

**FORM A**  
**Board of Regents, State of Iowa**  
**REQUEST TO IMPLEMENT A NEW DOCTORAL DEGREE PROGRAM**

**Institution:** Iowa State University

**CIP Discipline Specialty Title:** Veterinary Preventive Medicine, Epidemiology, and Public Health

**CIP Discipline Specialty Number (six digits):** 51.2510

**Level:** B \_\_\_\_\_ M \_\_\_\_\_ **D (Doctoral)** FP \_\_\_\_\_

**Title of Proposed Program:** Population Sciences in Animal Health

**Degree Abbreviation (e.g., B.S., B.A., M.A., Ph.D.):** PhD

**Approximate date to establish degree:** August, 2017

**Contact person: (name, telephone, and e-mail):**

Daniel Linhares, DVM, MBA, PhD. 515-294-9358. linhares@iastate.edu

**College that will administer new program:** ISU College of Veterinary Medicine

**Please provide the following information (use additional pages as needed). Do not use acronyms without defining them.**

**1. Describe the proposed new degree program, including the following:**

- a. A brief description of the program. If this is currently being offered as a track, provide justification for a standalone program (*not currently offered as a track*).**

**Program description** The Population Sciences in Animal Health doctoral program will be administered by the Department of Veterinary Diagnostic and Production Animal Medicine (VDPAM) in the College of Veterinary Medicine (CVM). The mission of the program is to equip future leaders (veterinarians and non-veterinarians) with the knowledge and skills to protect and promote the welfare and health of animals in populations. The program will be built on the existing departmental infrastructure, the current MS in Veterinary Preventive Medicine program administered by the department, and faculty expertise/research activity:

- VDPAM faculty (n = 54) include 34 Doctoral degrees, 34 MS degrees, and 22 American Veterinary Medical Association (AVMA) Board Certified specialists with responsibilities in the Diagnostic Laboratory, Extension, Field Services, Food Animal and Camelid Hospital, Animal Welfare, and Food Supply Veterinary Medicine sections.
- Teaching responsibilities of VDPAM faculty include 97 general and specialty courses in the veterinary curriculum plus the interdepartmental MS in Veterinary Preventive Medicine.
- In FY 2015, VDPAM faculty generated \$27.6 million in extramural research funding (102 grants) and produced 111 refereed publications, 359 proceedings, 249 abstracts and 324 invited presentations in the US and in 18 countries.

The purview of the program is broadly inclusive (wildlife, companion animal, livestock and poultry populations), with emphasis on Iowa livestock and poultry because of their numbers and impact. According to USDA NASS, Iowa leads the nation for laying hens and swine. According

to the Iowa Department of Agriculture, in 2015 Iowa's livestock and poultry (3.9 million cattle, 56,500 goats, 175,000 sheep, 21.3 million hogs, 10.5 million turkeys, 47.7 million laying hens) produced 7 billion pounds of red meat, 4.8 billion pounds of milk, 240 million pounds of cheese, 12.5 billion eggs, and 900,000 pounds of wool. The total value of Iowa's animal agricultural output was \$38 billion in 2013.<sup>1</sup> Animal agriculture also provided ~160,000 jobs and \$9.5 billion in wages, as well as \$1.2 billion in state and local taxes and \$1.9 billion in federal taxes.<sup>1</sup>

Recent outbreaks of infectious disease in Iowa demonstrate the opportunity for improvement in the welfare and health of the animals under our care:

- 2013: Porcine epidemic diarrhea virus (PEDV). Introduced from Asia, PEDV (first diagnosed in the USA by the ISU VDL) spread rapidly, causing losses of \$66.2 million on Iowa farms and significantly impacting the health of surviving pigs affected by the virus. PEDV has since become endemic.
- 2015: introduction of highly pathogenic avian influenza resulted in the loss of >30 million layers/pullets and 1.5 million turkeys and cost Iowa \$1.2 billion, including \$427,000,000 from the loss of 8,444 jobs and \$145,000,000 in lost taxes.<sup>2,3</sup>
- 2015: Senecavirus A (SVA) appeared in Iowa (detected by VDPAM faculty). SVA produces vesicular lesions (i.e., blisters) resembling those by foot-and-mouth disease virus (FMDV) infection and mortality (up to 70%) in suckling piglets.<sup>4</sup>
- 53 of the 86 avian, ruminant, swine, poultry and lagomorph diseases listed by the World Organization for Animal Health are in the U.S. and 21 are infectious for humans.<sup>5</sup>
- Porcine reproductive and respiratory syndrome virus (PRRSV), not present in Iowa before 1984, imposes \$664 million in losses each year to the US swine industry.<sup>6</sup>
- Chronic wasting disease and epizootic hemorrhagic disease impact white tail deer populations and spill over to susceptible livestock. Testing for both agents is performed under the supervision of VDPAM faculty through the ISU Veterinary Diagnostic Laboratory.

Furthermore, animal welfare assessment and auditing programs have emerged as fundamental components of mainstream commercial livestock and poultry marketing systems. Analysis of these databases provides opportunity to assist livestock industries with information about prevalence and risk factors to inform benchmarking and management interventions.

- Common Swine Industry Audit platform was launched in October 2014 for pork producers, packers and processors<sup>7</sup>
- United Egg Producers animal welfare certification and auditing program accounts for 76% of all egg produced in the U.S.<sup>8</sup>
- National Farmers Assurance Responsible Management (FARM) program is associated with farms producing 92% of the U.S. milk supply<sup>9</sup>

#### References cited in section 1a:

- <sup>1</sup> <http://www.decision-innovation.com/webres/File/docs/2016%20Iowa%20Animal%20Agriculture%20Economic%20Contribution%20Study%20160202.pdf>
- <sup>2</sup> <http://www.iowaagriculture.gov/avianinfluenza.asp>
- <sup>3</sup> <http://www.cidrap.umn.edu/news-perspective/2015/08/report-finds-12-billion-iowa-avian-flu-damage>
- <sup>4</sup> <http://dx.doi.org/10.1111/tbed.12516>
- <sup>5</sup> <http://dx.doi.org/10.1016/j.prevetmed.2012.11.021>
- <sup>6</sup> Holtkamp DJ, et al. 2013. Assessment of the economic impact of PRRSV on U.S. pork producers. J Swine Health Prod. 21:72-84
- <sup>7</sup> <http://www.pork.org/common-industry-audit/>

- <sup>8</sup> United Egg Producers, 2016. Animal Husbandry Guidelines for U.S. Egg Laying Flocks, 2016 Edition  
<sup>9</sup> <http://www.nationaldairyfarm.com>

**b. A statement of academic objectives.**

The objective of the program is to train future leaders (veterinarians and non-veterinarians) and create/disseminate knowledge in the area of Population Sciences in Animal Health. Program graduates will be prepared to respond to health and welfare issues in animal populations through research, education, clinical medicine, extension, and outreach.

The program will be structured and administered in accordance with the policies and rules established by the Iowa State University Graduate College. In brief, the student's work and progress will be under the supervision of a major professor and a Program of Study committee. Successful completion of the program will be achieved through the defense of a doctoral dissertation and completion of a minimum of 72 credits consistent with the following:

**Required courses (total of 20 credits):**

A. Basic required courses:

Course	Description	Credits
GR ST 565	Responsible conduct of research (or V Pth 554 Ethics in scientific research and writing)	1 Cr
STAT 587	Statistical methods for research workers	4 Cr

B. Additional required (basic) courses (select at least 3 out of 4):

Course	Description	Credits
VDPAM 527	Applied statistical methods in population studies	3 Cr
VDPAM 528	Principles of epidemiology and population health	3 Cr
VDPAM 529	Epidemiological methods in population research	3 Cr
STAT 402	Statistical design and the analysis of experiments	3 Cr

C. Additional required (advanced) courses (select at least 2 out of 4):

Course	Description	Credits
VDPAM 5X1	Animal welfare ( <i>new</i> )	3 Cr
VDPAM 5X2	Ecology of infectious disease ( <i>new</i> )	3 Cr
VDPAM 5X3	Applied diagnostic technologies ( <i>new</i> )	3 Cr
VDPAM 5X4	Principles of modeling / Information management ( <i>new</i> )	3 Cr

**Elective courses:** To be selected from ISU Graduate level courses in consultation with the student's Program of Study committee. At least 6 credits of elective courses are required, achieving a cumulative total of at least 26 course credits.

With the exception of the courses listed in Table C, all courses are currently offered at ISU and the majority are taught by VDPAM faculty. VDPAM faculty will develop and offer the courses listed in Table C.

**Catalog description of the new courses:**

**VDPAM 5X1: Animal Welfare.** Designing, implementing, and interpreting animal welfare assessment and auditing. Conducting field investigations to measure, and improve animal welfare associated with livestock health, and/or productivity. Implications of animal behavior on strategies to detect or manage diseases in the population of interest.

**VDPAM 5X2: Ecology of Infectious Diseases.** Understanding dynamics of pathogen transmission within and between population. Reducing risk of pathogen introduction in populations. Strategies to early detect pathogens, and classify herds according to disease status. Quantifying pathogen transmission, and health/production impact in animal populations. Applying and measuring the effect of interventions to manipulate disease transmission dynamics within and between populations.

**VDPAM 5X3: Applied diagnostic technologies.** Introduction to population health. Applied concepts of virology, serology, bacteriology, and molecular biology for infectious disease detection. Beyond pathogen detection: diagnosing infectious diseases in farm animal populations. Strengths and limitations of diagnostic assays to diagnose disease. Trends in diagnostic investigations.

**VDPAM 5X4: Principles of modeling / Information management.** Applied use of pharmacokinetic / pharmacodynamic (PK/PD) modeling for research, and clinical investigations. Transmission of pathogens within and between populations. Individual host modeling (virus within host). Introduction to information management for animal health-related research and clinical projects.

**c. The need for the program and how the need for the program was determined.**

The VDPAM External Advisory Board, a body composed of stakeholders from public and private sectors, has repeatedly urged the department to create a doctoral degree program because of the strength of the faculty, the reputation and visibility of the department, and the need for research and outreach in animal health and animal welfare in Iowa and beyond. The board meeting minutes of 09/28/2015 stated, the "*general consensus (among board members) was that a VDPAM PhD program would grow much needed research for the livestock and poultry industries and further VDPAM's national and international reputation*".

In addition, the most recent external Academic Program Review team's report to CVM Dean Nolan (May 31, 2012) characterized VDPAM as "*an outstanding and extremely productive department*" and went on to raise the question of "*... whether a large department can attain pre-eminence in their field without a strong graduate program that includes the PhD degree.*"

Reflecting the consensus of the VDPAM advisory board and the VDPAM external review team, the ISU CVM 2016-2020 strategic plan includes the goal of developing a doctoral degree program in VDPAM.

VDPAM has administered the interdepartmental MS in Veterinary Preventive Medicine since 2000 and a certificate in Veterinary Preventive Medicine since 2011. To date, 39 students have completed and been awarded the MS degree, with 20 students currently enrolled. Seven students have completed the Certificate program, with an additional 5 currently enrolled. Graduates of the MS or Certificate programs typically continue on with doctoral programs at ISU or elsewhere. Other graduates have taken positions in areas related to livestock

production, agricultural pharmaceuticals, veterinary vaccines, academia, and government.

Communications with the few established doctoral programs aligned with Veterinary Population Sciences, i.e. University of Minnesota, University of Guelph, Kansas State University and University of California- Davis, confirmed continued demand for their programs and graduates.

**d. The relationship of the proposed new program to the institutional mission and how the program fits into the institution's and college's strategic plan.**

The Iowa State University 2017-2022 strategic plan set the goal of “*grow(ing) the impact and scope of graduate programs*”, in part by expanding the “*number of PhD degrees conferred*”<sup>1</sup>. The plan strives to “*improve services and programs dedicated to economic development and the promotion of healthy communities, people and environments*”, in part by improving applied research and outreach programs.

The ISU CVM 2011-2016 strategic plan set the goal of “*building disease prevention and risk assessment expertise to improve food safety and security, biosecurity, vaccinology and therapeutics/antimicrobial use*”. The CVM is committed to becoming “*a pre-eminent institution recognized for excellence in professional and graduate education; application of knowledge to promote animal and human health; and scientific leadership to provide a safe and sustainable food supply with state, national and global impact*”.

The department of VDPAM was created in 1999 “*to support the continual improvement of food animal agriculture and food supply veterinary medicine to benefit Iowa and the world*”.

Thus, the doctoral program in Population Sciences in Animal Health is in complete alignment with the strategic plans of Iowa State University, the College of Veterinary Medicine, and the Department of Veterinary Diagnostic and Production Animal Medicine.

**Reference cited in section 1d:**

<sup>1</sup> <http://www.president.iastate.edu/strategic-plan>

**e. The relationship of the proposed new program to other existing programs at the institution; describe how the proposed program will enhance other programs at the university. Will the proposed program duplicate existing programs at the university?**

The proposed program is cross-disciplinary, and will potentially enhance opportunities for multidisciplinary research across Iowa State University. The program does not duplicate any existing program. Doctoral programs offered at the ISU CVM include:

- Veterinary Pathology (MS, PhD). Areas of emphasis include anatomic pathology, clinical pathology, or parasitology.
- Biomedical Sciences (MS, PhD). Areas of specialization include anatomy, physiology, pharmacology, and cell biology.
- Veterinary Microbiology (MS, PhD). This program offers the option of a PhD in Veterinary Microbiology with emphasis in Preventive Medicine by completing the required microbiology courses (bacteriology, virology and immunology) plus 4 courses in preventive medicine cross-listed with VDPAM and taught by VDPAM faculty. The proposed program does not require microbiology courses and will focus on population aspects of animal health.

Other doctoral programs offered at ISU that share a focus on animals include:

- Animal Science (MS, PhD). This program has a broad focus in the animal science. Students

take courses in: breeding, nutrition, physiology, reproduction, and meat science, while focusing on one species of domestic animals. Areas of specialization in animal science are applied ethology, breeding, genetics, nutrition, physiology, reproduction, and meat science.

- Animal Breeding and Genetics (MS, PhD). Areas of specialization include quantitative genetics (PhD), molecular genetics (PhD), and immunogenetics (PhD).
- Ecology and Evolutionary Biology (MS, PhD). Self-described as "...the study of mechanisms controlling the composition, structure, and functional processes of ecological systems and the mechanisms that regulate the pattern and rate of evolutionary change within and among species." (<https://eeb.iastate.edu/>)

None of these programs share the proposed focus on the population-based approaches to veterinary preventive medicine, animal health and animal welfare.

**f. The relationship of the proposed new program to existing programs at other colleges and universities in Iowa, including how the proposed program is different or has a different emphasis than the existing programs.**

The University of Iowa offers a variety of graduate programs that involve population health through the College of Public Health. Areas of emphasis include Biostatistics (MS, PhD), Clinical Investigation (MS), Community and Behavioral Health (MS, PhD), Epidemiology (MS, PhD), Health Management and Policy (MHA), Health Services and Policy (PhD), Occupational and Environmental Health (MS, PhD), and Master of Public Health (MPH).

The programs focus on human health issues, thus, the proposed program does not duplicate existing doctoral programs at other colleges and universities in Iowa.

The Population Sciences in Animal Health PhD program will expand opportunities to collaborate with University of Iowa in multidisciplinary areas including "One Health". According to the Centers for Disease Control and Prevention (CDC) "*One Health recognizes that the health of people is connected to the health of animals and the environment. The goal of One Health is to encourage collaborative efforts of multiple disciplines – working locally, nationally and globally – to achieve the best health for people, animals and our environment*".<sup>1</sup> Moreover, CDC stated that "*One Health approach is important because 6 out of every 10 infectious diseases in humans are spread from animals*"<sup>1</sup>.

**Reference cited in section 1f:**

<sup>1</sup> <https://www.cdc.gov/onehealth/>

**g. Special features or conditions that make the institution a desirable, unique, or appropriate place to initiate such a degree program.**

The College of Veterinary Medicine's expertise is animal health. Within VDPAM, the breadth and depth of expertise represented in the faculty (n = 54) make the department uniquely qualified to lead the proposed program. There are 34 faculty holding a doctorate and thus in position to supervise students within the proposed doctorate program. Seventeen VDPAM faculty members have trained PhD students previously or currently, and 30 faculty members have served on PhD POS committee. Furthermore, VDPAM faculty include AVMA Board Certified specialists in theriogenology (n = 2), internal medicine (3), clinical pharmacology (1), surgery (1), dairy production medicine (1), poultry production medicine (1), swine production medicine (2), small ruminant production medicine (1), veterinary preventive medicine (4), pathology (4), toxicology (2), microbiology (2), epidemiology (1), and animal welfare (1), providing the potential for qualified students to concurrently seek board certification.

VDPAM faculty are kept abreast of health issues in animal populations across the state of Iowa through their day-to-day responsibilities and field contacts within the Veterinary Diagnostic Laboratory, Veterinary Extension, Veterinary Field Services, Food Animal and Camelid Hospital, and Food Supply Veterinary Medicine sections.

- In FY 2015, the Veterinary Diagnostic Laboratory (ISU-VDL), processed >80,000 diagnostic cases and performed >1.2 million diagnostic tests, of which >95% involved livestock / poultry health issues. The ISU-VDL is the largest laboratory among its peer institutions.
- In FY 2016, the Food Animal and Camelid Hospital attended 849 patients in the Production Animal Theriogenology (reproduction) section and 1,021 patients in the Medicine and Surgery section.

VDPAM faculty are heavily invested in teaching, including 97 food animal-related courses and 3 animal welfare courses in the veterinary curriculum and courses offered through the interdepartmental Veterinary Preventive Medicine program. In addition, the Swine Medicine Education Center's teaching/research/outreach programs contribute to the prestige and visibility of the department. Housed within VDPAM since its inception in 2010, the Center's teaching programs have brought in 375 students from 24 different universities, >100 veterinarians from outside the U.S., and pig production executives from 31 different countries. In recognition of its expertise and competency, the Center also teaches swine medicine to veterinary students at the University of Tennessee, Kansas State University, the University of Wisconsin, and has contracts to provide instruction at the Midwestern University College of Veterinary Medicine in Arizona, and the Lincoln Memorial University in Harrogate, TN.

VDPAM faculty are active and productive researchers. In FY 2015, VDPAM faculty generated \$27.6 million in extramural funding (102 active grants) and produced 111 refereed publications, 359 proceedings, and 249 abstracts. Their work resulted in 324 invited oral presentations, including international meetings in Argentina, Belgium, Brazil, Canada, Chile, China, Colombia, Cuba, Germany, Italy, Japan, Korea, Mexico, Norway, Philippines, Poland, Thailand and the United Kingdom.

**h. Are the university's personnel, facilities, and equipment adequate to establish and maintain a high quality program?**

The present physical and human resources are sufficient for the foreseeable program needs. That is, the program in Population Sciences in Animal Health will utilize resources that are currently available through the CVM and/or have been developed for the current Certificate and MS-level programs.

**i. How does student demand for the proposed program justify its development?**

The ISU CVM does not offer a PhD-level graduate program focused specifically on Population Sciences in Animal Health. Potential U.S. and international students currently join similar programs at other Universities including the University of Minnesota, the University of Guelph, University of California – Davis and/or Kansas State University. Each of these universities has a pool of 40-60 graduate students focused on population sciences.

The proposed program would leverage existing ISU CVM resources and open new opportunities to expand graduate student admissions by recruiting students enrolled elsewhere. Moreover, because the proposed program is multidisciplinary by nature, it will expand opportunities for collaborative work within the CVM and between other Colleges and Universities.

In summary, the new program will train generations of high degree professionals capable of keeping Iowa's \$18 billion animal agriculture industry sustainable and strong over time. In other words, the VDPAM Population Sciences in Animal Health doctorate program will generate

science and professionals to help secure and improve the health and welfare of livestock and poultry industries in Iowa.

2. **Describe the state and/or national workforce need and/or demand for graduates of the proposed program currently and in the foreseeable future (provide documentation about the current sources of data used to estimate need and demand).**

The development of science and technology in animal health and animal welfare is proceeding at an unprecedented rate. Other parts of the world are applying “Precision Livestock Farming” techniques faster and more widely than we are seeing in the U.S. To remain sustainable and economically competitive, we must be in a position to evaluate and then implement the best of the newest technologies to Iowa livestock producers. Independent producers and integrated production systems rely on Land Grant institutions to keep them on the leading edge.

In addition, recent events highlight the need to strengthen our capacity for early detection and rapid, effective responses to emerging/re-emerging animal agriculture issues in Iowa and elsewhere. Iowa Secretary of Agriculture Bill Northey<sup>1</sup> noted that the recent (2014-2015) Pathogenic Avian Influenza outbreak was described by the USDA as the “*largest animal health emergency in the U.S. history*”, and that “*Iowa and Minnesota were the most severely impacted [among the 21 affected states]*”. He acknowledged the urgent need to “*make additional preparations to a foreign animal disease outbreak*” by “*increasing the capacity of the animal industry bureau and providing resources to better equip and prepare for future responses*”. The VDPAM Population Sciences program will contribute bridging this gap.

**Reference cited in section 2:**

<sup>1</sup> Iowa Department of Agriculture’s Animal Industry News volume 17, Issue 1 (2016)

3. **List all other public and private institutions of higher education in Iowa currently operating programs similar to the proposed new degree program. (For comparison purposes, use a broad definitional framework, e.g., such identification should not be limited to programs with the same title, the same degree designation, having the same curriculum emphasis, or purporting to meet exactly the same needs as the proposed program).**

As reviewed in 1d and 1e above, the focus of the proposed program is unique and would not duplicate any programs offered elsewhere within the state of Iowa. At present, students interested in Population Sciences seek admission to Universities in other states.

**If the same or similar program exists at another public or private institution of higher education in Iowa, respond to the following questions:**

Not applicable

- a. **Could the other institution reasonably accommodate the need for the new program through expansion? Describe collaboration efforts with other institutions.**
- b. **With what representatives of these programs has there been consultation in developing the program proposal? Provide a summary of the response of each institution consulted.**



- c. Has the possibility of an inter-institutional program or other cooperative effort been explored? What are the results of this study? (Consider not only the possibility of a formally established inter-institutional program, but also how special resources at other institutions might be used on a cooperative basis in implementing the proposed program solely at the requesting institution.)
  - d. Do other colleges in Iowa offer programs similar to the proposed program at comparable quality and cost?
  - e. Are letters of support included with the program proposal?
4. Estimate the number of majors and non-majors students that are projected to be enrolled in the program during the first seven years of the program.
- a. Undergraduate

Undergraduate	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7
<b>Majors</b>	N/A	N/A	N/A	N/A	N/A	N/A	N/A
<b>Non-Majors</b>	N/A	N/A	N/A	N/A	N/A	N/A	N/A

b. Graduate

Graduate	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7
<b>Majors</b> (new enrollments)	2	2	4	4	4	6	8
<b>Majors</b> (cumulative count of enrolled students)*	2	4	8	12	16	22	28
<b>Non-Majors</b>	N/A	N/A	N/A	N/A	N/A	N/A	N/A

\* assuming average time of 5 years to graduate.

c. What are the anticipated sources of these students?

Population Science in Animal Health builds on the current VDPAM MS in Veterinary Preventive Medicine (VPM), as is appropriate. As previously noted, the proposed program complements and leverages this program by providing the possibility for strong students to achieve the terminal degree (PhD), i.e., will enhance student recruitment.

We anticipate recruiting U.S. and international applicants from the following sources:

- ISU CVM veterinary graduates interested in Population Sciences in Animal Health. In 2016, 65% of ISU Veterinary Medicine graduates chose food or mixed-animal practice.
- Swine Medicine Education Center alumni. The Center's domestic and international outreach brings a high degree of visibility to ISU and our programs and the opportunity to recruit students with diverse backgrounds.
- VDPAM Veterinary Preventive Medicine (MS and/or Certificate students in the ISU Veterinary Preventive Medicine (VPM).
- Professionals working in the field who seek further education to advance in their career in research, teaching or service/outreach.
- New recruits contacted through networking and academic and professions organizations such as American Association of Swine Veterinarians, American Association of Bovine Practitioners and American Association of Avian Pathologists.

5. If there are plans to offer the program away from the campus, briefly describe these plans, including potential sites and possible methods of delivery instruction. Will off-

**campus delivery require additional HLC accreditation?**

Not applicable.

**6. Has the proposed program been reviewed and approved by the appropriate campus committees and authorities?**

In process.

**7. List date the program proposal was submitted to the Iowa Coordinating Council for Post High School Education (ICCPHSE) and results of listserv review.**

Plan to submit by the Spring semester of 2018.

**8. Will the proposed program apply for programmatic accreditation? When?**

Not applicable.

**9. Will articulation agreements be developed for the proposed program? With whom?**

Not applicable.

**10. Will there be opportunities for student internships?**

Yes. Research projects conducted by graduate students enrolled in the proposed program will offer internship opportunities for undergraduate and/or professional students.

**11. Describe the faculty, facilities, and equipment that will be required for the proposed program.**

As discussed in 1h, the Population Sciences in Animal Health will utilize the physical and human resources that are available through the CVM and/or have been developed for the current Certificate and MS-level programs. Office space for graduate students and laboratory space for field-based research is limited in the department and college. To assure success of the program and take full advantage of opportunities to conduct population medicine research in the field more space is needed for these purposes.

**12. From where will the financial resources for the proposed program come (list all that apply, e.g., department reallocation, college reallocation, grants, new to the university)?**

As with other existing graduate programs at the ISU CVM, financial support to cover student tuition, salary, and research projects will be provided by graduate faculty. There will be no department (VDPAM) or College (CVM) funds reserved to this program. VDPAM faculty has been successful to secure funding for graduate education and research:

<b>SOURCES</b>	<b>TOTAL AMOUNT</b>
VDPAM faculty	Approximately \$ 1,000,000 <sup>1</sup>
Fellowships (IVMA, Pharmaceutical companies)	Approximately \$ 800,000 <sup>2</sup>

References for section 12:

<sup>1</sup> In FYs 2012-2015, VDPAM Graduate Faculty secured \$1,134,773 of support for graduate student stipends, 51% from Federal grants and 49% from other sources (industry partners, VDPAM service unit funds, and commodity groups).

<sup>2</sup> Fellowships from entities including Boehringer Ingelheim Vetmedica, Inc., Zoetis, Inc., Iowa Pork Producers Association.

**13. Estimate the total costs/total new costs (incremental increases in expenditures) that will be necessary for the next seven years as a result of the new program. Be as specific as possible.**

Costs to support graduate students (tuition and salary), and to conduct research projects associated with the new program will be originated from research grants from graduate faculty, as discussed in the previous section. The costs associated with program administration (i.e. program assistant), and graduate student space (i.e. offices) are described below:

	TOTAL EXISTING COSTS	TOTAL NEW COSTS	TOTAL COSTS
Year 1	\$15,827	0	\$15,827
Year 2	\$16,302	\$30,000	\$46,302
Year 3	\$16,791	\$10,000	\$26,791
Year 4	\$17,295	\$10,300	\$27,595
Year 5	\$17,814	\$10,609	\$28,423
Year 6	\$18,348	\$21,855	\$40,203
Year 7	\$18,899	\$22,510	\$41,409

Budget justification: The current total costs are associated with program coordinator's (Ms. Erica Hellmich) percentage time spent on the current graduate program. We anticipate no new costs in year 1. Year 2 costs are budgeted for remodeling office space to allocate new PhD students. Years 3-5, and Years 6-7 reflect additional administrative effort (program assistant, 25%, and 50% respectively).

**14. Describe the marketing plan developed to communicate the new program and recruit students.**

The following channels will be used to advertise the new program and recruit students:

- ISU CVM and VDPAM websites
- Professional meetings including the ISU James McKean Swine Disease Conference, Allen D Lemman Swine Conference, International Pig Veterinary Society Congress, American Association of Swine Veterinarians annual meeting, Annual Conference of the American Association of Bovine Practitioners, American Association of Avian Pathologists Annual Meeting, Swine Feed Efficiency, Iowa Swine Day, and World Pork Expo.
- Newsletters (American Association of Swine Veterinarians, American Association of Bovine Practitioners and American Association of Avian Pathologists)
- VDPAM Faculty networking

**15. Describe the program evaluation plan to determine if the program is meeting the intended objectives, if the expected student enrollment has occurred, funding for the program, and any other components that affect the effective operation of the program.**

Progress of graduate students and of the proposed program will be measured and evaluated according to the following proposed benchmarks:

Benchmarks for students completing the PhD in Population Sciences in Animal Health

- GPA  $\geq$  3.0 on a 4-point scale
- $\geq$  2 peer-reviewed publications
- Have attended a regional, national, or international Conference, and presented (oral/poster) at least one research-related work
- Have passed qualifying examination

Expectations for students and major professors

- POS committee meeting should be held at least yearly, with more frequent one-on-one meetings between the student and major professor.
- Greater than 50% of students funded through PI's grants
- 100% job placement or further education of all graduates

Assessing student progress

The VDPAM PhD program DOGE will meet with graduate students twice per year: one meeting in the spring semester with all students and a fall semester meeting with each student individually. The objective of the meetings is to understand and document overall student progress, student concerns, and identify potential areas of improvement.

Continue tracking of graduation rate and placement, following key parameters:

- PhD graduates (total, concurrent, non-concurrent)
- Placement of PhD graduates
- Type of job for placed PhD graduates

**16. Include any additional information that justifies the development of this program.**

Animal agriculture in Iowa is worth approximately \$34,000,000,000 and is a key economic sector in the State of Iowa. The Population Sciences in Animal Health program will create a reference, research, and teaching center for welfare and health in animal populations. In addition to animal health challenges, understanding and addressing the public's expectations for animal health and welfare is core to the mission. Anticipating upcoming animal health challenges by training a cadre of future leaders in this area is the responsible thing to do.

Creating a Population Sciences in Animal Health program will result in research and development on this key area for the State of Iowa, which will contribute towards positioning ISU as a reference center for practitioners and key opinion leaders in the livestock industry. The interaction between ISU and the "field" is crucial to ensure that our research programs are positively impacting the animal agriculture in Iowa.

The proposed program will leverage and take full advantage of existing resources available in the ISU CVM, expanding opportunities to expand graduate student enrollments and funding/research.

**IOWA STATE UNIVERSITY**  
OF SCIENCE AND TECHNOLOGY

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February 21, 2017

To Whom It May Concern:

The VCS graduate program reviewed and support the proposal to develop a PhD program in Population Sciences in Animal Health. We perceive no duplication or significant overlap with our existing program and believe this program will benefit the ISU College of Veterinary Medicine by expanding graduate student enrollments and by expanding opportunities for collaborative research projects.

Sincerely,



Albert E. Jergens, DVM, PhD, DACVIM  
Professor and Associate Chair for Research and Graduate Studies (DOGE)  
Donn E. and Beth M. Bacon Professorship in Small Animal Medicine and Surgery  
Department of Veterinary Clinical Sciences  
College of Veterinary Medicine

**Department of Biomedical Sciences,**

Iowa State University,  
Ames, IA 50011,  
USA

2-27-2017

To whom it may concern:

**VDPAM Population Sciences in Animal Health PhD**

I am writing this reference in support of the new proposed VDPAM Population Sciences Graduate Program.

I as DOGE of the BMS, and Interdepartmental Toxicology, Graduate Programs have reviewed and support the proposal to develop a PhD program in Population Sciences in Animal Health. I perceive no duplication or significant overlap with our existing programs and believe this program will benefit ISU and the ISU College of Veterinary Medicine by expanding graduate student enrollment and by expanding opportunities for collaborative research projects.

The training of PhD and MS graduate students in Population Sciences in Animal Health by VDPAM is now needed, is appropriate and required for the general advance and training of the Veterinary Profession, of Production Animal Medicine and future leaders of Animal Health; it will allow the creation and dissemination of knowledge in the area of population Sciences in Animal Health.

Sincerely,



**Richard J. Martin**, BVSc, PhD, DSc, DipECVPT, MRCVS  
BMS and Toxicology DOGE  
Clarence Hartley Covault Distinguished Professor, Pharmacology,  
Department of Biomedical Sciences,  
Iowa State University,  
Ames, IA 50011  
Phone: 515-294-2470  
Email: rjmartin@iastate.edu

**IOWA STATE UNIVERSITY**  
OF SCIENCE AND TECHNOLOGY

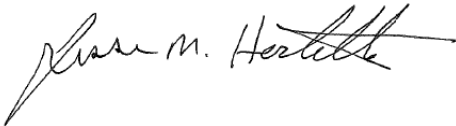
College of Veterinary Medicine  
Department of Veterinary Pathology  
Ames, Iowa 50011-1250  
515-294-0877  
FAX 515-294-5423

February 20, 2017

Dr. Linhares

The faculty in the Department of Veterinary Pathology have reviewed this request and have not found significant overlap or duplication with any of our current graduate programs.

Thank you



Jesse M. Hostetter, DVM, PhD, DACVP  
Professor  
Director of Graduate Education – Veterinary Pathology  
College of Veterinary Medicine  
Iowa State University  
Ames, IA. 50011  
515-294-0953

Feb 27, 2017

Dear Daniel,

The VMPPM graduate program has reviewed and supports your proposal to develop a PhD program in Population Sciences in Animal Health. We perceive no duplication or significant overlap with our existing program and believe this new program will benefit the ISU College of Veterinary Medicine by expanding graduate student enrollment and by expanding opportunities for collaborative research projects between our graduate faculty and students.

Sincerely,



Nancy Cornick

DOGE, Veterinary Microbiology and Preventative Medicine



## Academic Program Approval Voting Record

This document is to be appended as the last page of the proposal for any new or revised academic program to record the successive votes of approval as the proposal moves through its required review and approval steps. Consult Faculty Handbook Section 10.8 or the Faculty Senate Curriculum Committee website for information regarding Committee review and voting requirements for each action.

Curricular Action: (check appropriate boxes below)

1.  **New Program**    Name Change       Discontinuation       Concurrent Degree for:
2.    Undergraduate Major    **Graduate Major**    Undergraduate Minor    Graduate Minor  
       Undergraduate Certificate    Graduate Certificate       Other: \_\_\_\_\_
3. Name of Proposed Change: Population Sciences in Animal Health Ph. D Program
4. Name of Contact Person: Daniel Linhares e-mail address: Linhares@IAState.edu
5. Primary College: College of Veterinary Medicine (CVM) Secondary College: N/A
6. Involved Department(s): Veterinary Diagnostic and Production Animal Medicine (VDPAM)

**Voting record for this curricular action:**

Voting Body	Votes			Date of Vote
	For	Against	Abstain	
<b>Dept. or Program Committee</b>				
Veterinary Diagnostic and Production Animal Medicine (VDPAM) Research and Graduate Studies Committee	6	0	0	November 16, 2016
Veterinary Diagnostic and Production Animal Medicine (VDPAM) department	40	0	0	December 14, 2016
<b>College Curriculum Committee</b>				
College of Veterinary Medicine (CVM) Graduate Curriculum Committee	6	0	0	April 18, 2017
<b>College Approval Vote</b>				
CVM Faculty	92	6	0	June 23, 2017
CVM Dean's Cabinet	11	0	0	August 1, 2017
<b>Graduate Council</b>	11	0	0	Oct. 18, 2017
<b>Faculty Senate Curriculum Committee</b>				
<b>Faculty Senate Academic Affairs Council</b>	7	0	0	Nov 7, 2017
<b>Faculty Senate</b>				