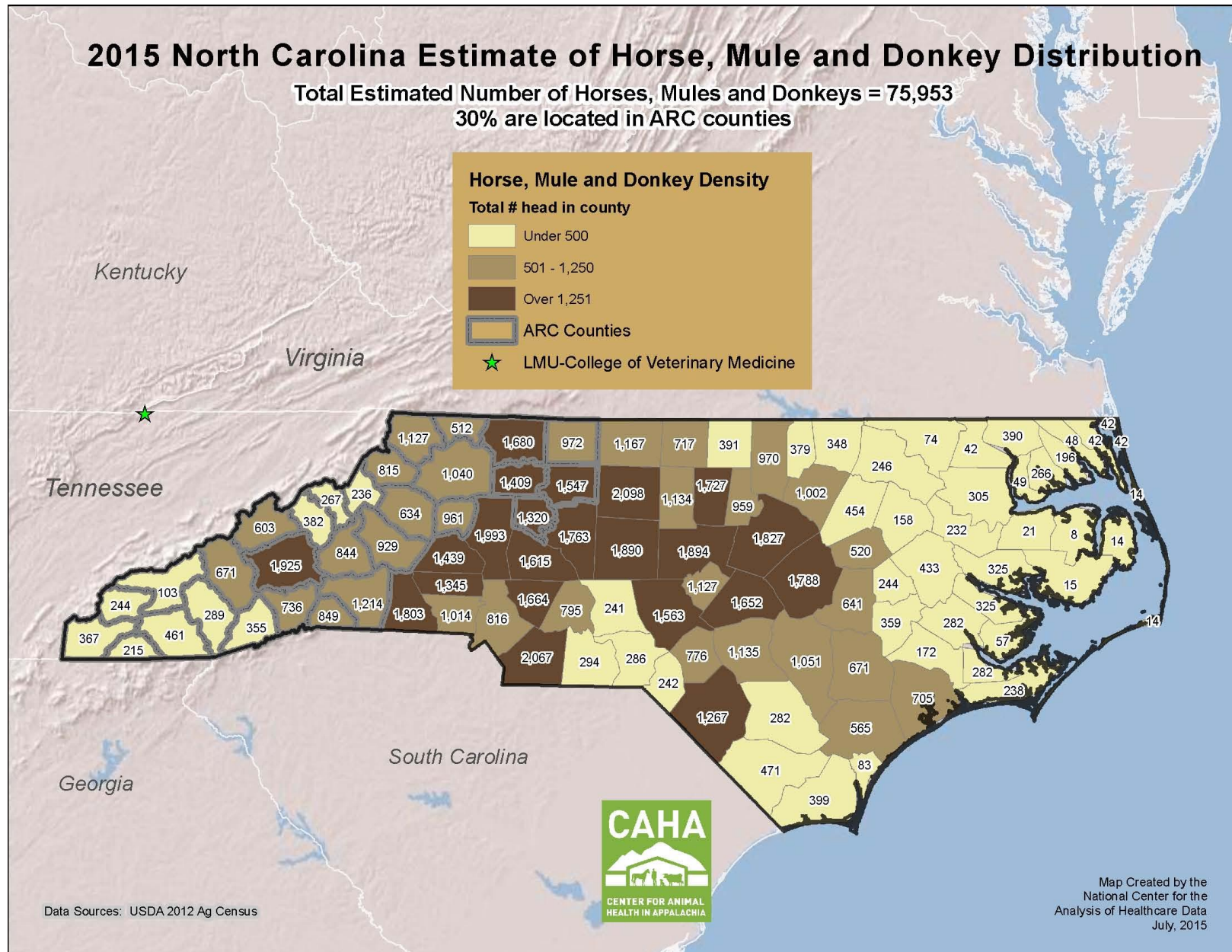
STATE ANALYSIS OF APPALACHIA – NORTH CAROLINA



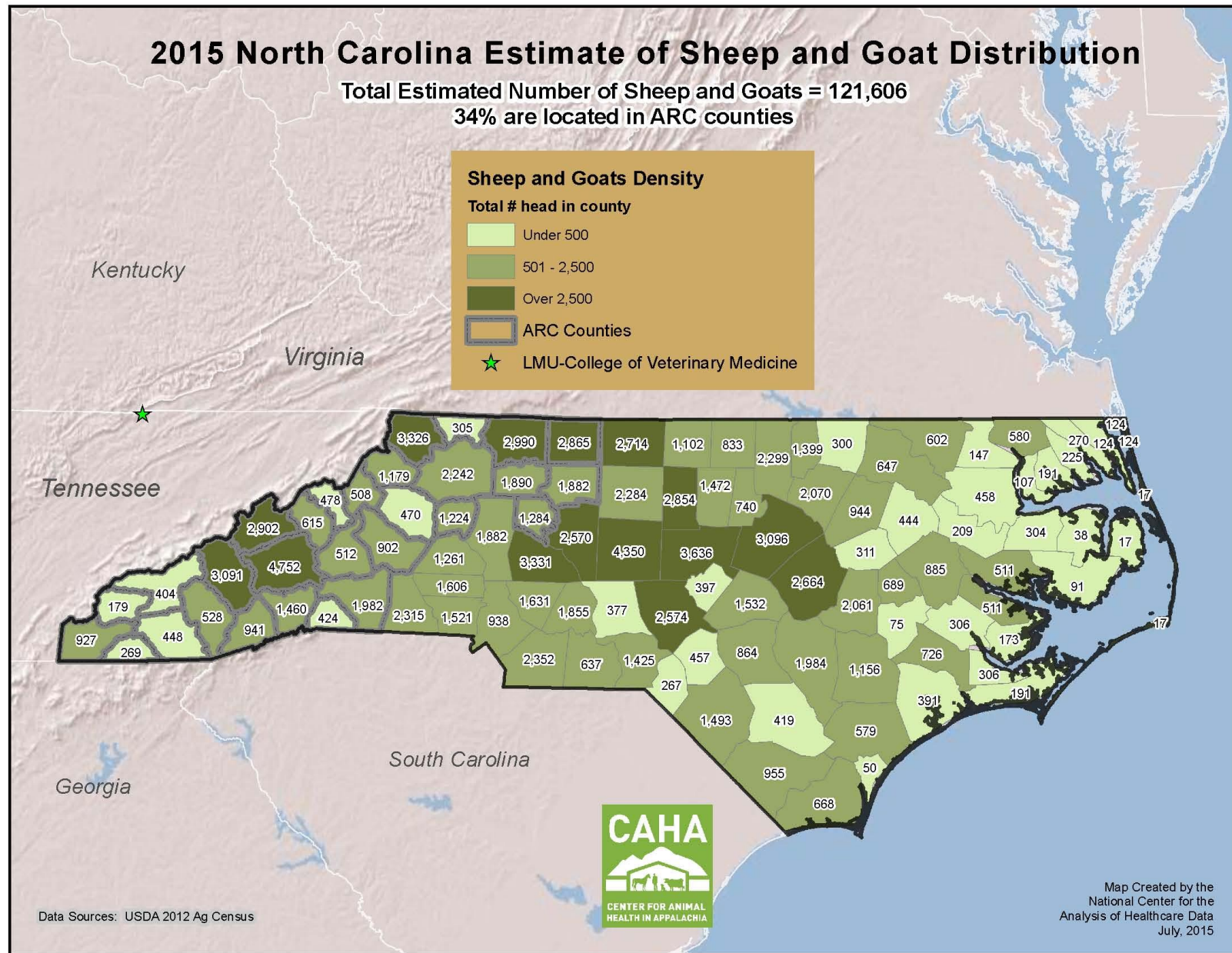
STATE ANALYSIS OF APPALACHIA – NORTH CAROLINA



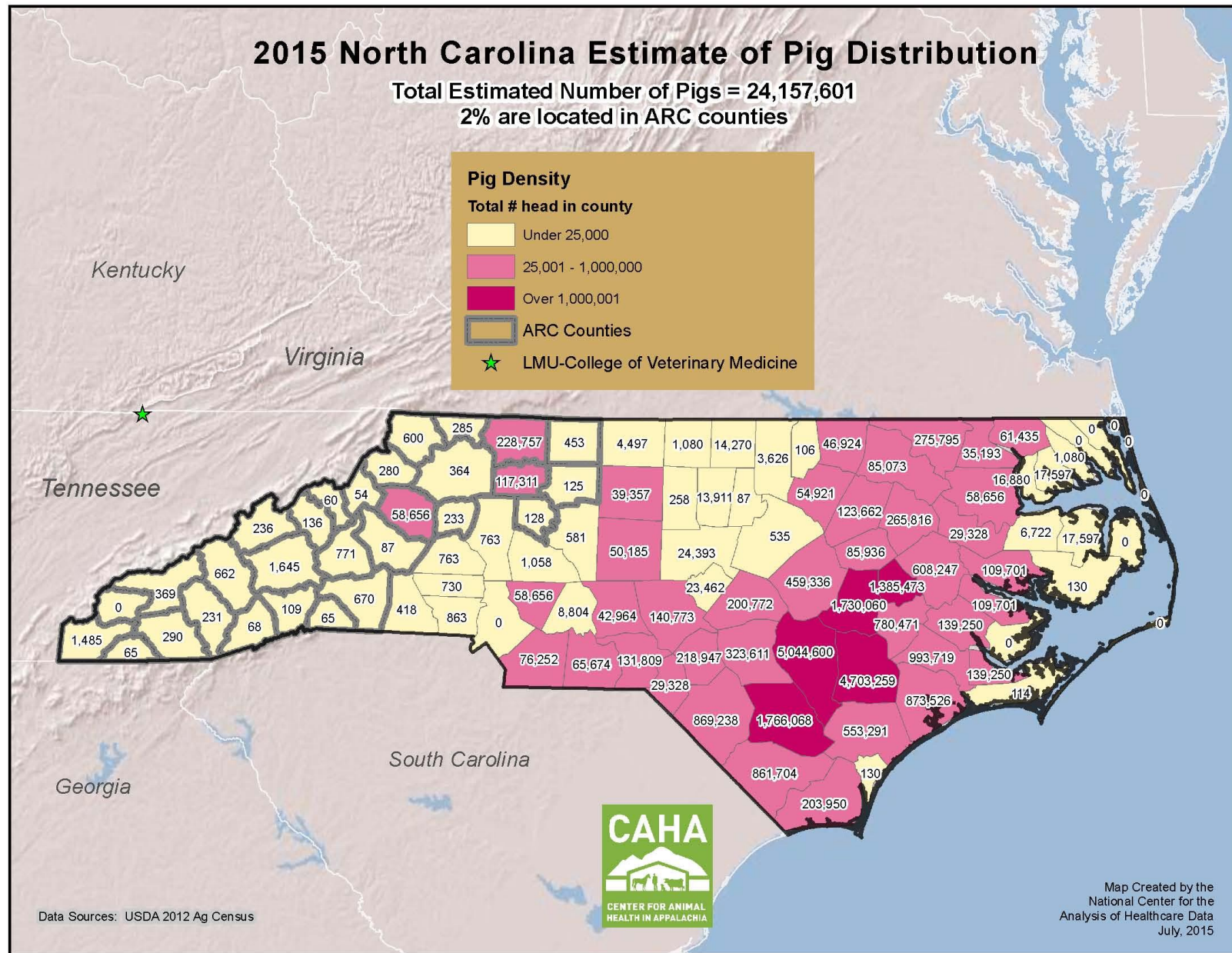
STATE ANALYSIS OF APPALACHIA – NORTH CAROLINA



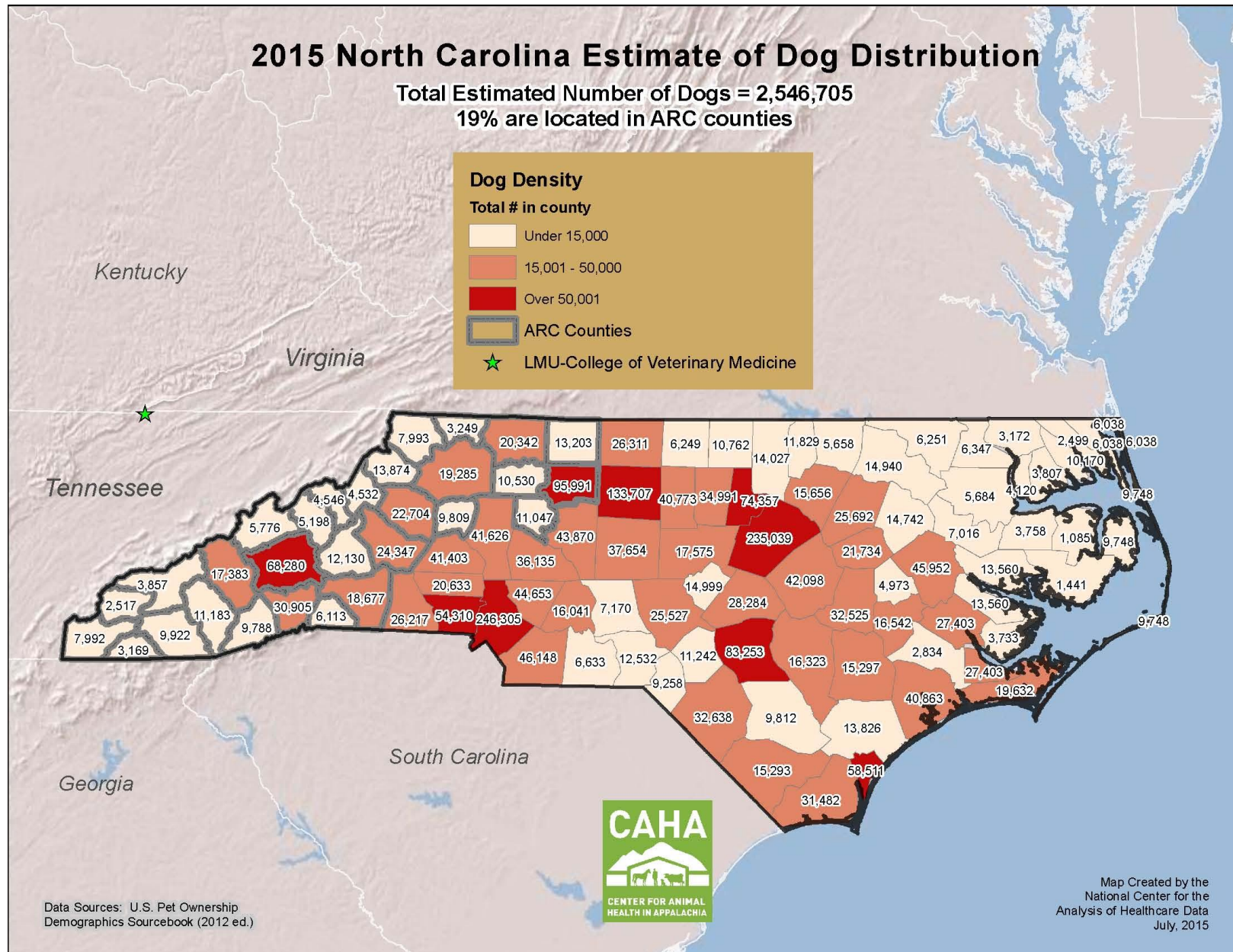
STATE ANALYSIS OF APPALACHIA – NORTH CAROLINA



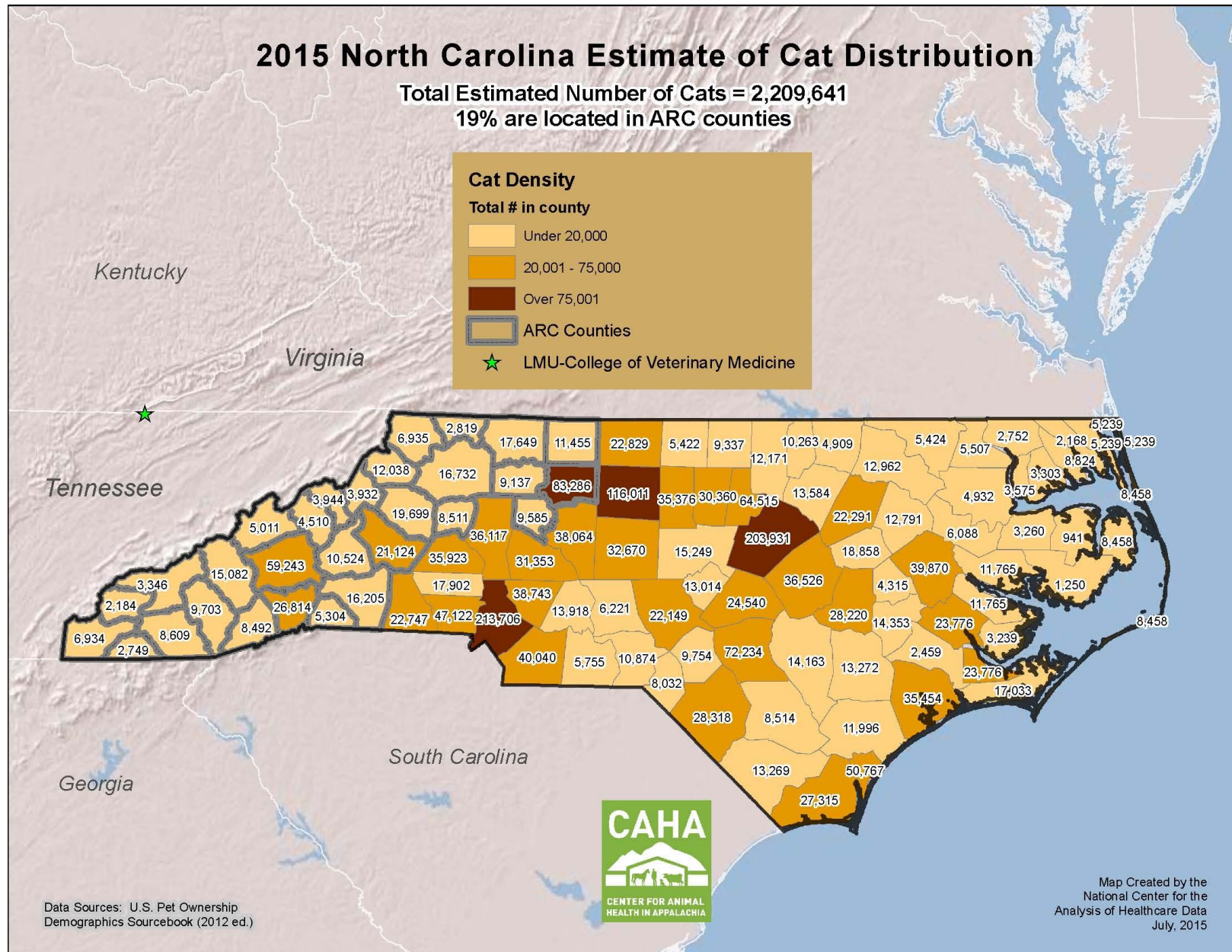
STATE ANALYSIS OF APPALACHIA – NORTH CAROLINA



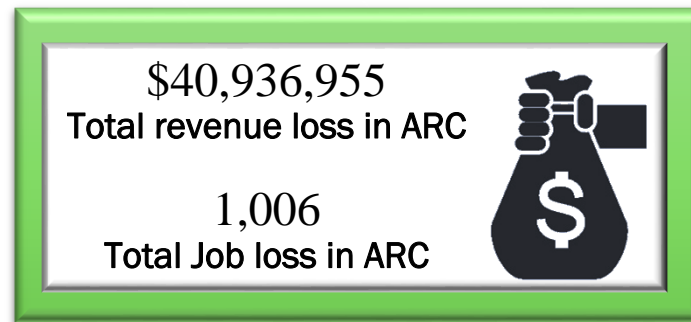
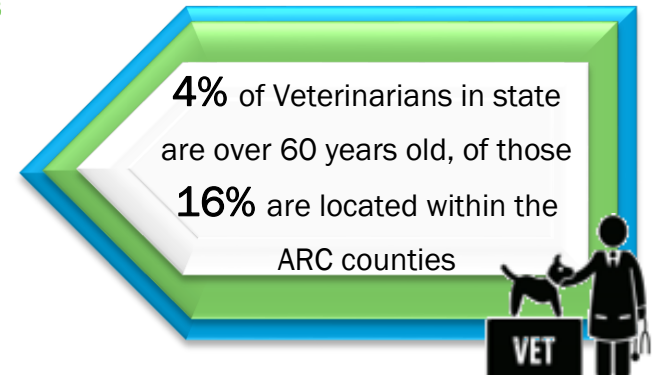
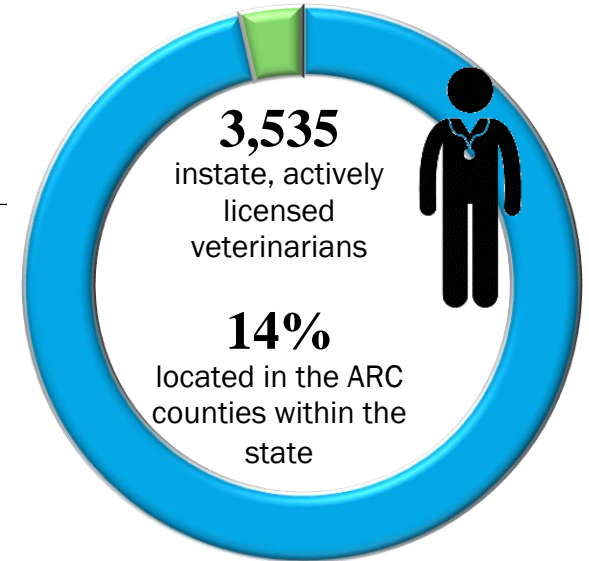
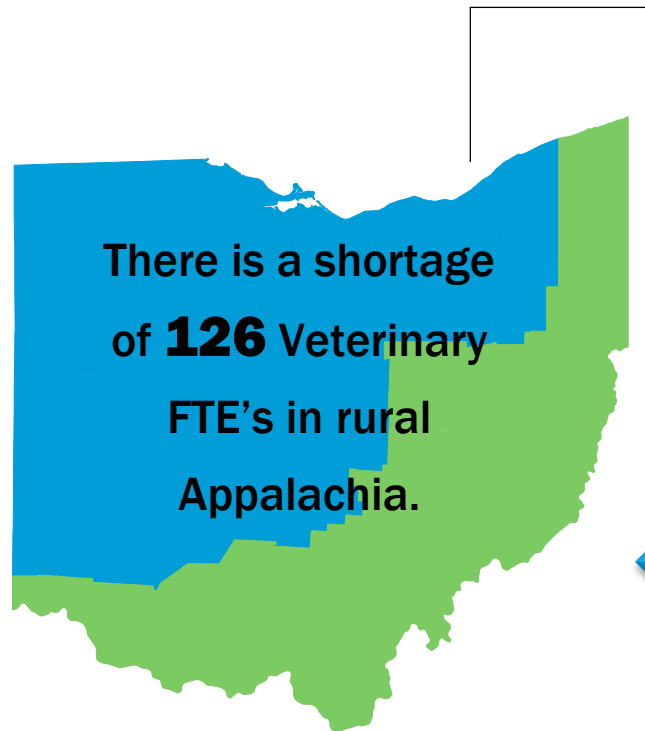
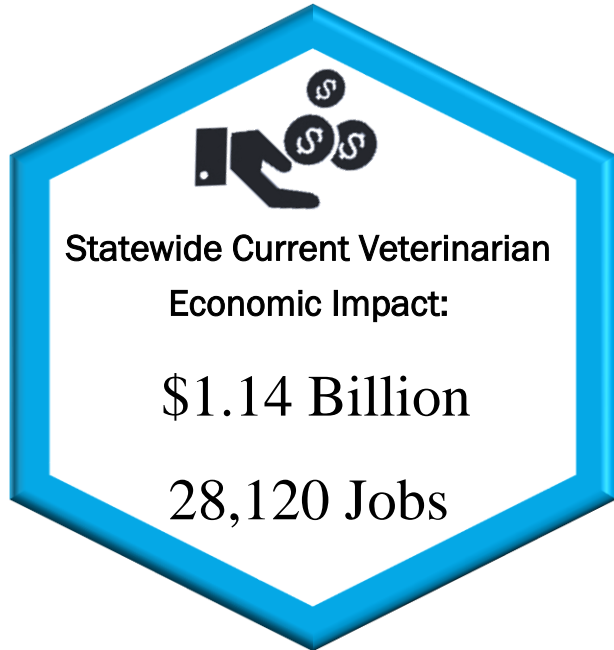
STATE ANALYSIS OF APPALACHIA – NORTH CAROLINA



STATE ANALYSIS OF APPALACHIA – NORTH CAROLINA

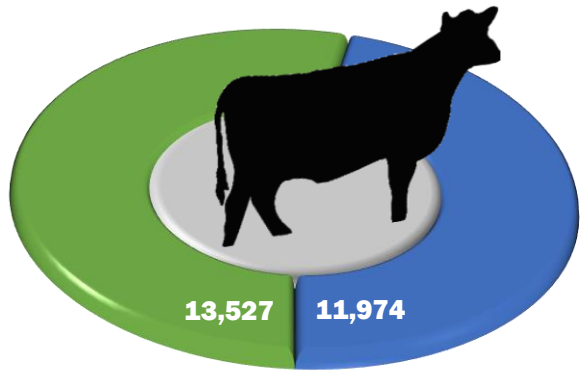


STATE ANALYSIS OF APPALACHIA – OHIO

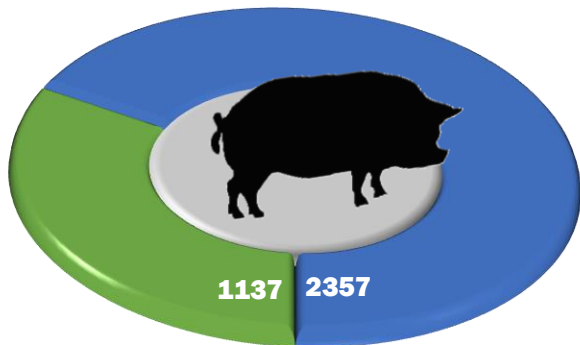


STATE ANALYSIS OF APPALACHIA – OHIO

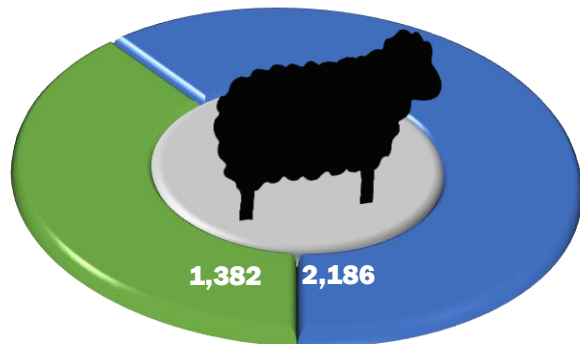
Ohio Farms by Type of Herd 2012



Total # of farms = 25,501



Total # of farms = 3,494

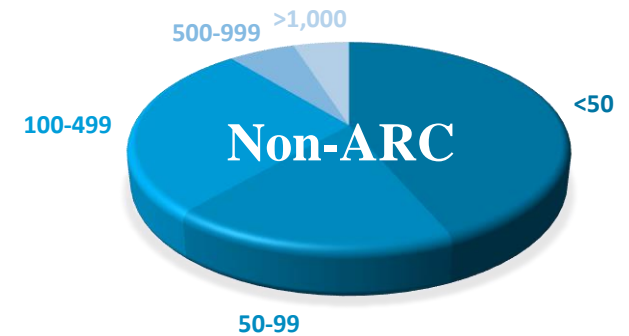


Total # of farms = 3,568

FARMS and FARMLAND

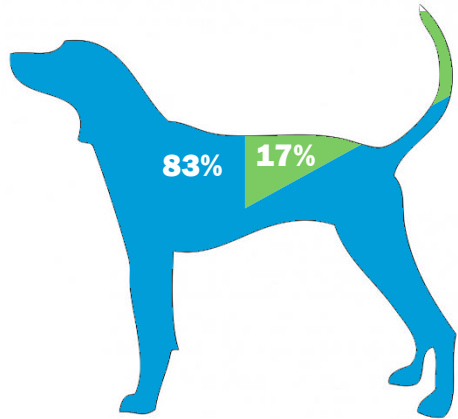
- Ohio covers about 26 million acres, 39% of this falls within ARC counties; 53% is land in farms.
- There are more than 75 thousand farms in Ohio, 36% are located in ARC counties; 60% of those farms are less than 100 acres.
- Of the 25,501 farms running cattle, 53% are located in ARC counties.
- 31% of the 3,718 Ohio farms with pigs are located in ARC counties. 84% of these have less than 25 head. 18% of the herds outside ARC maintain very large pig herds, however the size and number of herds in Ohio are shrinking.
- Of the 3,568 farms with sheep, 39% are located in ARC, the number and size of herds are growing, but 94% manage less than 100 animals.

Ohio Farms by Number of Acres (Percent)

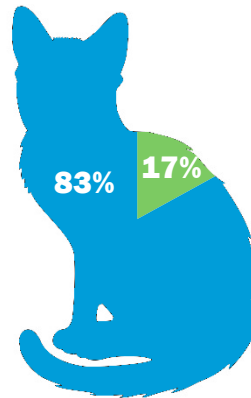


STATE ANALYSIS OF APPALACHIA – OHIO

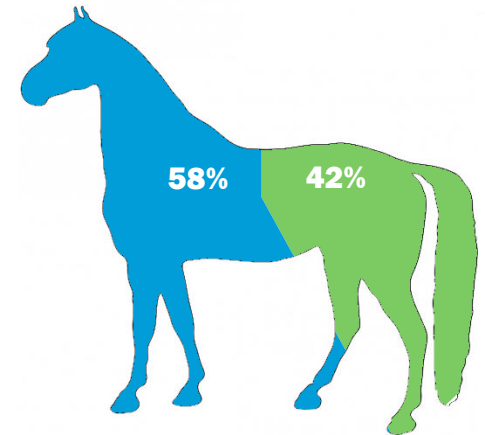
Species Distributions



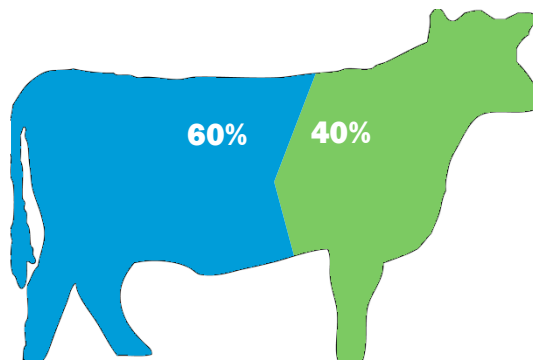
Total Estimated Number of Dogs =
2,716,027



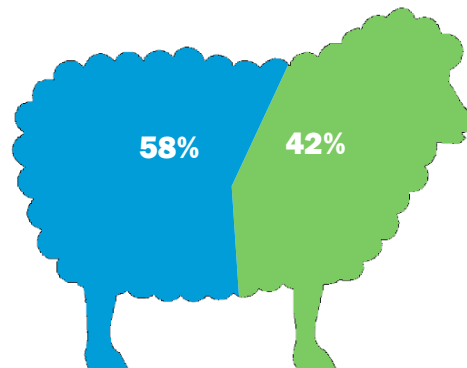
Total Estimated Number of Cats =
3,774,817



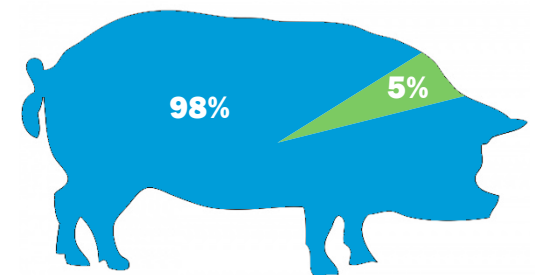
Total Estimated Number of Horse,
Mule & Donkey = 121,055



Total Estimated Number of Cattle*
= 1,697,149



Total Estimated Number of Sheep
& Goat* = 220,063



Total Estimated Number of Pig* =
5,586,571

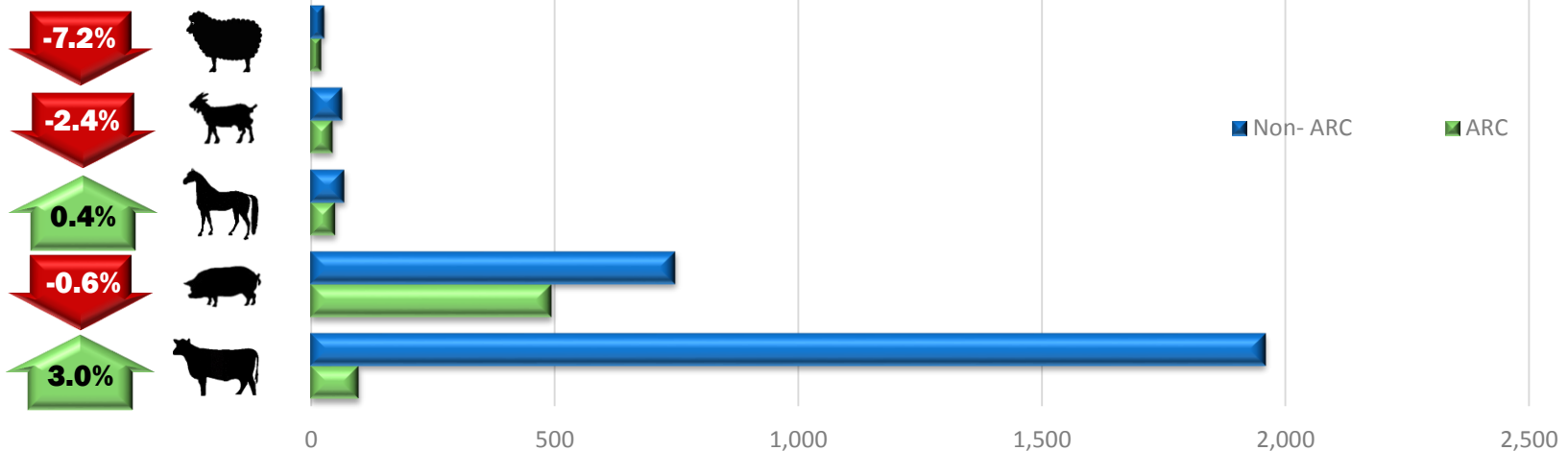
■ Non-ARC
 ■ ARC
 *estimated herd size

STATE ANALYSIS OF APPALACHIA – OHIO

Ohio Large Animal Inventory 2012

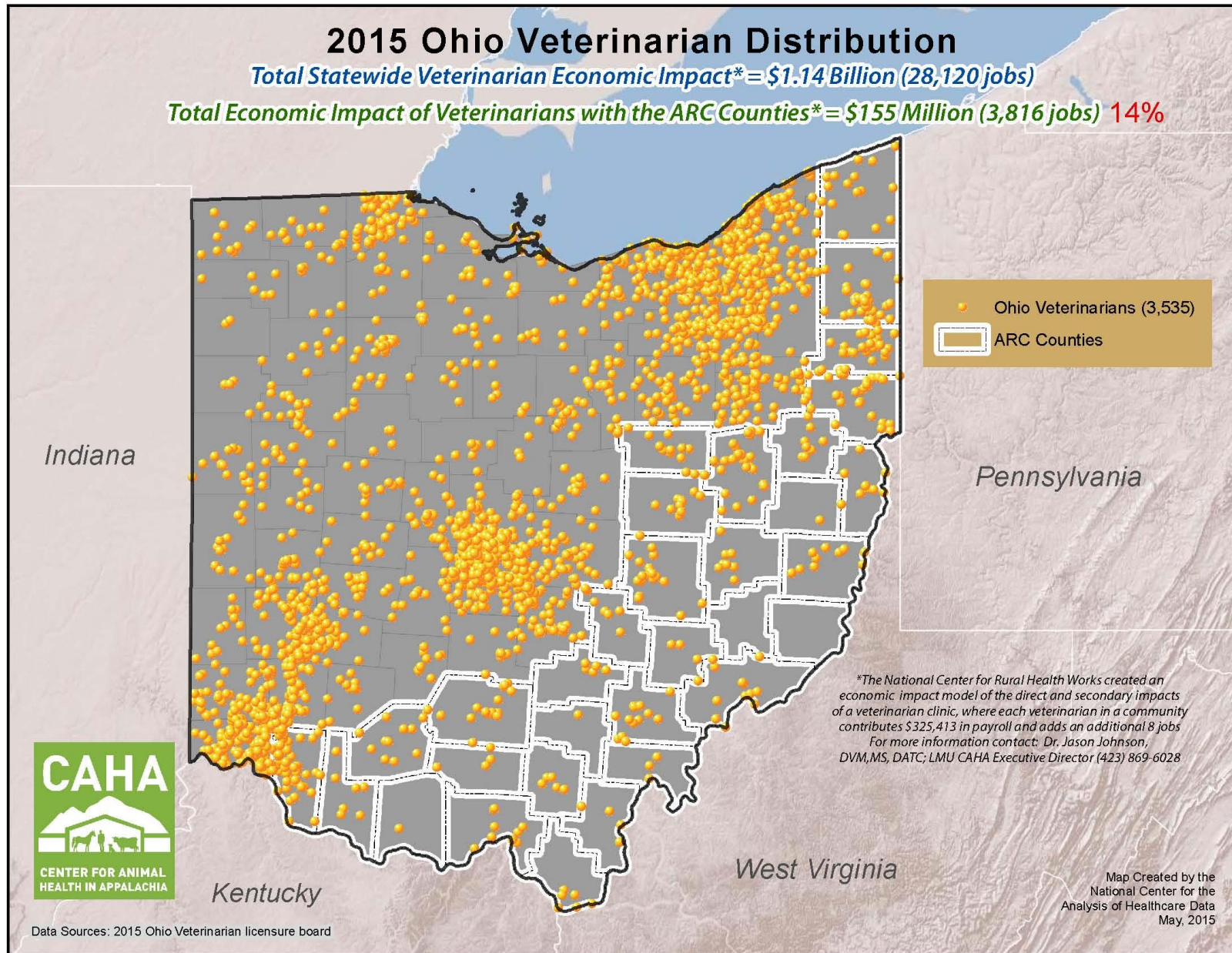
State LA Inventory CAGR,
2007-12

Thousand head

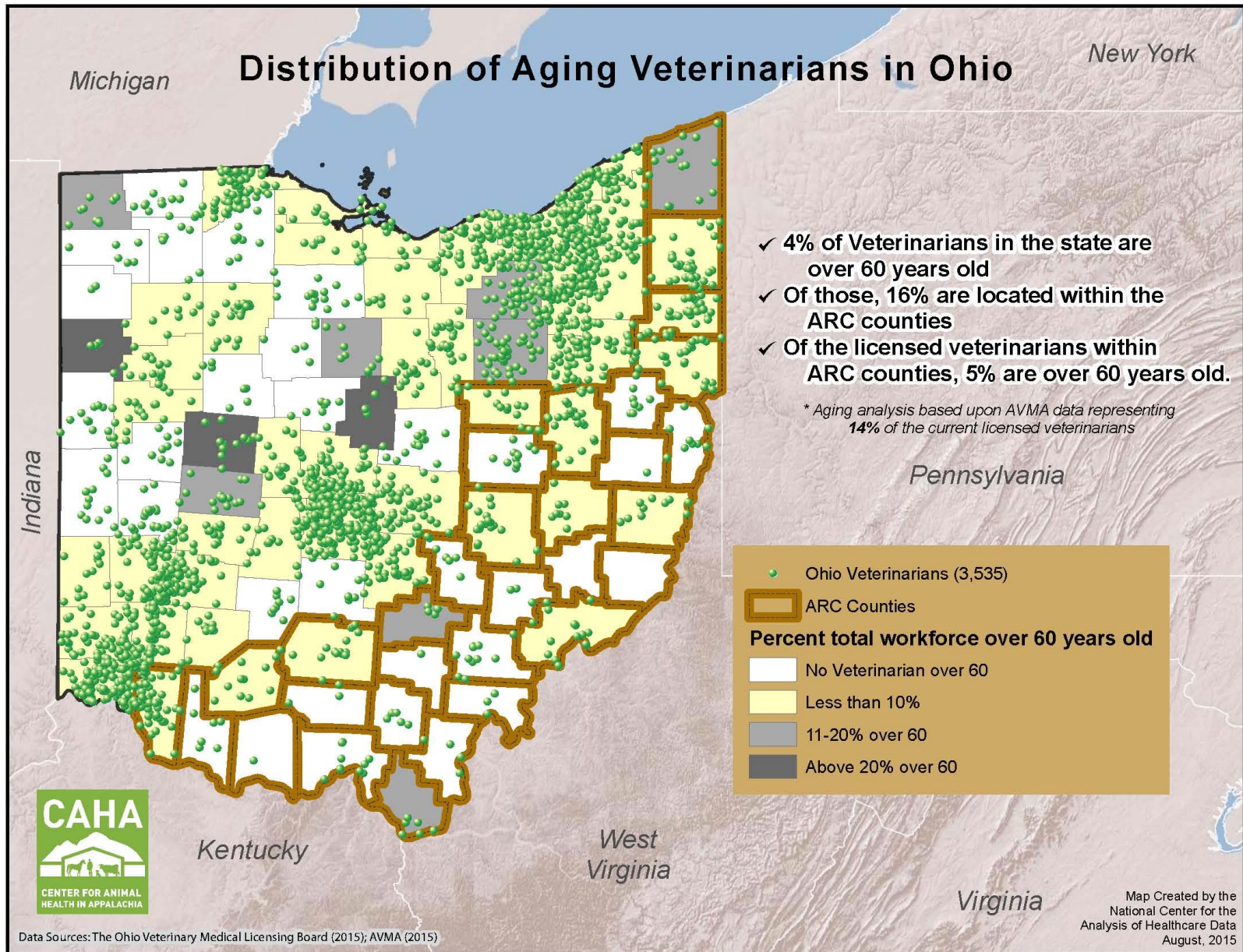


- 20% of the large animal inventory is located in ARC counties.
- Only 5% of the swine are located in ARC counties; the decline in the ARC pig inventory was outstripped by the growth outside ARC counties (CAGR -4.4% vs 3.4%).
- 60% of the cattle are located outside ARC. ARC counties are declining while the counties are growing outside of ARC (CAGR -1.74% vs 0.1%).
- More than 40% of the sheep herd is located in ARC; this portion is growing faster (CAGR 2.2%) than the rest of the state (CAGR -5%).
- 44% of the goat herd is located in ARC; it was not hit as hard by the decline in goats as the rest of the state (CAGR -5.3% vs. -8.6%).

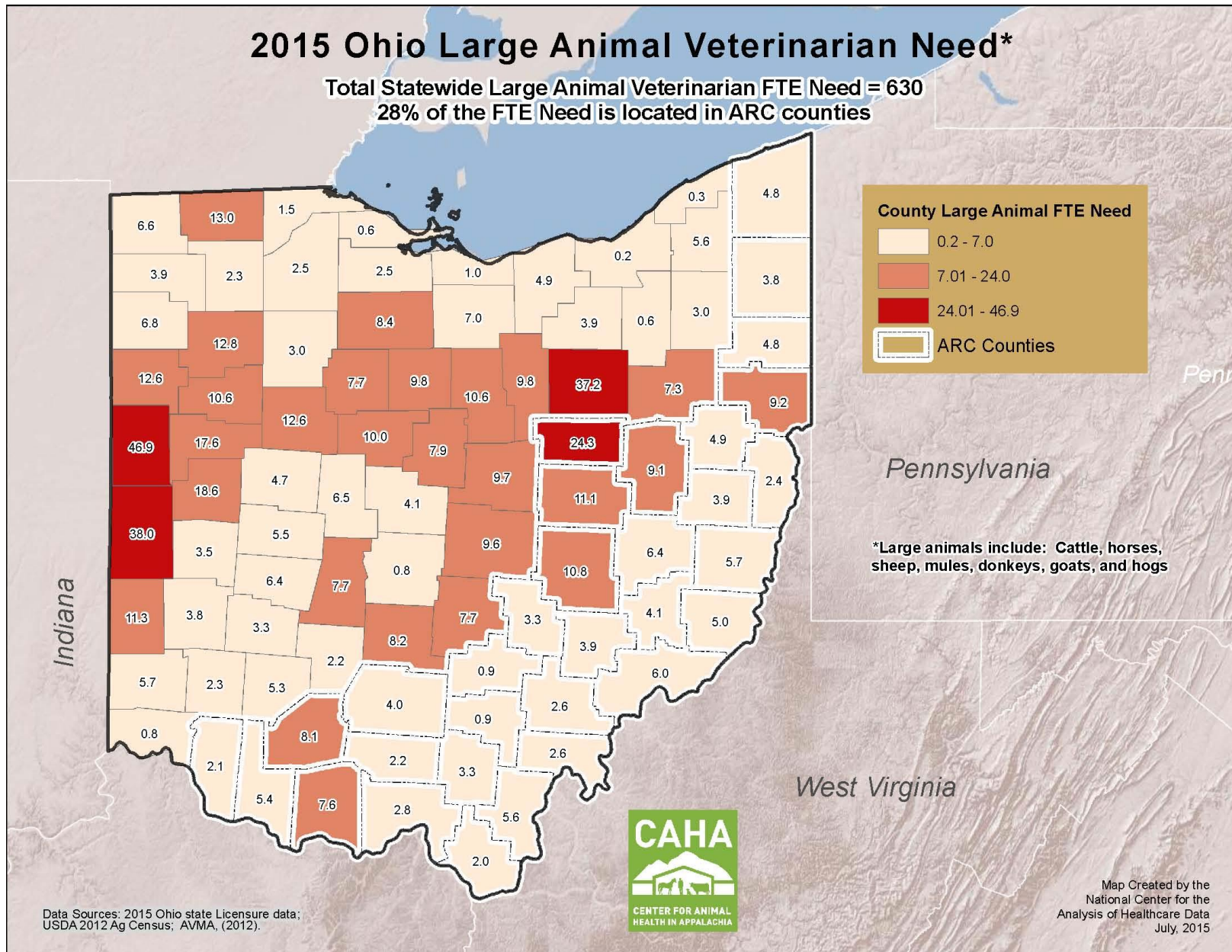
STATE ANALYSIS OF APPALACHIA – OHIO



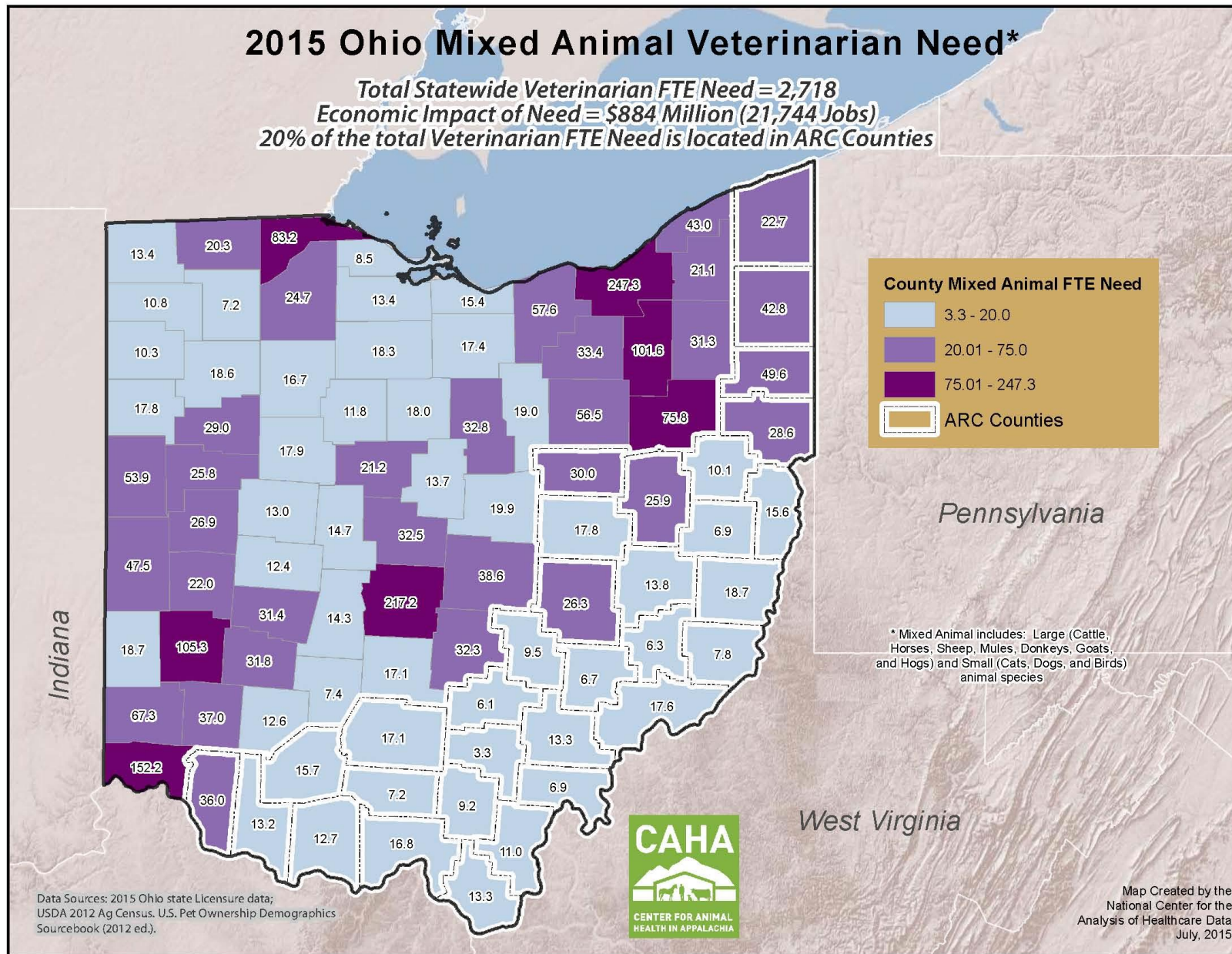
STATE ANALYSIS OF APPALACHIA – OHIO



STATE ANALYSIS OF APPALACHIA – OHIO

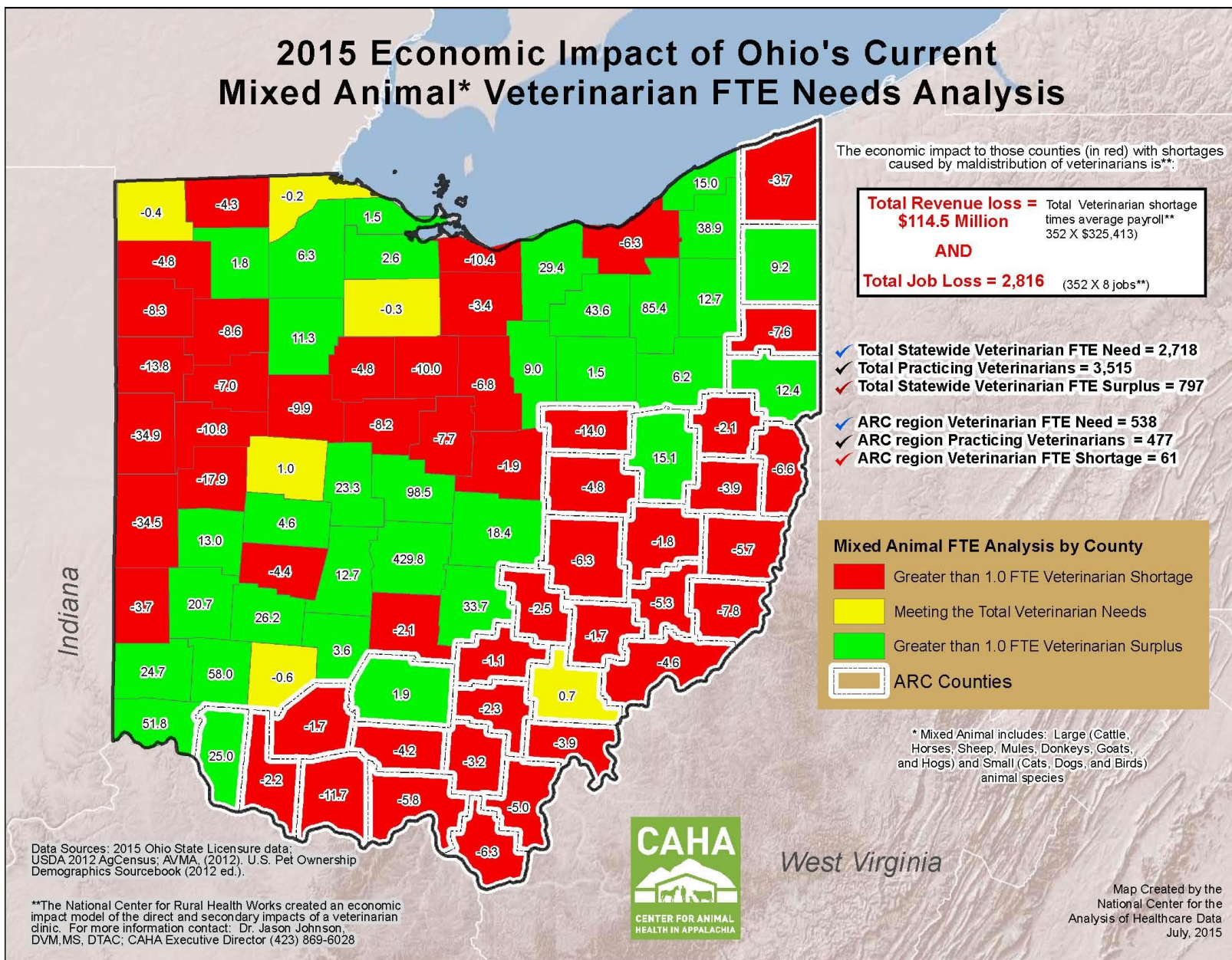


STATE ANALYSIS OF APPALACHIA – OHIO

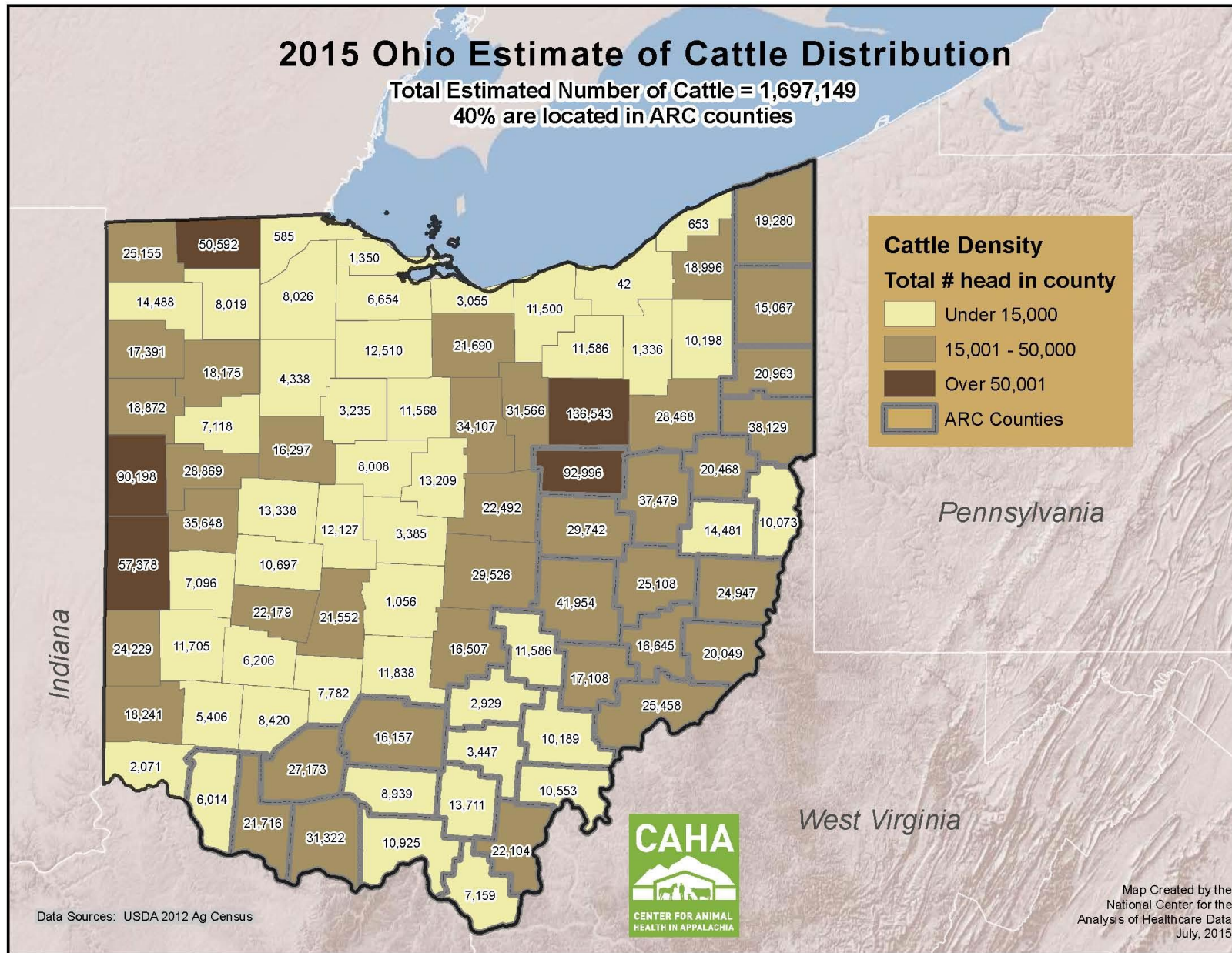


STATE ANALYSIS OF APPALACHIA – OHIO

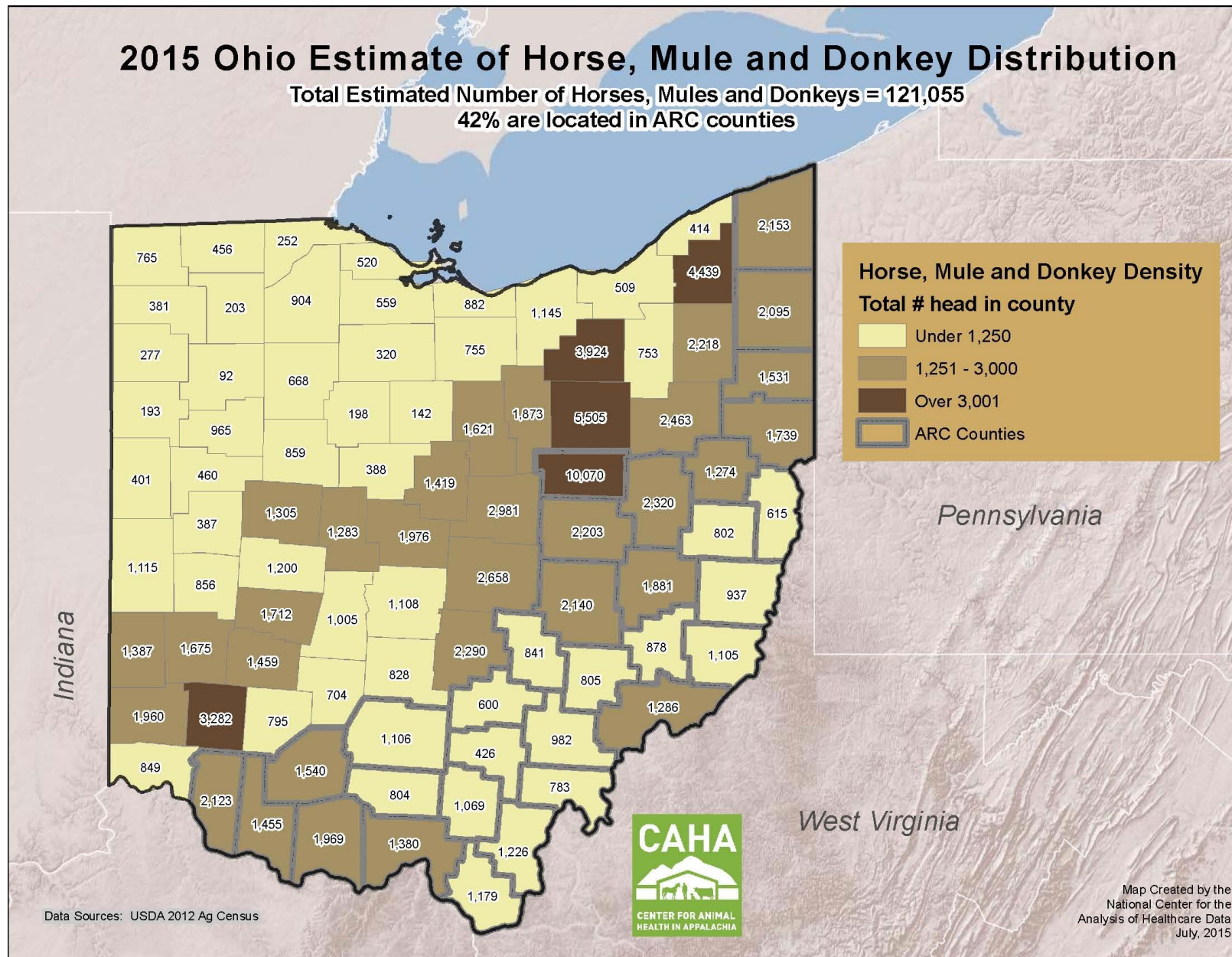
2015 Economic Impact of Ohio's Current Mixed Animal* Veterinarian FTE Needs Analysis



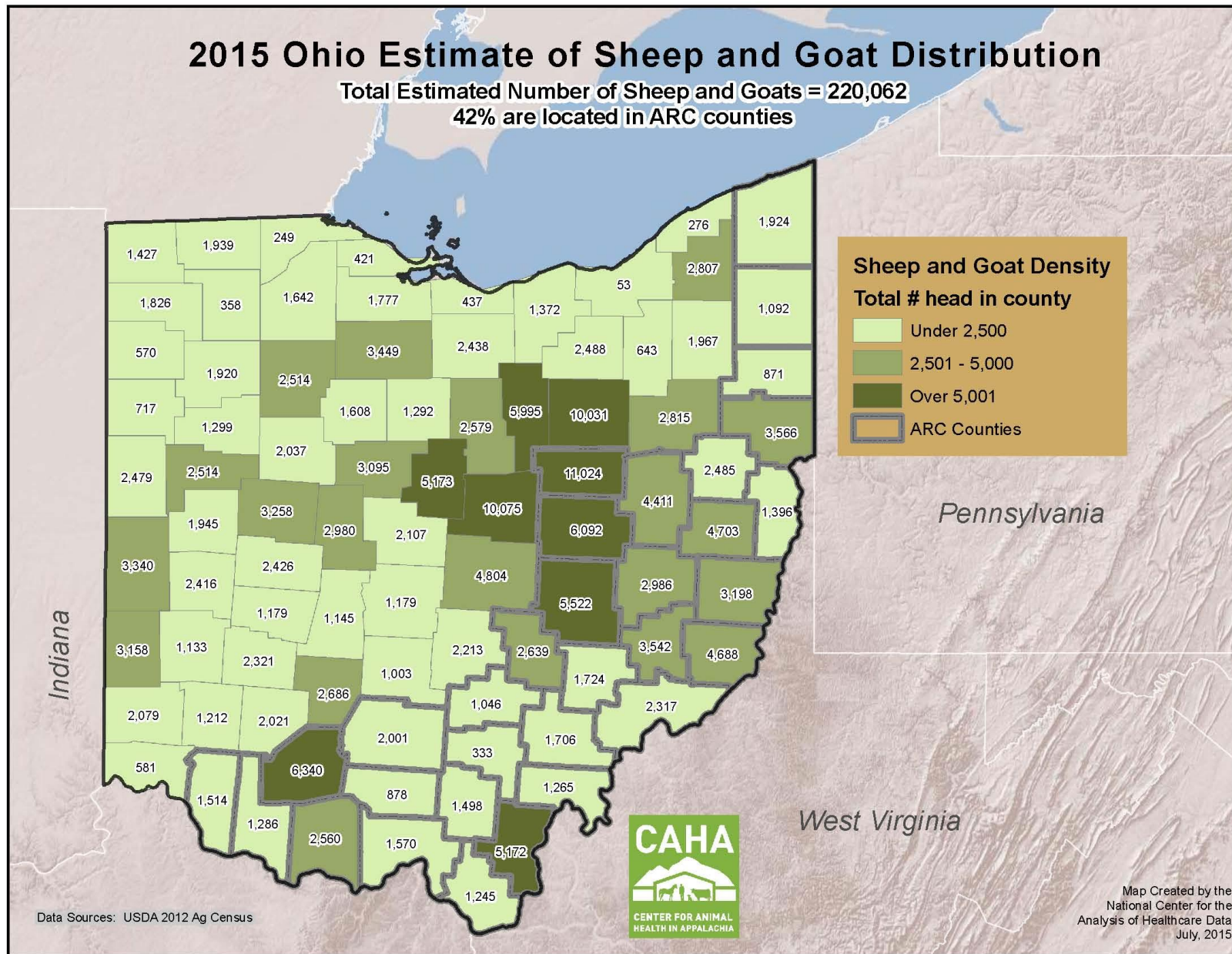
STATE ANALYSIS OF APPALACHIA – OHIO



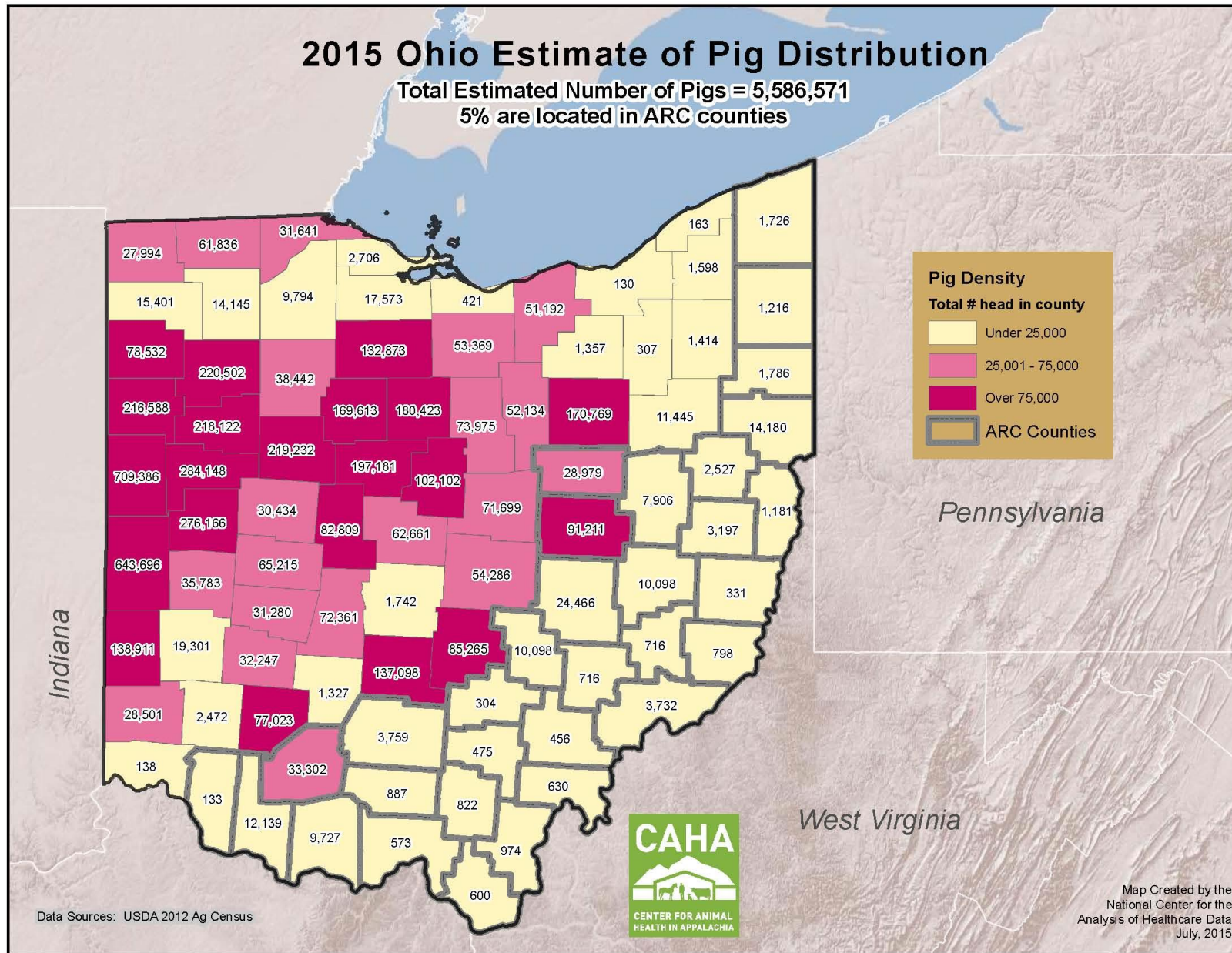
STATE ANALYSIS OF APPALACHIA – OHIO



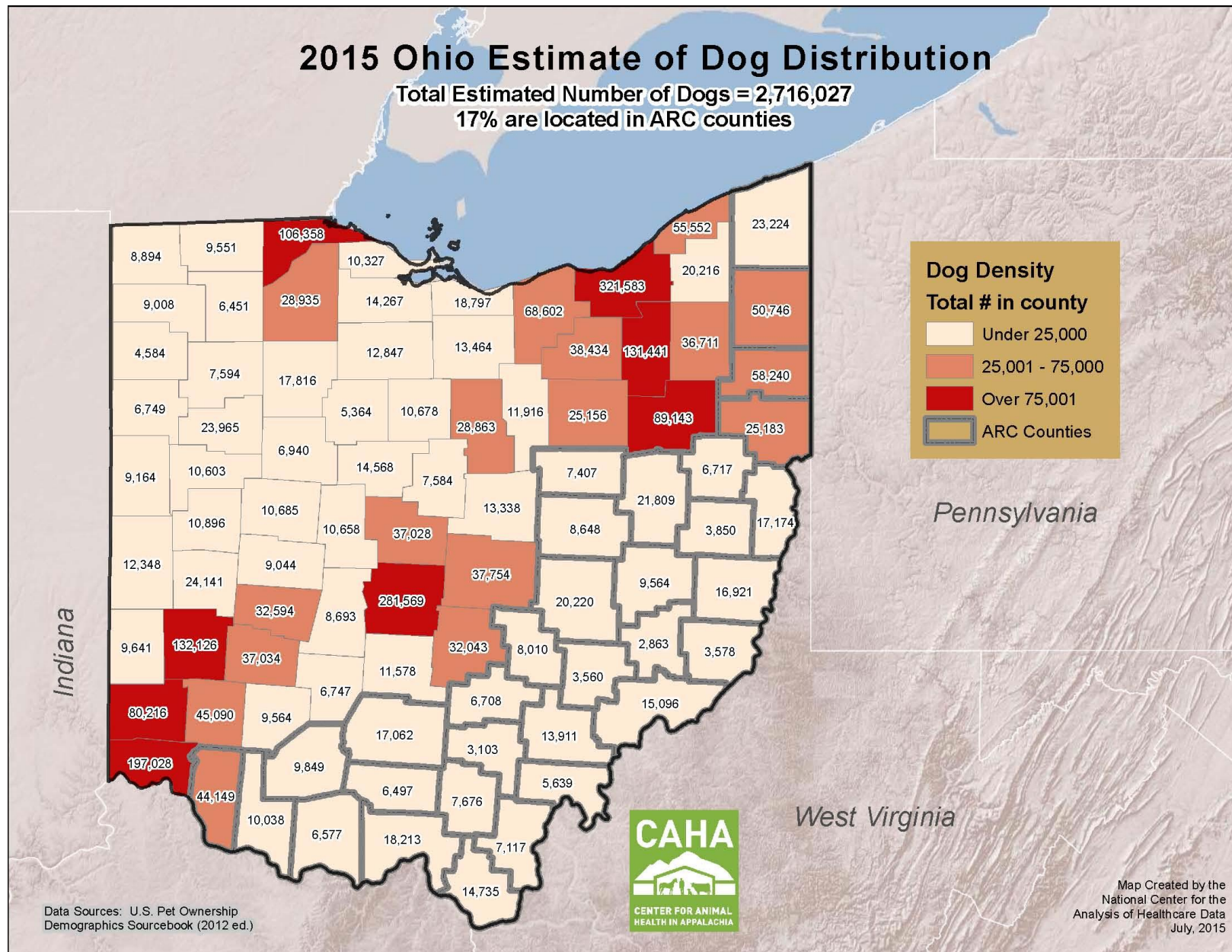
STATE ANALYSIS OF APPALACHIA – OHIO



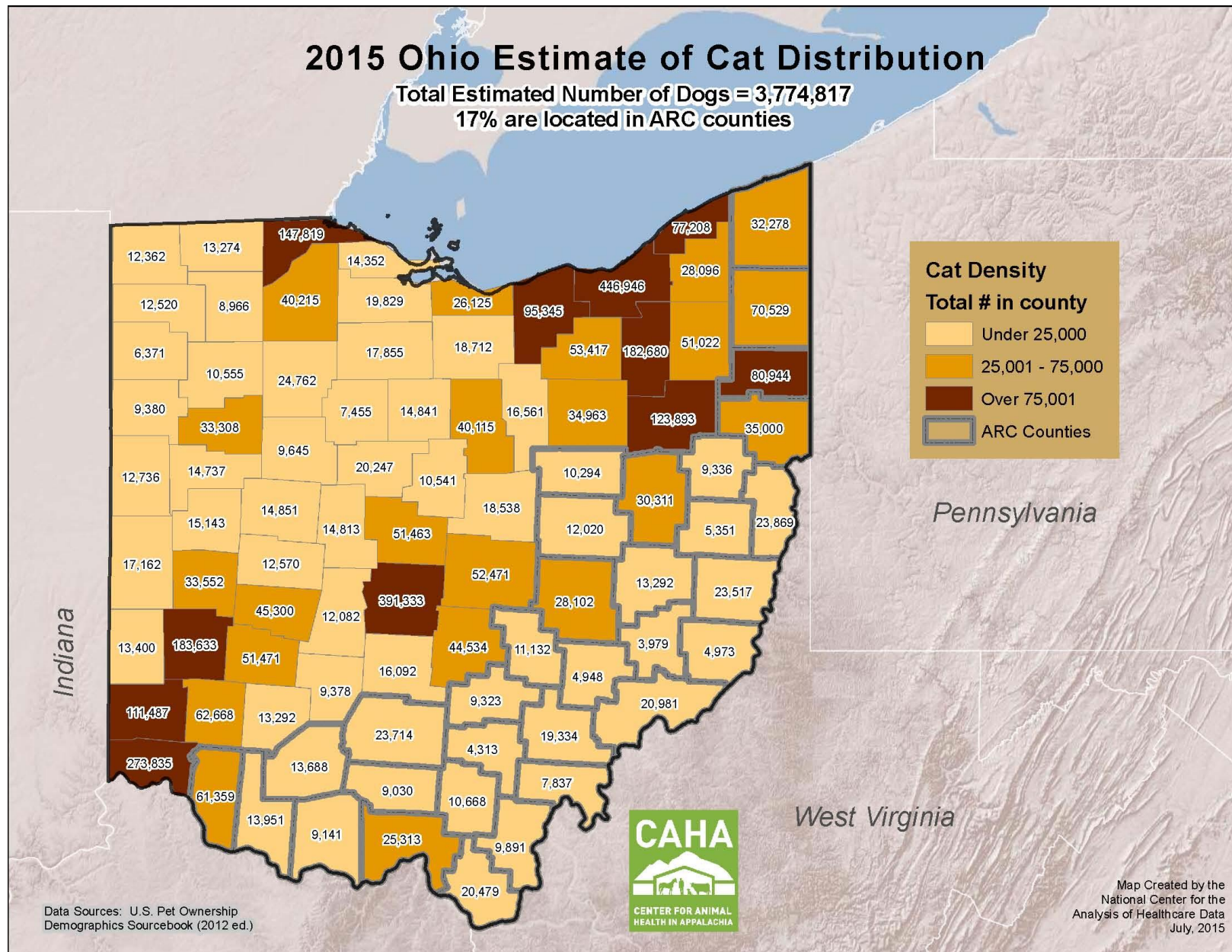
STATE ANALYSIS OF APPALACHIA – OHIO



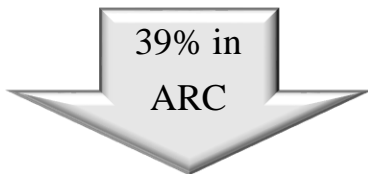
STATE ANALYSIS OF APPALACHIA – OHIO



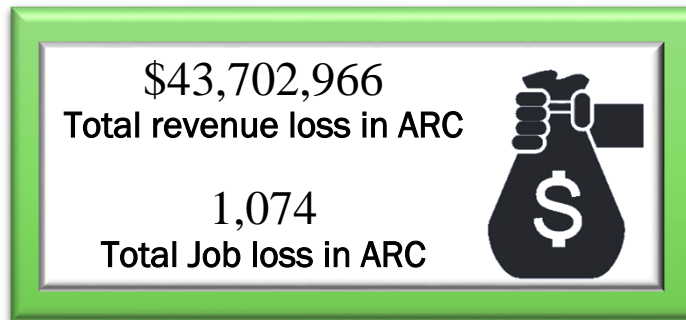
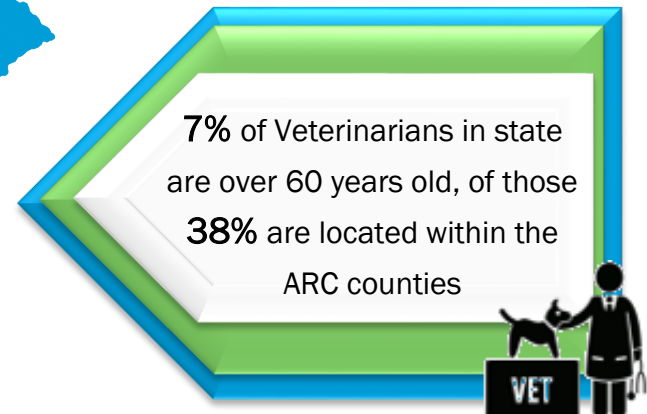
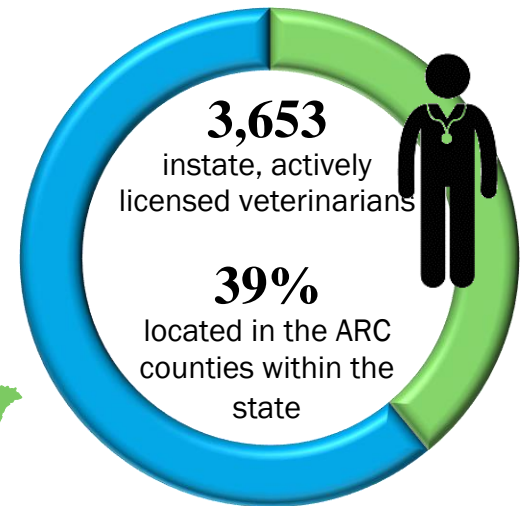
STATE ANALYSIS OF APPALACHIA – OHIO



STATE ANALYSIS OF APPALACHIA- PENNSYLVANIA

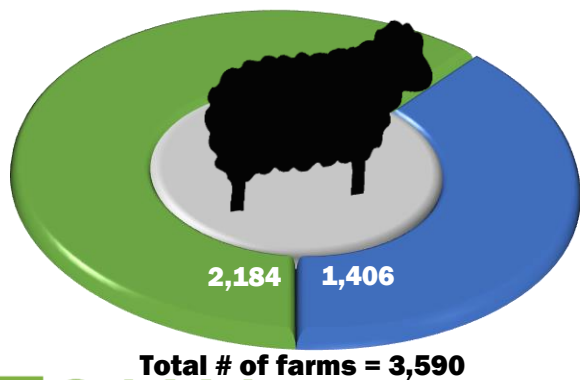
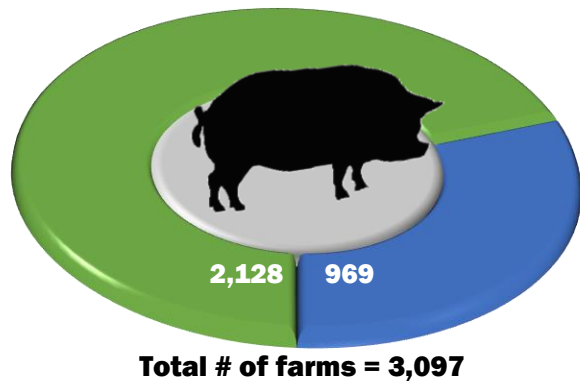
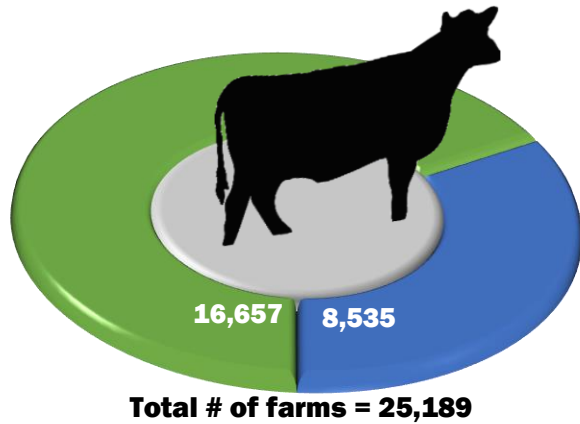


There is a shortage of
134 Veterinary FTE's in
rural Appalachia.



STATE ANALYSIS OF APPALACHIA – PENNSYLVANIA

Pennsylvania Farms by Type of Herd 2012



FARMS and FARMLAND

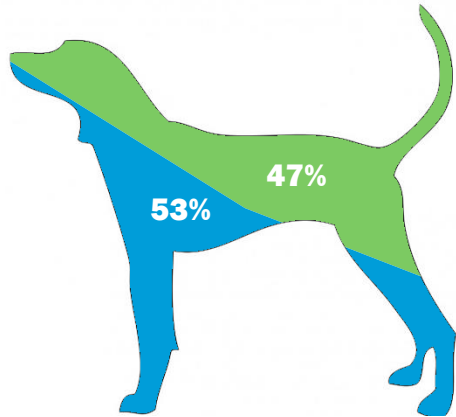
- Pennsylvania covers about 29 million acres, 81% of this falls within ARC; 27% is land in farms.
- There are more than 59 thousand farms in Pennsylvania, 66% are located in ARC counties; 58% of those farms are less than 100 acres.
- 66% of the 25,189 farms that have cattle are located in ARC. From 2007-2012 the number of herds decreased, but herds of 200-500 head grew throughout the state. Very large herds in ARC counties declined, 72% of herds in ARC have fewer than 50 head
- Pig herds are decreasing in size and volume in Pennsylvania. Of the 3,097 farms in PA, 69% maintain a pig herd in ARC, 80% of which have less than 25 head.
- Of the 3,672 farms that have sheep, 61% are located in ARC. The number and size of flocks are growing in ARC.

Pennsylvania Farms by Number of Acres (Percent)

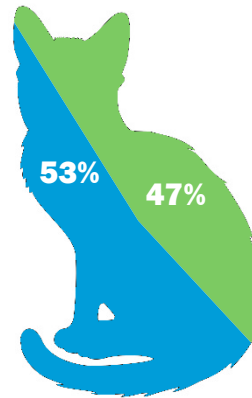


STATE ANALYSIS OF APPALACHIA – PENNSYLVANIA

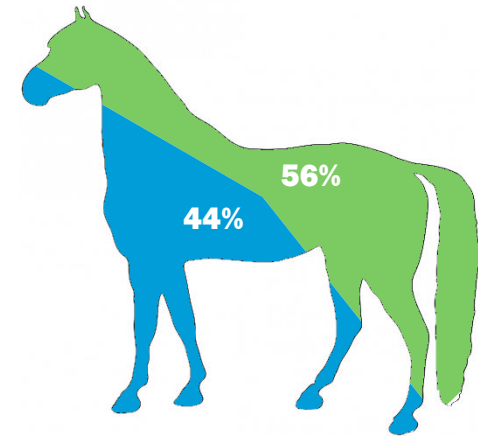
Species Distribution



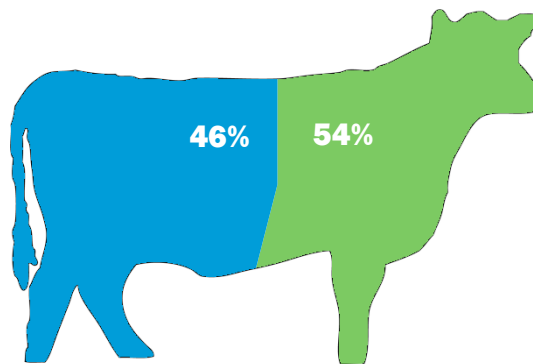
Total Estimated Number of Dogs =
2,409,074



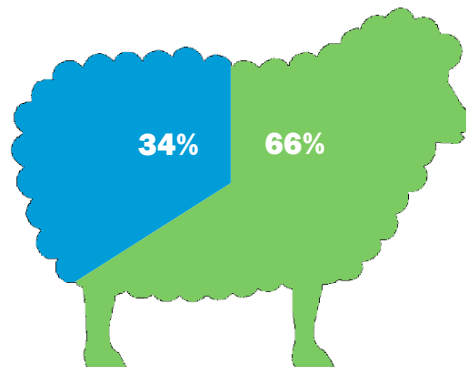
Total Estimated Number of Cats =
3,412,855



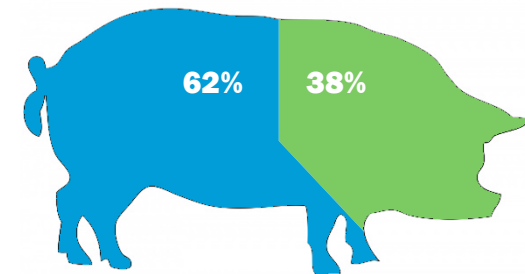
Total Estimated Number of Horse,
Mule & Donkey = 129,460



Total Estimated Number of Cattle*
= 2,221,858



Total Estimated Number of Sheep
& Goat* = 196,825



Total Estimated Number of Pig* =
3,080,160

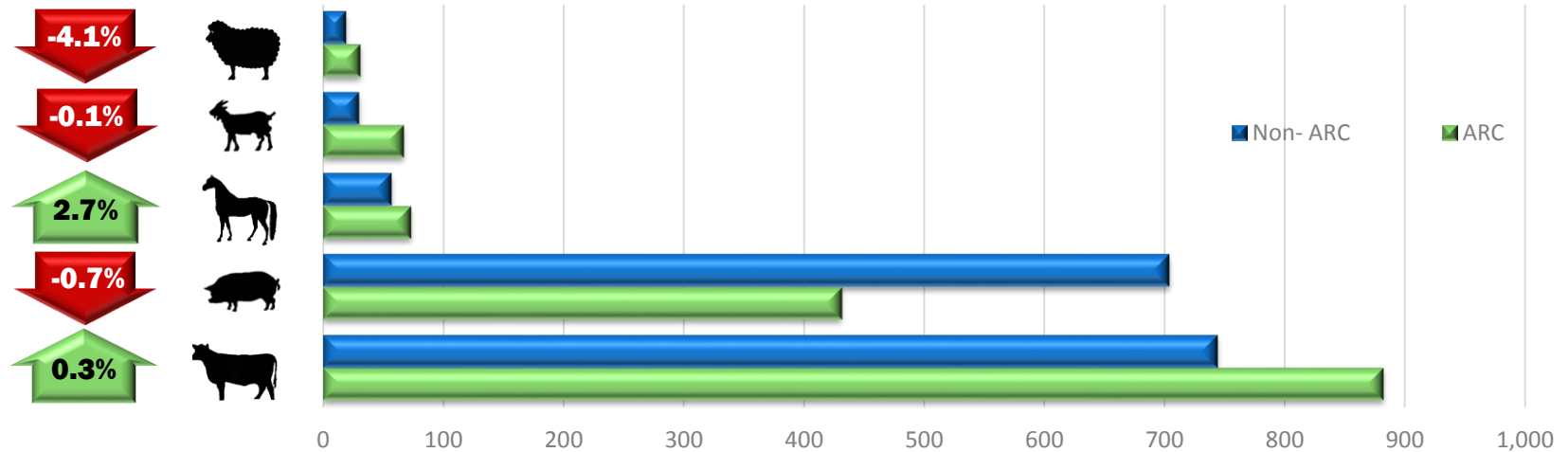
 Non-ARC  ARC *estimated herd size

STATE ANALYSIS OF APPALACHIA – PENNSYLVANIA

Pennsylvania Large Animal Inventory 2012

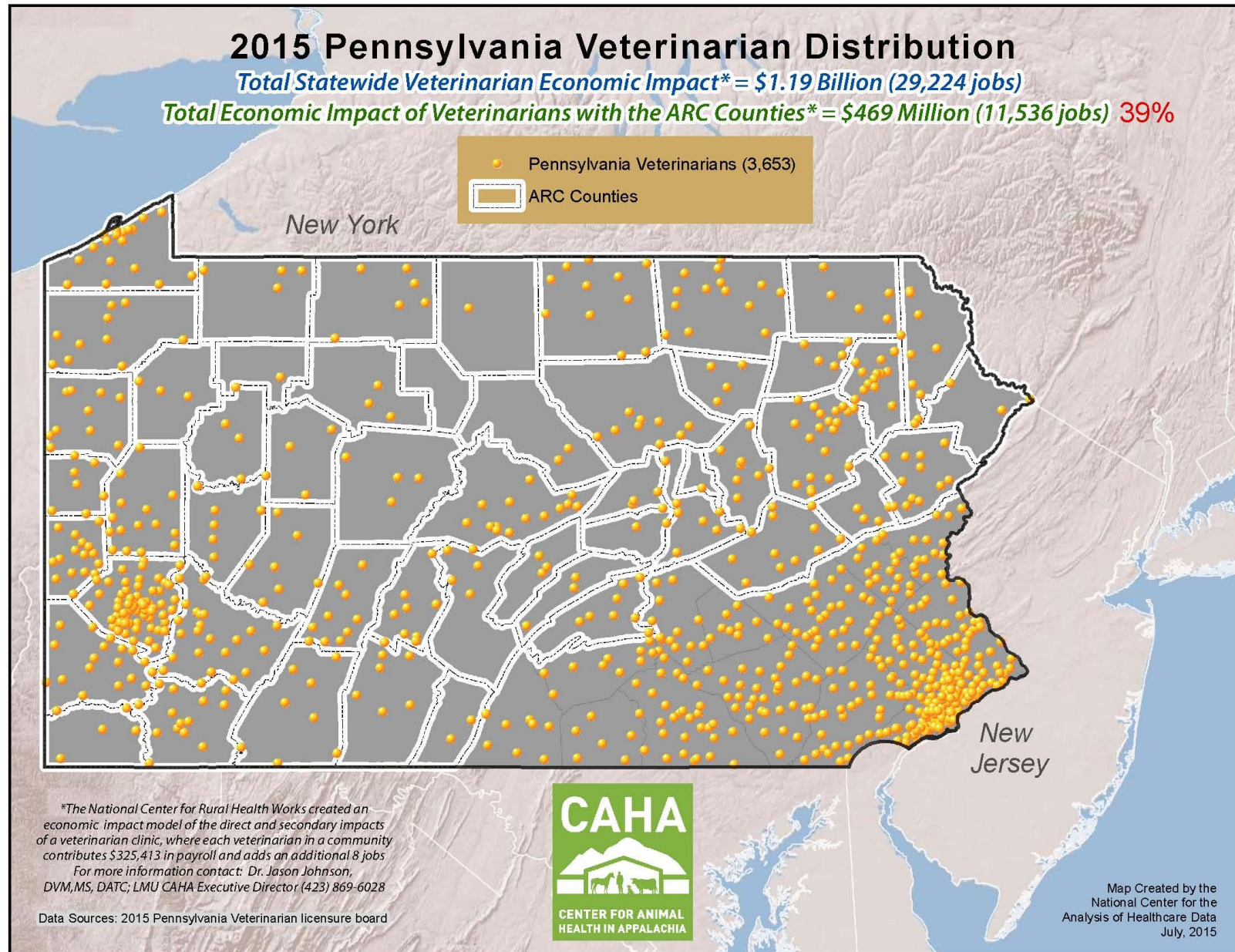
State LA Inventory CAGR,
2007-12

Thousand head

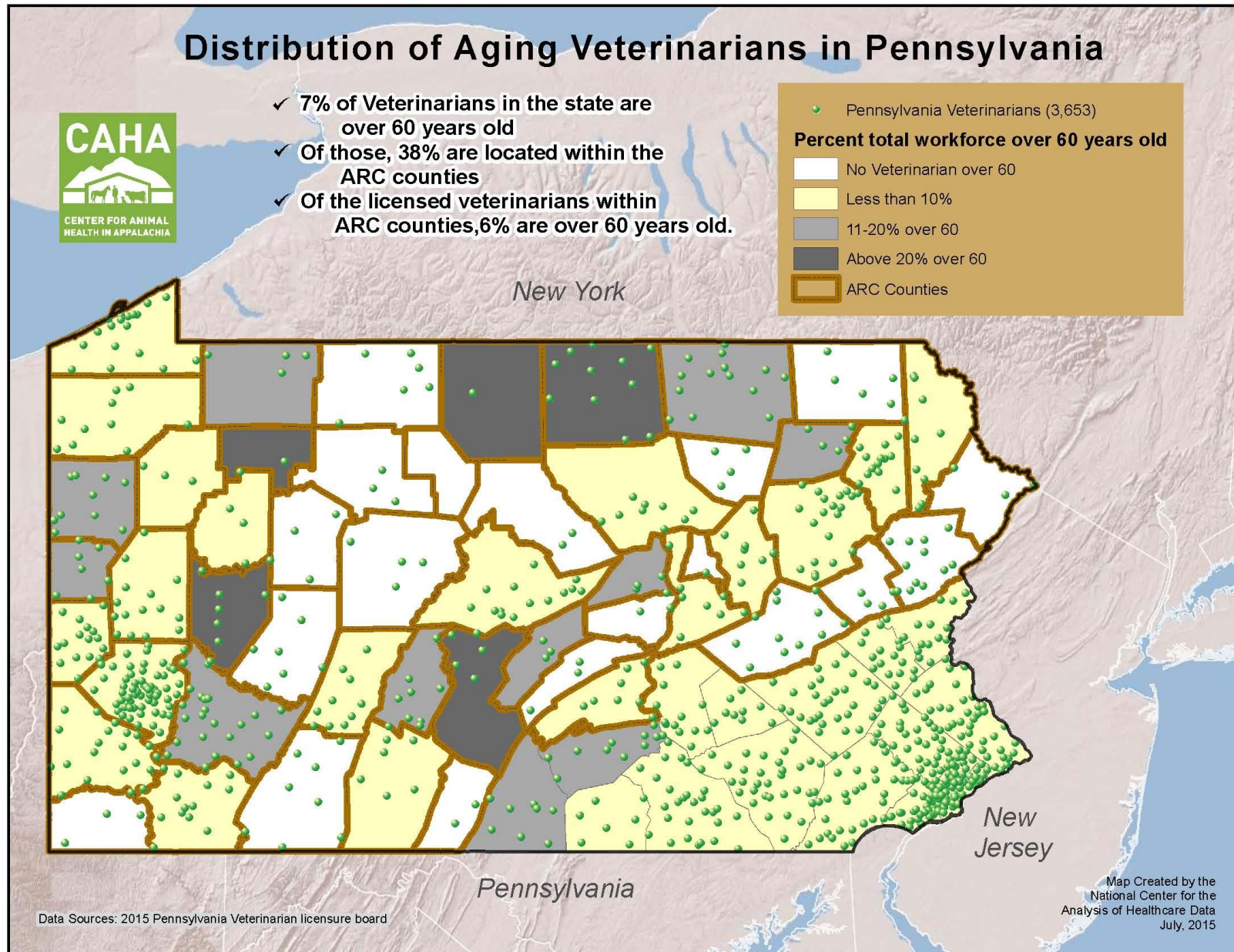


- 49% of the large animal inventory is located in ARC counties.
- The decline in growth of Cattle in ARC was balanced by the growth outside of ARC (CAGR -0.4% vs 1.1%).
- 38% of the swine are located in ARC; ARC growth was overcome by the decline in the pig inventory outside ARC (CAGR 0.5% vs -1.4%).
- Nearly 70% of the sheep herd is located in ARC; this portion is growing (CAGR 0.5%) when the rest of the state is in decline (CAGR -3.8%).
- 61% of the goat herd is located in ARC and it was hit harder by the decline in goats than the rest of the state (CAGR -4.3% vs. -3.8%).

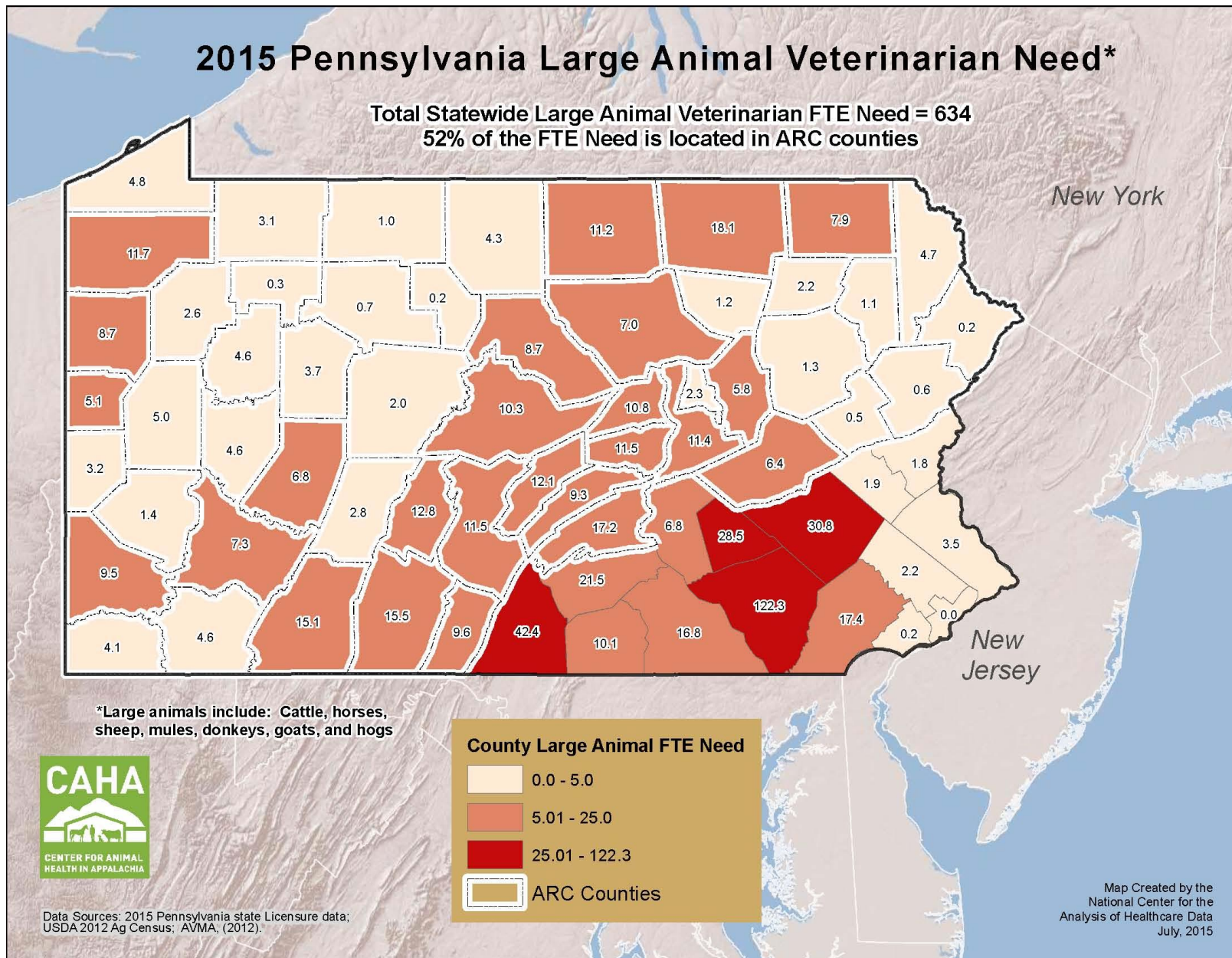
STATE ANALYSIS OF APPALACHIA- PENNSYLVANIA



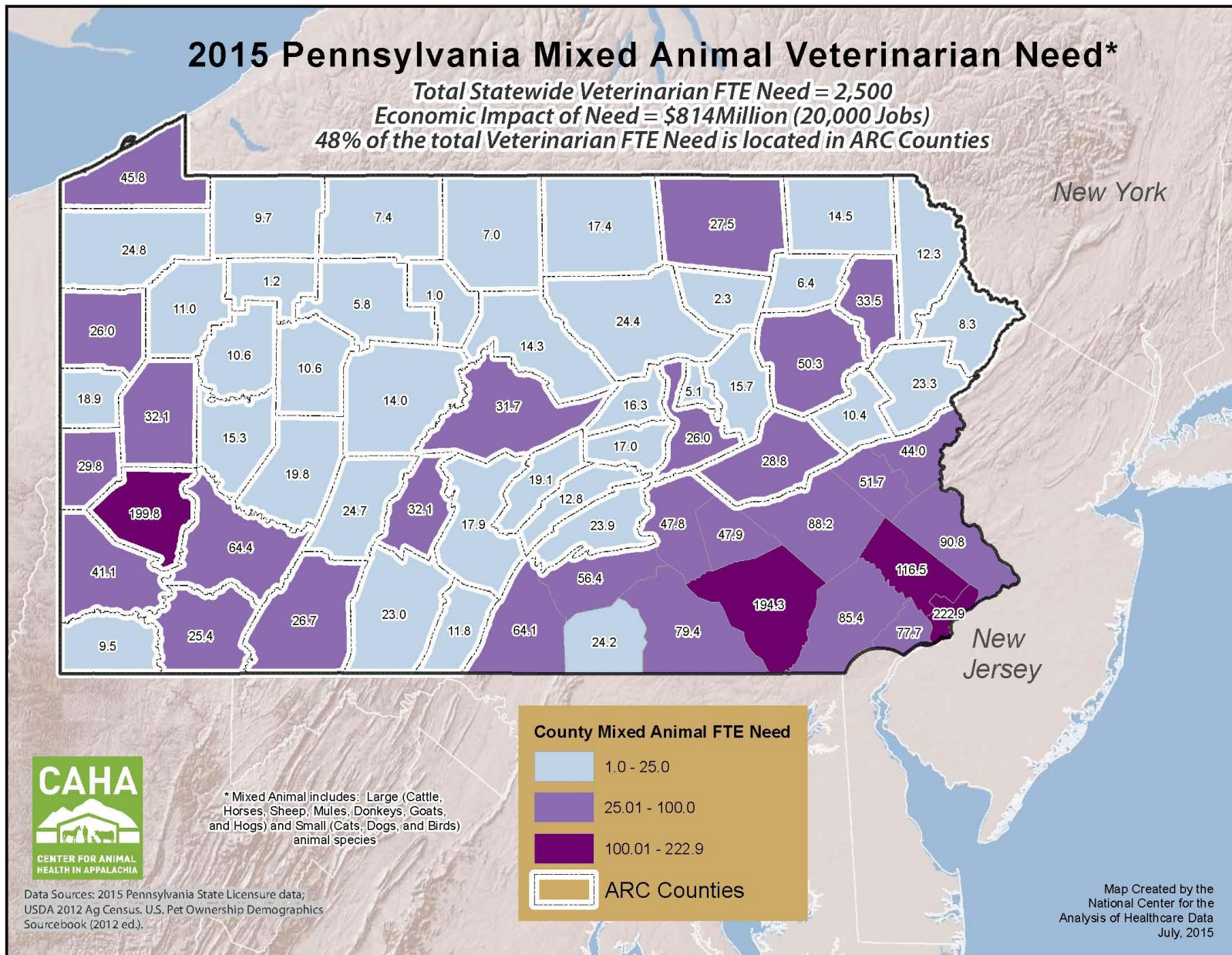
STATE ANALYSIS OF APPALACHIA – PENNSYLVANIA



STATE ANALYSIS OF APPALACHIA – PENNSYLVANIA



STATE ANALYSIS OF APPALACHIA – PENNSYLVANIA



STATE ANALYSIS OF APPALACHIA – PENNSYLVANIA

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

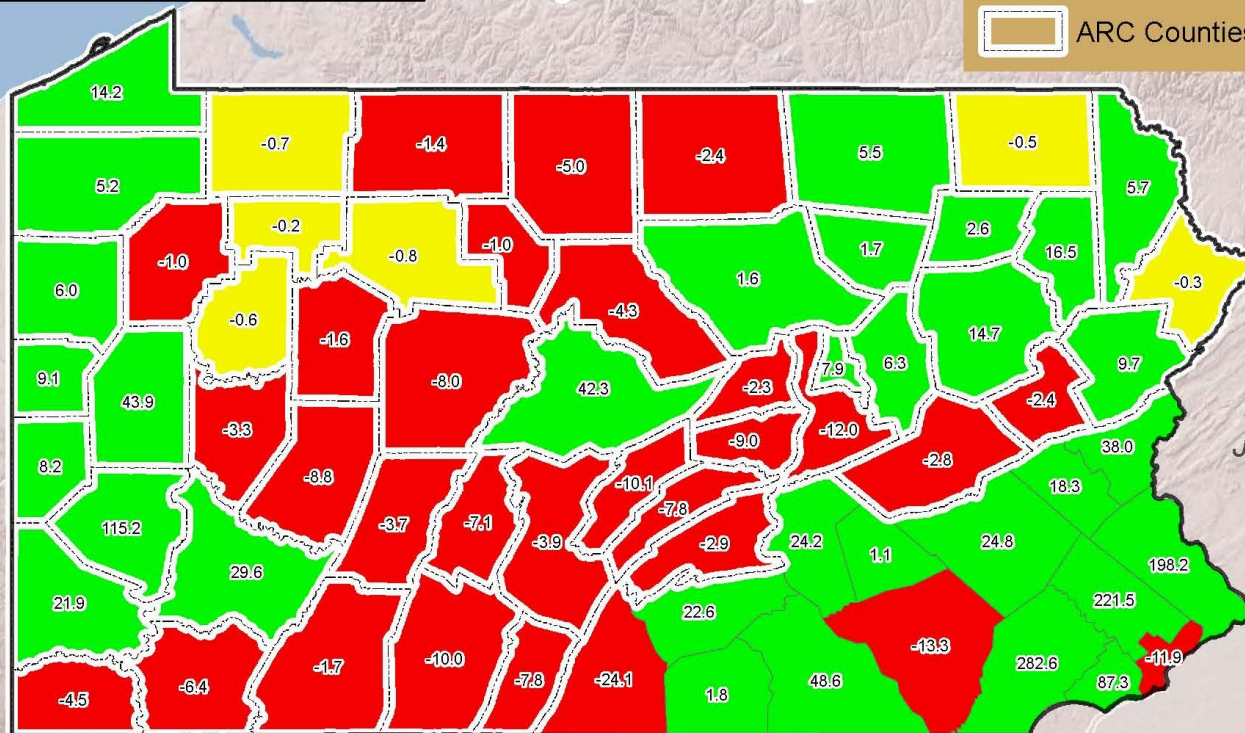
The economic impact to those counties (in red) with shortages caused by maldistribution of veterinarians is**:

Total Revenue loss = \$59.8 Million Total Veterinarian shortage times average payroll**
 184 X \$325,413
AND
Total Job Loss = 1,472 (184 X 8 jobs**)

- ✓ Total Statewide Veterinarian FTE Need = 2,500
- ✓ Total Practicing Veterinarians = 3,653
- ✓ Total Statewide Veterinarian FTE Surplus = 1,153
- ✓ ARC region Veterinarian FTE Need = 1,208
- ✓ ARC region Practicing Veterinarians = 1,442
- ✓ ARC region Veterinarian FTE Surplus = 234

Mixed Animal FTE Analysis by County

- Greater than 1.0 FTE Veterinarian Shortage
- Meeting the Total Veterinarian Needs
- Greater than 1.0 FTE Veterinarian Surplus
- ARC Counties



Data Sources: 2015 Pennsylvania State Licensure data, USDA 2012 AgCensus; AVMA, (2012). U.S. Pet Ownership Demographics Sourcebook (2012 ed).

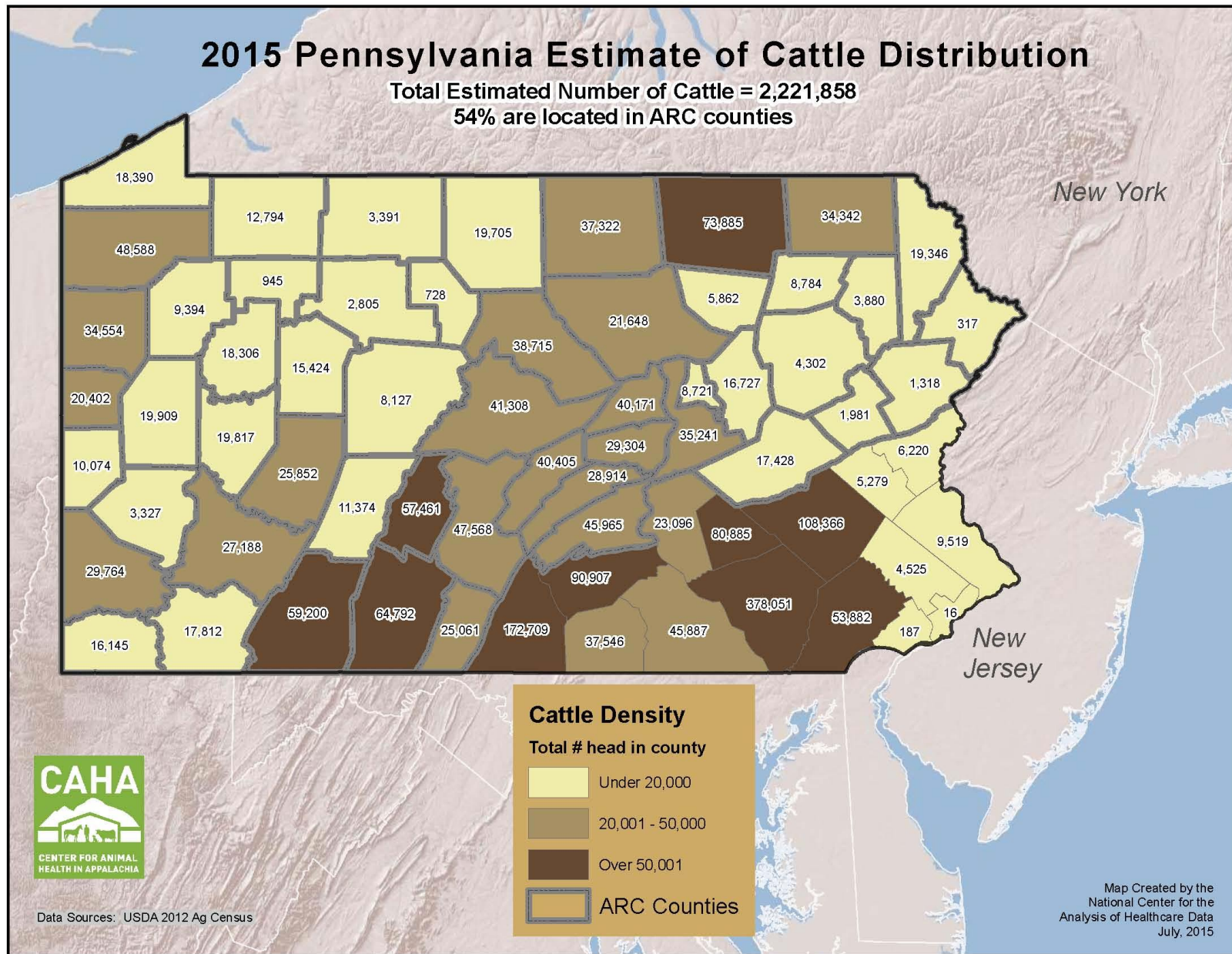
**The National Center for Rural Health Works created an economic impact model of the direct and secondary impacts of a veterinarian clinic. For more information contact: Dr. Jason Johnson, DVM, MS, DTAC; CAHA Executive Director (423) 869-6028

* Mixed Animal includes: Large (Cattle, Horses, Sheep, Mules, Donkeys, Goats, and Hogs) and Small (Cats, Dogs, and Birds) animal species

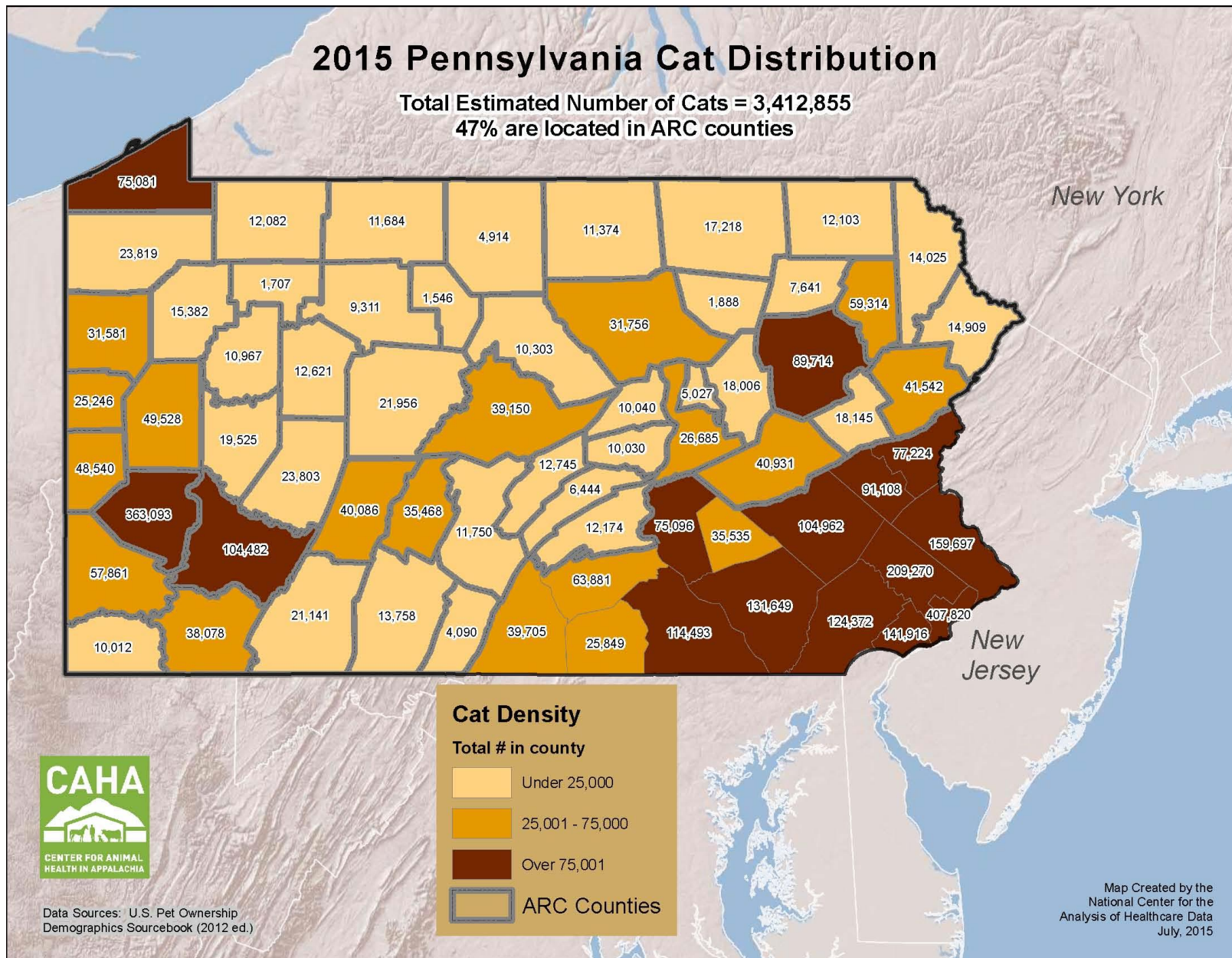


Map Created by the National Center for the Analysis of Healthcare Data July, 2015

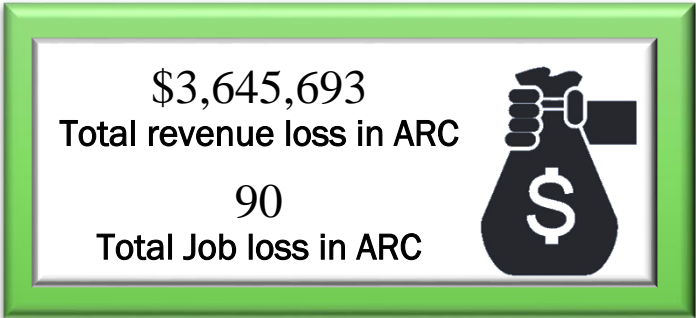
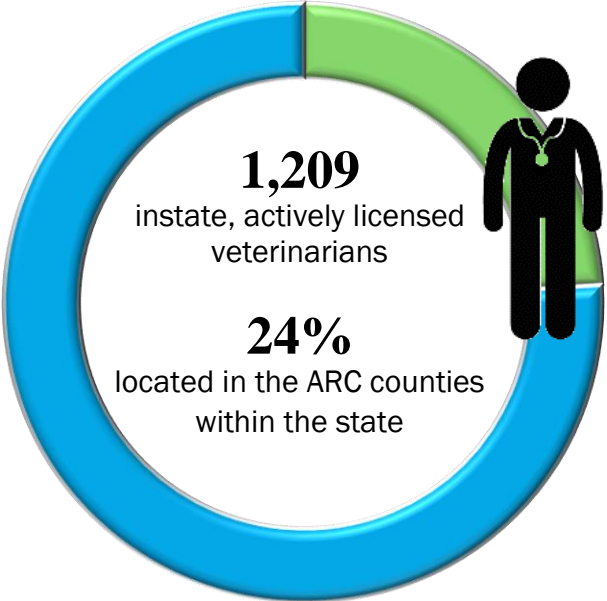
STATE ANALYSIS OF APPALACHIA – PENNSYLVANIA



STATE ANALYSIS OF APPALACHIA – PENNSYLVANIA



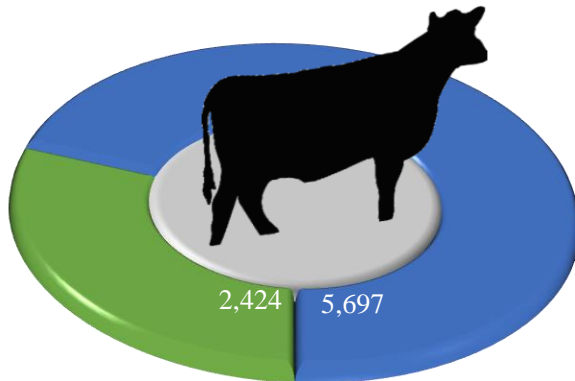
STATE ANALYSIS OF APPALACHIA- SOUTH CAROLINA



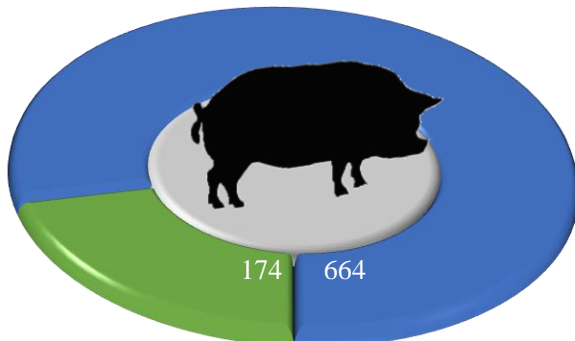
*State not analyzed

STATE ANALYSIS OF APPALACHIA – SOUTH CAROLINA

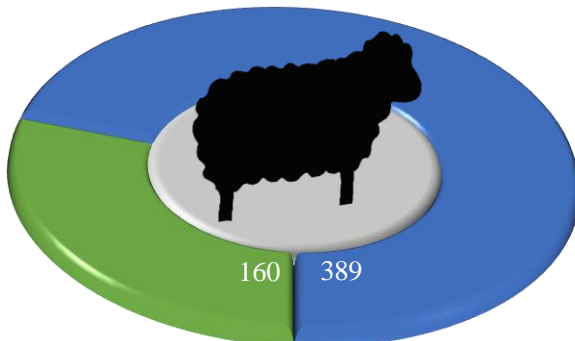
South Carolina Farms by Type of Herd 2012



Total # of farms = 8,121



Total # of farms = 838

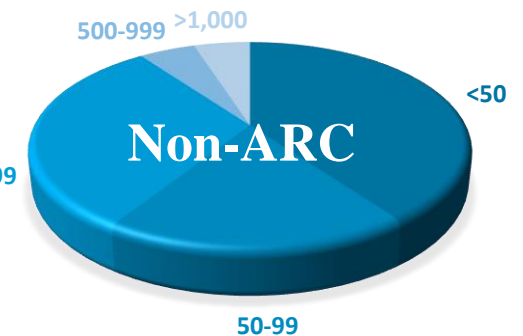


Total # of farms = 549

FARMS and FARMLAND

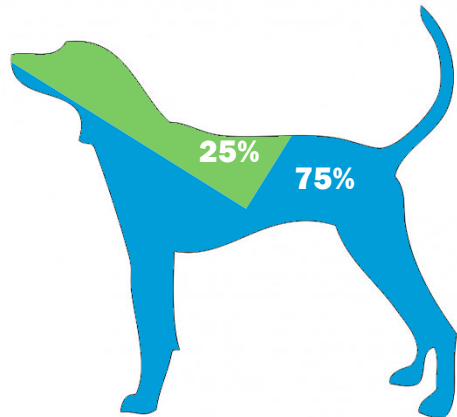
- South Carolina covers about 19 million acres, 13% of this falls within ARC - 26% is land in farms.
- There are more than 25 thousand farms in South Carolina, 24% are located in ARC; 58% of those farms in ARC counties are less than 50 acres.
- 30% of the 8,121 farms managing cattle are located in ARC. While overall the number of cattle herds decreased between 2007-2012, however the number of herds less than 50 head increased.
- 21% of the 838 farms running a pig herd in SC are located in ARC counties, 90% of which run less than 25 head. Smaller herds are growing in SC.
- 549 farms manage sheep flocks in SC, 29% of which are located in ARC. Of the 83% farms running sheep in ARC, 83% manage less than 25 animals.

South Carolina Farms by Number of Acres (Percent)

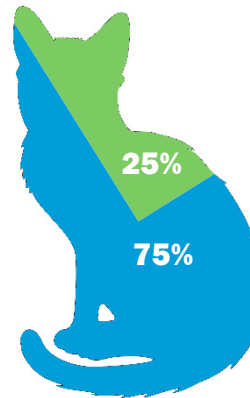


STATE ANALYSIS OF APPALACHIA – SOUTH CAROLINA

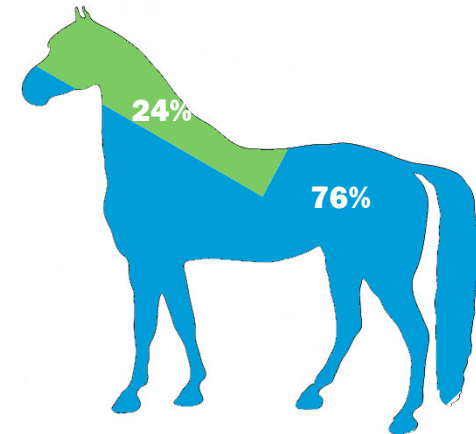
Species Distribution



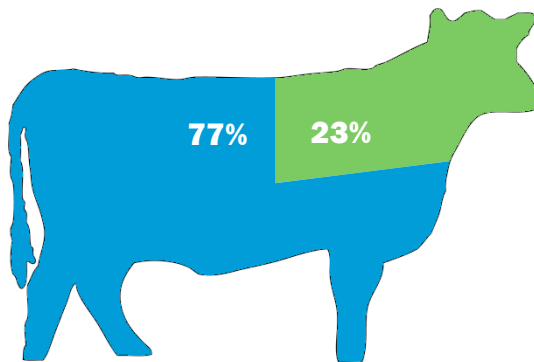
Total Estimated Number of Dogs =
1,244,813



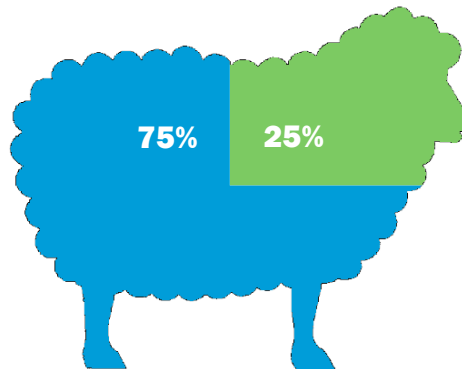
Total Estimated Number of Cats =
1,350,886



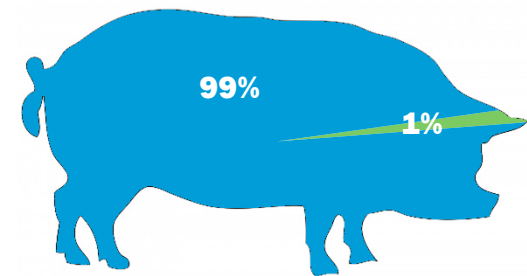
Total Estimated Number of Horse,
Mule & Donkey = 129,460



Total Estimated Number of Cattle*
= 2,221,858



Total Estimated Number of Sheep
& Goat* = 196,825

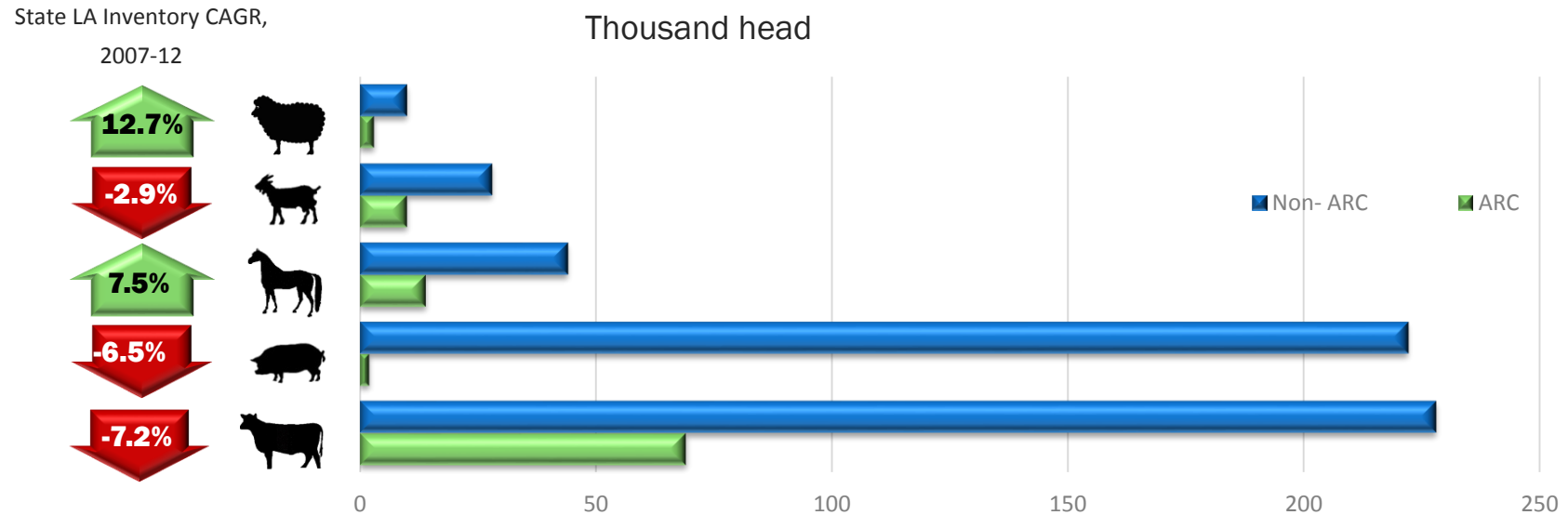


Total Estimated Number of Pig* =
3,080,160

Non-ARC ARC *estimated herd size

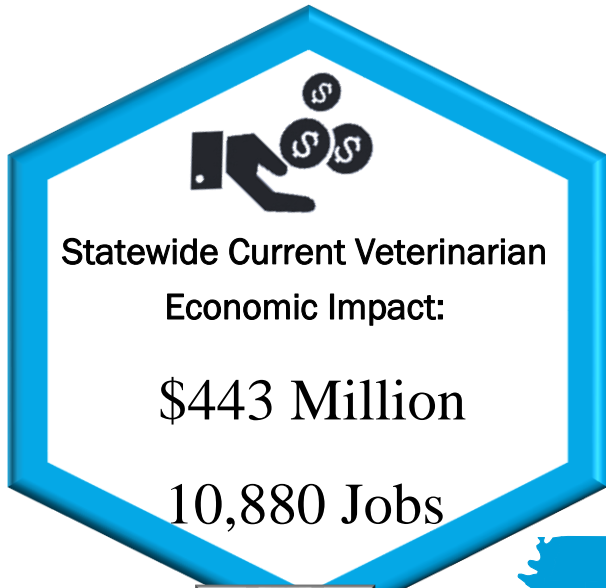
STATE ANALYSIS OF APPALACHIA – SOUTH CAROLINA

South Carolina Large Animal Inventory 2012

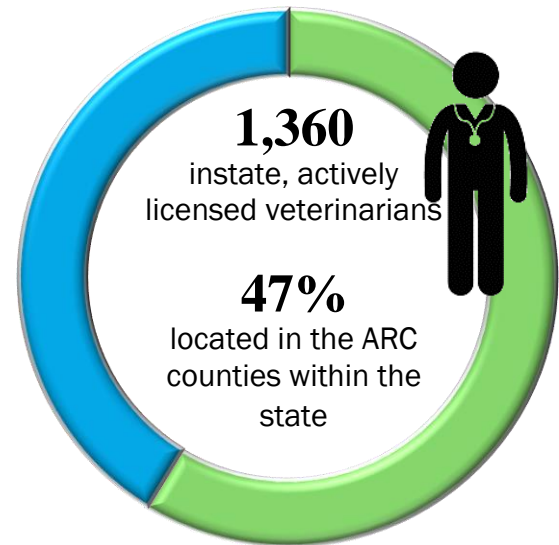


- 16% of the large animal inventory is located in ARC.
- The decline in ARC Cattle was not as strong as the contraction outside of ARC (CAGR -6.6% vs -7.4%).
- Most of the swine are located outside ARC; the decline in the pig inventory was worse in ARC than outside (CAGR -10.3% vs -6.5%).
- Only 24% of the goat herd is located in ARC. It was not hit as hard by the decline in goats as the rest of the state (CAGR -1.6% vs. -3.4%).
- Nearly 80% of the sheep herd is located outside ARC; the statewide growth was not as strong in ARC as the rest of the state (CAGR 6.1% vs 14.9%).

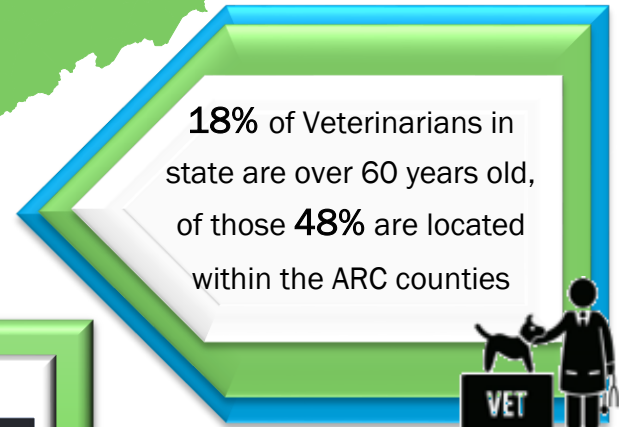
STATE ANALYSIS OF APPALACHIA- TENNESSEE



47% in ARC

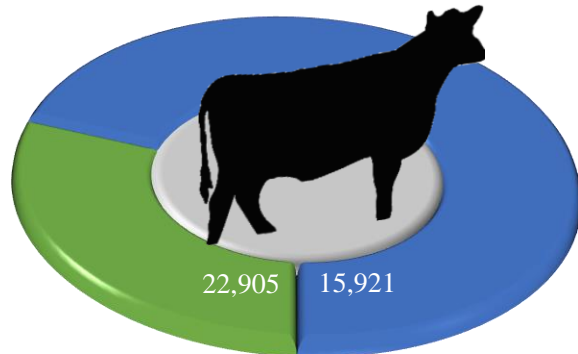


There is a shortage of **382** Veterinary FTE's in rural Appalachia.

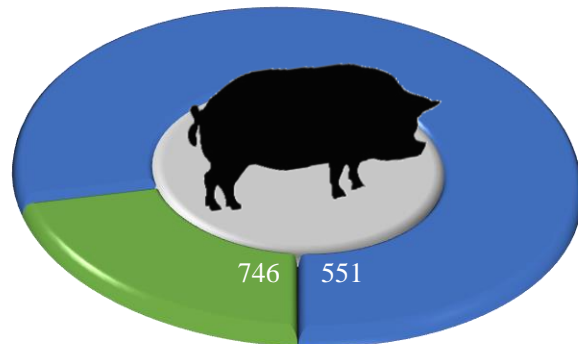


STATE ANALYSIS OF APPALACHIA – TENNESSEE

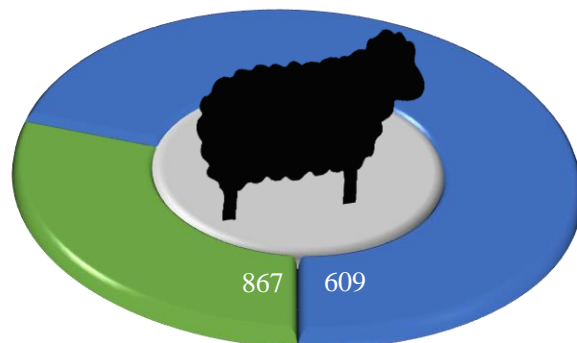
Tennessee Farms by Type of Herd 2012



Total # of farms = 38,826



Total # of farms = 1297

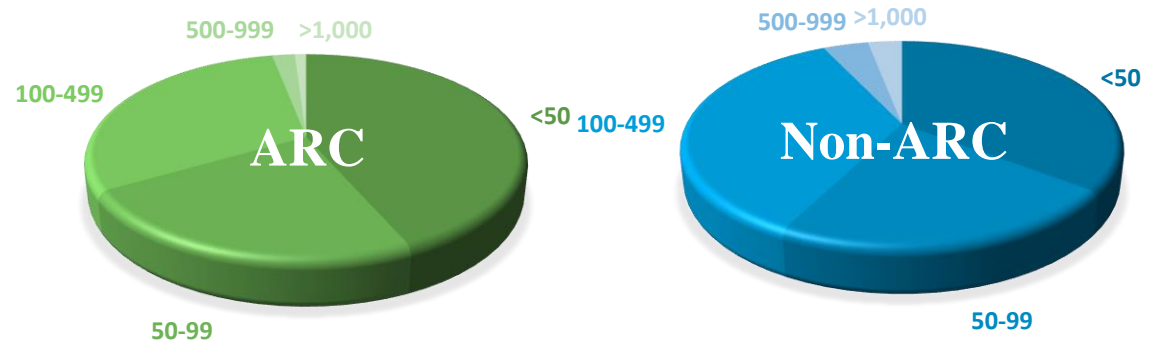


Total # of farms = 1476

FARMS and FARMLAND

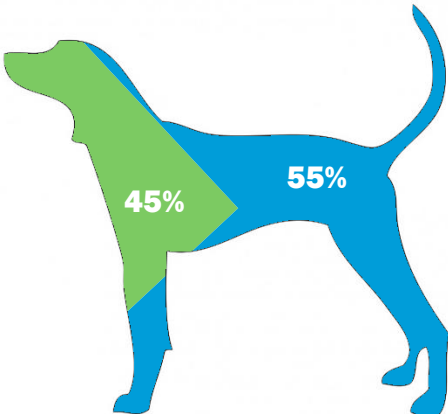
- Tennessee covers about 26 million acres, 49% of this falls within ARC; 41% is land in farms.
- There are more than 68 thousand farms in Tennessee, 53% are located in ARC counties; 43% of those farms are less than 50 acres.
- Nearly 39 thousand farms manage cattle. 59% are located in ARC counties. From 2007-2012 the number of herds declined, but the volume of herds of more than 500 head grew.
- 58% of the 1,297 farms in ARC counties maintain a pig herd, 88% of which run less than 25 head.
- The size and number of sheep flocks grew between 2007 and 2012. In ARC flocks between 50 and 200 animals grew in double digits. 96% of the farms with sheep in manage less than 100 head, 73% less than 50 head.

Tennessee Farms by Number of Acres (Percent)

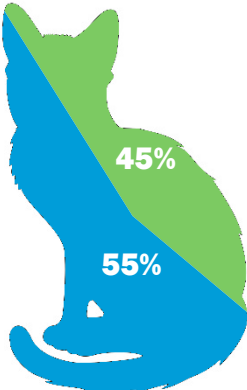


STATE ANALYSIS OF APPALACHIA – TENNESSEE

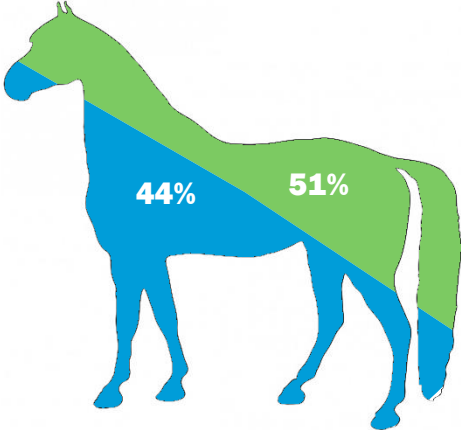
Species distributions



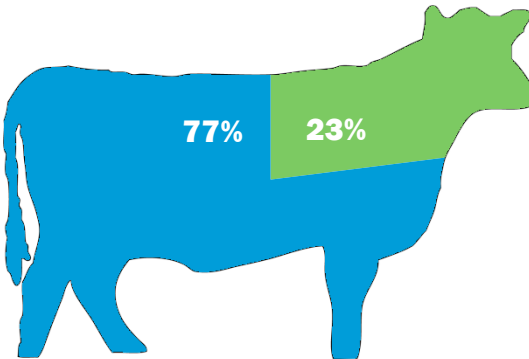
Total Estimated Number of Dogs = 2,169,390



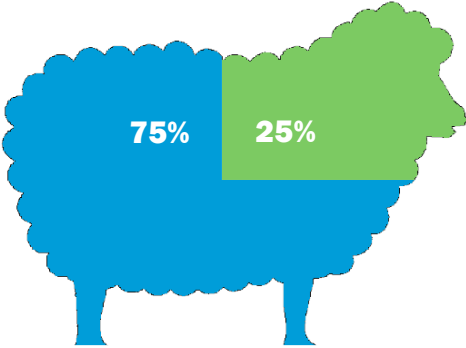
Total Estimated Number of Cats = 1,745,486



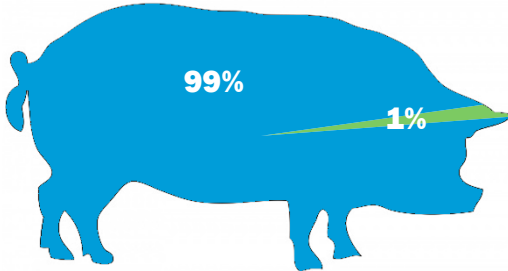
Total Estimated Number of Horse, Mule & Donkey = 112,009



Total Estimated Number of Cattle* = 2,221,858



Total Estimated Number of Sheep & Goat* = 196,825



Total Estimated Number of Pig* = 3,080,160

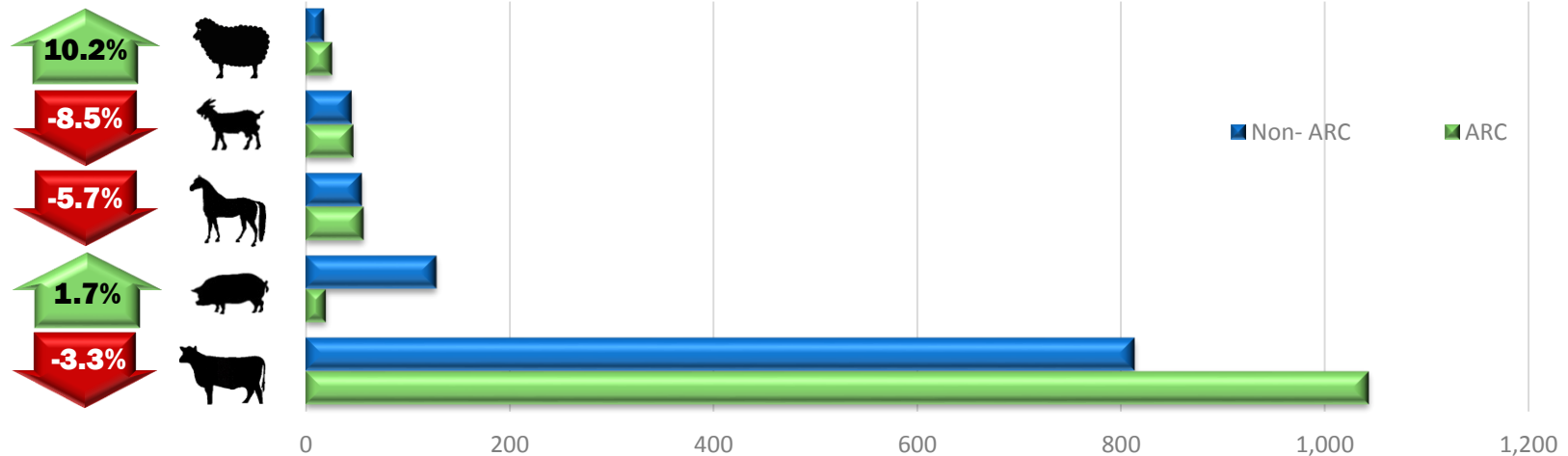
■ Non-ARC
 ■ ARC
 *estimated herd size

STATE ANALYSIS OF APPALACHIA – TENNESSEE

Tennessee Large Animal Inventory 2012

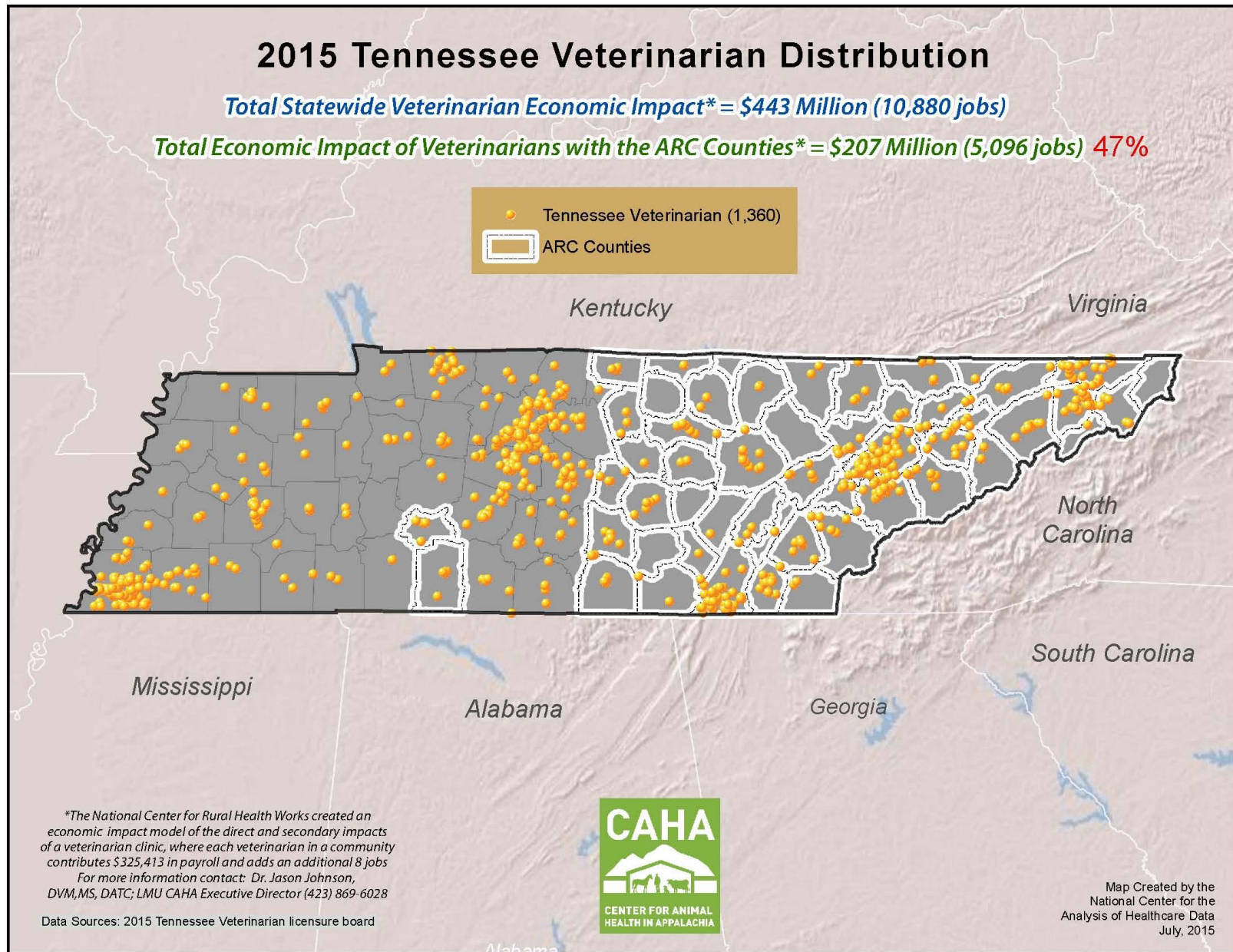
Thousand head

State LA Inventory CAGR,
2007-12

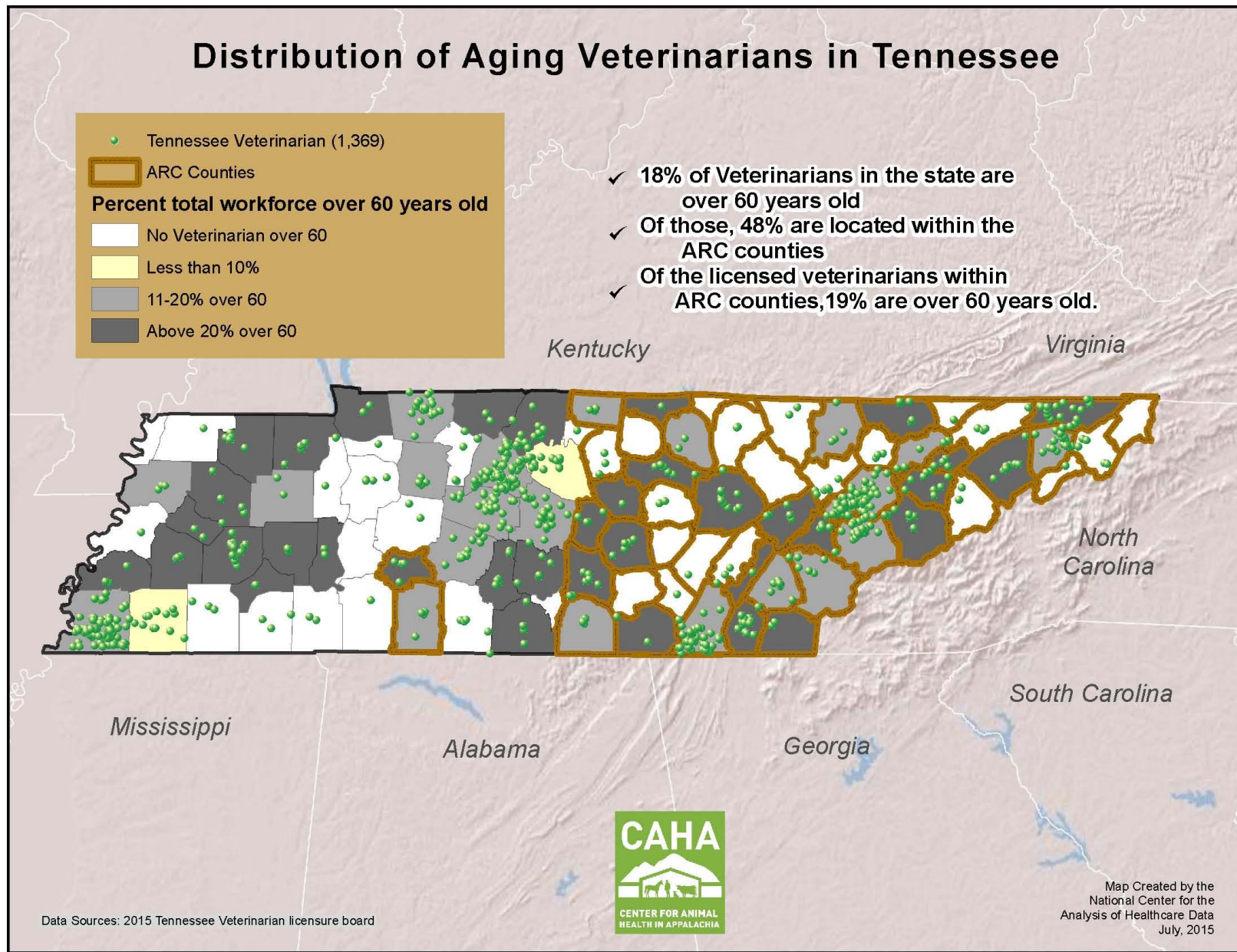


- 53% of the large animal inventory is located in ARC counties.
- Cattle in ARC counties were harder hit by the statewide decline than the rest of the state (CAGR -3.9% vs -2.4%).
- 86% of the swine are located outside of ARC. The decline in the ARC counties pig inventory was balanced by the growth outside of ARC (CAGR -10.4% vs 4.5%).
- The goat herd is in decline. ARC was hit harder by the decline in goats than the rest of the state (CAGR -8.9 vs. -8.2).
- Nearly 60% of the sheep herd is located in ARC; this portion is growing faster (CAGR 11.2%) than the rest of the state (CAGR 8.7%).

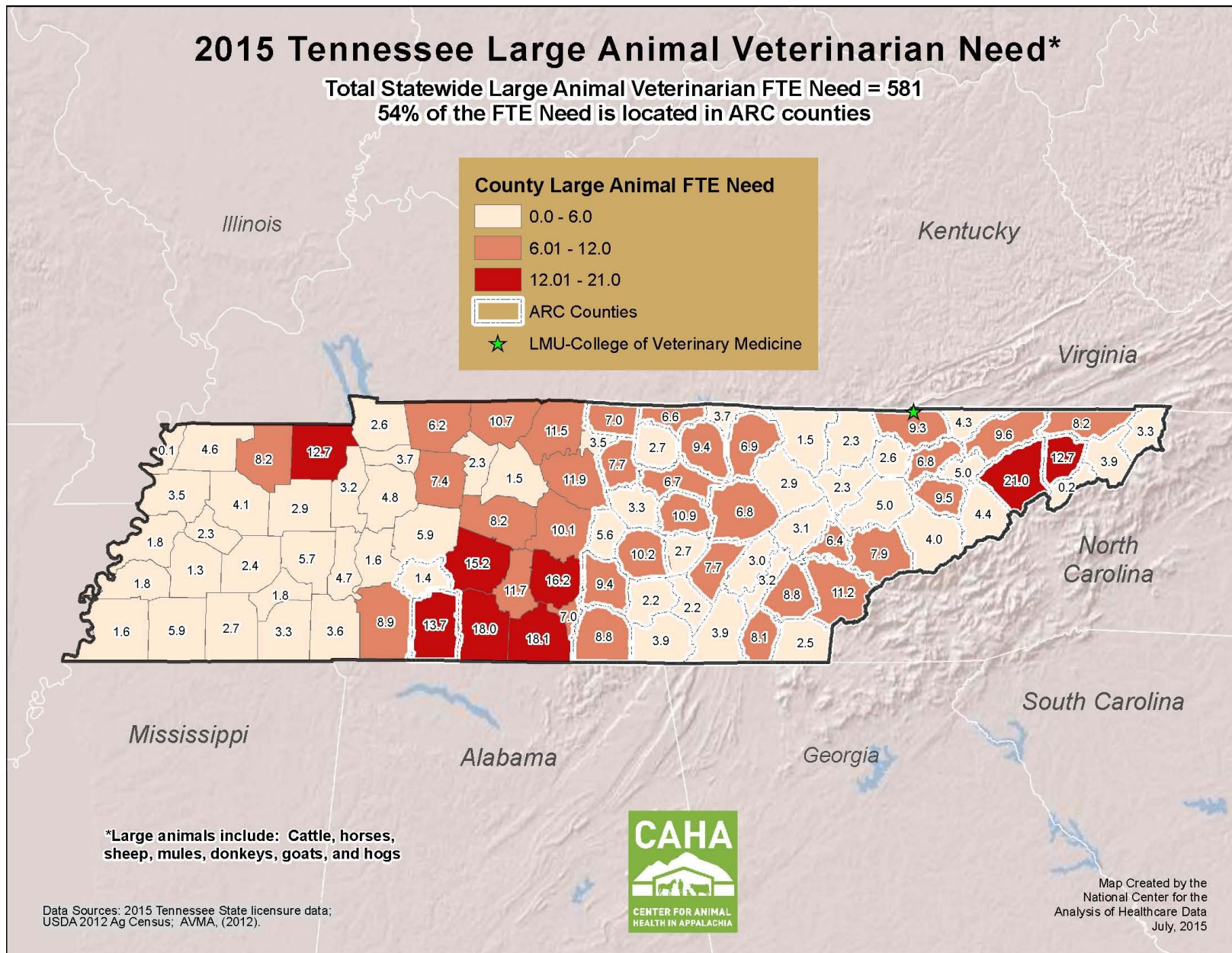
STATE ANALYSIS OF APPALACHIA- TENNESSEE



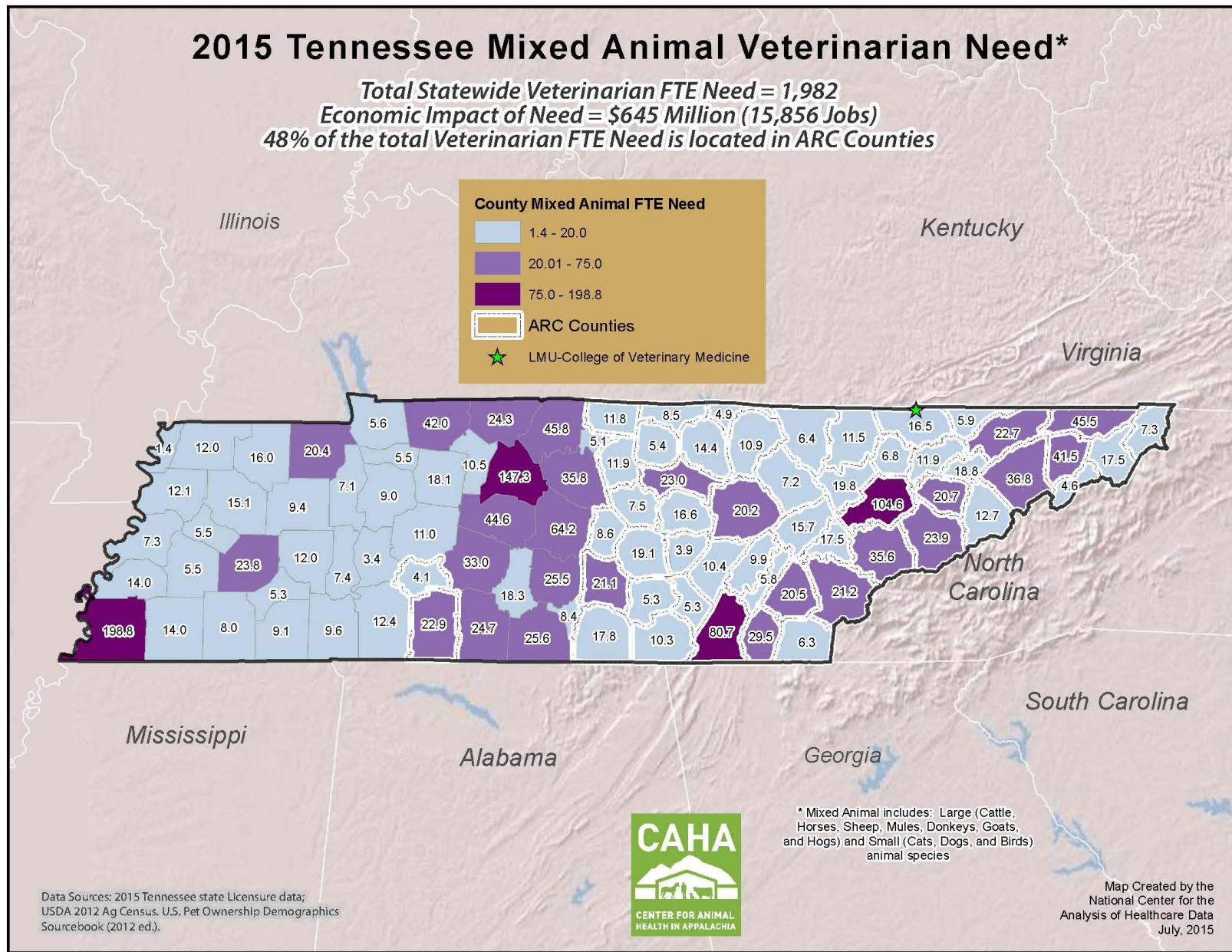
STATE ANALYSIS OF APPALACHIA – TENNESSEE



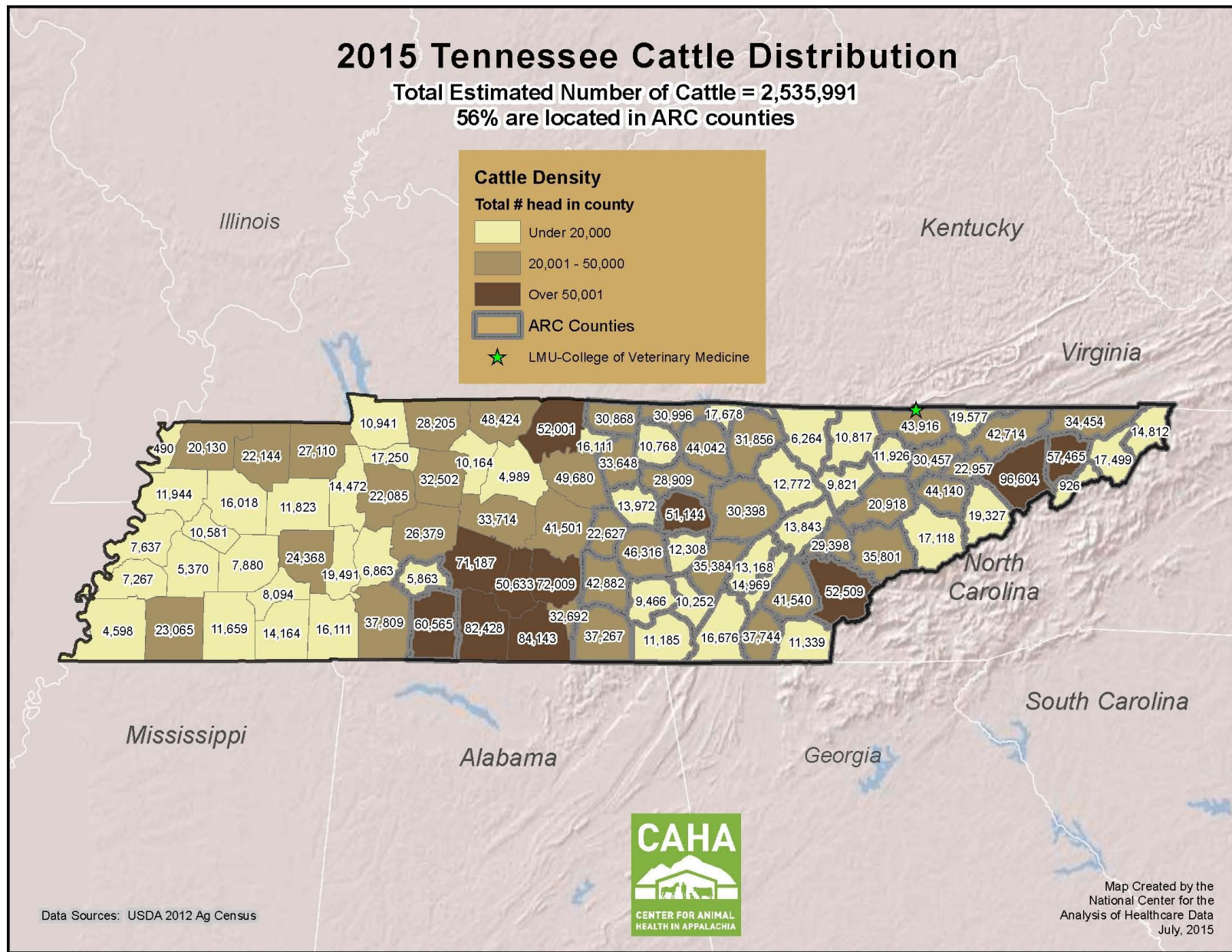
STATE ANALYSIS OF APPALACHIA – TENNESSEE



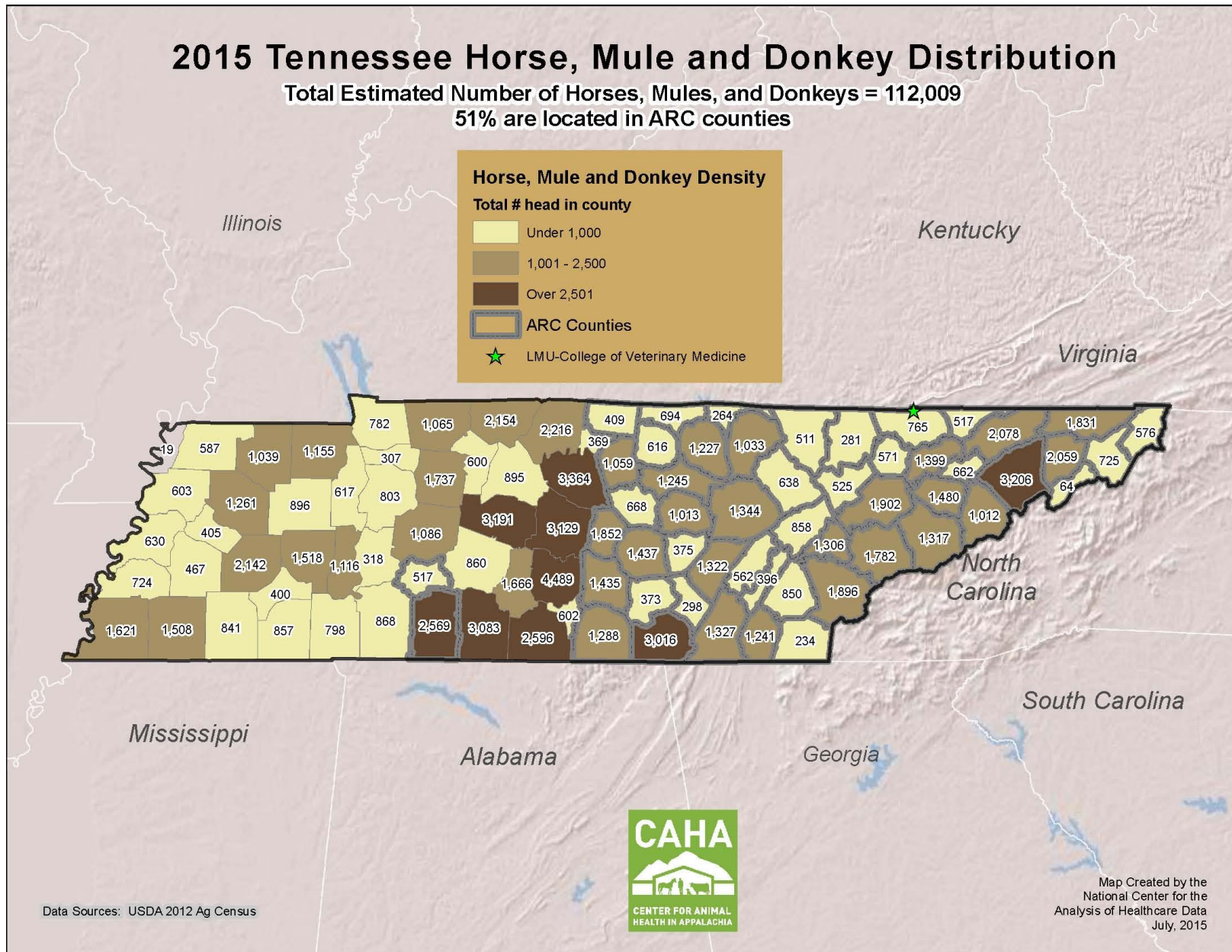
STATE ANALYSIS OF APPALACHIA – TENNESSEE



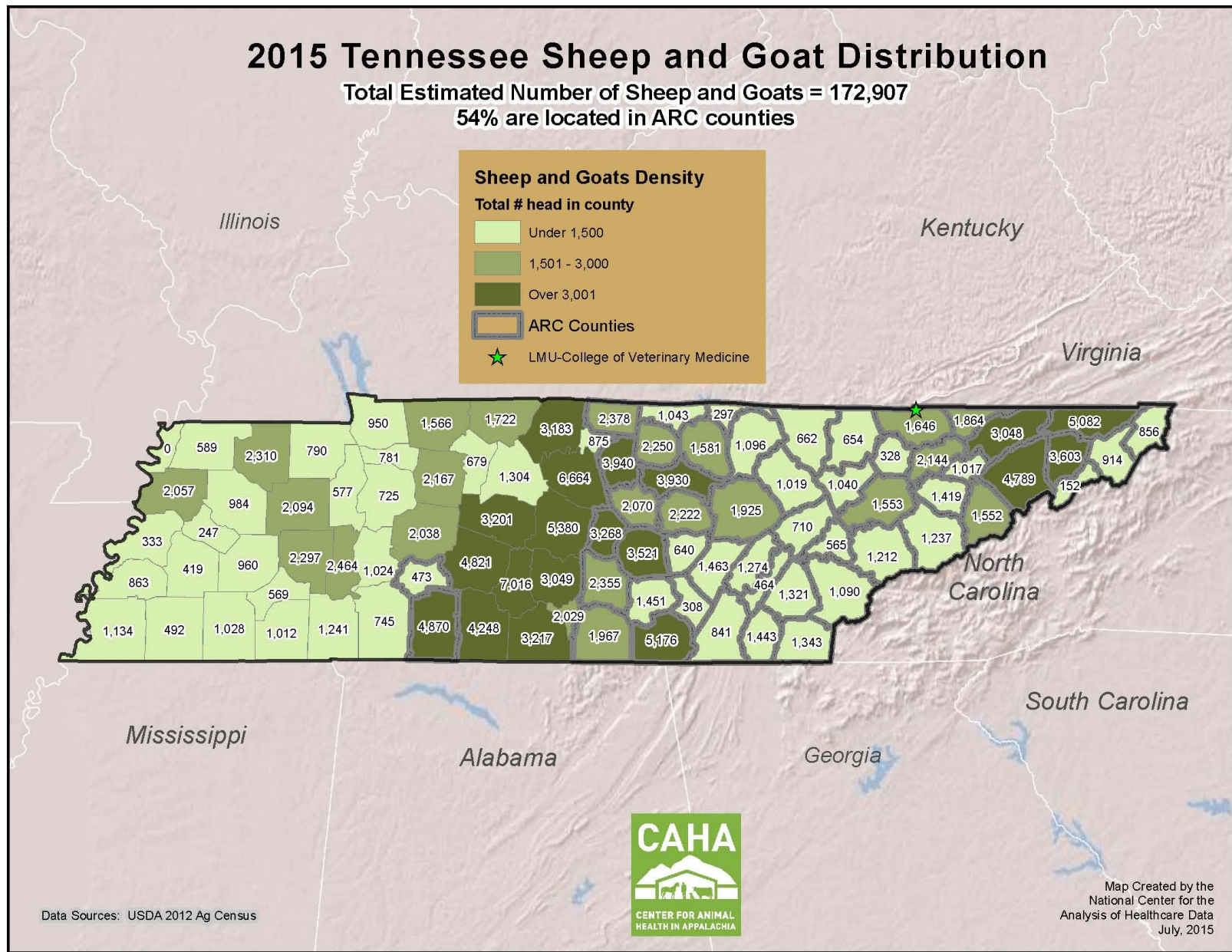
STATE ANALYSIS OF APPALACHIA – TENNESSEE



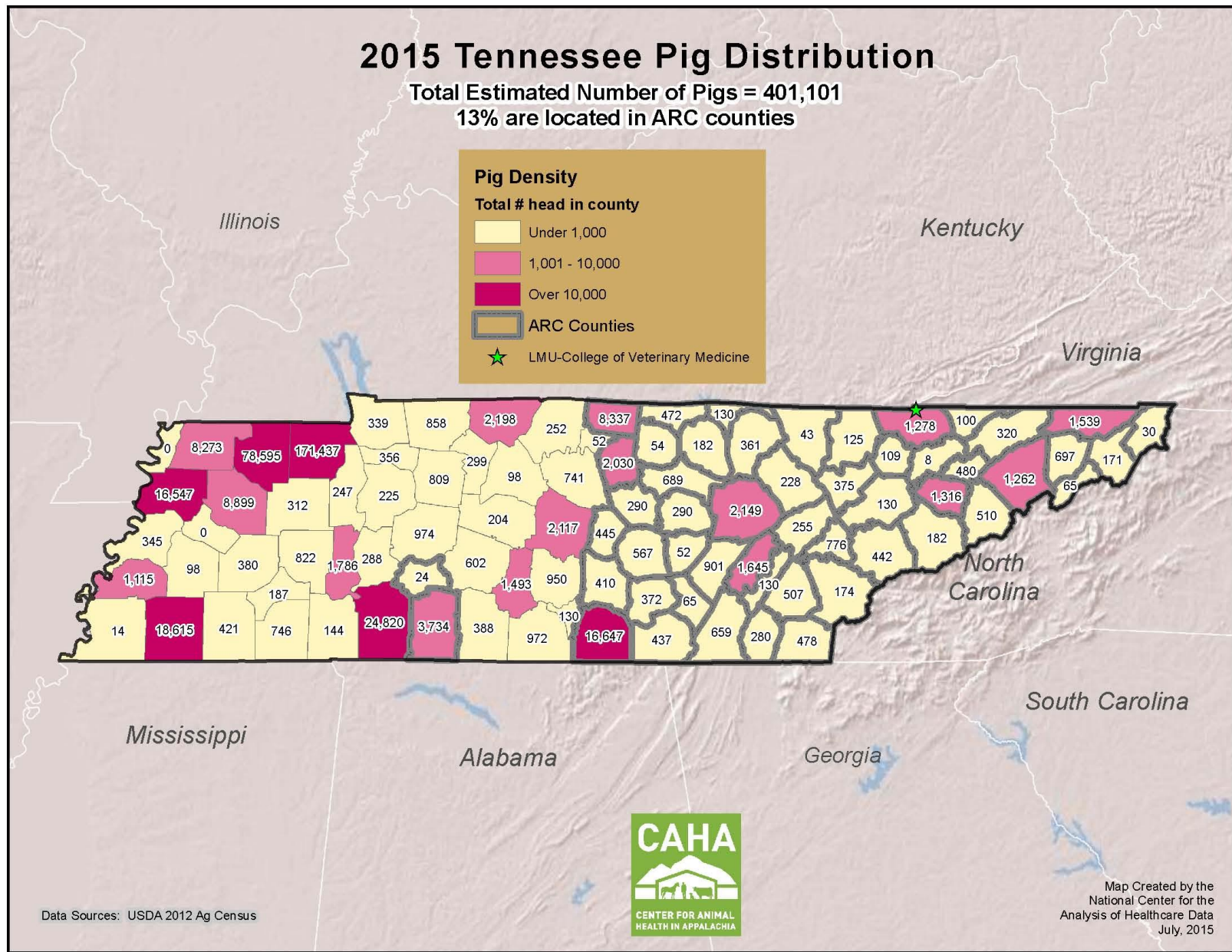
STATE ANALYSIS OF APPALACHIA – TENNESSEE



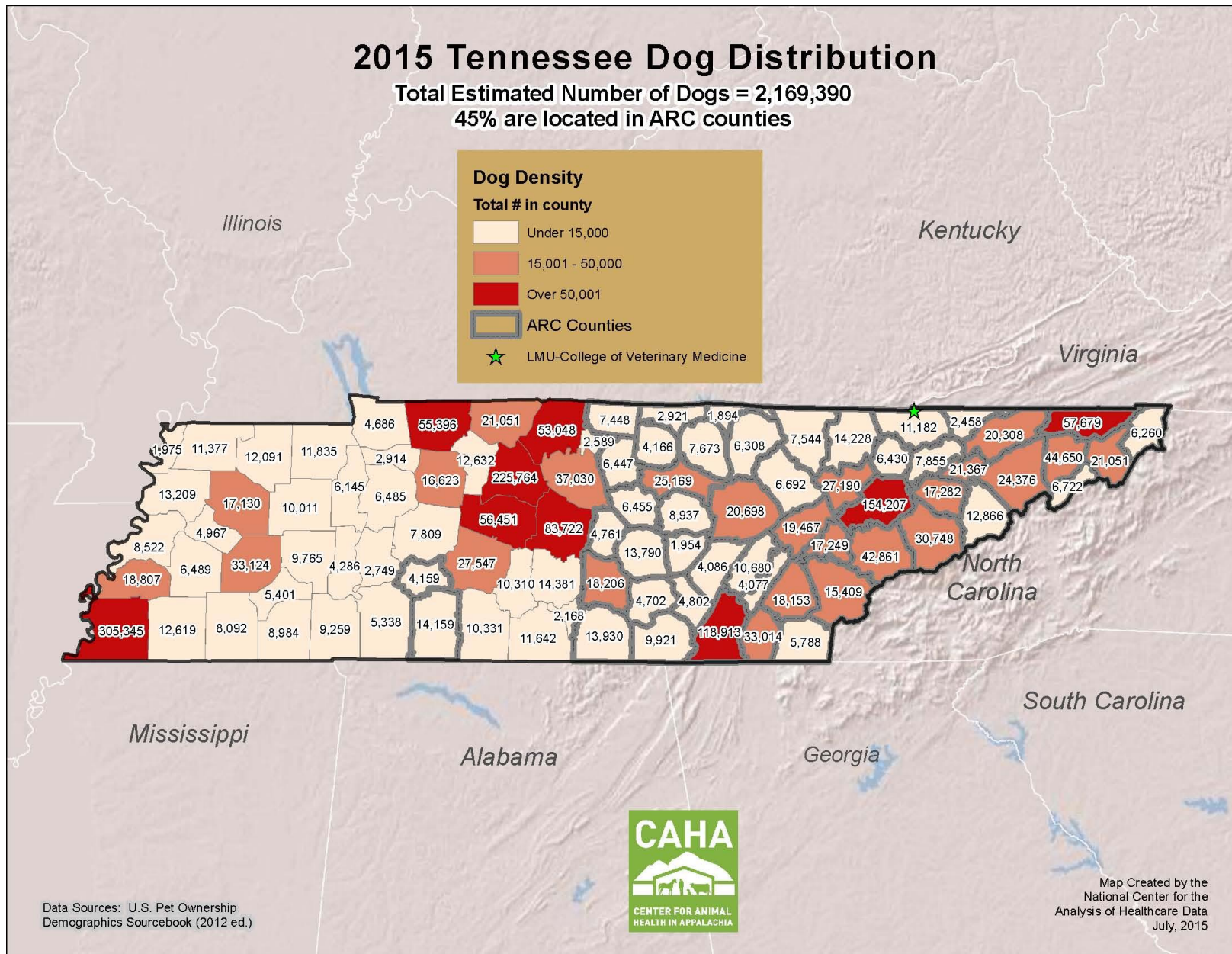
STATE ANALYSIS OF APPALACHIA – TENNESSEE



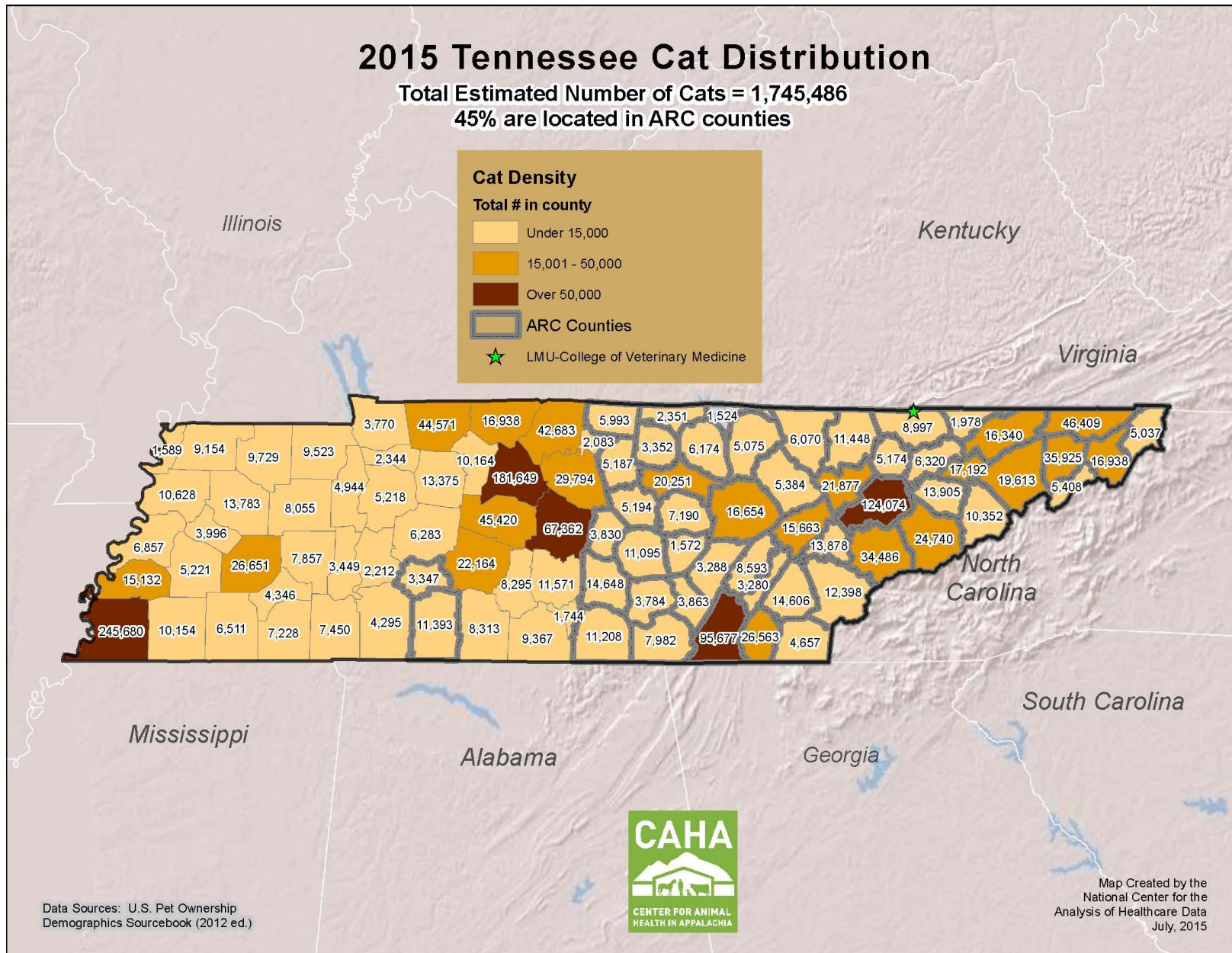
STATE ANALYSIS OF APPALACHIA – TENNESSEE



STATE ANALYSIS OF APPALACHIA – TENNESSEE



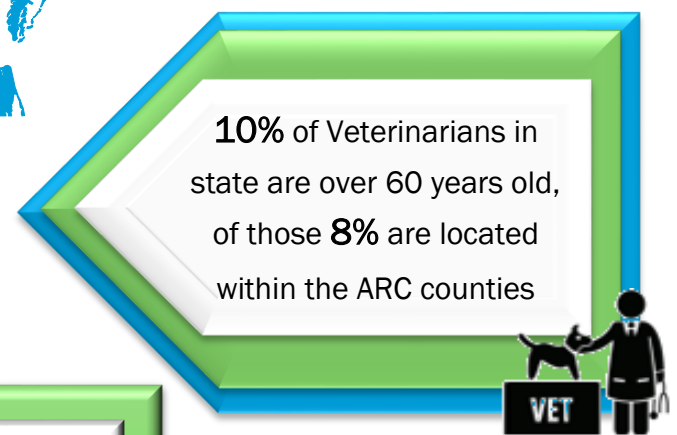
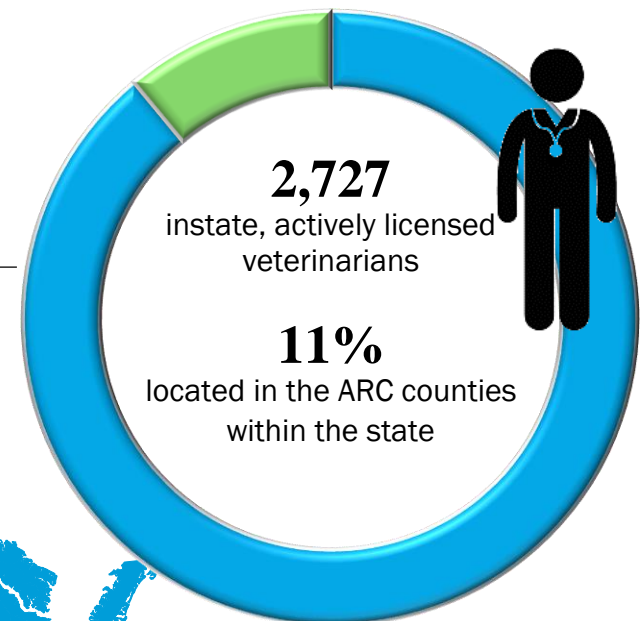
STATE ANALYSIS OF APPALACHIA – TENNESSEE



STATE ANALYSIS OF APPALACHIA- VIRGINIA

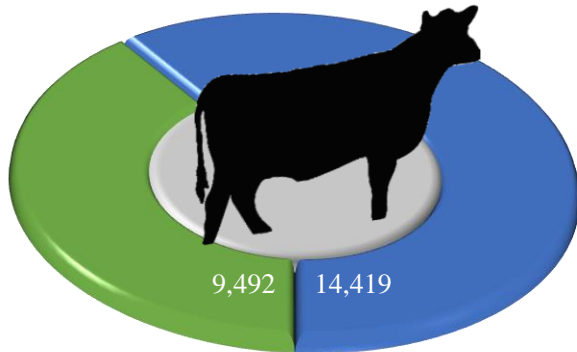


There is a shortage of
143 Veterinary FTE's in
rural Appalachia.

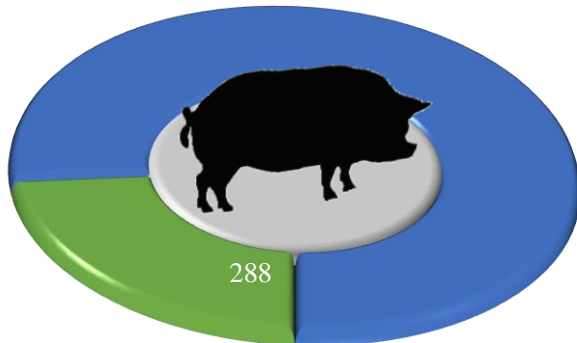


STATE ANALYSIS OF APPALACHIA – VIRGINIA

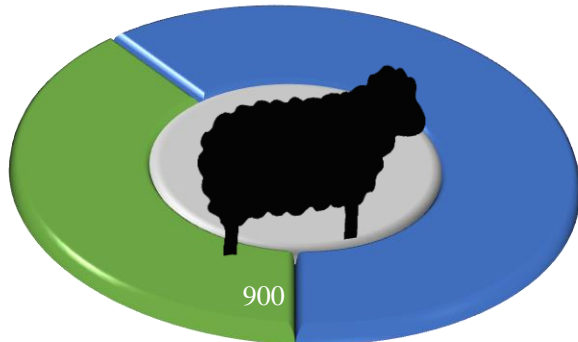
Virginia Farms by Type of Herd 2012



Total # of farms = 23,911



Total # of farms = 1,265

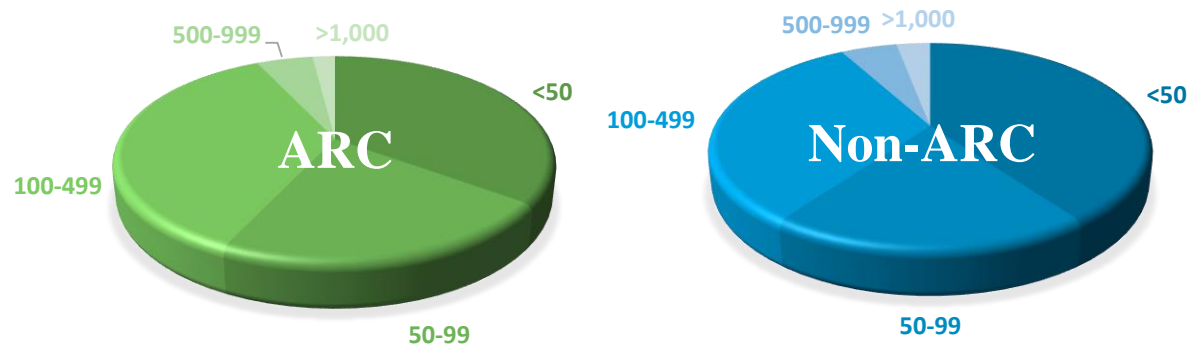


Total # of farms = 2,315

FARMS and FARMLAND

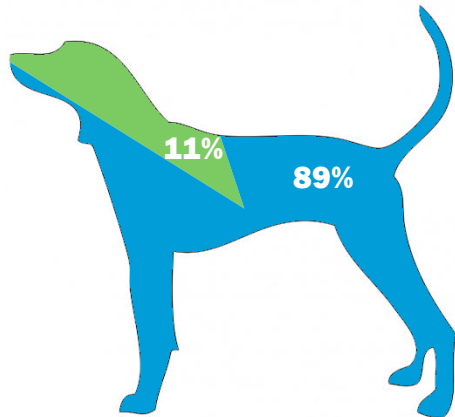
- Virginia covers about 25 million acres, 25% of this falls within ARC of which 33% is land in farms.
- There are more than 46 thousand farms in Virginia, 33% are located in ARC. There is not a typical size of farm as 57% of the farms <100 acres, 36% are 100-499 acres and 7% are >500 acres.
- There are nearly 26 thousand farms with cattle. From 2007-2012 the size of cattle in Virginia grew; however of the farms run fewer than 50 head
- 23% of the 1,265 farms in Virginia with pigs are located in ARC, 89% of which run less than 25 head.
- 39% of the 2,315 farms with sheep are located in ARC. The size and number of herds are growing in ARC counties. Most of this growth occurred in flocks with less than 100 animals.

Virginia Farms by Number of Acres (Percent)

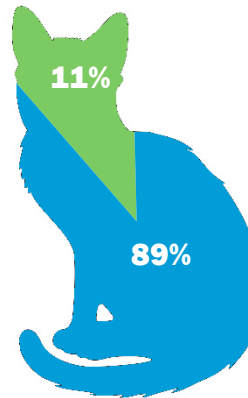


STATE ANALYSIS OF APPALACHIA – VIRGINIA

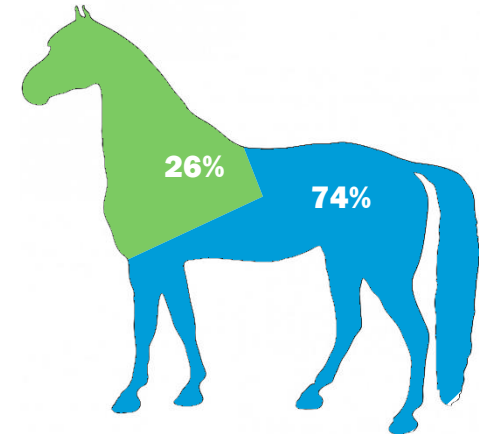
Species Distribution



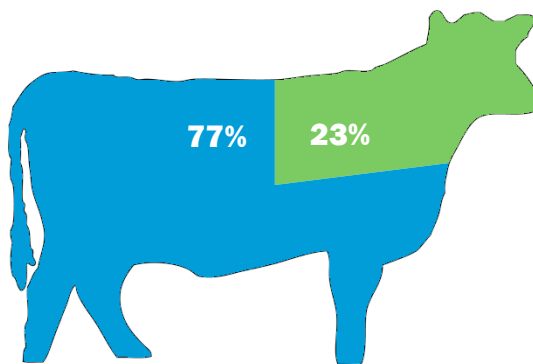
Total Estimated Number of Dogs =
1,654,815



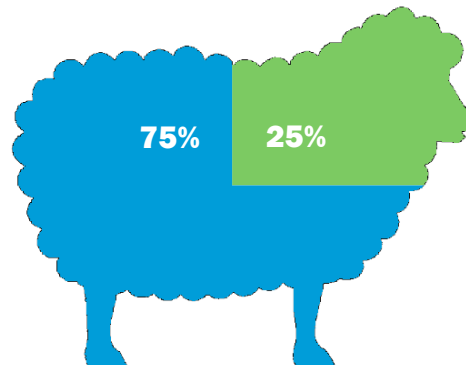
Total Estimated Number of Cats =
1,802,556



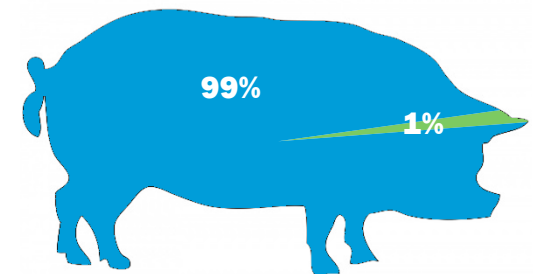
Total Estimated Number of Horse,
Mule & Donkey = 93,771



Total Estimated Number of Cattle*
= 406,135



Total Estimated Number of Sheep
& Goat* = 64,820



Total Estimated Number of Pig* =
608,120

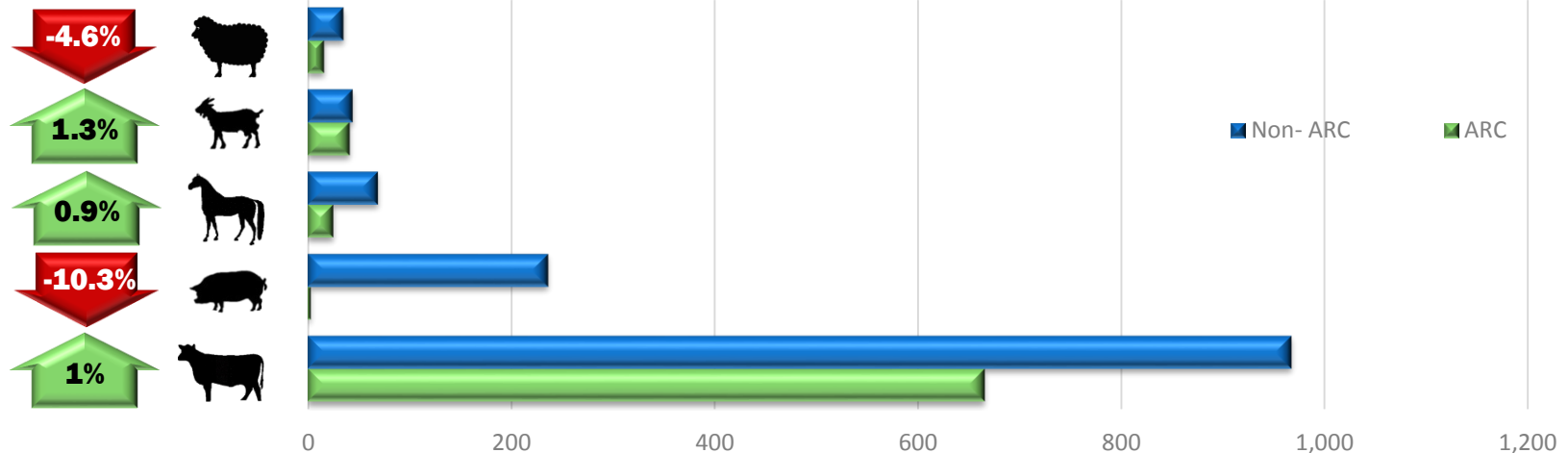
 Non-ARC  ARC *estimated herd size

STATE ANALYSIS OF APPALACHIA – VIRGINIA

Virginia Large Animal Inventory 2012

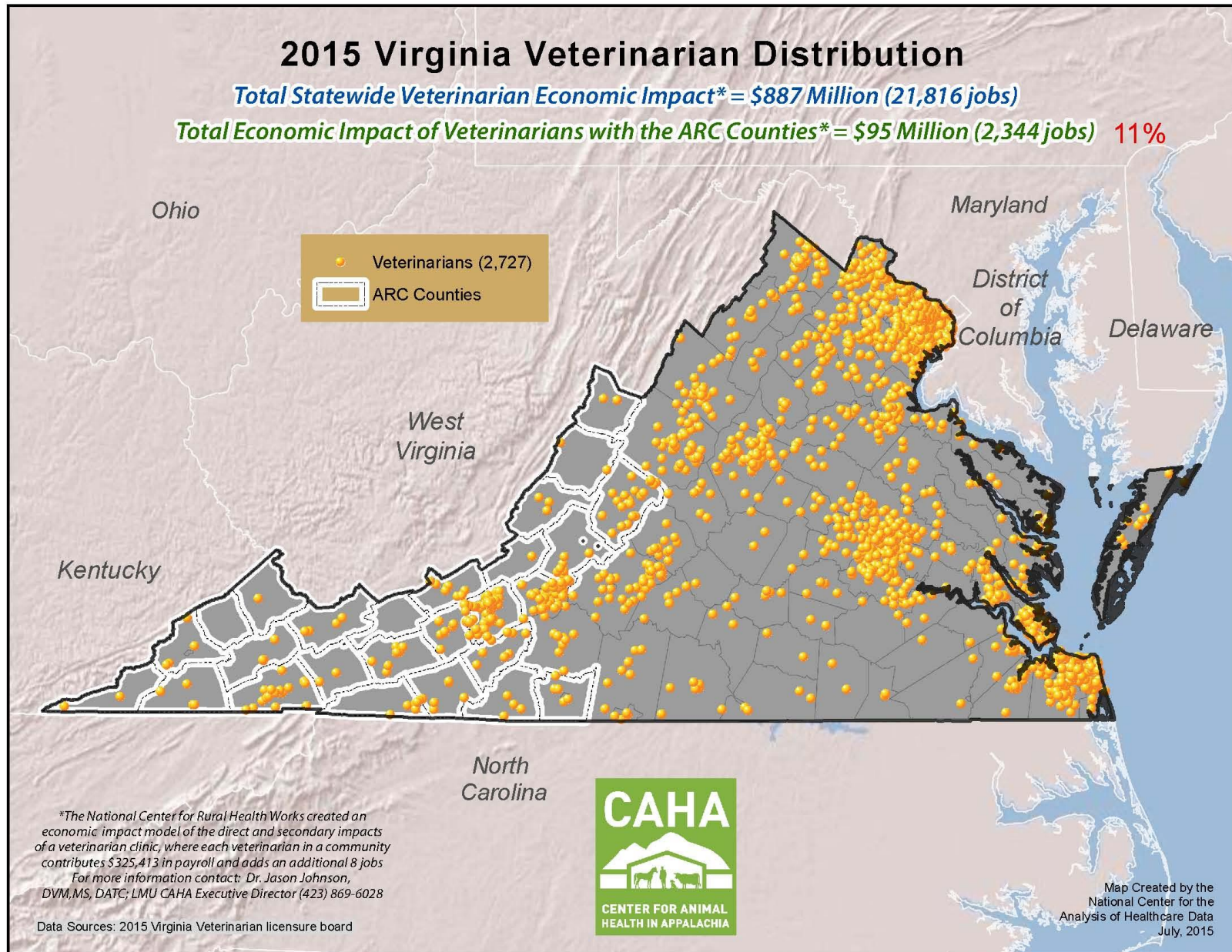
Thousand head

LA Inventory CAGR,
2007-12

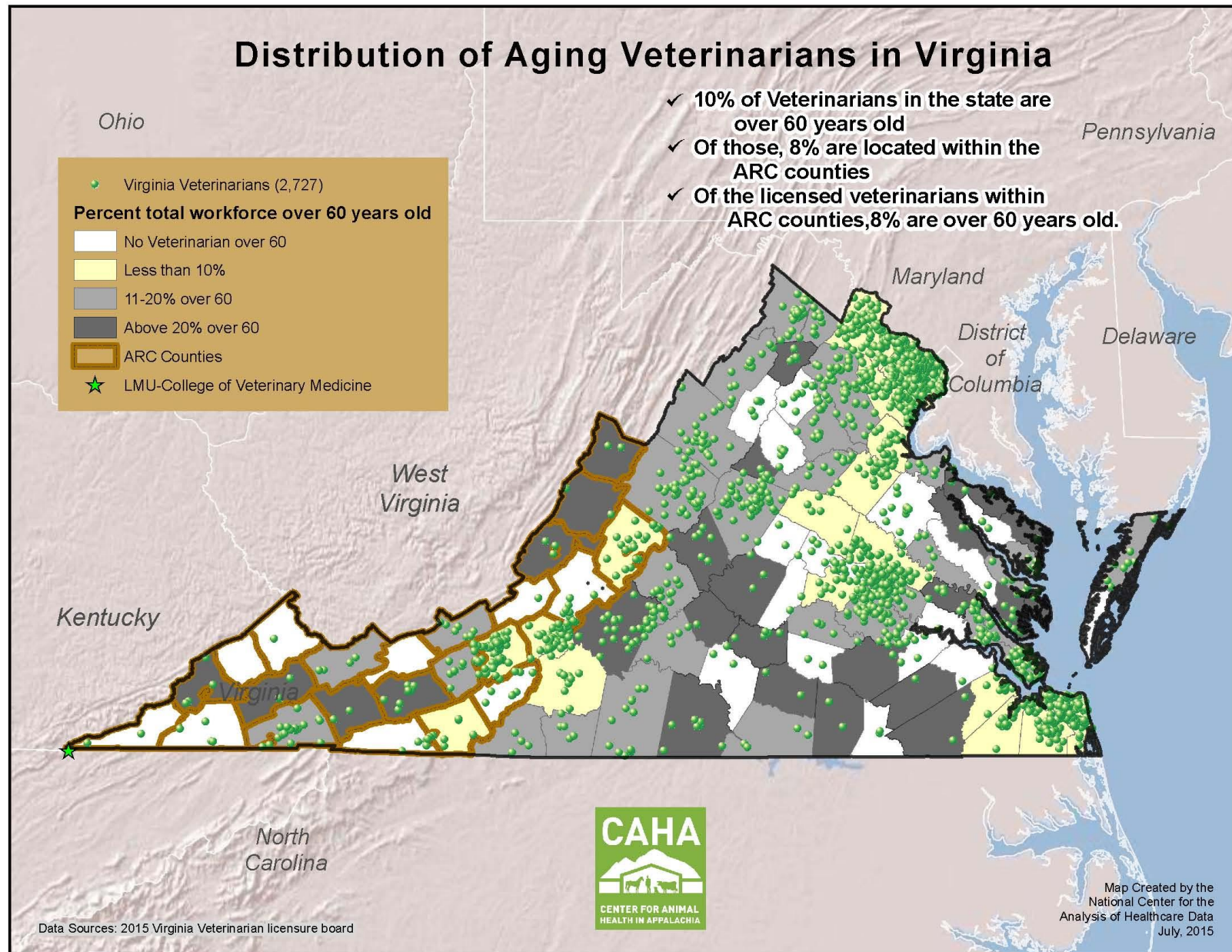


- 36% of the large animal inventory is located in ARC counties.
- Nearly 60% of the cattle is outside ARC counties, but the growth of herd in ARC counties overshadowed the decline outside (CAGR 3.5% vs -0.5%).
- Even though 99% of the swine are located outside ARC counties; the decline in the pig inventory was worse in ARC than outside (CAGR -44.5% vs -8.3%).
- Sheep flocks are distributed fairly evenly throughout the state. The ARC portion is growing faster than the rest of the state (CAGR 2% vs 0.6%).
- 69% of the goat herd is located outside ARC. However, the ARC portion of the herd was hit harder by the decline than the rest of the state (CAGR -7.3% vs. -3.2%).

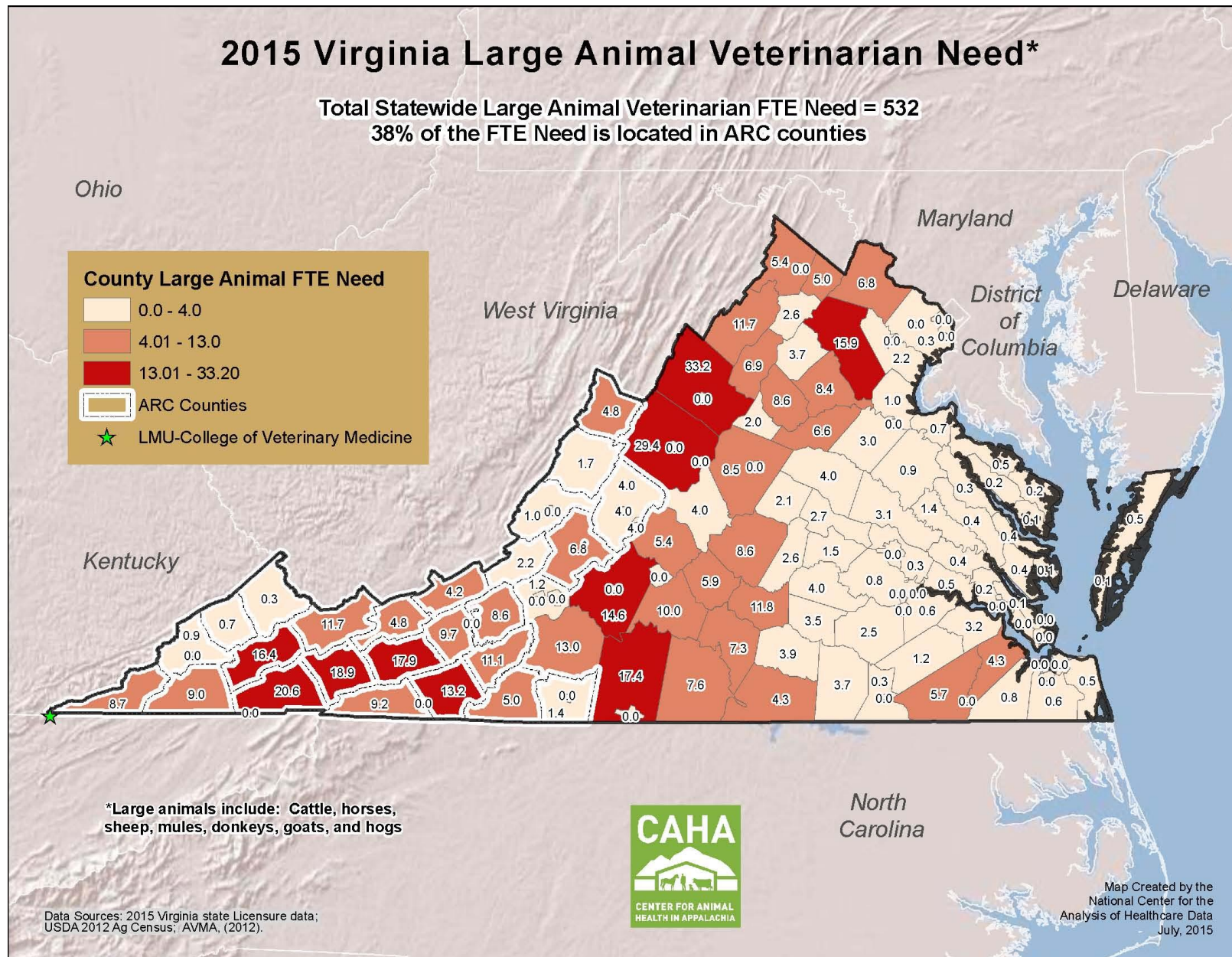
STATE ANALYSIS OF APPALACHIA- VIRGINIA



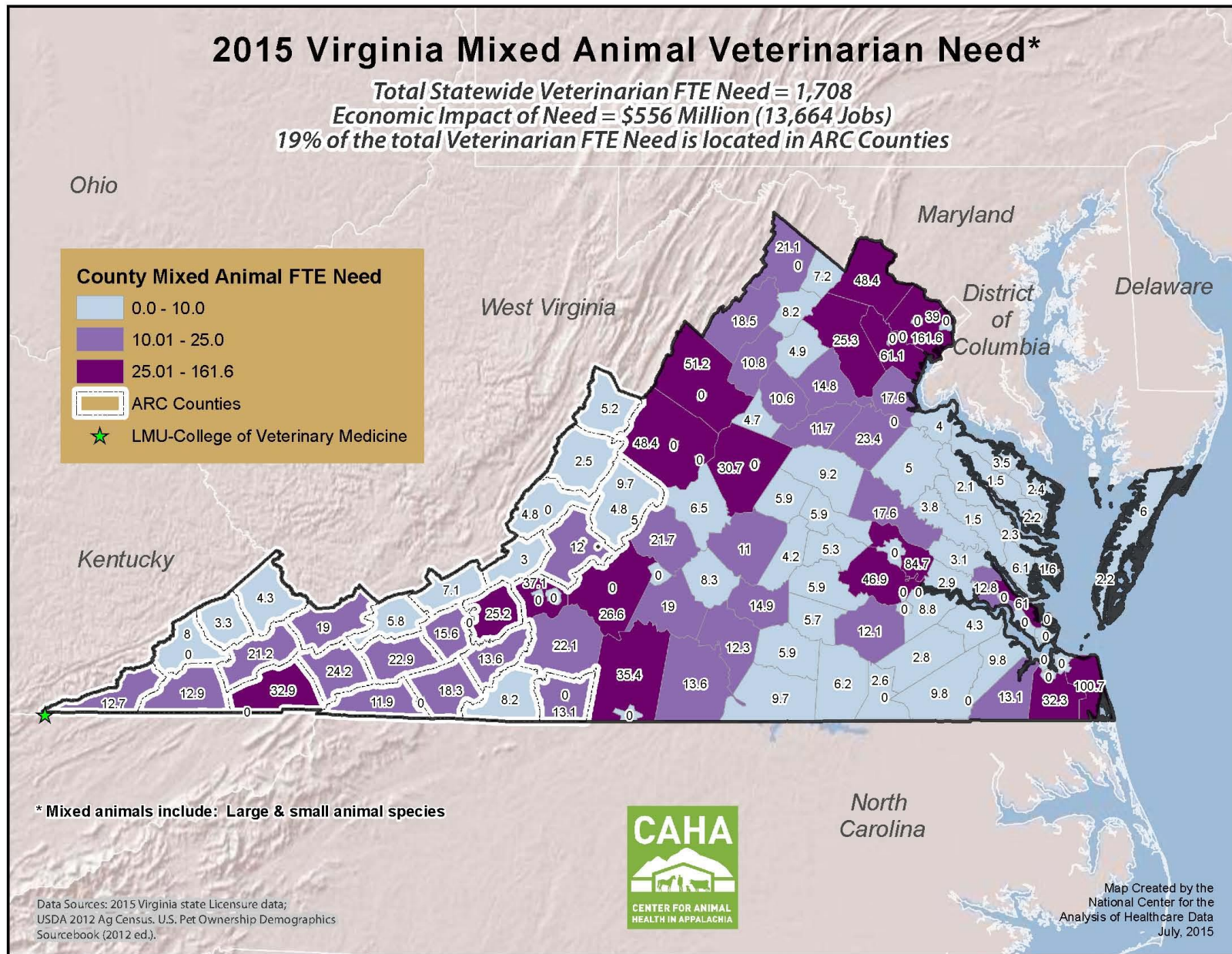
STATE ANALYSIS OF APPALACHIA – VIRGINIA



STATE ANALYSIS OF APPALACHIA – VIRGINIA



STATE ANALYSIS OF APPALACHIA – VIRGINIA



STATE ANALYSIS OF APPALACHIA – VIRGINIA

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

- ✓ Total Statewide Veterinarian FTE Need = 1,708
- ✓ Total Practicing Veterinarians = 2,727
- ✓ Total Statewide Veterinarian FTE Surplus = 1,019

- ✓ ARC region Veterinarian FTE Need = 327
- ✓ ARC region Practicing Veterinarians = 293
- ✓ ARC region Veterinarian FTE Shortage = 34

The economic impact to those counties (in red) with shortages caused by maldistribution of veterinarians is**:

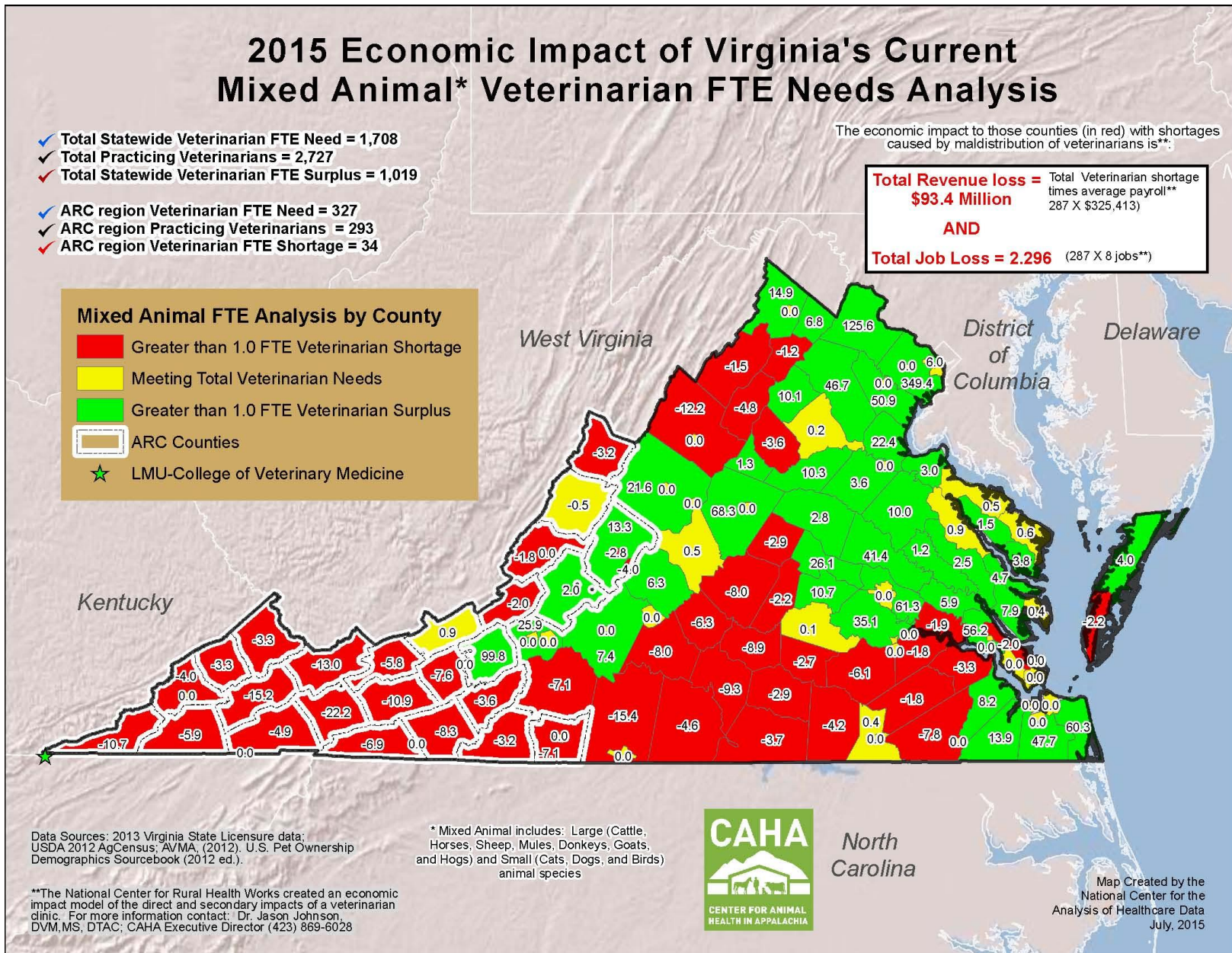
Total Revenue loss = \$93.4 Million Total Veterinarian shortage times average payroll**
 287 X \$325,413

AND

Total Job Loss = 2,296 (287 X 8 jobs**)

Mixed Animal FTE Analysis by County

- Greater than 1.0 FTE Veterinarian Shortage
- Meeting Total Veterinarian Needs
- Greater than 1.0 FTE Veterinarian Surplus
- ARC Counties
- ★ LMU-College of Veterinary Medicine



Data Sources: 2013 Virginia State Licensure data; USDA 2012 AgCensus; AVMA, (2012). U.S. Pet Ownership Demographics Sourcebook (2012 ed.).

* Mixed Animal includes: Large (Cattle, Horses, Sheep, Mules, Donkeys, Goats, and Hogs) and Small (Cats, Dogs, and Birds) animal species

**The National Center for Rural Health Works created an economic impact model of the direct and secondary impacts of a veterinarian clinic. For more information contact: Dr. Jason Johnson DVM, MS, DTAC; CAHA Executive Director (423) 869-6028

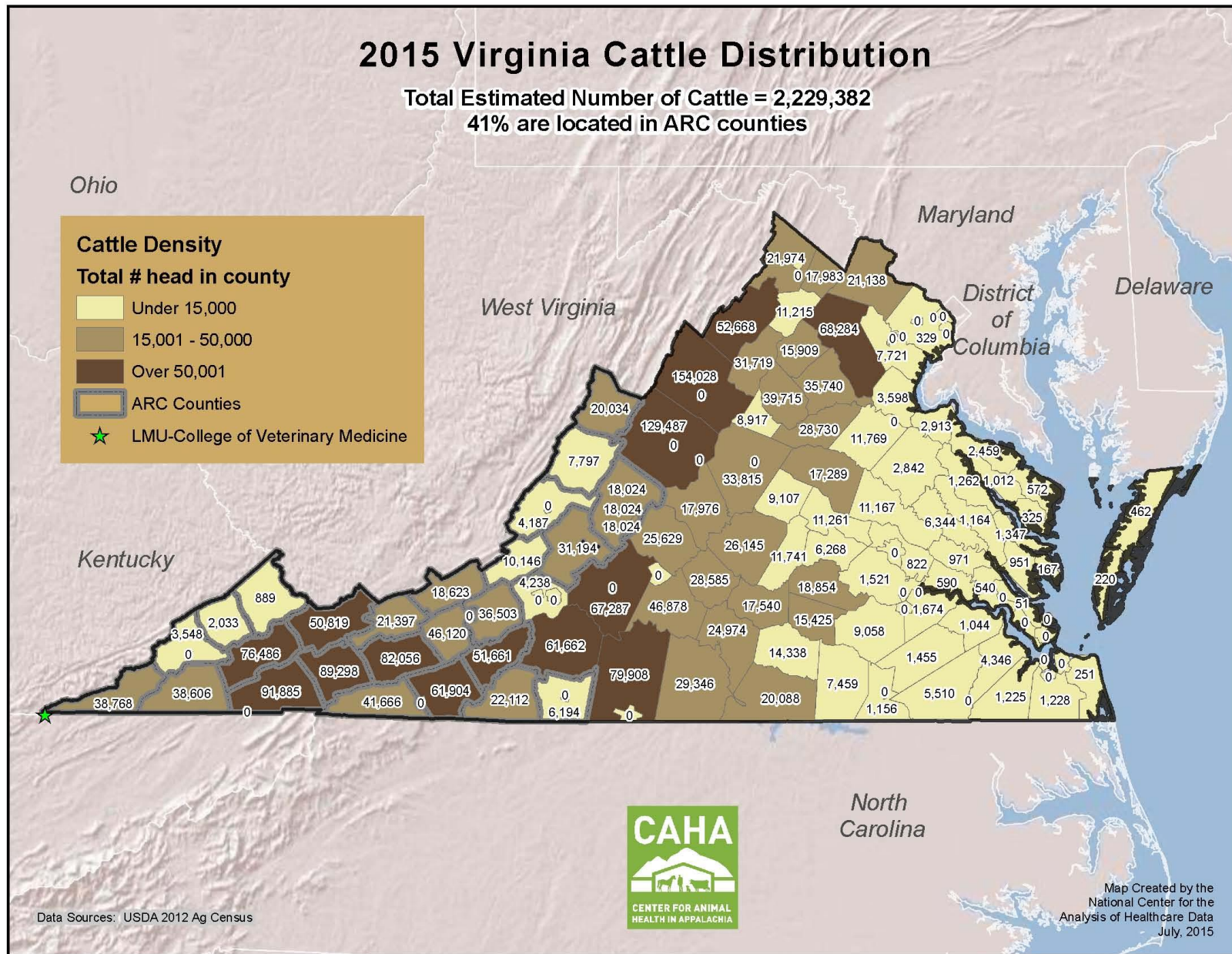


North Carolina

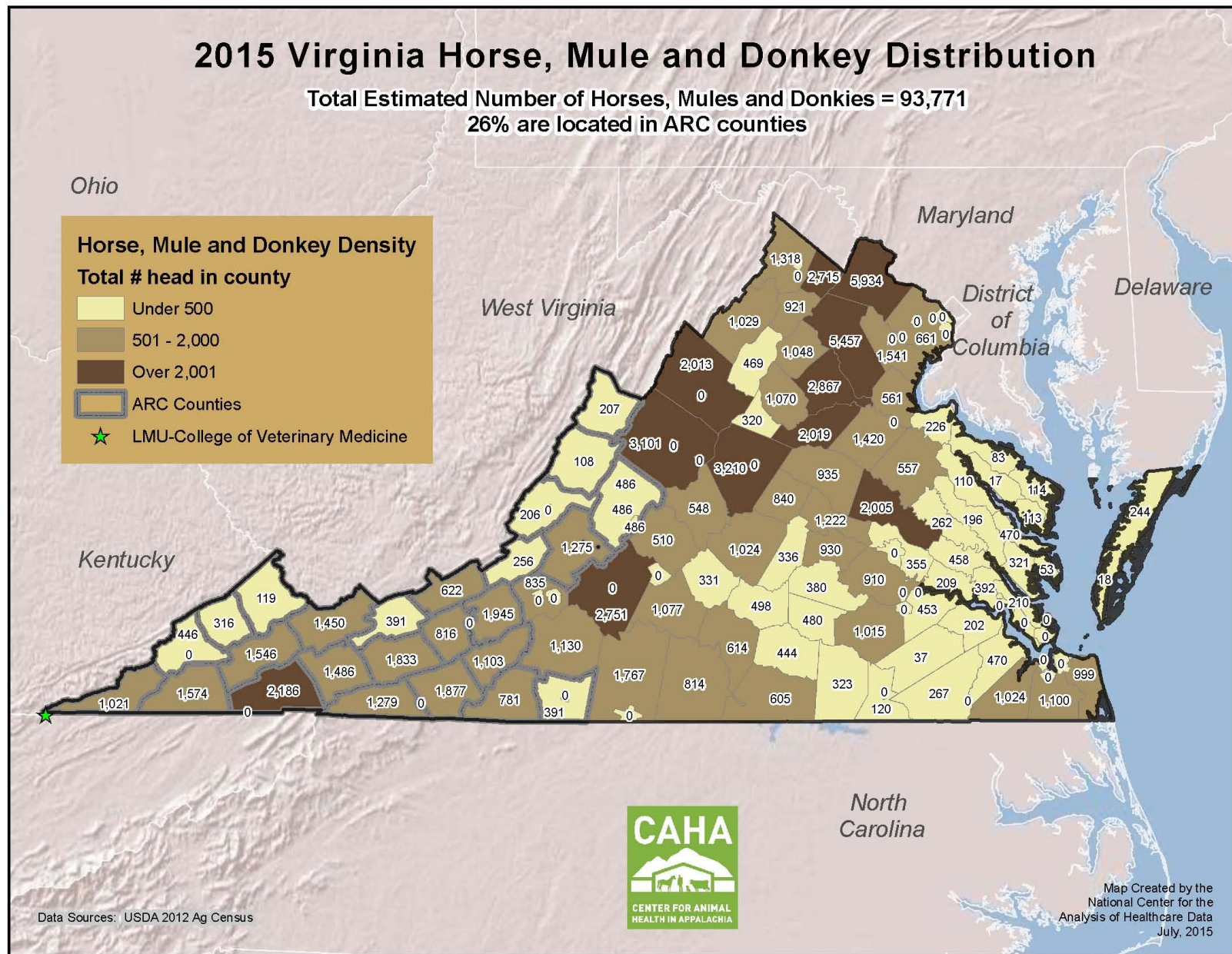
Map Created by the National Center for the Analysis of Healthcare Data July, 2015



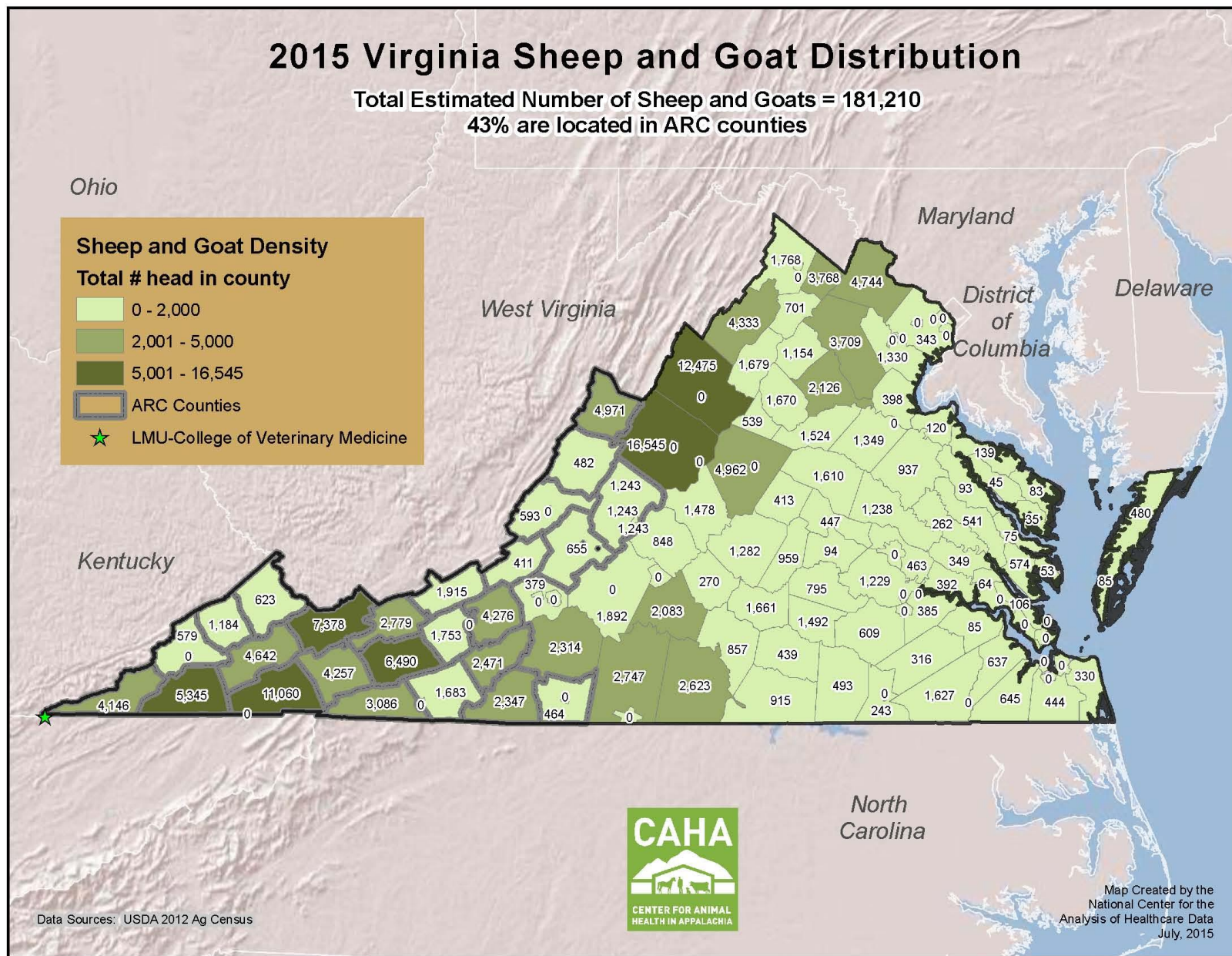
STATE ANALYSIS OF APPALACHIA – VIRGINIA



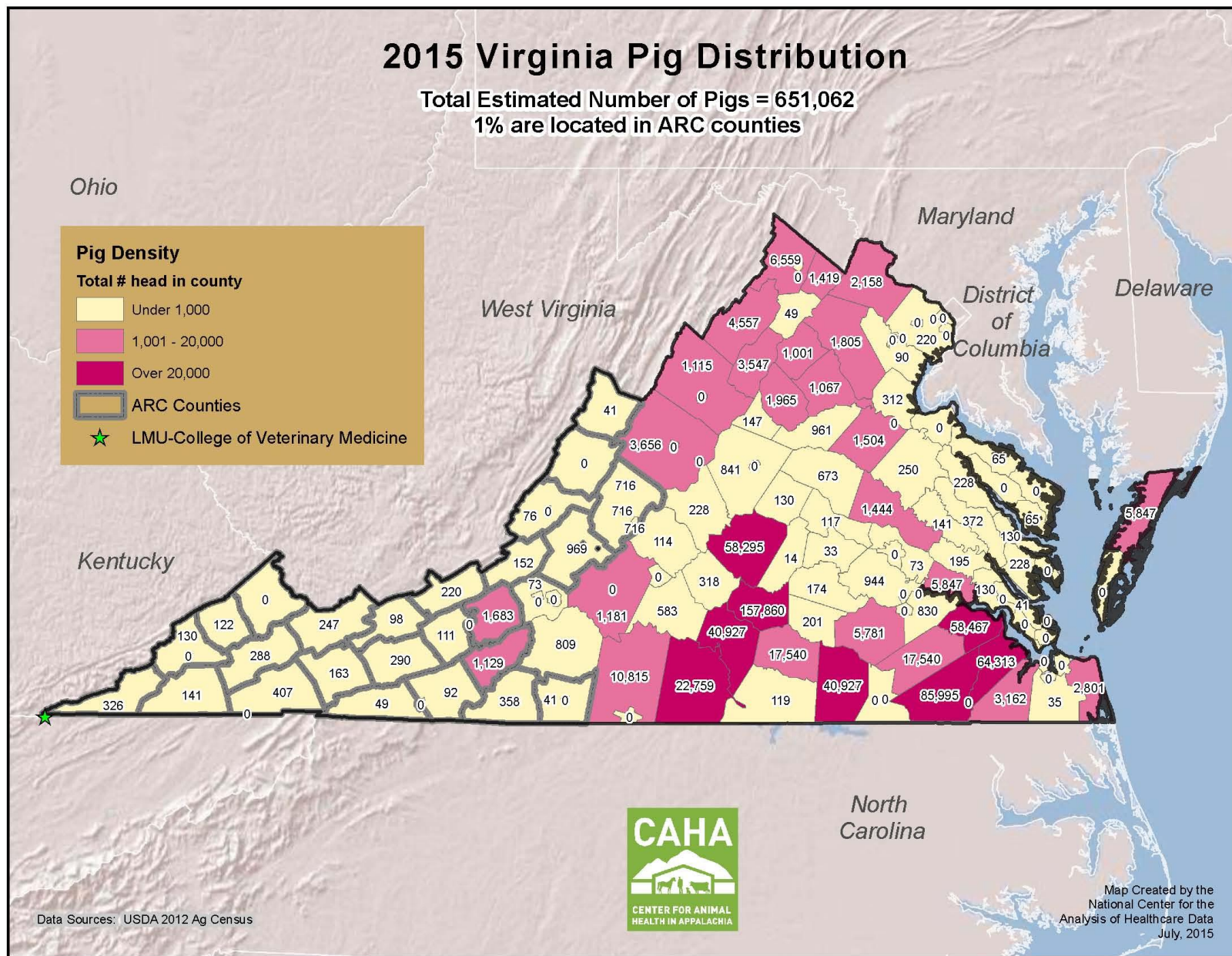
STATE ANALYSIS OF APPALACHIA – VIRGINIA



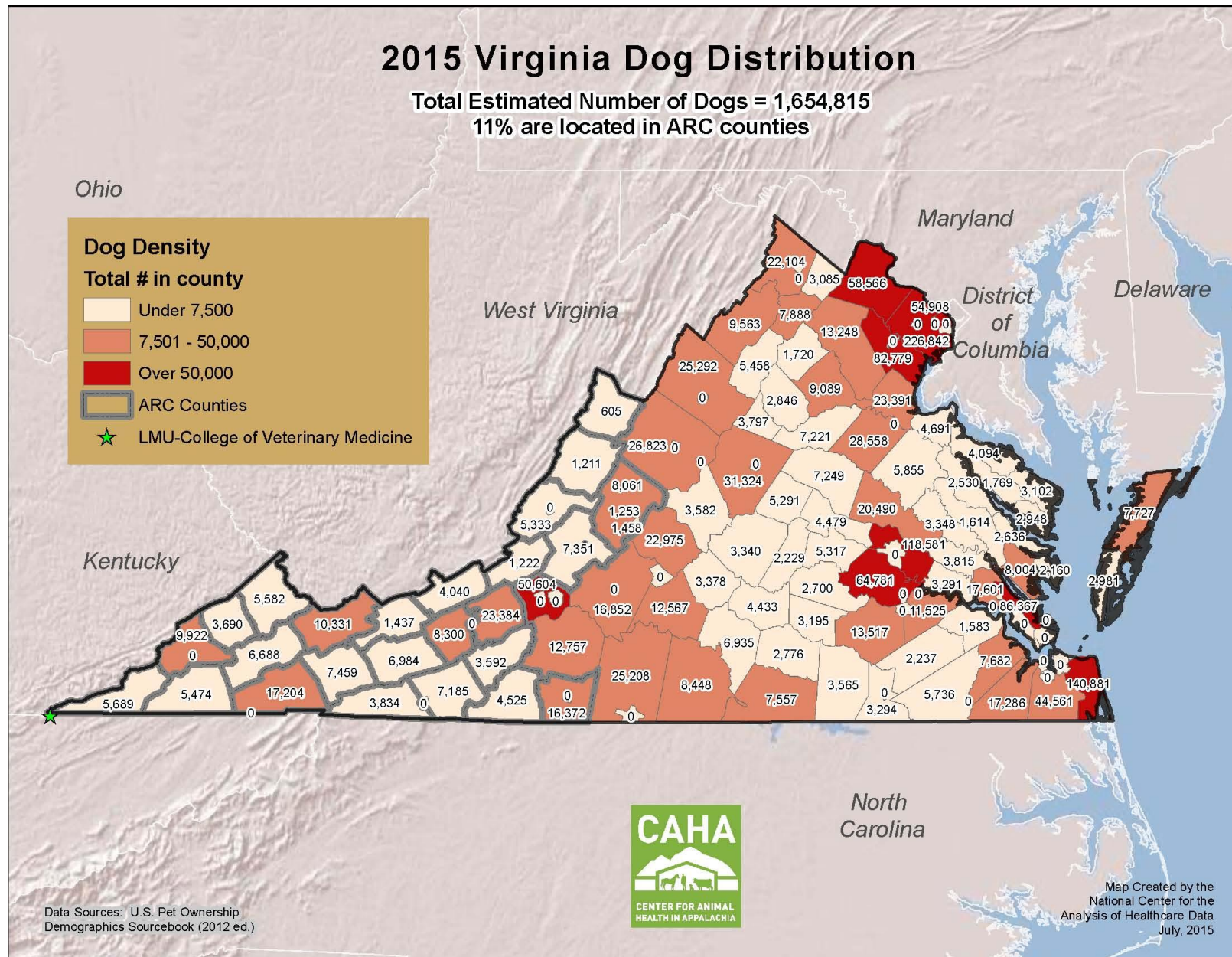
STATE ANALYSIS OF APPALACHIA – VIRGINIA



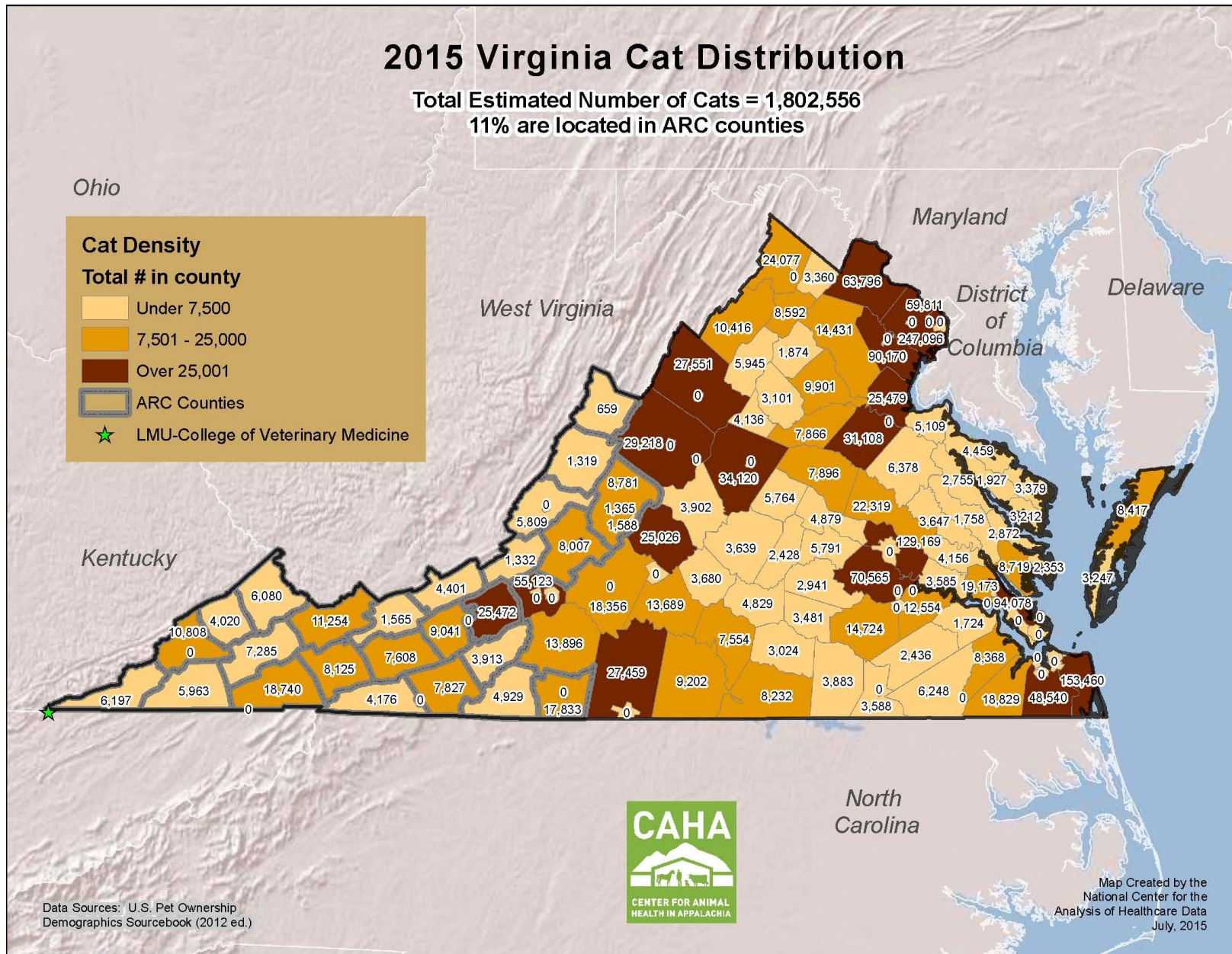
STATE ANALYSIS OF APPALACHIA – VIRGINIA



STATE ANALYSIS OF APPALACHIA – VIRGINIA



STATE ANALYSIS OF APPALACHIA – VIRGINIA



STATE ANALYSIS OF APPALACHIA – WEST VIRGINIA




**Statewide Current Veterinarian
Economic Impact:
\$122 Million
3,000 Jobs**

100% in
ARC




**ARC Current
Veterinarian
Economic Impact:
\$122 Million
375 Jobs**

There is a shortage
of **193**
Veterinary FTE's in
rural Appalachia.




375
instate, actively licensed
veterinarians

100%
located in the ARC counties
within the state



7% of Veterinarians in state are over
60 years old, of those **100%** are
located within the ARC counties

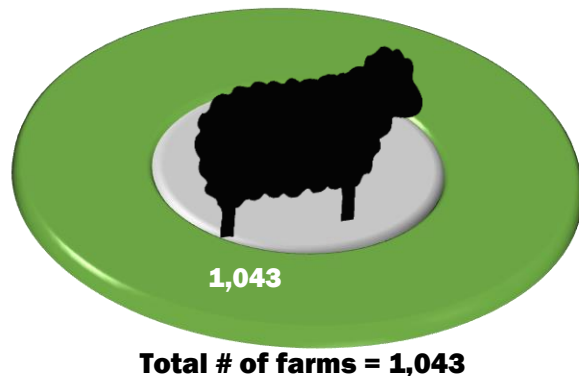
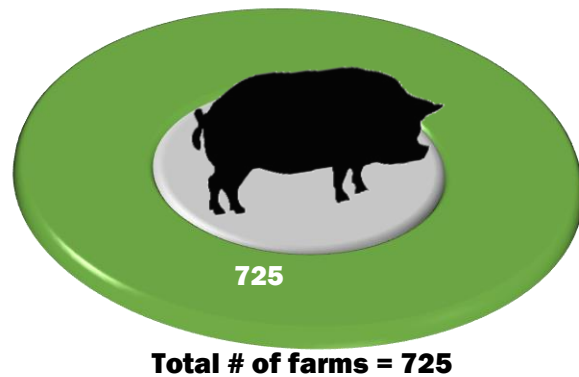
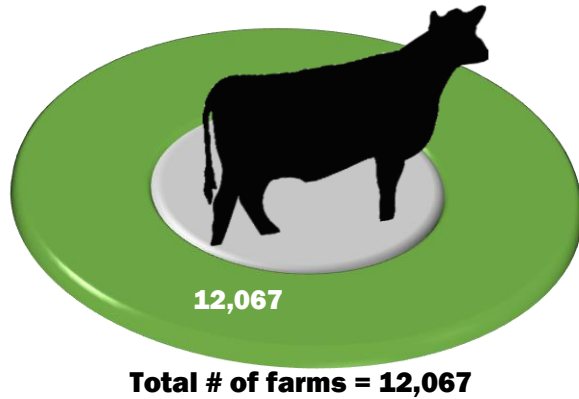


\$62,828,678
Total revenue loss in ARC

1,545
Total Job loss in ARC

STATE ANALYSIS OF APPALACHIA – WEST VIRGINIA

West Virginia Farms by Type of Herd 2012



FARMS and FARMLAND

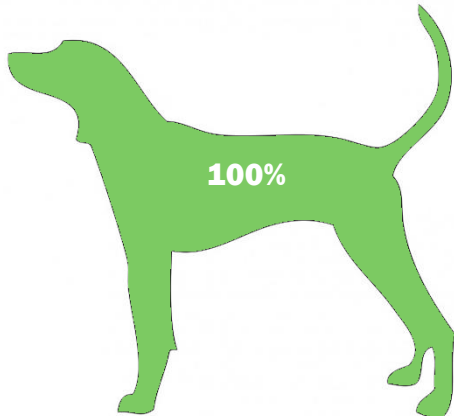
- West Virginia covers about 15 million acres, 100% of this falls within ARC; 23% is land in farms.
- There are more than 21 thousand farms in West Virginia, 100% are located in ARC; There is not a typical size of farm as 52% of the farms <100 acres, 43% are 100-499 acres and 6% are >500 acres.
- 12 thousand farms manage cattle. From 2007-2012 the number of herds with less than 100 cattle decreased. 93% of the herds have less than 100 head.
- There are 725 farms which maintain a pig herd. There was an overall decline in West Virginia, most of the disappearance occurred with herds of less than 25. 94% of farms pigs have less than 25 head.
- Of the 1,043 farms that have sheep, 64% manage less than 25 animals, another 30% have herds of 25-100 head.

West Virginia Farms by Number of Acres (Percent)



STATE ANALYSIS OF APPALACHIA – WEST VIRGINIA

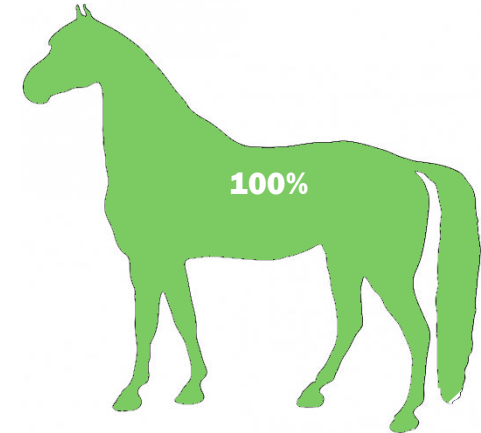
Species Distribution



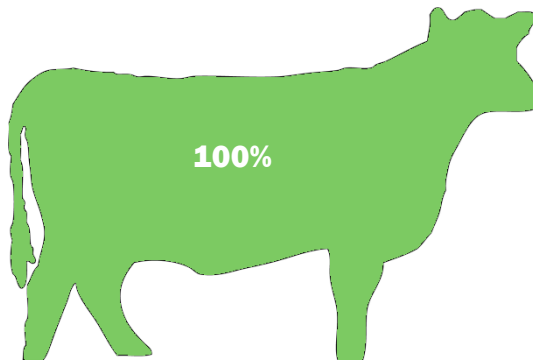
Total Estimated Number of Dogs =
649,256



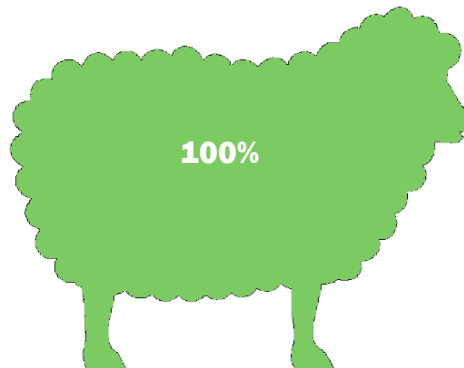
Total Estimated Number of Cats =
626,341



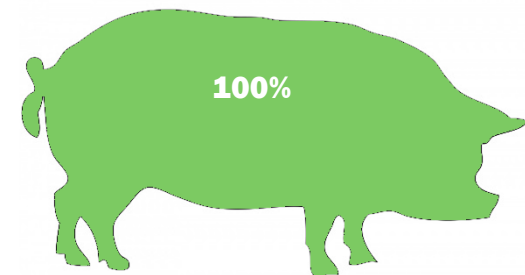
Total Estimated Number of Horse,
Mule & Donkey = 29,317



Total Estimated Number of Cattle*
= 566,823



Total Estimated Number of Sheep
& Goat* = 67,331

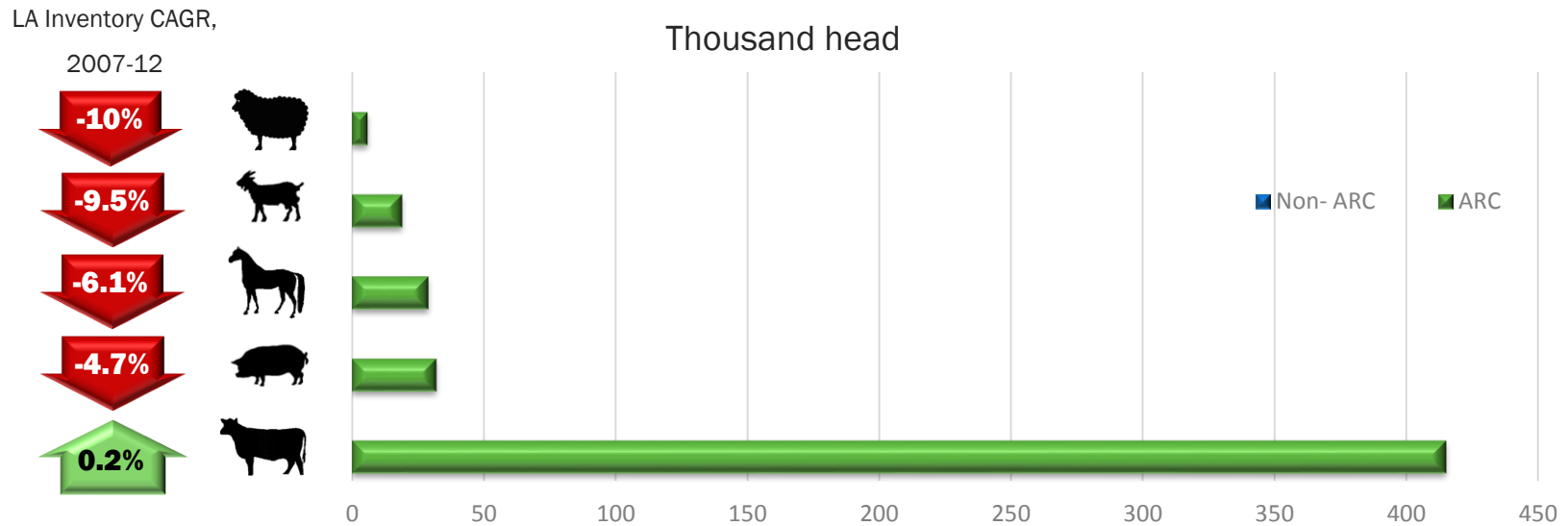


Total Estimated Number of Pig* =
15,939

 Non-ARC  ARC *estimated herd size

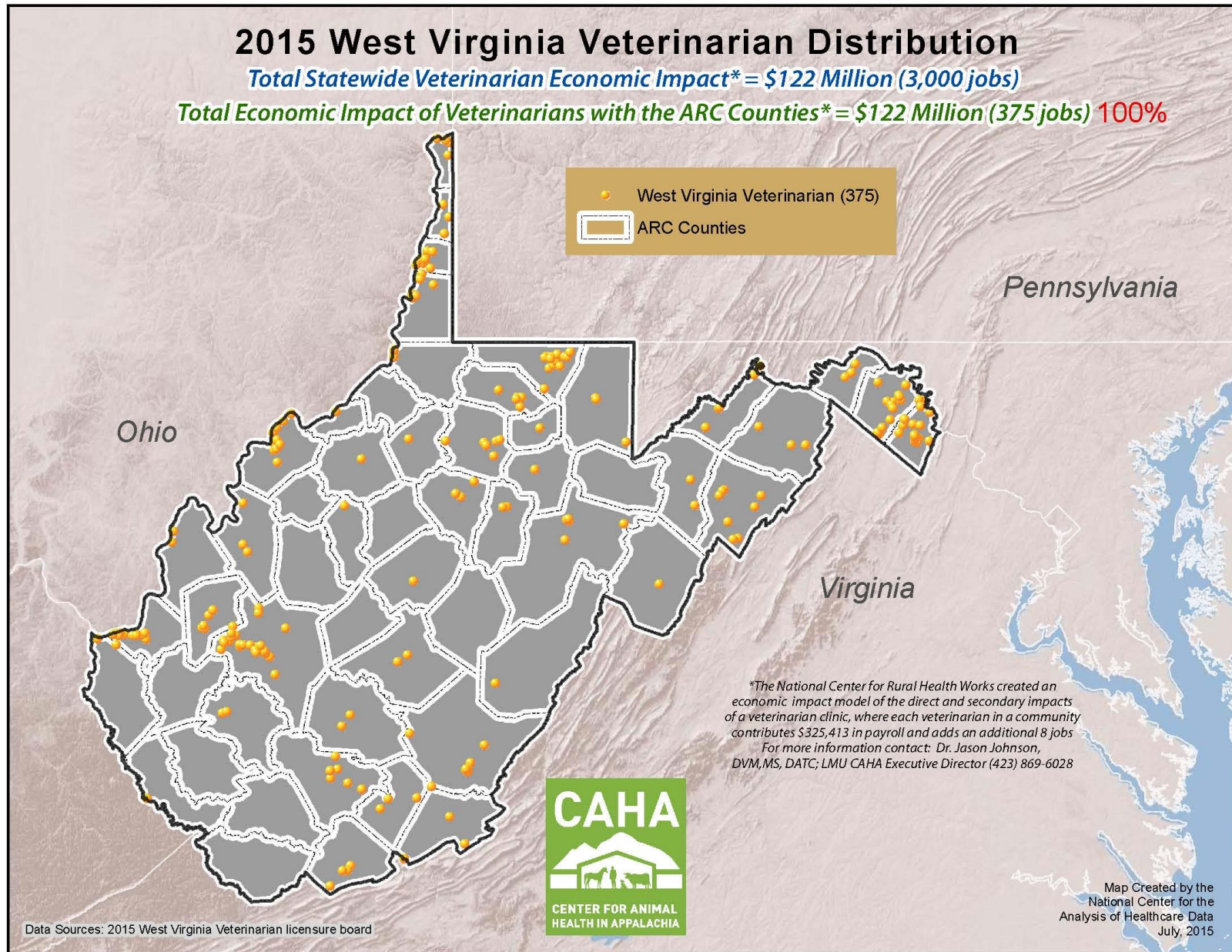
STATE ANALYSIS OF APPALACHIA – WEST VIRGINIA

West Virginia Large Animal Inventory 2012

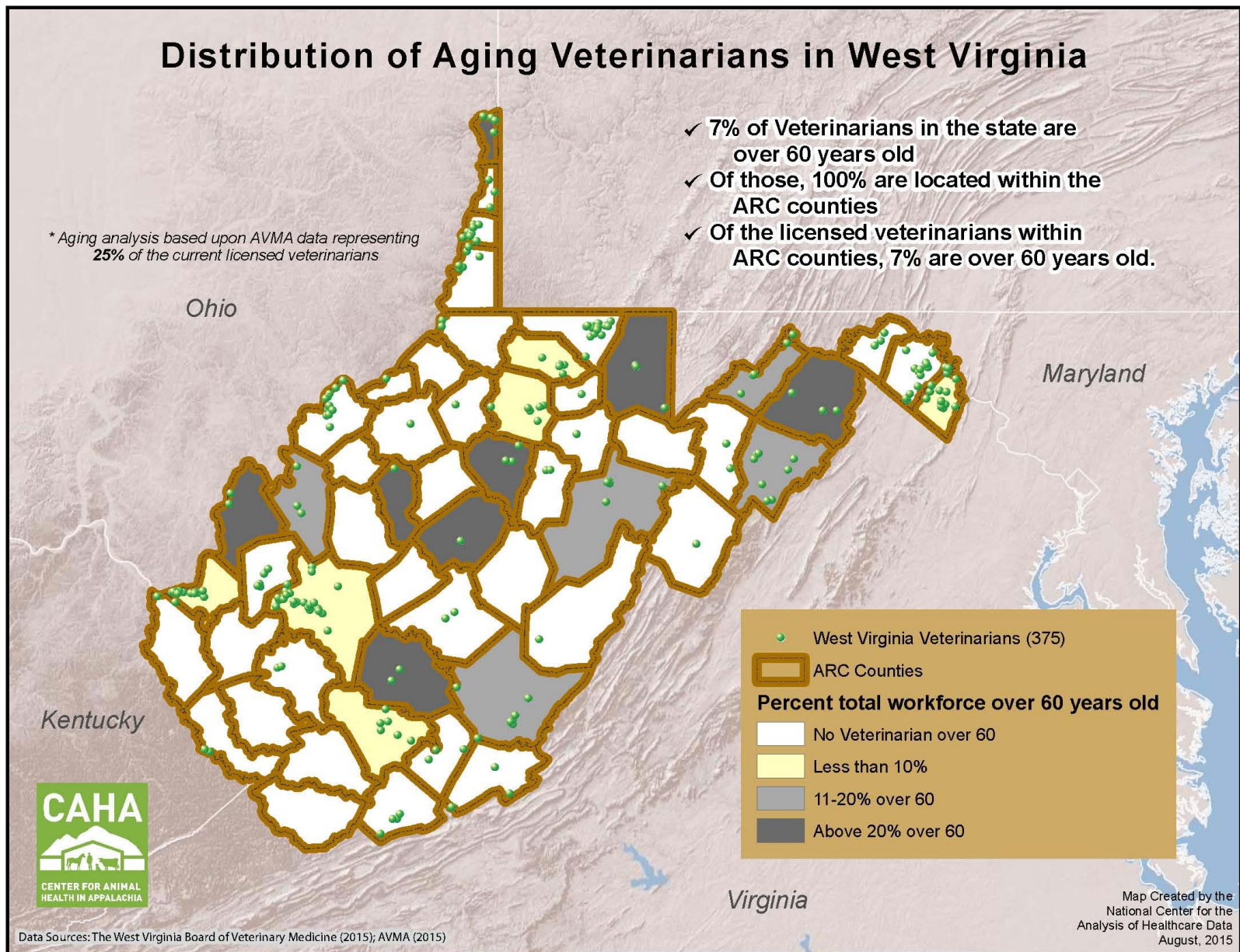


- 100% of the large animal inventory is located in West Virginia ARC.
- Cattle are growing (CAGR 0.2%) in the state, however, the rest of the large animal herd is declining.

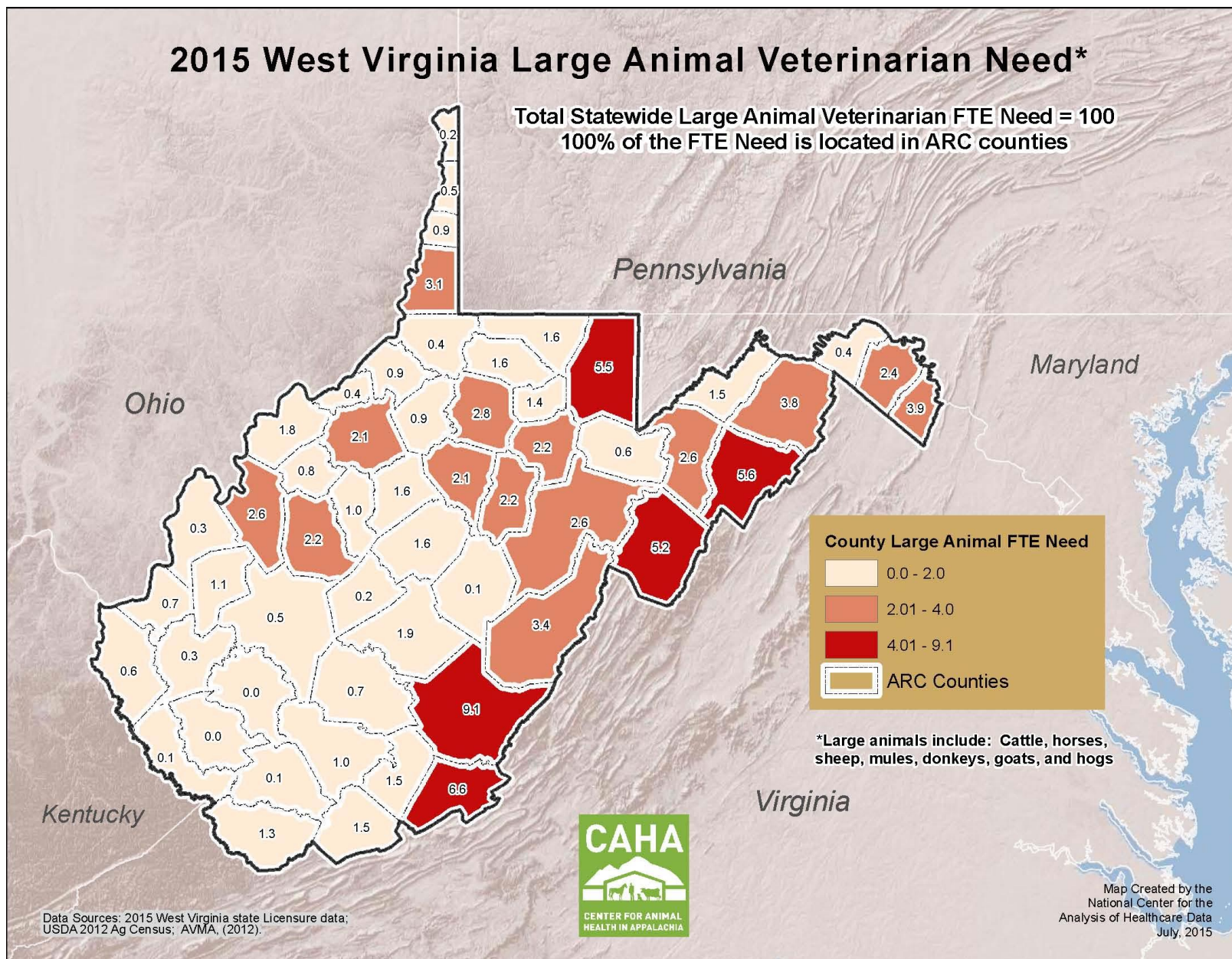
STATE ANALYSIS OF APPALACHIA – WEST VIRGINIA



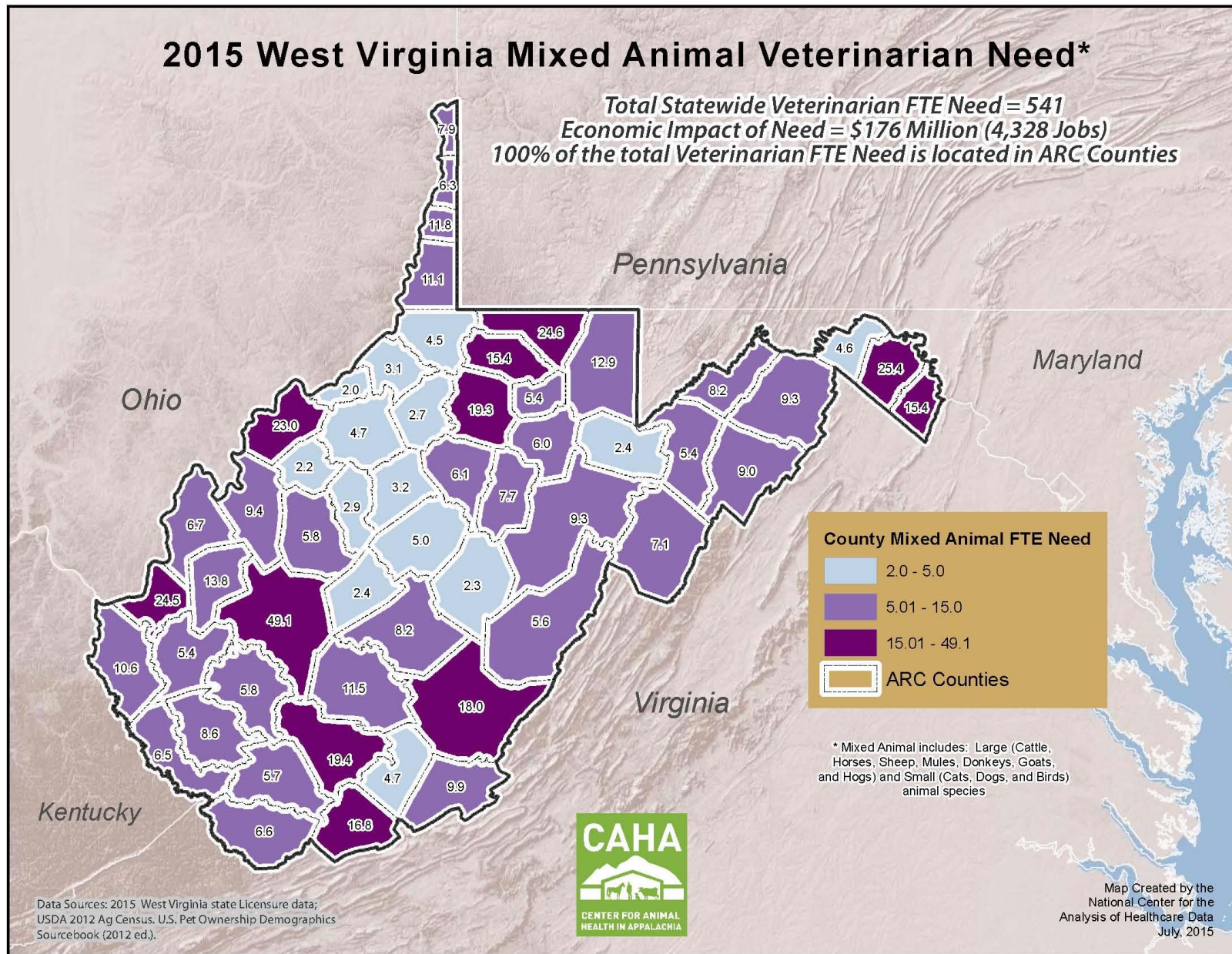
STATE ANALYSIS OF APPALACHIA – WEST VIRGINIA



STATE ANALYSIS OF APPALACHIA – WEST VIRGINIA



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

- ✓ Total Statewide Veterinarian FTE Need = 541
- ✓ Total Practicing Veterinarians = 375
- ✓ Total Statewide Veterinarian FTE Shortage = 166
- ✓ ARC region Veterinarian FTE Need = 541
- ✓ ARC region Practicing Veterinarians = 375
- ✓ ARC region Veterinarian FTE Shortage = 166

The economic impact of the state's shortage of veterinarians is**:

Total Revenue loss = \$54.0 Million Total Veterinarian shortage times average payroll**
 166 X \$325,413

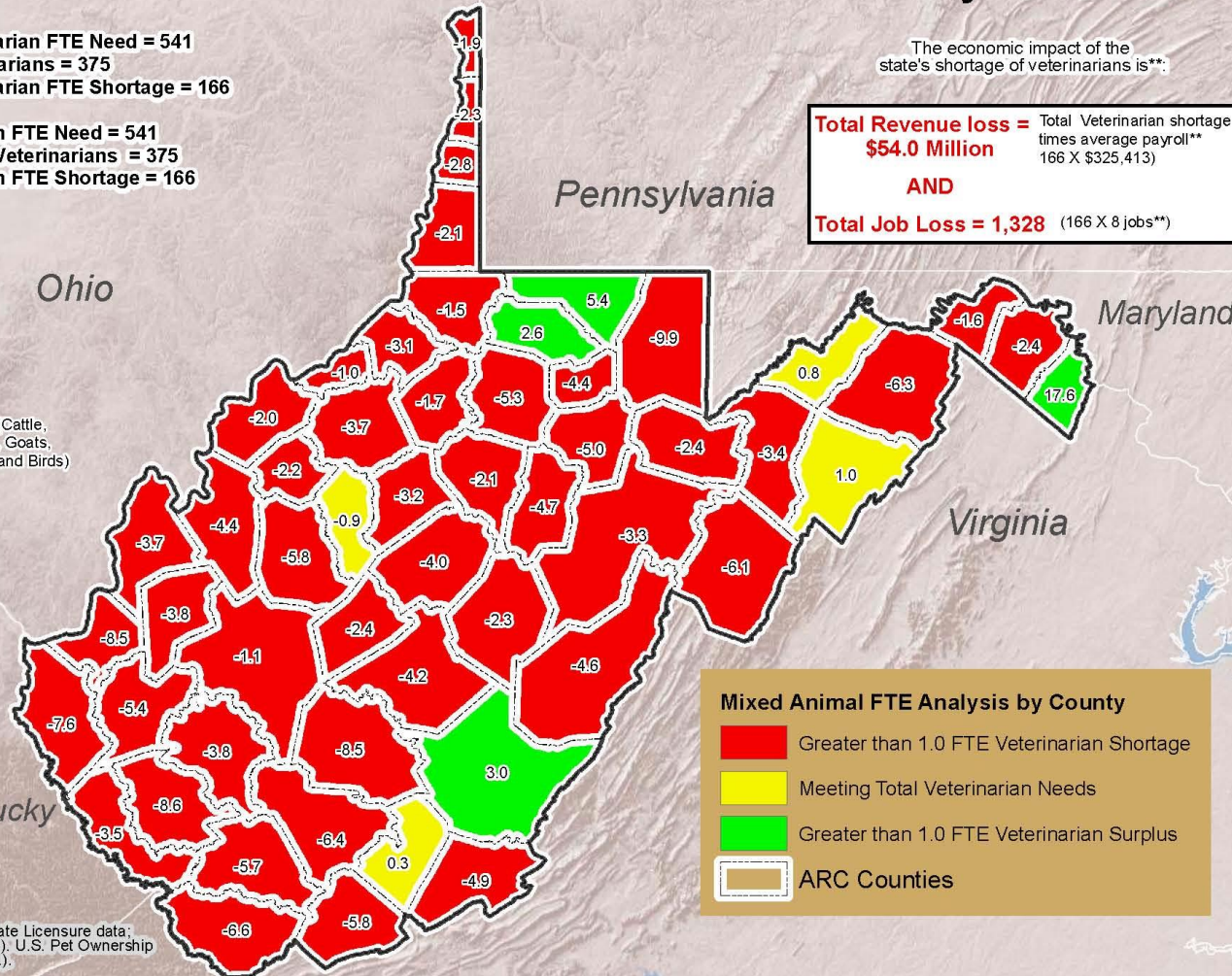
AND

Total Job Loss = 1,328 (166 X 8 jobs**)

* Mixed Animal includes: Large (Cattle, Horses, Sheep, Mules, Donkeys, Goats, and Hogs) and Small (Cats, Dogs, and Birds) animal species



Kentucky



Mixed Animal FTE Analysis by County

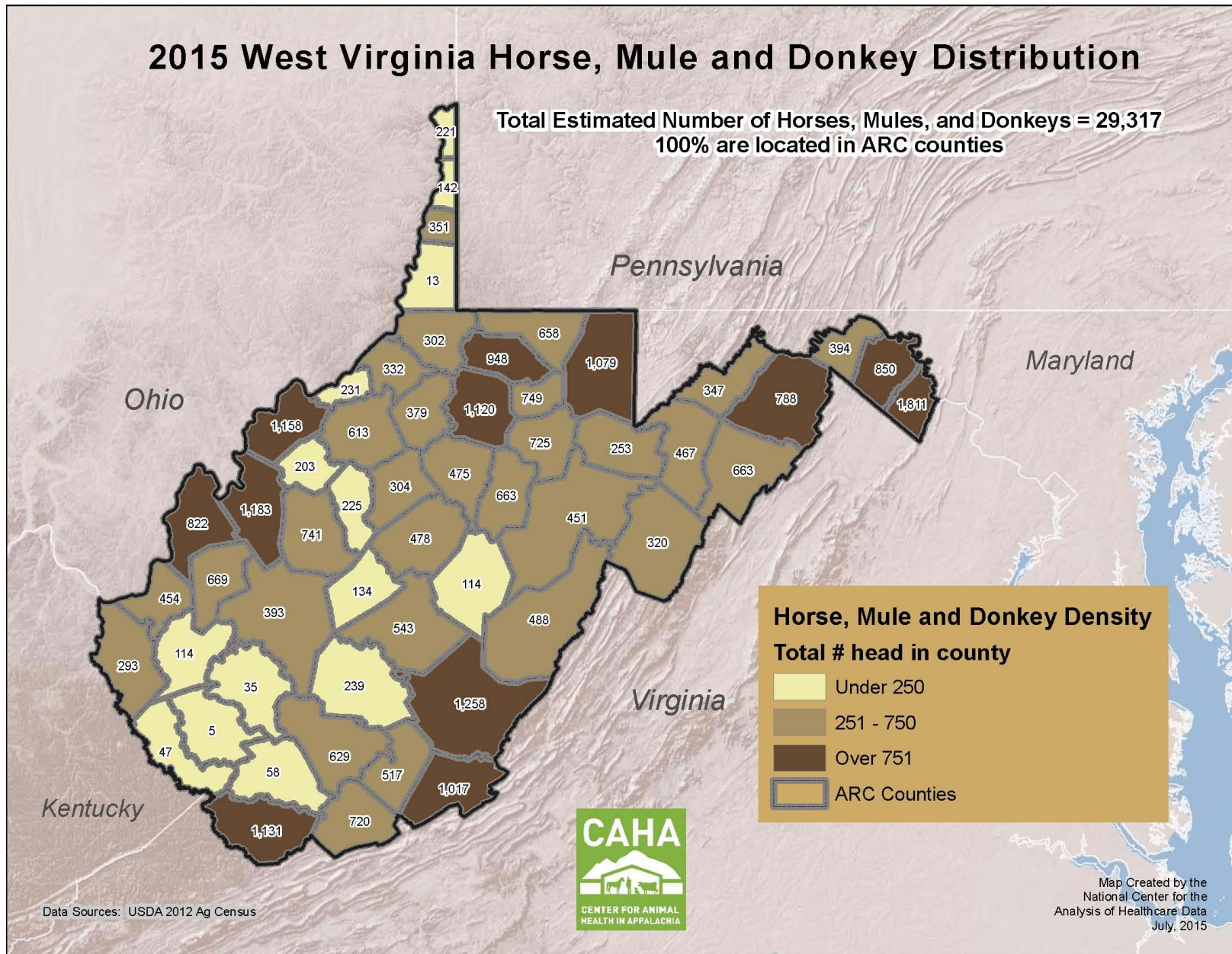
- Greater than 1.0 FTE Veterinarian Shortage
- Meeting Total Veterinarian Needs
- Greater than 1.0 FTE Veterinarian Surplus
- ARC Counties

Data Sources: 2013 West Virginia State Licensure data; USDA 2012 AgCensus; AVMA (2012); U.S. Pet Ownership Demographics Sourcebook (2012 ed.).

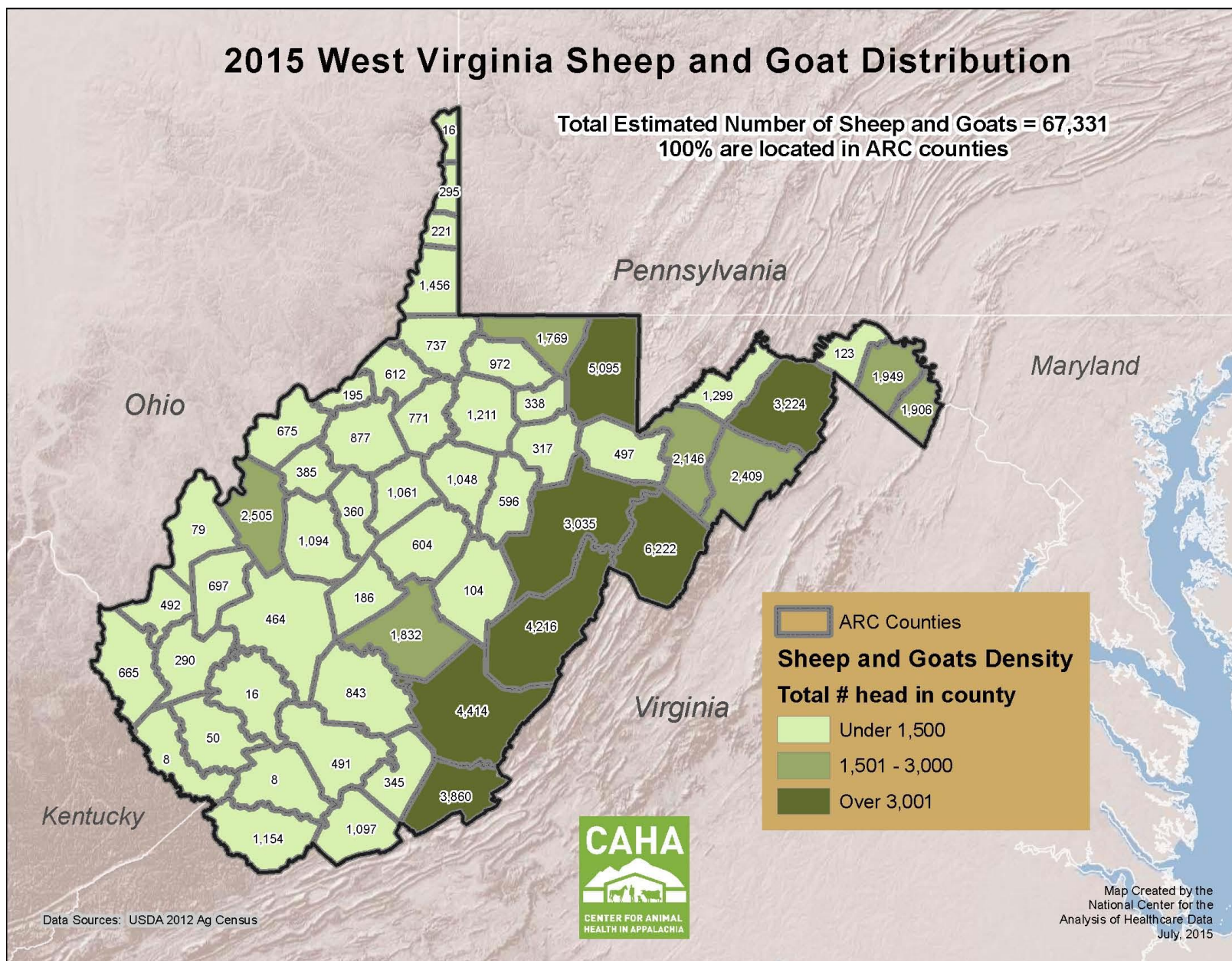
**The National Center for Rural Health Works created an economic impact model of the direct and secondary impacts of a veterinarian clinic. For more information contact: Dr. Jason Johnson, DVM, MS, DTAC; CAHA Executive Director (423) 869-6028

Map Created by the National Center for the Analysis of Healthcare Data July, 2015

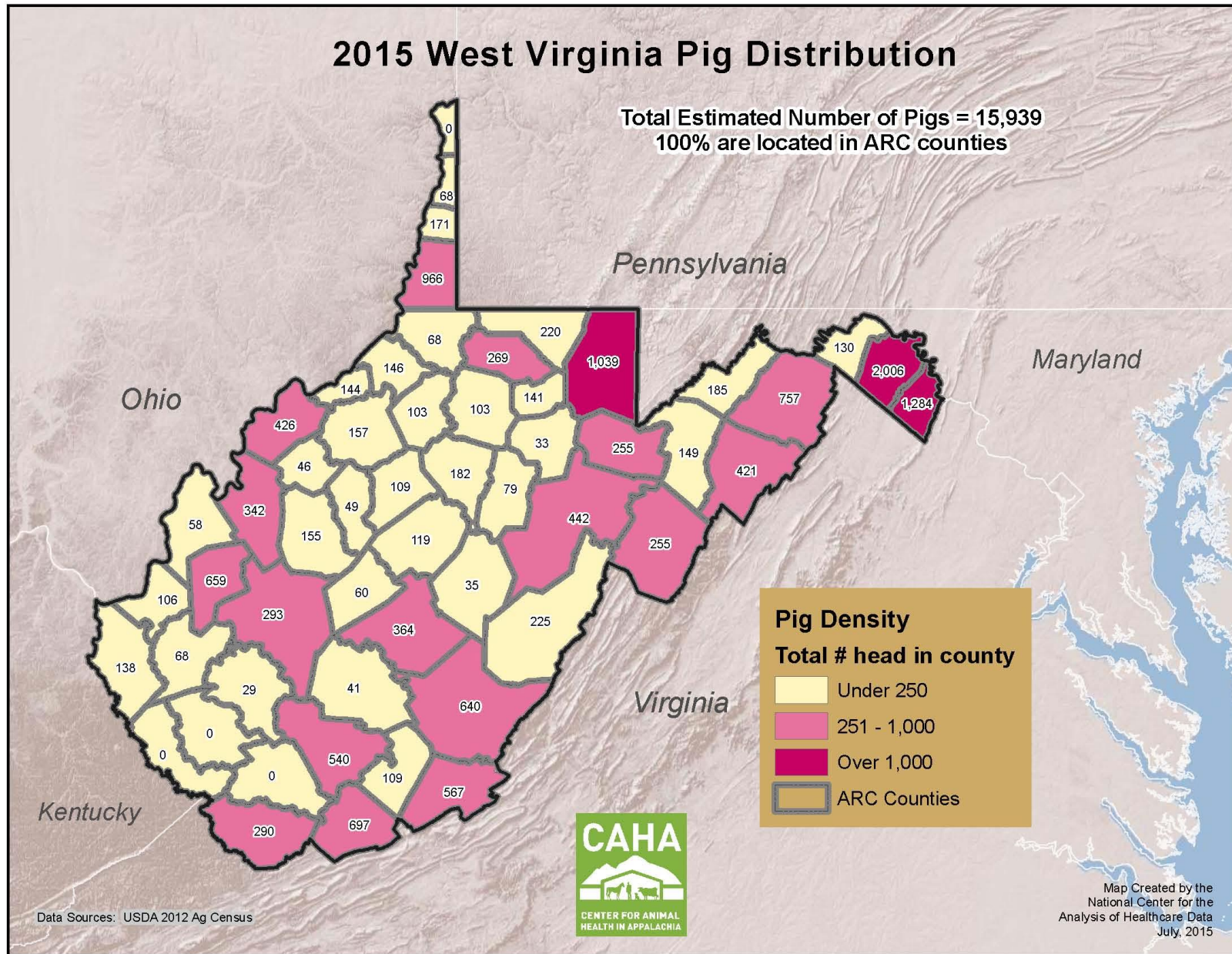
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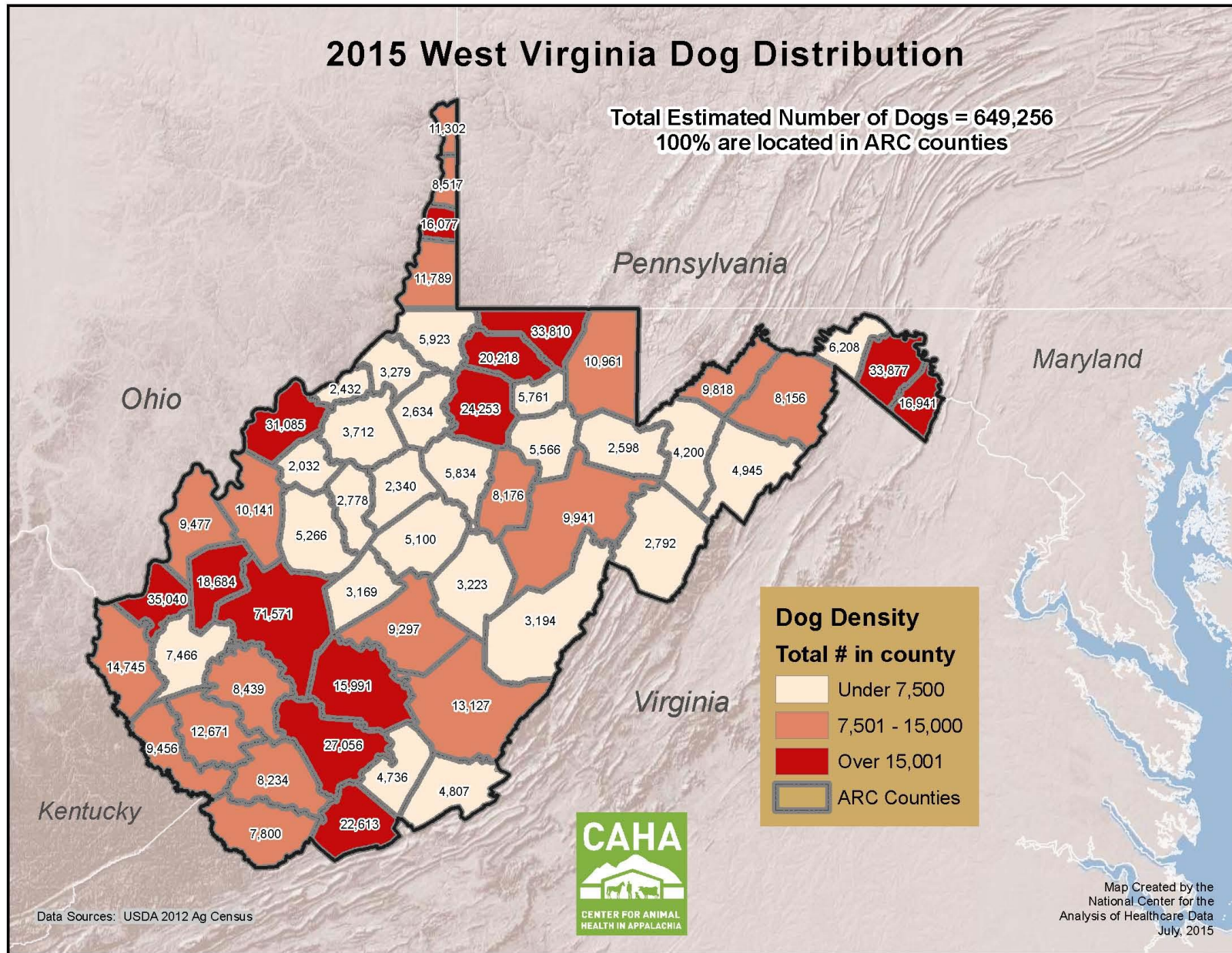
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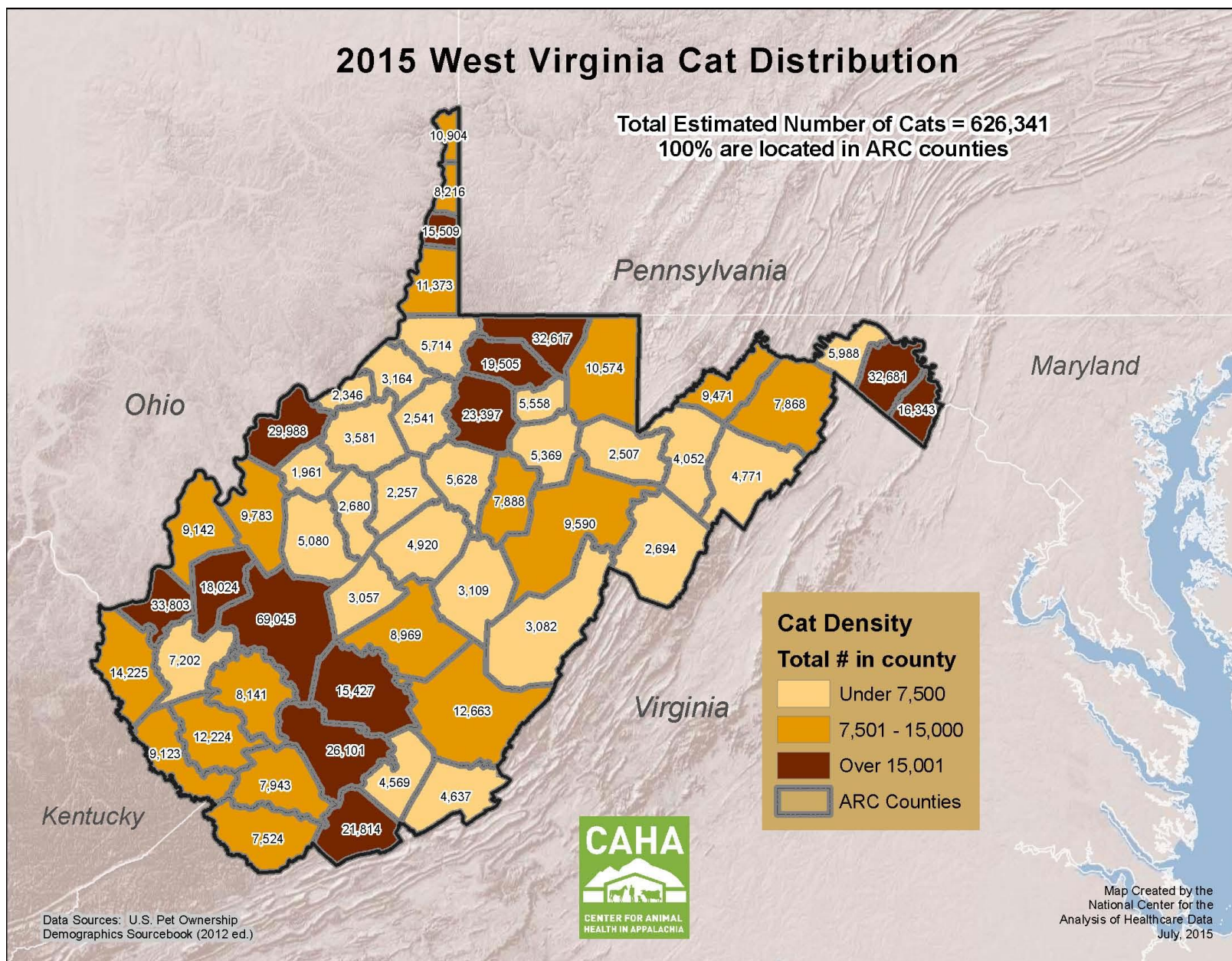
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METHODOLOGY

CAHA Large Animal Model – Methodology

The CAHA Large Animal Model is an estimate of the annual herd size within the counties of Appalachia. It is based on the USDA 2012 Agricultural Census. The model contains two levels of analysis, the county level inventory by species and an estimate of the herd size. The USDA withholds some county data to prevent disclosure of individual operation's details. Where data were withheld, an estimate was developed. These estimates were created using the following techniques:

- If size of farm details were available, then the missing data were replaced with an estimate derived from the number of “Farms by Inventory” multiplied by the size of farm for each county, where the size of the farm was held constant for all counties in that category.
- If size of farm details were unavailable, then the difference between sum of county data and the sum of state data was allocated evenly between counties where data had been withheld by number of farms included in the 2012 inventory.

The herd size estimate was derived to account for the number of animals, by county, which a veterinarian might be called upon to serve over the course of a year. Assuming slaughter is a proxy for production, factors derived from the percent of production were then multiplied by the county level inventory numbers. The percent of production was calculated by dividing the number of head reported in the 2012 commercial slaughter by the USDA 2012 inventory for the same species and period of time. This resulted in 2012 production factors by species: cattle 1.366, swine 2.714, sheep 1.407, and goats 1.21. This calculation assumes all farms and animals were equally productive. Inventory is assumed to be constant for all types of equine. No attempt was made to estimate equine births or number of pleasure animals not located on farms.

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