

An essential need: creating opportunities for veterinary students and graduates to gain an appreciation of responsibilities and opportunities in global veterinary issues

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Summary

Globalisation trends and bioterrorism issues have led to new concerns relating to public health, animal health, international trade and food security. There is an imperative to internationalise and strengthen global public health capacity by renewed emphasis on veterinary public health in veterinary education and increasing opportunities for elective experiential learning in public practice programmes for veterinary students. Recent experience with a US-Brazil Higher Education Consortia Program is used as an example of potential ways in which veterinary students can gain an appreciation for global veterinary issues.

Keywords

Academic exchanges – Curriculum – Education – Geographic information systems – Globalisation – International veterinary medicine – Veterinary public health – Western hemisphere.

Introduction

New concern over bioterrorism and global pandemics have lent new urgency to public health preparedness and planning. Global health agencies in the United Nations, the World Organisation for Animal Health (OIE), the Centers for Disease Control and Prevention (CDC) and counterpart agencies in Europe and elsewhere have responded by offsetting new risks in a smaller world of increased travel,

trade and intensive agriculture by improved surveillance and a new reserve of intervention capabilities. There is a sense of medical drama in vaccine stockpile-creation, deployment of CDC 'Disease Cowboys' (3) and the surge in capability of CDC Epidemic Intelligence Service officers (4), field epidemiology training programmes, veterinary response teams and enhanced inspection systems of food for export. Close analysis of these new threats, however, soon leads back to the wisdom of readiness for all-hazard risks, natural or man-made, and the dangers of emerging or

introduced diseases that in many respects have always been there (2, 9). Capabilities at the local level remain key – there is a need to raise the international public health standard for dealing with diseases at source, not at borders, and for implementation of a higher standard for education of national public health corps (1).

If the imperative is to internationalise and strengthen global public health capacity, programmes addressing this issue must be incorporated into the educational system. This has begun to happen. There is a renewed vision of ‘One Medicine, One Health’ within the veterinary medical community (7) and this has stimulated expansion of existing partnerships between Schools of Public Health (SPH) and Colleges of Veterinary Medicine (CVM). Since 2002, this has led to the creation of 17 concurrent degree programmes, with more planned, for veterinary students in the United States (US) where both the Doctor of Veterinary Medicine (DVM) and Master of Public Health (MPH) degrees can be earned at the same time or in a reduced time period (5).

A global view of veterinary public health implies greater involvement in international studies within combined degree programmes. While students are exposed to emerging and exotic diseases as part of their education, how much better is it to study the effects of these diseases first hand where they occur and to study issues of control in two or more countries using a comparative approach? International collaboration within a globalised veterinary corps is needed before the veterinary community can succeed in the vision of ‘One Health’ and function with other professionals in the ‘team sport’ of public health. The authors make the case here for ways international educational exchanges can contribute to the ‘One Health’ model based on recent experience with a US-Brazil Higher Education Consortia Program (10).

Global studies in veterinary public health

Time available to veterinary students in North America for an elective curricular concentration in public health is typically limited to summers, elective course time, clinical block rotations or extra coursework above that required by the very demanding Doctor of Veterinary Medicine (DVM) curriculum. The DVM-Master of Public Health (DVM-MPH) concurrent degree programmes are tailored to utilise available student time to complete the 42-45 credit hours of formal coursework required for the MPH. This is often facilitated by on-line course offerings, intensive short courses in ‘summer institutes’ (8) or transferring credits (Cr) from similar courses in the veterinary curriculum (or another SPH) toward the MPH degree. Field experience

and capstone requirements (6-8 Cr) of MPH programmes accredited by the Council on Education for Public Health (CEPH) provide an opportunity for overseas study, enabling students to gain first-hand experience in global veterinary public health (the Association of Schools of Public Health manages several such internships and fellowships: [ww.asph.org](http://www.asph.org)). Several avenues are available for students interested in public health to pursue international study.

Individual projects

Individualised project study has been the standard path for US veterinary students to take part in international studies, using funds available at home universities, outside funding agencies, or self-funding. High student initiative is required, assisted by faculty members’ overseas contacts and the college coordinator of international studies. The levels of support, the duration of study and the project topics vary widely. For example, since 2001, Louisiana State University (LSU) has sent an average of two to three veterinary students per year on individualised project travel of six weeks or more using funds from the LSU Travel Fellowship in International Veterinary Medicine, or supported by more generous awards from faculty research funds or foundations such as the Geraldine R Dodge Foundation or the Nestle Purina Veterinary Student Summer Research Fellowships programme. Very often a modest \$1,000 (all dollar amounts are given in US\$) travel fellowship is the decisive factor in student willingness to embark on an overseas veterinary adventure. Of nineteen LSU students, five completed studies in Ethiopia, six in Thailand, four in China, two in Italy, and one each in Yugoslavia and Egypt. Other students have used the contact lists and linkage resources of the student-governed International Veterinary Student Association to arrange time abroad, mostly with private veterinary practitioners in western countries. If study plans are pre-approved as field experience or capstone coursework according to SPH criteria, many of these overseas studies by veterinary students can be applied as credit hours toward the MPH degree.

Individual projects offer a wide range of possibilities, but there is little programmatic focus and there is lack of parity in exchange of veterinary students between universities. In US veterinary colleges, there is a problem of available space in clinical courses unless a one-to-one student exchange is in place, and visiting students are limited by immigration visa rules in the extent to which they can handle and treat animals. The result is limited hosting of veterinary students from overseas on short-term clinical rotations, although this imbalance may later be offset by the greater number of overseas veterinary students who enter US graduate schools or residency programmes.

Structured group study programmes

Veterinary students can take part in a variety of international group learning tours, structured short-term courses of variable length or summer-long programmes that may involve aspects of public health or zoonotic diseases. Full-time faculty or resident directors typically supervise well designed, structured programmes, often with significant course subscription costs. Examples of available courses are Envirovet, a popular team-taught, seven-week programme in which students spend four weeks at Florida and Georgia field sites and three weeks in Zanzibar, and wildlife medicine courses such as Vet Adventure or EcoLife Vets-In-The-Wild Expeditions (both three weeks) in South Africa. An innovative programme of semester or summer abroad for undergraduates interested in public health was recently begun by the Organization for Tropical Studies based at Duke University that may be adapted for professional school students. Students selected for the programme travel to three study sites in Costa Rica over a 15-week period where they complete four university accredited courses presented as field-based, hands-on learning by lecture/discussion, readings and field trips (16 Cr):

- Tropical Medicine and Public Health
- Research Practicum
- Ethnobiology
- Culture and Language.

A two-week stay with Costa Rica host families increases Spanish language skills.

Exchange programmes via university-to-university cooperative agreements

International cooperative agreements between university partners are a frequently used mechanism to establish exchange programmes that facilitate active student, faculty and research collaboration between partner universities. University exchange programmes provide a number of advantages over individualised projects. Most importantly, a history of interaction is built that fosters long-term special relationships, mutual familiarity of programmes and faculty, bi-lateral recognition of course credits, ease of placement of exchange students and faculty, and parity in student numbers from each partner.

The option of semester or year-long immersion of students in courses within existing university curricula is limited for veterinary students because of barriers to transferability of courses, the necessity for language fluency, the number of seats mandated for each class, and lock-step curriculum schedules where only summers or clinical year elective time are available. Innovative approaches may increase the popularity of the curriculum immersion option. Recent initiatives aimed at harmonisation of veterinary education in the European Union (EU) that allow students to attend

other EU veterinary colleges via the ERASMUS programme (European Region Action Scheme for the Mobility of University Students) have been successful in Europe where most students are proficient in at least one other language (6, 11).

An alternative approach that combines mentored field projects, language training and some formal coursework may enable veterinary students to undertake global public health studies abroad with more flexibility. In the following discussion, the authors make the case for wider use of international academic partnerships as a way to promote the goal of a globalised veterinary public health community, citing as an example the authors' recent experience with a US-Brazil higher education consortium project.

Fund for the Improvement of Postsecondary Education

In the US, the Fund for the Improvement of Postsecondary Education (FIPSE) programme represents a first-of-a-kind collaboration among the US Department of Education and foreign government agencies to fund and coordinate innovative programmes that foster student exchanges and multilateral curricular development, enabling students to 'internationalise' through study abroad. FIPSE support of transnational integration of campus curricula includes support for several programmes that accommodate a range of academic and professional disciplines: the European Union-United States Atlantis Program, the Program for North American Mobility in Higher Education (US, Canada and Mexico), the United States-Russia Program, and the US-Brazil Higher Education Consortia Program. Since its inception in 1992, FIPSE international programmes have provided US federal funding that, matched by counterpart government agencies, has funded over 2,000 projects that promote international education partnerships, including veterinary medicine. These innovative FIPSE programmes are structured to overcome common barriers to internationalisation of higher education by US and overseas partner universities, typically two in each country, on a number of fronts.

A US-Brazil Higher Education Consortium was initiated in 2004 by establishing an academic exchange partnership between LSU, the University of Minnesota (UMN) and Southern University (SU) in the US and the Federal University of Bahia (UFBA) and Sao Paulo State University (UNESP) in Brazil. Students from veterinary medicine, medicine, public health and the social, environmental and agricultural sciences were linked in an interdisciplinary programme entitled 'Health, Environment, Livestock and People: An International Learning Community'. The project centred on mentored student study in the

laboratories of host university faculty using an experiential learning approach. The objectives of the consortium were:

- to establish an interdisciplinary course of study that enables mentored student studies on hemispheric health through an educational exchange of students at universities in the US and Brazil. The programme is open to students enrolled in veterinary school, medical school, schools of public health and graduate/advanced undergraduate students in the social, agricultural and environmental sciences;
- to utilise geographic information systems and remote sensing (GIS/RS) methods to develop a medical 'spatial database infrastructure' for use in analysis of the environmental risk of human and animal disease and the potential societal effects of health issues related to globalisation, trade, food security and international development;
- to implement sustainable veterinary school, medical school, school of public health, and graduate school educational linkages in the US and in Brazil that increase the capability of addressing emerging threats to animal and human health in the western hemisphere.

Programme implementation

The first project year was devoted to planning and preparation. A representative from each of the partner universities and the external examiner convened at the annual Project Director's meeting in Brazil for this purpose. Planning phase activities included course development, recruitment of a pool of potential faculty mentors, student recruitment and publicity, development of programme

schedules and evaluation plans. A formal international cooperative university exchange agreement was signed by authorised representatives of each of the partner universities in the first project year to facilitate multi-university programme development and to ensure consortium commitment. During the three subsequent years (2005-2008), the student exchange programme supported a total of 27 students from the US and 32 students from Brazil. Of the total 27 US participants, mobility stipends were provided from FIPSE funds for 22 US students. Matching funds for 28 Brazilian students were provided by the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES), the Brazilian counterpart of the US Department of Education. Nine additional students joined the programme using separate funds: four from Brazil were self-funded and five from the US were provided with funding from home veterinary colleges. The latter US students applied for the programme after seeing an announcement of the Brazil international study opportunity through the American Association of Veterinary Medical Colleges (AAVMC) International Education Committee. Programme timelines and key events for summer studies by US students in Brazil and semester-long studies by Brazilian students in the US are shown in Figure 1.

Student recruitment and selection

The programme was advertised using flyers, student email lists, special lectures and by classroom contact. Applications were ranked and selected for funding based on a two- to three- page essay on background interests and proposed projects, a curriculum vitae, and an interview to evaluate personal qualifications and language skills. Assisted by project directors, student awardees then

Brazilian Students ^(a)



US Partner Sites – 16 weeks

Health, Environment, Livestock and People (3-6 credits)
2-week introduction, GIS Course, 12-week project
English tutoring

US Students ^(b)



Brazil Partner Sites – 9 weeks

Health, Environment, Livestock and People (3-6 credits)
2-week introduction, GIS Course, 7-week project
Portuguese tutoring

The first year that the programme ran, Brazilian students arrived in the autumn semester; in the 2nd and 3rd years they arrived in the spring semester
a) between 9 and 10 Brazilian students took part in the programme each year
b) between 7 and 11 US students spent the summer in Brazil each year
GIS: geographic information systems

Fig. 1
Comparison of the timelines for US and Brazilian students taking part in the exchange project run by the US-Brazil Higher Education Consortium

Students from Brazilian universities spent a semester (16 weeks) at US partner sites and US students spent 9 weeks in Brazil during their summer break

Table I
Number of exchange students at partner universities in the United States and Brazil, 2005-2008

| University of origin | To Brazil | | | | | To USA | | | | |
|----------------------|-----------|-----|-----|------|--------|--------|-----|-----|------|--------|
| | DVM | MPH | Med | Grad | Adv UG | DVM | MPH | Med | Grad | Adv UG |
| LSU | 4 | 3 | | 3 | | | | | | |
| UMN | 5 | 1 | 1 | 1 | | | | | | |
| SU | | | | 1 | 2 | | | | | |
| Other university * | 5 | | | 1 | | | | | | |
| UFBA | | | | | | 14 | | 3 | | 1 |
| UNESP | | | | | | 14* | | | | |

LSU – Louisiana State University

UMN – University of Minnesota

SU – Southern University

UFBA – Federal University of Bahia

UNESP – Sao Paulo State University

DVM – Veterinary medical students

MPH – Master of Public Health student

Med – Medical student

Grad – Graduate School

Adv UG – Advanced undergraduate

* Of 27 students from the USA, two were from Kansas State University, two were from Virginia Polytechnic Institute and one was from Mississippi State University

** 3 funded from other sources

contacted a mentor from those listed at host universities and negotiated work plans during the semester before travel. The number of student participants is listed, by university and discipline, in Table I.

Language preparation

For US students, \$1,000 of a total \$4,500 student stipend was allocated for language training. Language mastery at the minimum level of completion of a Beginning Portuguese 101 course was required (based on a national test standard) by the end of the semester before summer travel, with subsequent tutoring in Brazil. The Portuguese course met twice a week at LSU and UMN. Distance learning was available for students not on site. Mandatory English language skills of Brazilian students were evaluated by interview. Most sought continued tutoring in the US.

Student assembly

For each exchange cycle, an initial two-week student assembly at LSU in the US or UFBA in Brazil was devoted to programme introduction, cultural orientation, student-mentor meetings, guest lectures, and field trips to local research and health care facilities. An intensive 10-module, computer-based laboratory short course on Geographic Information System (GIS) methods was given in week two. Based on approved work plans, students then dispersed to host universities to complete GIS projects (1 Cr) during 7 weeks (US students) or 14 weeks (Brazilian students) of mentored project study.

Mentored projects

Course credit for mentored project studies could be given using existing course numbers and titles in the students' home university curriculum, for example, as elective credit for veterinary students, as special topics for graduate students or as the field experience or capstone requirement

of MPH students in SPH. Most Brazilian students applied mentored studies in the US toward their 'Estagio', the requirement of Brazilian veterinary curricula for at least 400 h of faculty-supervised study on a veterinary topic in the final year.

Re-assembly and final reports

Students re-assembled as a group at LSU and SU in Baton Rouge, Louisiana, or at UNESP in Jaboticabal, Sao Paulo, for three days in the week preceding departure to submit a written report and an oral powerpoint presentation to fellow students and faculty on project results, including the GIS course project. Programme evaluation by students and faculty was also done at this time. Projects were highly individualised based on mutual student and mentor interests and ranged from field/clinical studies to primarily laboratory research.

Outcome assessment

The primary goal of the consortium was to establish an interdisciplinary course of study that enables mentored student studies on hemispheric health through an educational exchange of students at universities in the US and Brazil. This objective was largely met. A total of 27 students from the US and 32 students from Brazil travelled to consortium partner universities in Brazil or the US. Numbers exceeded proposed targets (22 from each country) through provision of additional funding from CAPES for Brazilian students and recruitment of additional US students from other universities who were able to identify separate university travel funds supplemented by personal funding. The AAVMC played a key role in publicising and recruiting at-large students from other US universities.

The experiential study approach of the project combines the attractions of group study with the flexibility of individualised study plans. Students know there will be companions from home to share their experiences with and, within the broad objectives of the project, they can choose from a large number of topics within the wide range of hemispheric health issues. It is of interest that 60% of students gravitated to topics focusing on zoonoses/public health importance and that these studies were nearly ideally suited to meeting the MPH students' capstone/field experience requirement. Veterinary public health topics, along with topics that focused on food animal/trade issues (a third of all topics), were also very well suited to meeting the 'Estagio' requirement of Brazilian professional school students.

Faculty mentors were attracted by the short-term commitment to hosted students working on projects that fitted into laboratory activities taking place at the time. Over 60 mentors within consortium universities indicated their willingness to host students. Thirteen faculty had multiple mentorships during the three-year project, hosting a total of 31 of the 59 students, and this influenced how frequently a topic was chosen by students: Chagas disease – 5, Leishmaniasis – 5, West Nile Virus – 5, Brucellosis – 4, Tuberculosis – 3, Rickettsiae/Ehrlichia – 3, Leprosy – 3, Porcine Reproductive and Respiratory Syndrome Virus – 3, Human Immunodeficiency Virus – 3, Cysticercosis – 2 and Caprine Arthritis Encephalitis – 2. Host mentors were selected who had good English skills for project guidance and, with student effort to learn Portuguese, language issues were not a major obstacle.

Both Brazilian and US students succeeded in developing creditable projects at the time of the presentation of written and oral reports at student re-assembly. Project results were applied to an MPH capstone by three US students and toward the 'Estagio' by 22 Brazilian students. Eight students reported project results at international scientific meetings. Thirteen of 22 Brazilian students from Cycle 1 and 2 entered graduate school (five PhD, eight MS). Thus far, of seven Cycle 1 students from the US, two pursued a PhD and two are in residency programmes (MD-Pediatrics; DVM-Large Animal Medicine and Surgery). Students will be tracked for three years after graduation.

The mentored student project format is predicated on a high level of independence and initiative by students, commitment by mentors, and supervision by directors. Problems and pitfalls were sometimes encountered. The challenges students most often cited were the abbreviated study time, programme dependence on the level of commitment by mentors, financial concerns and frustration with the different ways of doing business in Brazil or the US. On several occasions students were re-assigned to a new mentor with a change of project due to

mentor inability to serve (e.g. Hurricane Katrina, illness) or lack of commitment. The consensus of the Directors is that three to four students at a given partner university, preferably sharing living space with host country students, is optimum for student mastery of language, cultural experience, and project management.

It is difficult to evaluate the personal enrichment of student participants. In exit interviews, students unanimously indicated that they enjoyed their time in Brazil or the US. Clearly, the US and Brazil share western culture, ethnicity and similar histories in many respects and shared experiences at partner universities built easy friendships among both Brazilian and US students. The cultural attractions of Bahia – beaches, music, food and a history dating back to the 1600s – and the closeness of the small college town of Jaboticabal were striking. Opportune attendance by the Director and an LSU Geography Evaluator at a party for US students hosted by UNESP students revealed indelible cultural seamlessness, comfortable familiarity and emotional departure of new discovered friends.

Course development

Two multi-institutional, multi-disciplinary courses were created by the project to be submitted for adoption as formal numbered courses in the curricula of consortium universities:

- Health, Environment, Livestock and People in the Western Hemisphere (3-6 Cr). Formal curriculum adoption of the course title and number will facilitate continuation of experiential studies on hemispheric health and assignment of credits for mentored projects;
- Geospatial Health and Environment (3 Cr). Credit was assigned for the short course (2 Cr) and course project (1 Cr) reported at the three-day project re-assembly. A South America 'Minimum Medical GIS Database and Manual' was used by students to create maps on specific diseases for final reports. An equivalent course is currently offered as a graduate course at LSU and as ENHS 6253 at the LSU School of Public Health. Louisiana State University and UFBA are designated official sites of the GnosisGIS International School for Geospatial Health (www.gnosisgis.org) for short course offerings.

Sustainability

Can FIPSE/CAPES consortia programmes be used as a model for future linkages elsewhere? For example, would there be benefits from similar US-East Africa and US-Southeast Asia academic consortia partnerships? And can the model be improved? Modifications of the FIPSE/CAPES programme to consider might be greater

emphasis on faculty linkages more likely to continue after project completion and result in cross-fertilised curricula and new bi-lateral research programmes. Current US-Brazil consortium plans call for renewal of consortium cooperative agreements for five more years and additional university partners in Brazil (Recife, Curitiba) and the US (via AAVMC). If more North American veterinary, medical and public health schools had a South American partner open to each other's students and faculty, how great an influence would there be on hemispheric health

development? Recent trends in veterinary medical education are toward internationalisation and emphasis on protecting public health and food security. Europeans are harmonising veterinary education (6, 11). In Latin America there is new interest in accreditation as a means for increasing standards (12). We propose that university-to-university academic exchanges are an underutilised avenue for globalisation of veterinary public health. ■

Une nécessité impérieuse : sensibiliser les étudiants et les vétérinaires diplômés aux responsabilités et aux possibilités dans le domaine vétérinaire à l'échelle mondiale

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Résumé

L'évolution de la mondialisation et les problèmes liés au bioterrorisme ont fait apparaître de nouveaux sujets de préoccupation dans les domaines de la santé publique, de la santé animale, du commerce international et de la sécurité alimentaire. Il est impératif d'internationaliser et de renforcer les capacités de la santé publique à l'échelle mondiale, en renouvelant l'intérêt pour la santé publique vétérinaire dans les programmes d'enseignement vétérinaire et en multipliant les possibilités offertes aux étudiants en médecine vétérinaire d'effectuer des stages au sein du service public. L'expérience acquise par le programme conjoint d'enseignement supérieur États-Unis d'Amérique-Brésil permet aux auteurs de montrer comment on peut sensibiliser les étudiants aux questions vétérinaires à l'échelle mondiale.

Mots-clés

Amériques – Échange universitaire – Enseignement – Médecine vétérinaire internationale – Mondialisation – Programme d'enseignement – Santé publique vétérinaire – Système d'information géographique. ■

Una necesidad básica: ofrecer a los estudiantes y titulados en veterinaria la ocasión de aprehender las responsabilidades y oportunidades ligadas a problemas veterinarios de dimensión mundial

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Resumen

Las tendencias de la mundialización y el problema del terrorismo biológico han dado lugar a nuevas preocupaciones relativas a la salud pública, la sanidad animal, el comercio internacional y la seguridad alimentaria. Ahora es imperativo internacionalizar y fortalecer los medios de acción en materia de salud pública a escala mundial, por el expediente de hacer nuevamente hincapié en la salud pública veterinaria en los planes de estudios y de incrementar las posibilidades de aprendizaje práctico opcional en los programas de prácticas públicas dirigidos a los estudiantes de veterinaria. Los autores describen la reciente experiencia de un programa de enseñanza universitaria consorciada entre Estados Unidos y Brasil como ejemplo de posible método para que los estudiantes de veterinaria aprehendan globalmente una serie de temas veterinarios de dimensión mundial.

Palabras clave

Enseñanza – Hemisferio Occidental – Intercambios universitarios – Medicina veterinaria internacional – Mundialización – Plan de estudios – Salud pública veterinaria – Sistemas de información geográfica.



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