REPORT OF THE COMMITTEE ON PSEUDORABIES

Chair: Dr Paul Anderson, St Paul, MN
Vice Chair: Jim Leafstedt, Alcester, SD

Dr. John Atwell, NC; Dr. Carter Black, GA; Mr. Philip Bradshaw, IL; Dr. William Brown, KS; Dr. Max Coats, TX; Dr. Paul DuBois, KS; Dr. Gene Erickson, NC; Dr. Michael Gilsdorf, MD; Dr. Larry Granger, MD; Dr. Tom Hagerty, MN; Dr. Ned Hahn, IL; Dr. Howard Hill, IA; Dr. Sam Holland, SD; Dr. Richard Hull, IL; Dr. John Johnston, IN; Dr. Charles Kirkland, NC; Dr. John Korslund, MD; Dr. Bret Marsh, IN; Dr. David Marshall, NC; Dr. Charles Massengill, MO; Dr. James McKean, IA; Dr. John Schiltz, IA: Mr. Jeff Schnell, IA; Mr. James E. Stocker, NC; Dr. Paul Sundberg, IA; Dr. Paul O. Ugstad, CA; Dr. Larry L. Williams, NE

The committee met on Tuesday, November 8, 2005, from 8:00 am until 12:00 pm. There were 30 attendees. Dr. Paul Anderson and Mr. Jim Leafstedt co-presided.

Dr. Max Coats delivered the report from the Feral Swine Subcommittee on Brucellosis and Pseudorabies. The report was approved and is included in these proceedings following the Committee on Brucellosis Report.

Joseph L. Corn, Southeastern Cooperative Wildlife Disease Study, College of Veterinary Medicine, University of Georgia, Athens, presented a time-specific paper entitled "*Implications of feral swine expansion: Expansion of feral swine in the United States and potential implications for domestic swine."* The paper is included in these proceedings following the Committee on Brucellosis Report.

Phil Bradshaw delivered the report of the National Pseudorabies Control Board. The Board met on November 7, 2005, from 1:30 to 5:30 p.m. There were 15 attendees. Twenty-seven state applications were approved for renewal of Stage V Status. They were Alabama, Alaska, Connecticut, Delaware, Florida, Georgia, Hawaii, Idaho, Indiana, Kentucky, Maine, Massachusetts, Michigan, Minnesota, Mississippi, Nebraska, Nevada, New Jersey, North Dakota, Ohio, Puerto Rico, Rhode Island, South Carolina, South Dakota, Virgin Islands, West Virginia and Wisconsin.

The Control Board formulated two recommendations, one on state pseudorabies program site reviews and the other on surveillance guidelines to be considered by the Committee.

The Program Standards Subcommittee reported - no changes for the State-Federal-Industry Pseudorabies Program Standards.

Glenn Slack, National Institute of Animal Agriculture (NIAA), announced the completion and release of a video presentation entitled "*Mission Accomplished: Eradication of Pseudorabies Virus in the United States."* The committee then viewed the video presentation in its entirety. Copies of the DVD and VHS version were distributed to committee members and are available through the National Institute for Animal Agriculture (NIAA). The video was produced through funding provided by United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS).

Dr. John Korslund delivered the National Program Status Report to the committee and he reported that four herds were infected with pseudorabies during 2005. One transitional herd in Louisiana was found on slaughter surveillance, tested, and destroyed. A group of captured feral swine in Arizona were seized by the state from a "hog/dog fight" in northern Arizona were found positive for the disease and destroyed. Two herds in Louisiana were found on slaughter surveillance. One owner had only one hog and the second owner had two. All three animals were captive feral pigs that were slaughtered. None remain on the farm.

He talked about possible 9 CFR 85 Revisions and Program Standards. In the future, he reported that it will be more difficult to change Program Standards without changing underlying 9 CFR 85 sections.

Dr. Korslund reported that no Pseudorabies Program Reviews/Site Reviews were conducted in 2005.
He reported that feral swine continue to spread into the Midwest (Iowa, Wisconsin, Michigan, Nebraska, Pennsylvania and New Jersey). Two serious swine brucellosis outbreaks from direct exposure occurred this

year, one in Georgia and one in Iowa. There is still no evidence of significant PRV viral spread in contact herds. There is plenty of evidence of *excellent* brucellosis spread in contact herds. Prevention of contact is the control method of choice.

Dr. Korslund finished by reviewing pseudorabies (PRV) funding issues. There is currently $5,033,454 left in the Accelerated Pseudorabies Eradication Program (APEP) account.

Dr. Jere Dick introduced the topic of comprehensive surveillance systems for swine diseases. He talked about the National Safeguarding Review and the establishment of the National Surveillance Unit, Fort Collins, Colorado. He talked about the need to design integrated surveillance systems. He also discussed the need to coordinate these systems with Animal Health Program staff, veterinary laboratories throughout the country and with state partners. He stressed that we must take new approaches to surveillance, that surveillance systems must be objective based, and that such systems will come with a price.

Dr. Eric Bush discussed development of the comprehensive surveillance plan.

There will be five objectives to the plan: (1) Rapid detection of PRV in U.S. commercial swine, (2) monitor the risk of introduction of PRV, (3) surveillance of international PRV status, (4) document freedom of PRV to facilitate trade, and (5) assess progress in PRV educational campaigns.

He discussed seven possible surveillance programs that may be implemented: (1) Population-based passive reporting of suspicious Pseudorabies (PRV) cases, (2) laboratory-based surveillance of tissues submitted from sick pigs, (3) slaughter-based surveillance of randomly selected cull sows, (4) livestock-market-based surveillance in southern states, (5) population-based surveillance of outdoor sites in counties with feral swine, (6) hunter-kill surveillance for wild boar hunting clubs, and (7) passive reporting of swine directly exposed to feral swine.

Three major areas will be considered in determining risk: (1) The distribution of feral swine population; (2) the prevalence of PRV in feral swine; and (3) the size and characteristics of the population at risk.

Dr. Bush stated that no timetable for implementation has been established.

Final implementation of the surveillance plan will be carried out by the USDA-APHIS-VS Swine Health Program staff.

The following recommendations were approved by the Committee:

1. The Committee recommends that the members of the National Pseudorabies Control Board review current language in 9 CFR on pseudorabies and consult with USDA-APHIS-VS Swine Programs staff members to identify which portions of the State-Federal-Industry Pseudorabies Program Standards may be appropriate for inclusion in 9 CFR. The group will present findings to the Swine Health Committee at the 2006 annual meeting of the National Institute for Animal Agriculture (NIAA).

2. The Committee recommends that the National Pseudorabies Control Board (NPCB) continue its work in determining state program status. The Committee further recommends that the Control Board work with USDA-APHIS-VS to select states for pseudorabies program site reviews as follows:

> The National Pseudorabies Control Board will identify states with increased risk for transmission of pseudorabies from feral and transitional swine to commercial swine. The NPCB will recommend to Veterinary Services (VS) staff that these states be reviewed by VS-state-industry teams to determine the actual risk of transmission and make recommendations for corrective actions. Review reports will be presented to the NPCB as directed by the Board for their use in determination of state status.

3. Confidence is now high that all infection for swine brucellosis and pseudorabies has been eliminated from commercial swine in the United States. These diseases occur and will continue to occur in specific feral swine populations. Surveillance programs for swine brucellosis and pseudorabies should be targeted at

commercial swine that originate from geographic areas where feral swine exist. Surveillance in commercial swine from other areas of the country should be limited to levels sufficient to demonstrate absence of disease consistent with international trade requirements.

The Committee recommends that USDA-APHIS-VS alter surveillance strategies for swine brucellosis and pseudorabies in U.S. commercial swine as follows:

Target the majority of surveillance resources for pseudorabies and swine brucellosis to commercial swine that originate from geographic areas where disease risk from feral swine is highest.

Alter the major packer surveillance program for pseudorabies and swine brucellosis to target cull sows and boars that originate from geographic areas where risk of disease is highest.

Feral swine should not be included in national surveillance studies.

Implementation processes should include input from state regulators and industry representatives to best accomplish risk assessment and methodology.

Feral Swine Subcommittee on Brucellosis and Pseudorabies Report

Co-Chairs:
Dr. Carter Black, Atlanta, GA
Dr. Max Coats, Austin, TX

The Subcommittee meeting was called to order by Dr. Max Coats at 1:00 pm on Sunday, November 6, 2005. There were 46 attendees at this year's meeting.

Dr Joe Corn presented a time-specific paper entitled *"Implications of feral swine expansion: Expansion of feral swine in the United States and potential implications for domestic swine."* He presented information on the tremendous expansion of feral swine that occurred between 1982 and 2004. Maps that had been developed to show the distribution and density feral and domestic swine were presented. His presentation clearly described why the potential for disease exposure and transmission between domestic swine and feral swine continues to increase. A complete copy of this paper is in these proceedings.

Dr John Korslund presented "Feral Swine: *The View from USDA-APHIS-VS."* Three swine brucellosis cases occurred this year -- one each in Texas, Georgia and Iowa. All were feral swine related. Veterinary Services funded three feral swine projects this year: One project at SCWDS, and an educational program in Iowa, and some contraceptive research studies made at the Wildlife Services Laboratories. Dr Korslund discussed some possible changes that would act to harmonize the in the swine brucellosis uniform methods and rules with the PRV Program Standards.

Edward Stephens presented "Wild Boar Hunting – A Market Analysis." Mr. Stephens produces wild boars for hunting preserves at his operation located in Illinois and he is endeavoring to promote raising wild boars with a known health status. His experience indicated that there was no reliable production and marketing information routinely compiled relating to the "wild boar hunting" business. He has observed that in the process of the distribution of Eurasian and feral swine for hunting that the animals are often transported on the same vehicles with no cleaning between loads and that many haulers employ no routine biosecurity measures. He commented that both states and USDA need to recognize the wild boar industry as a legitimate business.

State reports were given by Iowa, Georgia and Texas that had swine brucellosis cases in 2005.

> Iowa - Dr. John Schiltz reported that 50 percent of a 99 sow breeding swine herd was positive for brucellosis. The exposure was from infected feral swine. As the result of this case, Iowa has developed an ad hoc feral swine task force to work towards feral swine eradication.
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> Georgia - Dr. Carter Black reported on the Georgia case, that involved a show pig producer that had been a Validated-Qualified herd for 9 years. The index animal was detected on a quarterly test. The required whole herd test disclosed 19 brucellosis-positive animals in the herd of 120. There were inadequate biosecurity measures in place to prevent exposure to feral swine. This herd was classified as a transitional herd and was depopulated with indemnity.
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> Texas - Dr. Jeffery Musser reported on a cattle herd that was detected by market testing. The index cow was cultured positive for *Brucella abortus*. The balance of herd test revealed another reactor, which was found to be culture positive for *Brucella suis*. There was no other infection found in any of the contact herds and the *B. abortus* was likely in the animal when it was purchased. Collection of samples from feral swine on the ranch produced culture-confirmed feral swine, indicating that the *Brucella suis* infection was likely contracted from swine in the area after the replacement cow was added to the herd.

Mr. Seth Swofford, USDA-APHIS reported on Wildlife Services (WS) and the USDA Feral Swine Disease Monitoring Plan. In addition to providing a brief overview of his agency and its roles, he more specifically detailed some of their activities in support of their National Wildlife Disease Surveillance and Emergency Response Program. Specifics were provided on some of the activities relating to feral swine. Approximately 11,000 feral swine will be killed this year in conducting their control operations, while the disease-monitoring activities are to be centered on Classical Swine Fever (CSF), PRV and swine brucellosis surveillance. There

will be monitoring and testing of a targeted 1,355 animals from 18 states.

Dr. William Stoffregen reported on swine brucellosis vaccine research activities at USDA, Agricultural Research Service (ARS) National Animal Disease Center (NADC) that indicated that RB51 has been tried in feral swine on several occasions and was shown not be of significant value. They are currently evaluating products derived from a *Brucella suis* rough mutant. Results indicate that significant increases in cell-meditated immunity have been produced using *Brucella suis* 353-1derived vaccine.

Dr. Max Coats led the discussion on the proposed changed needed to harmonize the Swine Brucellosis UM&R and the PRV Program Standards. The meeting was ended prior to the completion of the discussions but the full recommendations are to be proposed to the Committee on Brucellosis for their consideration. The proposed changes will accomplish harmonization with the current PRV Program Standards.

IMPLICATIONS OF FERAL SWINE EXPANSION: EXPANSION OF FERAL SWINE IN THE UNITED STATES AND POTENTIAL IMPLICATIONS FOR DOMESTIC SWINE

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The distribution of feral swine in the United States has expanded greatly in the past 22 years. Documentation of this expansion is provided in national feral swine distribution maps produced by the Southeastern Cooperative Wildlife Disease Study (SCWDS). Data for these maps were collected by SCWDS from each of the state wildlife management agencies in the United States during 1982, 1988 and 2004. Each state provided data on the distribution of feral swine for the given year, and the states' data were collated into national maps (Figure 1). In 1982, 17 states reported feral swine in a total of 475 counties. In 2004, 28 states reported feral swine in 1014 counties. This represents an increase of 11 (165 percent) states and 539 (213 percent) counties and over a period of 22 years.

The expansion of the feral swine distribution is the result of a number of natural and human-associated factors. Natural dispersal of feral swine from extant populations probably is responsible for spread in localized areas where feral swine were present previously. New populations occurring in areas distant to other feral swine populations are the result of localized escape of domestic swine, localized but intentional release of domestic swine, or the intentional transport and release of wild-caught or captive feral swine. Newly established populations in areas distant to the previous feral swine distribution are a result of the escape or release of domestic or feral swine as feral swine are not capable of dispersing across entire states on their own.

The presence of swine diseases in feral swine populations presents a risk for domestic swine, and the expanding distribution of feral swine provides increased opportunities for contact between feral and domestic swine. Surveys for selected disease agents in feral swine have demonstrated the presence of pseudorabies virus (PRV), *Brucella suis*, and other agents of veterinary importance in feral swine populations throughout their range in the United States (Nettles and Erickson 1984, Corn et al. 1986, Van der Leek et al. 1993). Disease agents may be maintained in feral swine populations over time, or may be transient. Corn et al. (2004) showed that once PRV is introduced into a population, it continues to circulate in the population indefinitely. In contrast, Nettles et al. (1989) found that classical swine fever was not maintained in feral populations in the absence of infected domestic swine, nor had it been maintained in two island populations where the disease had been introduced as a feral swine population control measure.

Disease agents may be transmitted both from domestic to feral populations, and from feral to domestic populations. Escape or release of infected domestic swine into a feral situation may result in transmission of disease agents into the feral population. Disease agents also may move from domestic to feral swine via contaminated water, feed, sewage and through nose-to-nose contact at fences or via aerosols to nearby

animals. Disease agents may be introduced from feral populations into a domestic herd via contamination of feed or water, direct contact through fences, entry of feral swine into domestic swine pens, and by intentional introduction of feral animals into a domestic situation. In addition, transport and release of feral swine into new areas can result in transport of any associated disease agent.

With the continuing geographic expansion of feral swine populations, more states and areas of domestic swine production are being confronted with a feral reservoir for swine diseases. To assess the geographic association of feral and domestic swine we developed overlay maps of the distributions of feral swine and commercial swine production in the United States. These overlays were based on a model for targeting surveillance for PRV in feral swine as presented by George et al. (2003). The national feral swine distribution map was used to determine which states to include in the assessment. Domestic swine production maps were prepared for all states where feral swine were reported during 2004 as described by George et al. (2003) using data on the number of domestic swine farms and number of domestic swine per county from the 2002 Census of Agriculture (USDA, 2004). Feral swine maps were overlaid with the domestic swine ranking maps, and counties where both feral swine and high levels of domestic swine production occurred were identified (Figure 2, Table 1). Nationwide, the 50 counties within the reported distribution of feral swine with the highest rankings for domestic swine production were spread out among 14 states, but 16 (32 percent) of the highest ranked counties, including the top eight, were in North Carolina.

The expansion of feral swine in the United States and the associated increase in potential contacts with domestic swine presents a growing risk for disease transmission. The maps provided herein present a geographic description of the expansion of the feral swine range in the United States, and delineate the overlap of the feral swine and high-density domestic swine production distributions. Risks for transmission of disease agents, such as PRV and *B. suis*, from feral to domestic swine, and for transmission of domestic or foreign animal disease agents from domestic to feral swine exist where the two distributions overlap. Targeted surveillance for PRV, *B. suis* or other disease agents can be used to determine if selected disease agents are present where both commercial swine production and feral swine occur. Similar mapping and surveillance may be used to assess other risks, including disease transmission between transitional, backyard or other domestic swine and feral swine.

We thank M. Madden and J. Massour for assistance in map preparation. Primary funding for this project was provided through Cooperative Agreement numbers 04-9113-0863-CA and 05-9113-0863-CA, Veterinary Services, Animal and Plant Health Inspection Service, U.S. Department of Agriculture. Additional funds were provided through sponsorship from the fish and wildlife agencies of Alabama, Arkansas, Florida, Georgia, Kansas, Kentucky, Louisiana, Maryland, Mississippi, Missouri, North Carolina, Ohio, Puerto Rico, South Carolina, Tennessee, Virginia, and West Virginia; through the Federal Aid to Wildlife Restoration Act (50 Stat. 917) and Grant Agreement 14-45-GT09-96-0002, Biological Resources Division, U.S. Geological Survey, U.S. Department of the Interior; and through Cooperative Agreement 05-9613-0032-CA, Veterinary Services, Animal and Plant Health Inspection Service, U.S. Department of Agriculture.

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Figure 1. Distribution of feral swine in the United States: 1982 and 2004.

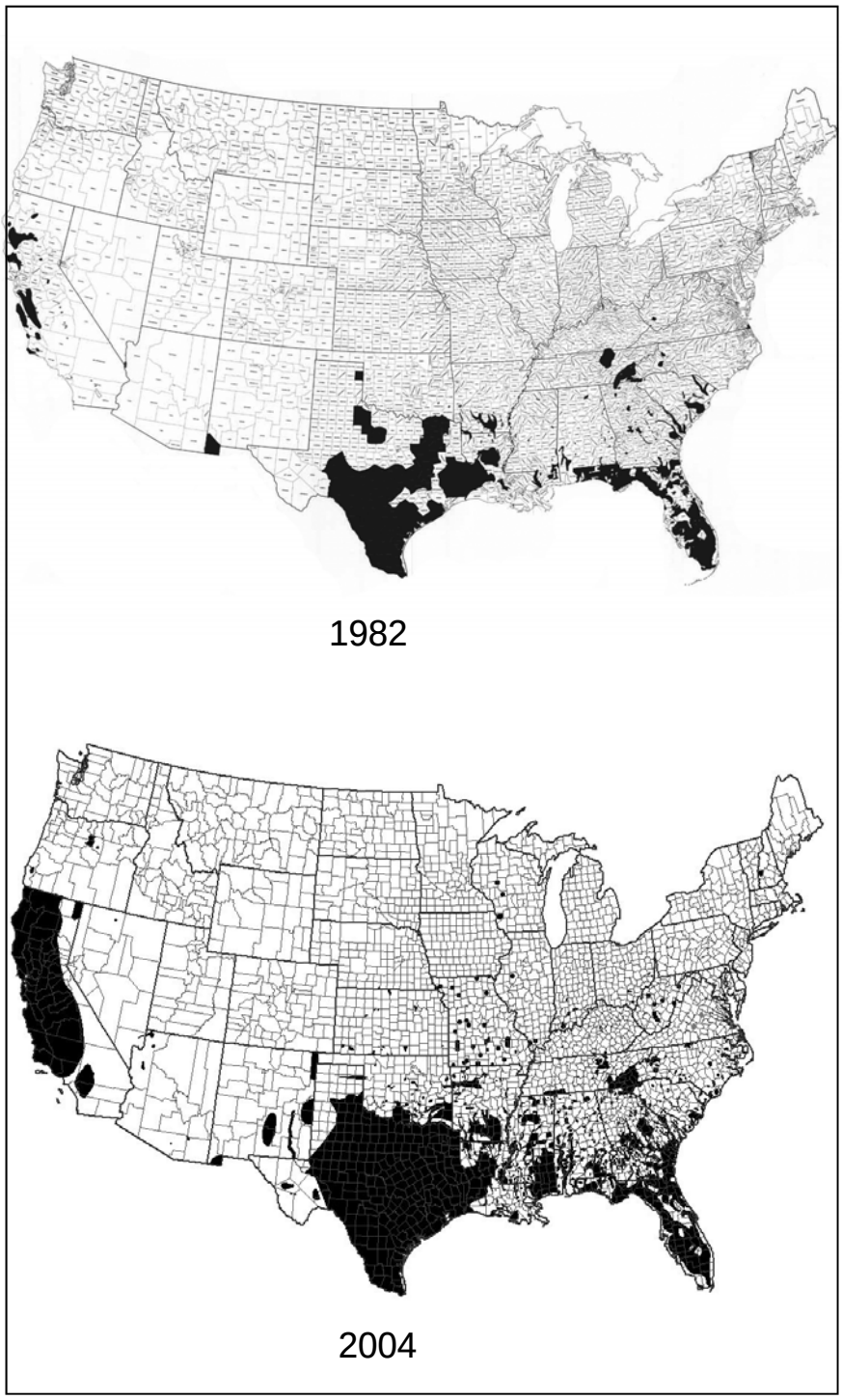

Figure 2: Highest priority commercial swine counties within the range of feral swine in the United States. Light grey areas are the reported distribution of feral swine in 2004. Blackened counties are the 50 highest ranked swine producing counties within the range of feral swine in 2004.

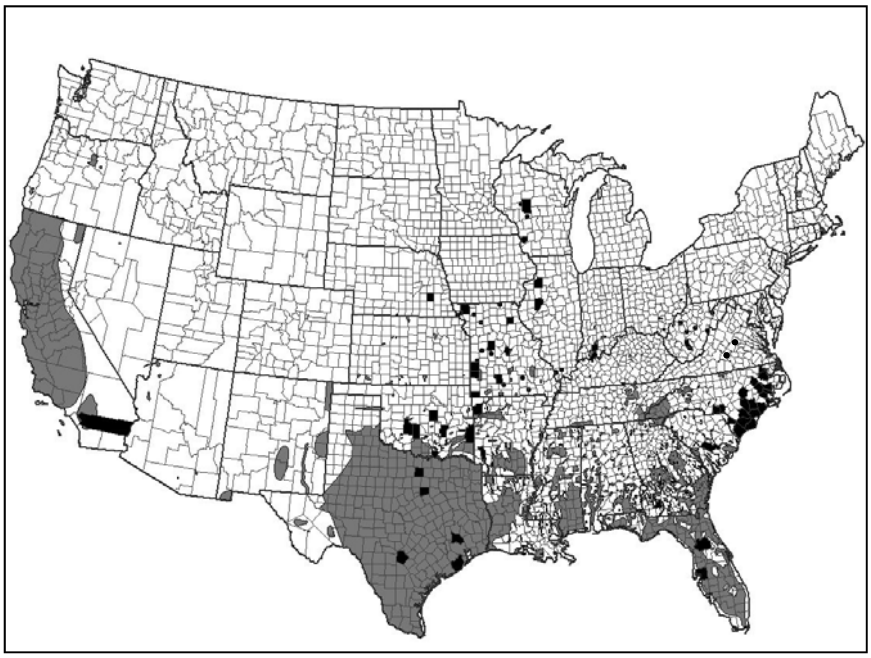

Table 1: Highest priority commercial swine counties within the range of feral swine in the United States. Counties are ranked 1-40 based on the number of commercial swine farms, number of commercial swine, and the presence of feral swine.

State	County	National Rank	Number of Farms	Number of Pigs	% Ranked Production
NC	Duplin	1	380	2166185	4.32
NC	Sampson	2	320	2001731	3.96
NC	Bladen	3	90	865615	1.66
NC	Pender	4	57	289573	0.58
NC	Columbus	5	58	255732	0.52
NC	Johnston	6	74	189358	0.42
NC	Onslow	7	69	190960	0.42
NC	Pitt	8	50	192092	0.40
OK	Hughes	9	49	149488	0.32
MO	Vernon	10	53	135141	0.30
NC	Edgecombe	11	27	148042	0.30
IN	Dubois	12	110	84659	0.27
NC	Craven	13	29	95632	0.20
SC	Dillon	14	22	97388	0.20
MO	Shelby	15	62	72172	0.20
IL	Fulton	16	42	74006	0.18
NC	Brunswick	17	33	75195	0.17
NC	Beaufort	18	22	81178	0.17
AR	Washington	19	62	56051	0.17
FL	Marion	20	135	2498	0.15
GA	Mitchell	21	20	67811	0.14
MO	Barton	22	34	59674	0.14
WI	Clark	23	118	8724	0.14
NE	Seward	24	62	40896	0.14
MO	Webster	25	109	11613	0.14
NC	Anson	26	16	63408	0.13
MO	Pettis	27	62	36731	0.13
SC	Orangeburg	28	74	27853	0.13
NC	Bertie	29	34	49360	0.13
MO	Nodaway	30	69	28223	0.12
IN	Spencer	31	52	34938	0.12
FL	Hillsborough	32	108	1724	0.12
MO	Henry	33	29	46653	0.11
NC	Hertford	34	14	54422	0.11
NC	Richmond	35	14	53961	0.11
MO	McDonald	36	38	39348	0.11
SC	Horry	37	30	43900	0.11
MO	Cole	38	51	28482	0.10
AR	Howard	39	38	35758	0.10
TX	Bexar	40	90	3412	0.10