

UNITED STATES DEPARTMENT OF AGRICULTURE  
ANIMAL AND PLANT HEALTH INSPECTION SERVICE

1. REGISTRATION NO. 55-R-0005	CUSTOMER NO. 842	FORM APPROVED OMB NO. 0579-0036
2. HEADQUARTERS RESEARCH FACILITY (Name and Address, as registered with USDA, include Zip Code)		
NORTH CAROLINA STATE UNIVERSITY CAMPUS BOX 7514 RALEIGH, NC 27695-7514		

**ANNUAL REPORT OF RESEARCH FACILITY**  
(TYPE OR PRINT)

3. REPORTING FACILITY (List all locations where animals were housed or used in actual research, testing, teaching, or experimentation, or held for these purposes. Attach additional sheets if necessary.)

FACILITY LOCATIONS/sites

(b)(2)High, (b)(7)f

REPORT OF ANIMALS USED BY OR UNDER CONTROL OF RESEARCH FACILITY (Attach additional sheets if necessary or use APHIS FORM 7023A)

A. Animals Covered By The Animal Welfare Regulations	B. Number of animals being bred, conditioned, or held for use in teaching, testing, experiments, research, or surgery but not yet used for such purposes.	C. Number of animals upon which teaching, research, experiments, or tests were conducted involving no pain, distress, or use of pain-relieving drugs.	D. Number of animals upon which experiments, teaching, research, surgery, or tests were conducted involving accompanying pain or distress to the animals and for which appropriate anesthetic, analgesic, or tranquilizing drugs were used.	E. Number of animals upon which teaching, experiments, research, surgery or tests were conducted involving accompanying pain or distress to the animals and for which the use of appropriate anesthetic, analgesic, or tranquilizing drugs would have adversely affected the procedures, results, or interpretation of the teaching, research, experiments, surgery, or tests. (An explanation of the procedures producing pain or distress in these animals and the reasons such drugs were not used must be attached to this report)	F. TOTAL NO. OF ANIMALS (Cols. C + D + E)
4. Dogs	14	7	189		196
5. Cats	9	1	105		106
6. Guinea Pigs			20		20
7. Hamsters		6	4		10
8. Rabbits			279		279
9. Non-Human Primates					
10. Sheep		20	43		63
11. Pigs		199	787	36	1022
12. Other Farm Animals					
Horses		28	90		118
13. Other Animals					
Llama		1			1
Alpaca			6		6
Red Wolves		2			2

ASSURANCE STATEMENTS

- 1) Professionally acceptable standards governing the care, treatment, and use of animals, including appropriate use of anesthetic, analgesic, and tranquilizing drugs, prior to, during, and following actual research, teaching, testing, surgery, or experimentation were followed by this research facility.
- 2) Each principal investigator has considered alternatives to painful procedures.
- 3) This facility is adhering to the standards and regulations under the Act, and it has required that exceptions to the standards and regulations be specified and explained by the principal investigator and approved by the Institutional Animal Care and Use Committee (IACUC). A summary of all the exceptions is attached to this annual report. In addition to identifying the IACUC-approved exceptions, this summary includes a brief explanation of the exceptions, as well as the species and number of animals affected.
- 4) The attending veterinarian for this research facility has appropriate authority to ensure the provision of adequate veterinary care and to oversee the adequacy of other aspects of animal care and use.

**CERTIFICATION BY HEADQUARTERS RESEARCH FACILITY OFFICIAL**  
(Chief Executive Officer or Legally Responsible Institutional official)

I certify that the above is true, correct, and complete (7 U.S.C. Section 2143)

SIGNATURE OF C.E.O. OR INSTITUTIONAL OFFICIAL	NAME & TITLE OF C.E.O. OR INSTITUTIONAL OFFICIAL (Type or Print)	DATE SIGNED
(b)(6), (b)(7)c		12/01/2008

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UNITED STATES DEPARTMENT OF AGRICULTURE  
ANIMAL AND PLANT HEALTH INSPECTION SERVICE

1. REGISTRATION NO.  
55-R-0005

CUSTOMER NO.  
842

FORM APPROVED  
OMB NO. 0579-0036

**CONTINUATION SHEET FOR ANNUAL REPORT  
OF RESEARCH FACILITY  
(TYPE OR PRINT)**

2. HEADQUARTERS RESEARCH FACILITY (Name and Address, as registered with USDA, include Zip Code)  
NORTH CAROLINA STATE UNIVERSITY  
CAMPUS BOX 7514  
RALEIGH, NC 27695-7514

**REPORT OF ANIMALS USED BY OR UNDER CONTROL OF RESEARCH FACILITY (Attach additional sheets if necessary or use this form.)**

A. Animals Covered By The Animal Welfare Regulations	B. Number of animals being bred, conditioned, or held for use in teaching, testing, experiments, research, or surgery but not yet used for such purposes.	C. Number of animals upon which teaching, research, experiments, or tests were conducted involving no pain, distress, or use of pain-relieving drugs.	D. Number of animals upon which experiments, teaching, research, surgery, or tests were conducted involving accompanying pain or distress to the animals and for which appropriate anesthetic, analgesic, or tranquilizing drugs were used.	E. Number of animals upon which teaching, experiments, research, surgery or tests were conducted involving accompanying pain or distress to the animals and for which the use of appropriate anesthetic, analgesic, or tranquilizing drugs would have adversely affected the procedures, results, or interpretation of the teaching, research, experiments, surgery, or tests. (An explanation of the procedures producing pain or distress in these animals and the reasons such drugs were not used must be attached to this report)	F. TOTAL NO. OF ANIMALS (Cols. C + D + E)
Cattle		73	48		121
Goats		55	4		59
Pallas Cats		6			6
Woodchucks			8		8
Gerbils			2		2
Ferrets			22		22

**ASSURANCE STATEMENTS**

- 1) Professionally acceptable standards governing the care, treatment, and use of animals, including appropriate use of anesthetic, analgesic, and tranquilizing drugs, prior to, during, and following actual research, teaching, testing, surgery, or experimentation were followed by this research facility.
- 2) Each principal investigator has considered alternatives to painful procedures.
- 3) This facility is adhering to the standards and regulations under the Act, and it has required that exceptions to the standards and regulations be specified and explained by the principal investigator and approved by the Institutional Animal Care and Use Committee (IACUC). A summary of all the exceptions is attached to this annual report. In addition to identifying the IACUC-approved exceptions, this summary includes a brief explanation of the exceptions, as well as the species and number of animals affected.
- 4) The attending veterinarian for this research facility has appropriate authority to ensure the provision of adequate veterinary care and to oversee the adequacy of other aspects of animal care and use.

**CERTIFICATION BY HEADQUARTERS RESEARCH FACILITY OFFICIAL  
(Chief Executive Officer or Legally Responsible Institutional official)**  
I certify that the above is true, correct, and complete (7 U.S.C. Section 2143)

SIGNATURE OF C.E.O. OR INSTITUTIONAL OFFICIAL	NAME & TITLE OF C.E.O. OR INSTITUTIONAL OFFICIAL (Type or Print)	DATE SIGNED
	(b)(6), (b)(7)c	12/01/2008

## APHIS Form 7023 Column E Explanation

This form is intended as an aid to completing the APHIS Form 7023 Column E explanation. It is not an official form and its use is voluntary. Names, addresses, protocols, veterinary care programs, and the like, are not required as part of an explanation. A Column E explanation must be written so as to be understood by lay persons as well as scientists.

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1. Registration Number: 55-R-0005

2/3. Species (common name) & Number of animals used in this study:

Pigs (36)

4. Explain the procedure producing pain and/or distress.

This study was to determine changes in the antigenicity of and immune response to Porcine Respiratory and Reproductive Syndrome Virus (PRRSV) that have led to cross protection failures of PRRSV vaccines and inadequate protection of commercial swine herds from this disease. The potential for pain and/or distress was caused by challenge with the wild-type virus (WTV) to naive pigs (to confirm that the WTV strain used for the study caused PRRS) and two groups of vaccinated pigs. Virus infected pigs were generally lethargic, had slightly elevated rectal temperatures (103.4 - 106.0), and could develop secondary pathogenic bacterial infections. Therefore, pigs were prophylactically treated at the time of PRRSV infection with a broad-spectrum antibiotic for 12 to 14 days total. Pigs that had other severe clinical manifestations (secondary bacterial infections with body temperatures between 104.0 - 107.0 that were non-responsive to a change in antibiotic regimen) or were exhibiting severe clinical signs (lateral recumbency, severely depressed activity or moribund) were euthanized.

5. Provide scientific justification why pain and/or distress could not be relieved. State methods or means used to determine that pain and/or distress relief would interfere with test results. (For Federally mandated testing, see Item 6 below)

Analgesic treatment would adversely affect the natural expression of pro-inflammatory immunologic responses the experiment is designed to study. We intend to measure the innate immune response pro-inflammatory cytokines TNF, IL-8, IL-1 which are necessary for subsequent development of robust acquired cell mediated immunity (CMI) response characterized by CD4+CD8+IFN secreting cells in the pig. PRRSV infection has been shown to suppress the levels of pro-inflammatory cytokine production and subsequently pigs produce delayed CD4+CD8+IFN responses. The study looked at whether this phenomenon is repeated following heterologous PRRSV infections and responsible for severe disease in otherwise immune animals. Furthermore, the use of antipyretics and other anti-inflammatory agents would mask signs of fever, malaise, or moderate depression, all of which were scored for comparison of vaccine efficacy.

6. What, if any, federal regulations require this procedure? Cite the agency, the code of Federal Regulations (CFR) title number and the specific section number (e.g., APHIS, 9 CFR 113.102):

Agency:

CFR:

North Carolina State University is a land-grant university and a constituent institution of the University of North Carolina

Research and Graduate Studies  
Sponsored Programs and Regulatory Compliance

NC STATE UNIVERSITY

(b)(6), (b)(7)c

North Carolina State University  
Campus Box 7514  
Raleigh, North Carolina 27695-7514

(b)(6), (b)(7)c

December 1, 2008

**ADDENDUM TO THE FY2008 APHIS FORM 7023 SUBMISSION FOR  
NORTH CAROLINA STATE UNIVERSITY USDA REGISTRATION # 55-R-0005 / 842**

**EXCEPTIONS TO STANDARDS REPORT FOR THE REPORTING PERIOD OF  
OCTOBER 1, 2007 THROUGH SEPTEMBER 30, 2008**

**Protocol #1**

**Species:** Dogs

**Number affected:** 2

**Exception to Standards:** Fasting dogs for 36 hours prior to an endoscopy training session.

**Standard:** 9 CFR Ch.1, Pt. 3, Subpt. A, Sec. 3.9 (a) Feeding: Dogs and cats must be fed at least once each day, except as might be required to provide adequate veterinary care.

**Justification:** A fast of at least 36 hours is required for colonoscopy. The procedure cannot be performed effectively unless the colon is completely empty of solid material. Reference: Jones, BD. Endoscopy of the lower gastrointestinal tract. Vet Clin N Amer: Small Anim Pract 20: 1229-1242, 1990.

**Protocol #2**

**Species:** Pigs

**Number affected:** 6

**Exception to Standards:** Pigs are housed individually in farrowing crates to prevent potential damage, displacement and/or destruction of intravenous catheters.

**Standard:** 9 CFR Ch.1, Pt. 3, Subpt. F, Sec. 3.128 Space Requirements: Enclosures shall be constructed and maintained so as to provide sufficient space for each animal to make normal and social postural adjustments with adequate freedom of movement.

**Justification:** Intravenous catheters are necessary for multiple blood draws over a period of several days, both for the safety of the technicians taking the sample and the comfort of the pigs. If pigs are housed in normal pens while these catheters are in place, there is a very high likelihood that they will roll in urine and feces play in water troughs and/or otherwise contaminate their catheter site or displace or destroy their catheters. In group-housed pigs, there is the additional concern that other pigs will chew on and displace or destroy the catheters. Placing these 100 kg pigs in farrowing crates designed for larger sows (150 kg), provides sufficient space for them to be comfortable, but will not permit them to roll or engage in other activities that could contaminate, dislodge or damage their catheters.

**Protocol #3**

**Species:** Pigs 42

**Number affected:** **Exception to Standards:** A group of sows in the Teaching Animal Unit (TAU) are housed in gestation crates to recreate an environment similar to that found on the majority of pig farms in North Carolina. The gestation crates measure 2 ft. wide by 7 ft. 1 in. long, and do not permit the full range of species typical movements or postural adjustments.

**Standard:** 9 CFR Ch.1, Pt. 3, Subpt. F, Sec. 3.128 Space Requirements: Enclosures shall be constructed and maintained so as to provide sufficient space for each animal to make normal and social postural adjustments with adequate freedom of movement.

**Justification:** The overall teaching objective and purpose of the TAU are explained in the **Teaching Animal Unit Manual**. "This unit has been designed and is operated to provide veterinary students with live animal laboratory learning experiences with large animals. These units are operated in a manner similar to commercial food animal production units" (page 1 TAU Manual, 2004). One of our goals is to provide students the opportunity to recognize and understand commercial food animal production practices and management, as they would be exposed to in the field as veterinarians. All of our farm animal units are operated as close to commercial standards as possible. The swine unit is a confinement swine operation, farrow to finish. We teach agricultural practices to veterinary students including pig flow, management of the pregnant sow, farrowing, piglet processing, nutrition, ventilation in confinement swine facilities, disease prevention, biosecurity, and pregnancy diagnosis in a natural commercial setting."

#### **Protocol #4**

**Species:** Dogs

**Number affected:** 9

**Exception to Standards:** Dogs were maintained in metabolism units that permit most postural adjustments and movements but do not meet the floor space requirements. Smaller dogs were originally requested for the study but were not available. The dogs were housed in these units for periods of up to 48 hours for drug metabolism and pharmacokinetic studies.

**Standard:** 9 CFR Ch.1, Pt. 3, Subpt. A, Sec. 3.6 (c) (1) (i) and (iii) Primary enclosures -Additional requirements for dogs - Space: Each dog housed in a primary enclosure must be provided a minimum amount of floor space, calculated as described in this portion of the regulations. The interior height must be 6 inches higher than the head of the dog.

**Justification:** The University Attending Veterinarian and members of the IACUC examined the metabolism units and considered them adequate for the limited period that the dogs will be housed in them. The dogs used for this study ranged from 34-37 inches nose to tail head length (11.1 to 12.8

**Standard:** 9 CFR Ch.1, Pt. 3, Subpt. F, Sec. 3.128 Space Requirements: Enclosures shall be constructed and maintained so as to provide sufficient space for each animal to make normal and social postural adjustments with adequate freedom of movement.

**Justification:** The overall teaching objective and purpose of the TAU are explained in the **Teaching Animal Unit Manual**. "This unit has been designed and is operated to provide veterinary students with live animal laboratory learning experiences with large animals. These units are operated in a manner similar to commercial food animal production units" (page 1 TAU Manual, 2004). One of our goals is to provide students the opportunity to recognize and understand commercial food animal production practices and management, as they would be exposed to in the field as veterinarians. All of our farm animal units are operated as close to commercial standards as possible. The swine unit is a confinement swine operation, farrow to finish. We teach agricultural practices to veterinary students including pig flow, management of the pregnant sow, farrowing, piglet processing, nutrition, ventilation in confinement swine facilities, disease prevention, biosecurity, and pregnancy diagnosis in a natural commercial setting."

#### **Protocol #4**

**Species:** Dogs

**Number affected:** 9

**Exception to Standards:** Dogs were maintained in metabolism units that permit most postural adjustments and movements but do not meet the floor space requirements. Smaller dogs were originally requested for the study but were not available. The dogs were housed in these units for periods of up to 48 hours for drug metabolism and pharmacokinetic studies.

**Standard:** 9 CFR Ch.1, Pt. 3, Subpt. A, Sec. 3.6 (c) (1) (i) and (iii) Primary enclosures –Additional requirements for dogs - Space: Each dog housed in a primary enclosure must be provided a minimum amount of floor space, calculated as described in this portion of the regulations. The interior height must be 6 inches higher than the head of the dog.

**Justification:** The University Attending Veterinarian and members of the IACUC examined the metabolism units and considered them adequate for the limited period that the dogs will be housed in them. The dogs used for this study ranged from 34-37 inches - nose to tail head length (11.1 to 12.8 sq. ft. floor space required). The metabolism units, after allowing for removal of space for water bowls, provide 10.6 sq. ft. and approximately 2-4 inches above the top of the head (vs. USDA requirements for 6 inches space above the top of the dog's head). Because the dogs were being provided less than the required floor and head space, the investigator agreed to the following accommodations:

- No dog was kept in the metabolism units for more than 48 hours (during sampling portion of the protocol).
- Each dog was removed from the unit at least once each hour during the first 6 hours and allowed to exercise in the room for 5 minutes. Throughout the remaining duration of stay in the metabolism units, each dog was exercised on a leash for 5-10 minutes every two hours during the study, with the exception of the night-time hours when the lights are turned off in the room.
- Unit hygiene was maintained by cleaning as frequently as necessary whenever soiling of the cage was observed.
- Dogs received an approved diet and continual access to water while in the metabolism units.
- The Principal Investigator or his colleague, both licensed veterinarians, inspected each dog throughout the stay in metabolism units for any clinical signs or lesions associated with this period of confinement.

**Protocol #5****Species:** Pigs**Number affected:** 16 piglets**Exception to Standards:** Pre-term (105-108 days gestation) and full-term (115 days gestation) piglets are group-housed (4 - 8 piglets/pen or incubator) in intensive care-type pens or an incubator providing 4 square feet floor space.**Standard:** 9 CFR Ch.1, Pt. 3, Subpt. F, Sec. 3.128 Space Requirements: Enclosures shall be constructed and maintained so as to provide sufficient space for each animal to make normal and social postural adjustments with adequate freedom of movement.**Justification:** Both pre-term and full-term piglets are dependent on a feeding tube, and need to be housed in a warm environment with mats, heating pads and heat lamps or similarly equipped incubators with oxygen supplementation that will allow for constant visual monitoring and the ability to provide oxygen to all piglets if needed. Piglets will be humanely euthanized after 30 hours. The IACUC approved the use of the pens/incubators for group housed piglets since they will be able to make all postural changes and adjustments and have adequate room to move for this limited time period.