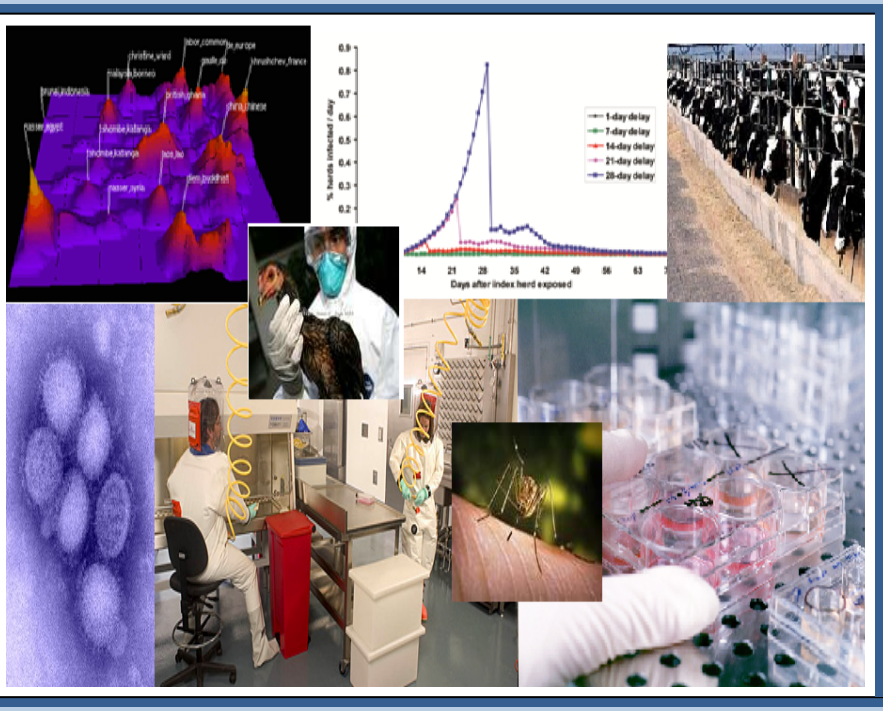

Global Public and Animal Health Protection and Defense: Educating the 21st Century Workforce

Using Stakeholder Input to Develop Educational Programs in Foreign Animal, Zoonotic, and/or Emerging Infectious Diseases

Co-hosted by:

FAZD CENTER
National Center for Foreign Animal and Zoonotic Disease Defense

TEXAS A&M UNIVERSITY
VETERINARY MEDICINE & BIOMEDICAL SCIENCES

Findings from the Forum on Strategic Actions for Advancing the Foreign Animal and Zoonotic Disease Defense Workforce

August 25-25, 2010

Columbus, Ohio

Prepared by the DHS National Center for Foreign Animal and Zoonotic Disease Defense Center and the Center on Education and Training for Employment

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1. Executive Summary

The DHS National Center for Foreign Animal and Zoonotic Disease Defense (FAZD Center) and the Center on Education and Training for Employment (CETE) co-hosted a DACUM (**D**eveloping **A C**urricul**UM**) occupational analysis workshop in Columbus, Ohio on August 25-26, 2010. A group of leading biodefense and biosecurity experts convened to assess the 21st century competencies (knowledge, skills and abilities) utilized by agencies whose workforce plays a critical role in protecting against high-consequence foreign animal, zoonotic and/or emerging infectious diseases.

The FAZD Center is a DHS Center of Excellence (COE) that advances and supports cutting-edge interdisciplinary research and education to provide integrated biodefense solutions against foreign animal, zoonotic, and/or emerging animal diseases. The FAZD Center is dedicated to research and education programs that protect the US agricultural and public health sector from potentially catastrophic disease events that pose risk to the overall well-being of animals, wildlife and/or humans, whether introduced naturally or intentionally.

CETE utilizes research-based practices that support workforce development; encourages and expands innovative nontraditional educational and career pathways; and promotes curriculum development and occupational analysis. CETE is committed to assist organizations, agencies, industries and academia build the intellectual capital needed to meet the demands of a global economy with a highly-trained, skilled and competent workforce.

The workshop panel included experts from diverse fields and disciplines, including emergency management, public policy, laboratory research and diagnostics, epidemiology, public health, veterinary medicine and food safety and security. The panel was charged to develop a Competency Profile (DACUM Research Chart) for a Global Public and Animal Health Protection and Defense expert as a function of multiple job occupations (i.e., agricultural scientist, veterinarian, epidemiologist, virologist, and/or microbiologist etc.). The panel utilized a research-based approach, known as the DACUM process, to identify the competencies needed to better prepare the nation's next generation workforce in foreign animal and zoonotic disease defense (FAZD). Specifically, the objectives of the workshop included the following:

1) Develop a national FAZD database of required core competencies for FAZD education, research and training;
2) Identify and determine current gaps and specific needs of the public sector workforce for FAZD prevention, response and recovery measures;
3) Predict future workforce trends;
4) Provide knowledge domains for future training initiatives.

The workshop outcomes included listing 8 overarching duties and 147 associated tasks. In addition, essential knowledge, skills and behaviors were identified. A complete listing of all outcomes can be found in Section 5. A summary of the Competency Profile (DACUM Research Chart) for Global Public and Animal Health Protection and Defense can be found online at http://fazd.tamu.edu.

2. Purpose and Approach of Workshop

There is a growing understanding that human health, animal health and the environment are inextricably connected. Foreign animal, zoonotic, and/or emerging animal diseases present a growing threat to human and animal health and endanger food security. An outbreak of one of these diseases can also have catastrophic economic effects. Therefore, increased education and training in detecting and responding to an outbreak is vital to our national security.

Creating and developing a workforce to protect from foreign animal and/or zoonotic diseases, requires a proactive, aggressive and comprehensive strategic approach that will include a broad knowledge base in basic and translational research, countermeasure development, diagnostic assay validation and deployment, epidemiologic and economic modeling and an innovative, 21st century technology-driven education and training program.

Traditionally, the approach to education is to determine what needs to be taught, teach it, and then test to see if the content was learned. Current research in education supports the transition to competency-based training, which is the alignment of training with the outcomes and assessment of worker performance in relation to specific worker conditions. The competency-based approach to training requires that educators and workers identify the necessary knowledge, skills, and behaviors as applied in real world conditions.[1,2]

"Global Public and Animal Health Protection and Defense Function"

All occupations in the field of biodefense and biosecurity related to prevention and protection, surveillance and detection, response and recovery, and threat awareness.

The purpose of the DACUM workshop was to gather information from agricultural and public health experts to identify the core competencies needed to train veterinarians, emergency managers, diagnosticians, medical regulators, public health professionals, epidemiologists and researchers whose job function encompassed "Global Public and Animal Health Protection and Defense." For this workshop a "Global Public and Animal Health Protection and Defense" function is defined as occupations in the field of biodefense and biosecurity. The fields of biodefense and biosecurity include occupations involved in disease 1) prevention and protection, 2) surveillance and detection, 3) response and recovery, and 4) threat awareness.

[1] Sandberg, J. Understanding human competencies at work: An interpretive approach. *Journal of Academic Management*, 2000. 43:9-25.

[2] Wolf, R.M. Evaluation in Education: Foundations of Competency Assessment and Program Review: 3rd Edition. New York, NY: Praeger Publishers, 1990.

FAZD DACUM Workshop Coordination Committee and Participants

- Co-Chair: Tammy Beckham, Director, FAZD Center and Texas Veterinary Medical Diagnostic Laboratory (TVMDL)
- Co-Chair: Heather Simmons, Education and Outreach Lead, FAZD Center
- Co-Chair: Jennifer Rinderknecht, Research Associate, FAZD Center

- Dr. Michelle Colby, Branch Chief, DHS S&T, Chem/Bio Division
- Dr. Paul Gibbs, Associate Dean for Students and Instruction, University of Florida, College of Veterinary Medicine
- Dr. Michael Gilsdorf, Executive Vice-President, National Association of Federal Veterinarians
- Captain Hugh Mainzer, Chief Veterinary Officer, United States Public Health Service, National Center for Environmental Health, Centers for Disease Control and Prevention (CDC)
- Mr. John Moser, Associate DACUM Program Manager, Ohio State University
- Dr. Suelee Robbe-Austerman, Veterinary Medical Officer, United States Department of Agriculture, Animal Plant Health Inspection Service, National Veterinary Services Laboratory
- Dr. Paul Williams, Director for Agriculture, Food and Veterinary Programs, Terrorism Emergency Response and Preparedness Division, Georgia Office of Homeland Security

Approach

DACUM is a research-based assessment to recruit, gather, synthesize and integrate stakeholder input to maximize educational and training programs. Specifically, the DACUM process is integrated into an occupational analysis model which can be used to create new education and training programs and revise or enhance existing programs.

The DACUM process involves a 2 day workshop, a panel of 5-12 experts, and a facilitator. During the FAZD Center workshop, the panel developed a competency profile chart outlining the Global Public and Animal Health Defense and Protection function into general areas of competencies (also known as duties). Each duty was further subcategorized into related tasks.

DACUM Operates on Three Premises….

- **Any occupation can be described in terms of skills required to perform specific tasks.**
- **Experts can describe their occupation better than anyone else**
- **All tasks, in order to be performed correctly, require certain knowledge, skills, tools and worker behaviors**

A Task Verification Analysis will be conducted later this year to verify the Competency profile constructed by the DACUM panel to confirm the accuracy of the results of the workshop.

3. Discussion Topics

The participants of the DACUM workshop were asked to focus their discussions within four thematic topics, in order to identify future educational training strategies:

- DACUM Competency Chart (consisting of duties and tasks)
- General Knowledge and Skills
- Tools, Equipment and Supplies
- Future Trends and Concerns
- Worker Behaviors

In the following section, the discussions from the panelists are summarized within the four topical areas.

4. Findings DACUM-Research Chart

Duty A: Administer Intersectoral Health Protection and Defense Policy
1. Examine societal trends in existing public health policy
2. Engage public and private stakeholders in policy process
3. Identify legislative activities, judicial findings, and regulatory priorities
4. Develop health protection and defense policies (e.g., interagency, agency)
5. Assess potential unintended consequences of health protection and defense policies
6. Perform cost/benefit analyses on policy and strategy
7. Develop health protection and defense guidelines
8. Develop a resource allocation plan (e.g., budget personnel, appropriations)
9. Implement health protection and defense policy
10. Establish an intersectoral unified command
11. Validate interoperability of policy implementation
12. Revise health protection and defense plans

Duty B: Manage Disease Prevention and Health Promotion Activities
1. Prioritize prevention strategies
2. Track foreign animal, emerging and zoonotic disease activity
3. Develop disease prevention and health promotion programs in response to new policies or disease situations
4. Review comprehensive frameworks for health protections (e.g., threats, drivers, opportunities)
5. Conduct risk assessment to identify critical nodes
6. Monitor animal, people, and product movement
7. Control animal, people, and product movement
8. Review risk data
9. Prioritize critical nodes
10. Develop risk management plan
11. Review existing mitigation practices
12. Identify protective health systems gaps
13. Evaluate animal & public health infrastructure
14. Identify population health vulnerabilities
15. Conduct health surveillance
16. Access health profession workforce for competency and adequacy
17. Monitor international disease control activities
18. Participate in international disease control and health promotion organizations (e.g., WHO, OIE, FAO)
19. Promote biosecurity and food security

20. Inventory national & international health assessments information (e.g., NAHMS, Healthy People)
21. Promote preventive medicine programs (e.g., vaccines)
22. Create health outcomes forecast program (e.g., visual analytics, visual assessment)
23. Approve points of entry for animals/animal products
24. Coordinate disease prevention or program activities with partner organizations
25. Administer federal veterinary accreditation program
26. Establish regionalization for disease risk
27. Ensure security of select agents

Duty C: Prepare for Incident Response
1. Assure diagnostic laboratory response capability
2. Perform homeland security exercise and evaluation program (HSEEP)
3. Develop incident response protocol, plans and responsibilities (e.g., LIMS, IDF)
4. Identify new response technologies
5. Identify incident response support information (e.g., meteorological, environmental quality, biological)
6. Identify multidisciplinary incident responders
7. Develop incident command team
8. Credential participating incident responders
9. Conduct proficiency testing on diagnostic lab
10. Maintain incident response plans (e.g., annexes, playbooks, ESFs)
11. Establish incident responder occupational safety and health training program (e.g., PPE, HazMat)
12. Develop responder resiliency plan (e.g., family support, mental health support)
13. Ensure adequacy of national stockpiles (e.g., vaccines, medical equipment, pharmaceuticals)
14. Establish animal disposal plan
15. Identify additional workforce needs and resources
16. Implement continuity of operations plan
17. Develop incident response scenarios and consequence models
18. Develop legal framework for incident response
19. Develop reach-back capability for subject matter expertise
20. Maintain emergency contracts
21. Establish mutual aid collaborations (e.g., EMAC, local, international)
22. Manage logistics & supplies for incident response (e.g., equipment, water, transportation)
23. Standardize diagnostic tests
24. Develop interactive incident response processes with stakeholders (e.g., podcasts, SMS messaging)
25. Recognize sentinel events (e.g., volcanoes, oil spill)
26. Establish diagnostic protocols for new/emerging disease conditions

Duty D: Detect and Diagnose Disease or Exposure
1. Develop field testing capabilities
2. Review regulatory requirements for disease reporting
3. Investigate abnormal clinical presentation
4. Determine sampling frame
5. Determine clinical sampling procedures
6. Collect diagnostic samples
7. Determine priority and optimal conditions for sample preservation & shipping
8. Manage laboratory testing, workflow & reporting
9. Correlate data from multiple diagnostic labs (e.g., human health, veterinary, environmental)
10. Provide diagnosis
11. Report diagnostic test results
12. Maintain lab quality assurance program

Duty E: Manage Incident Response
1. Recognize scope and magnitude of incident
2. Activate emergency response plan
3. Mobilize clinical health provider network
4. Manage affected populations (e.g., isolate, vaccinate, treat)
5. Establish movement controls (e.g., travel restriction, quarantine, zoning)
6. Establish surveillance within specific zones
7. Mobilize stockpile resources
8. Reduce or eliminate exposure to causal agent
9. Determine origin of causal agent (e.g., intentional, accidental, natural)
10. Implement epidemiological protocols
11. Establish incidence response at lowest political level (e.g., parish or county)
12. Implement incident communications plan
13. Initiate criminal/forensic investigations
14. Implement animal disposal plan
15. Assess impacted environmental or ecological systems
16. Conduct cleaning & disinfection of affected premises
17. Enhance surveillance outside zone
18. Identify need for new safety and health
19. Ensure responder safety and health
20. Administer indemnity programs
21. Coordinate volunteer activities
22. Ensure culturally sensitive incident response (e.g., animal welfare, vaccines)

Duty F: Coordinate Incident Recovery
1. Establish freedom from disease, infection, and exposure
2. Ensure decontamination of premises
3. Conduct post-incident surveillance
4. Determine national/international requirements for resumption of trade & travel
5. Deactivate emergency response centers
6. Activate disaster field offices and disaster recovery centers
7. Ensure animal/human welfare and well-being
8. Provide life sustaining essentials
9. Review and lift restrictions
10. Conduct incident damage assessment
11. Address environmental impact
12. Communicate recovery activities with constituencies and participants
13. Replenish stockpile inventories
14. Assures responder post-incident safety and health
15. Ensure restoration of affected infrastructure
16. Compile data for reports (e.g., after-action, epidemiological)

Duty G: Implement Outreach and Professional Development
1. Conduct stakeholder awareness training
2. Develop incident communications plan
3. Coordinate development of proactive outreach process (e.g., factsheets, IT infrastructure, communication networks)
4. Train PAHPD professionals in journalistic methods
5. Develop multi-modal training programs
6. Provide training for responders (e.g., just-in-time, job development)
7. Improve multidisciplinary awareness of other response functions
8. Identify outreach and development gaps & needs
9. Develop list of SMEs for outreach & professional development
10. Identify advocacy champions to assist in outreach (e.g., academic, industry, political)
11. Participate in professional development events (e.g., conferences, online courses, exercises)
12. Establish career development continuum (e.g,. training, certification)

Duty H: Conduct Research and Evaluation
1. Create new decision support tools
2. Establish processes to evaluate effectiveness of prevention, detection, response & recovery activities
3. Conduct research on diseases and agents of concern
4. Conduct research on sociological response to incident
5. Analyze effects of global commerce on disease movement
6. Administer research programs
7. Research effects of ecological change on disease transmission
8. Research methods to improve interventions
9. Establish requirements for new technologies
10. Develop new technologies (e.g., diagnostics, vaccines, models)
11. Create new decision support tools
12. Establish processes to evaluate effectiveness of prevention, detection, response and recovery activities
13. Develop after-action reports
14. Evaluate effectiveness of communication and outreach activities
15. Evaluate effectiveness of current research
16. Evaluate ethical and legal implications of response activities

Acronyms

ESF – Emergency Support Function
FAO – Food and Agriculture Organization
HSEE – Homeland Security Exercise and Evaluation Program
HUREX – Hurricane Exercise
IDF – Information Dashboard Framework
LIMS – Laboratory Information Management System
NAHMS – National Animal Health Monitoring System
NEDSS - National Electronic Disease Surveillance System
PAHPD – Public and Animal Health Protection and Defense
PPE – Personal Protective Equipment
SMS – Short Message Service
WHO – World Health Organization

General Knowledge and Skills

- Basic surgery and veterinary skills (e.g., animal handling and care, proper use of drugs)
- Health promotion knowledge
- Knowledge of biosecurity practices (e.g., carcass disposal, disinfection techniques, etc.)
- Basic business fundamentals knowledge (e.g., budgeting, accounting, and personnel management)
- Time management skills
- Oral and written communication skills
- Population dynamics for animal and/or human disease surveillance and survey systems
- Knowledge of monitoring systems for animal health
- Knowledge of disease prevention and management techniques (e.g., eradication or control)
- Disease diagnostics and differentiation (e.g., interpretation challenges, freedom from disease, accuracy and validity)
- Knowledge of laboratory techniques (e.g., serological techniques, molecular techniques, genetic mapping etc)
- Problem solving skills
- Knowledge of epidemiology and population/herd health (e.g., study design, types of epidemiological analysis, validity, accuracy, sampling types, etc.)
- Knowledge of statistical analysis and interpretation for epidemiological data and modeling (e.g., categorical data analysis)
- Information technology skills (e.g., database management)
- Interviewing skills
- Supervisory/leadership skills
- Organizational skills
- Incident Command System knowledge (e.g., animal disease outbreaks and natural disasters)
- One Health Concept knowledge
- Overall ecology management knowledge
- Wildlife disease management knowledge
- Understanding, evaluation, and application of modeling
- Response planning knowledge
- Risk assessments/analyses/communication knowledge
- Knowledge of response plans
- Knowledge of gap analysis
- Knowledge of management of emergency cases
- Client communication knowledge
- Knowledge of population treatment and vaccination
- Pathology knowledge (e.g., sample/tissue collection and storage, host pathogen interactions)
- Immunology knowledge
- Cultural awareness
- Governmental policies and procedures knowledge
- Foreign animal disease training knowledge
- Economic implications and policy design knowledge (e.g., cost-benefit analyses, gain theory, etc.)
- Livestock production practices and economics knowledge

Future Trends and Concerns

- Increased use of modeling
- Lack of understanding of agriculture by the general public
- The economy and its effect on the workforce
- Recession/election year – unpopular to defend the public workforce
- Flat-lined agency budgets- no new programs or pay funding
- Decreased emphasis on animal health
- Decreased emphasis on foreign animal and emerging diseases
- Decreased emphasis on animal research
- Animal activists attacking animal agriculture
- Animal welfare concerns in the forefront
- Continual food recalls- public getting more concerned
- Pandemic threats
- Veterinary shortages (e.g., diagnostic labs, large animal, veterinary colleges, etc.)
- Veterinary curricula need revising
- Lack of an adequate livestock ID traceability system
- Agencies unsure of their futures
- Decreasing number of agricultural workers
- Decreasing profit margins for farmers
- Increasing regulations and record keeping for farmers
- More public concern over agricultural waste and disposal
- Antibiotic resistance issues surrounding livestock and humans
- Rise in importation of animal products
- No increase in exported animal products
- United States is not self-sufficient
- Increases in price of oil/energy
- Public/media/political/medical profession doesn't understand the importance of agriculture
- Increases in food prices
- Uncertainty in how Dept. of Homeland Security will function in the future
- Importation threats
- Biosecurity threats at all levels
- Increase in government stove-piped regulations
- Increased industrial agriculture (e.g., herd size, environmental impact of livestock concentration, multiple animals for single product)
- Increases in speed and distance of routine live animal movement
- Increases in the sophistication and discrimination "high resolution" diagnostic testing
- Increasing specialization and decreasing generalization of professionals
- Increasing data volume and complexities of data management
- Difficulty with regulations keeping up as technology changes at an increasing pace

Tools, Equipment, Supplies and Materials

- Web 2.0
- BioWatch
- BioSense
- Dashboard technology
- SNOMED (Synchronized Nomenclature of Medicine Clinical Terms)
- LOINC (Logical Observation Identifiers Names and Codes)
- LIMS (Laboratory Information Management System)
- HL7 (Health Level 7)
- NAHLN (National Animal Health Laboratory Network)
- NAHMS (National Animal Health Monitoring System)
- NEOSS
- HUREX
- RRECAP
- GLEWS (Global Early Warning and Response System)
- EpiInfo
- Statistical Analysis software
- SPSS (Statistical Package for the Social Sciences)
- Stata
- Genotyping
- Personal Protection Equipment
- Biosafety levels 3 & 4 facilities
- Diagnostic equipment
- Clinical equipment

Worker Behaviors

- Visionary
- Self-motivated
- Flexible
- Resilient
- Team player
- Energetic
- Leader
- Detail oriented
- Extroverted
- Professional
- Creative
- Intuitive
- Innovative
- Persistent
- Ethical
- Ethical
- Communicator
- Flexible
- Accurate
- Able to handful stressful situations
- Compassionate
- Persuasive
- Credible
- Approachable
- Methodical
- Logical
- Consistent
- Diplomatic
- Consensus builder

5. Contact Information

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Appendix A.

DACUM Terminology[3]

Competency- A description of the ability one possesses when they are able to perform a given occupational task effectively and efficiently.

Competency Profile- A graphic portrayal of all the duties and associated task statements important to workers in a given occupation. Also used are the terms **task list, occupational profile, and DACUM Research Chart.**

DACUM- An acronym for Developing A Curriculum. It is an approach to job, occupational, process, and functional analysis that involves bringing a committee of expert workers together under the leadership of a trained facilitator. Modified brainstorming techniques are used to specify in detail the duties and tasks that successful workers in their occupation must perform. The general knowledge and skills needed, important worker behaviors, tools and equipment, and future trends and concerns are also identified. The Center also defines DACUM as including the task verification and task analysis components of the **analysis** phase of curriculum development.

DACUM Research Chart- This is the name given to all DACUM charts developed by the Center on Education and Training for Employment at Ohio State University. Each chart contains a graphic portrayal of the duties and tasks identified, plus the four descriptive lists of: 1) general knowledge and skills, 2) worker behaviors, 3) tools, equipment, supplies, and materials, and 4) future job trends/concerns.

Duty- A cluster of related tasks from a broad work area or general area of responsibility (area of competence).

Occupational Analysis- A process to identify the duties and tasks that are important to workers in any given occupation. A number of alternative approaches to occupational analysis are available. Also sometimes is called **job analysis**.

Task- A work activity that is discrete, observable, performed within a limited period of time, and leads to a product, service or decision. Tasks are also frequently referred to as the competencies that students or trainees must obtain in order to be successful workers.

[3] DACUM Terminology. Note from DACUM Hanbook (Annex 7), by R. Norton, 1997, Columbus Ohio

Task Statement- A description of a meaningful unit of work that contains an action verb, an object that receives the action, and usually one or more qualifiers, and represents a typical job assignment that an employer or customer would pay for.

Verification- The process of having experts review and confirm or refute the importance of the task (competency) statements identified through occupational analysis. Other questions such as the degree of task learning difficulty are also frequently asked. Reviewers are usually selected from the ranks of practicing workers and immediate supervisors of such workers. This process is also sometimes referred to as **validation**.