

Master of Public Health Field Experience Report

VETERINARY CAPACITY BUILDING AND FOOD SECURITY CHALLENGES IN DEVELOPING COUNTRIES

by

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Abstract

Veterinary capacity building is the transfer of technical knowledge and skills to individuals in an effort to create sustainable change, and for this report, it will focus on veterinary capacity building for the improvement of livestock production practices and food security in regions with limited resources, such as Guyana. In support of this goal, the veterinary engagements between the Guyana Livestock Development Authority (GLDA) and Farmer to Farmer (F2F) veterinary volunteers from 31 October to 18 November 2016 covered an extensive range of topics and training opportunities for veterinary professionals and staff of the GLDA. The team recognized several challenges for the veterinary community in Guyana and provided several recommendations for improvement in animal health services in a resource-limited situation. The F2F veterinary team thought that future engagements should target two levels of engagement based upon the expertise of prospective volunteers. One level of engagement should focus on training and skill development for veterinary professionals and livestock producers. The second level of engagement should involve assistance in the development of a strategic, time-structured plan for the implementation of an Active Animal Health Surveillance Program. Typically, the slaughter of meat animals in low-resource countries occurs in abattoirs or local butcher shops. Therefore, veterinary capacity building that focuses on improving sanitation levels surrounding the slaughter process would reduce foodborne public health risks to consumers. An adaptive approach that considers the local culture, social setting, and economic environment, will be paramount for successful opportunities with sustainable improvements in meat hygiene.

Subject Keywords: capacity building, meat inspection, Guyana, farmer-to-farmer, slaughter, food security

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Chapter 1 - **Field Experience Scope of Work**

The primary focus of this capstone project was related to veterinary capacity building in developing countries to improve food security and public health. To achieve this focus, I volunteered for a United States Agency for International Development (USAID) Farmer to Farmer (F2F) veterinary project in Guyana, South America. The goal of the field experience was to directly evaluate methods for achieving effective veterinary capacity building in developing countries to improve food security, public health issues, and prevent the spread of emerging infectious diseases.

The F2F Program is currently funded by USAID to provide volunteer services for international development during 2014-2018 and operates in about 26 core countries.¹ The Partners of the Americas is the base organization supporting countries of the Caribbean basin.¹ The F2F Program is implemented under the Partners organization utilizing U.S. volunteers from domestic careers, agribusiness, cooperatives, and universities to improve global agriculture and food security and to develop sustainable partnerships with farmers, agriculture producer groups, rural businesses, and service providers.

Geographically, Guyana is located in the northeast region of South America and is bordered by the Atlantic Ocean to the north, Venezuela to the west, Suriname to the east, and Brazil to the south and southwest (Figure 1.1).² The capital and largest city is Georgetown. The country was formerly a British colony until declaring independence in 1966. Guyana has been linked historically to the Caribbean countries and maintains many British traditions including being the only English speaking country in South America. The population of 735,909 consists of mixed ethnic groups including Indians, Africans, Amerindians, Chinese, and other mixed racial groups and 90% of the people inhabit a narrow coastal region of the country comprising about 10% of the country's land.² The country has also been divided by the government into ten administrative regions (Figure 1.2).³

Guyana's economy is dependent on the export of sugar, gold, rice, bauxite, timber, and shrimp. The agricultural sector has limited land to effectively cultivate for crops and provide pasture for livestock. The agricultural area along the coast is partially below sea-level and protected by an aging system of dikes and waterways. As a result, detrimental weather and flooding can have an adverse effect on both crop and livestock production. Guyana's livestock

populations were estimated at 210,000 cattle, 185,000 pigs, 120,000 sheep, and 15 million chickens in the country in 1987.⁴

The F2F Program requested a veterinary team to participate in a thorough farm and facility assessment for Guyana. In addition to myself, the volunteer veterinary professionals included Carla Huston, DVM, PhD (ACVPM) from the College of Veterinary Medicine at Mississippi State University and Major Marc Knobbe, DVM, MPH (ACVPM). As a U.S. Army Veterinary Corps officer, Dr. Knobbe served as the preceptor/mentor for this field experience as an active public health official.



Figure 1.1 Guyana, South America map²



Figure 1.2 Administrative Regions of Guyana⁴

Chapter 2 - Learning Objectives

The following learning objectives for this public health field experience in Guyana were developed following consultation with my MPH Committee and Dr. Knobbe. These objectives included:

- Develop familiarity with the necessary steps to conduct effective veterinary capacity building efforts in a developing country;
- Conduct veterinary assessments to determine livestock production gaps and needs to improve productivity;
- Conduct veterinary assessments to evaluate public health concerns related to infectious and zoonotic diseases; and
- Develop or utilize existing frameworks to complete an effective veterinary public health assessment.

The goal of these learning objectives was to efficiently prepare and deliver veterinary capacity building efforts in an effective, comprehensive approach consistent with the desires of the host nation and project supporting officials. While these objectives may represent this specific Guyana mission, they encompass concepts that could readily apply toward many missions in a variety of developing countries.

2.1 Mission planning

2.1.1 Principles of Capacity Building

Gaining a clear understanding of capacity building is a necessary first step to effectively implement such a process. The focus for capacity building efforts has shifted over the past years. According to Wigboldus, capacity development, as it is also termed, is a core concept in development cooperation.⁵ It can be viewed as a broadening of a development focus from catering to direct needs and provision of technical assistance, to the inclusion of addressing more structural causes of poverty and establishing sustainable development prerequisites.⁵

Essentially, the delivery method can be either through direct services or a capacity building approach. Direct services have the most value in crisis situations, such as natural

disasters, disease outbreaks, or conflict environments. Capacity building efforts focus more on enabling the host nation animal health professionals and farmers to improve their methods of livestock production and marketing. Some indicators of successful capacity building include: sustainable production, improved market systems, functional laboratory surveillance, and biosecurity improvements. There are a variety of barriers to successful capacity building; however, enabling animal health professionals with supportive measures that work within their national animal health system can lead to more sustainable results.⁶

2.1.2 Key Resources

International development efforts are dependent on preparation and successful relationships with a variety of key stakeholders. These key stakeholders may include host nation government officials, United States government officials (e.g. USAID), international governmental officials (IGO's), and non-governmental officials (NGO's). The Chief Veterinary Officer (CVO) is a key government representative of the host nation and serves as the leading official for animal health activities in the country. The CVO's responsibilities include the development of policies relating to animal health and disease issues affecting the host country. Developing a relationship with the CVO is important to better facilitate capacity development efforts within the existing national animal health system.

In resource-poor nations, private-sector veterinarians have a limited role in most animal health monitoring, disease reporting, and control programs. Rather, government veterinarians play a major role in managing these programs in developing countries, as is the case in Guyana. Additionally in Guyana, the government veterinarians provide ambulatory services for routine livestock ailments, in part, due to limitations of available private veterinarians; and the local society is accustomed to expect these services from the government at no- or low-fee costs. Many resource-poor countries lack adequate veterinary resources to maintain such programs. They may rely significantly on donor agency funding and training of basic animal health workers or para-veterinarians to fill this void. The consequences of this financial reliance on outside support can result in disruption of existing surveillance programs when funding is limited. Building internal veterinary capacity can help buffer this situation and minimize risks. In contrast, U.S. private practice veterinarians play a key role in surveillance activities related to reportable diseases and in notification of suspect diseases which are reported to government veterinary officials for further investigation.⁶

Key agricultural and animal health IGO's include the United Nations Food and Agriculture Organization (UN-FAO), the World Organization for Animal Health (OIE), and regional organizations like the Pan American Health Organization (PAHO) which addresses regional trade, development, and disease issues.⁷ U.S. government embassy team officials involved with bilateral agricultural and animal health development may include the United States Department of Agriculture-Foreign Agriculture Service (USDA-FAS), USAID country project staff, and Department of Defense (DOD) staff involved in development programs.

2.2 Veterinary Assessments Performed

The activities performed as part of this field experience over the three-week program duration included consultation with the Guyana Livestock Development Authority (GLDA) veterinary staff relating to the techniques used to diagnose veterinary internal medicine problems. The veterinary team volunteers visited livestock farms and facilities in various regions of the GLDA to become familiarized with local livestock production and management systems. Visits to several poultry, small ruminant, large ruminant, and swine production sites, as well as to a single fish farming site, allowed for observation of the various systems and common practices of livestock rearing in Guyana. The assessments provided an opportunity to provide recommendations regarding the application of diagnostic techniques in both the field and laboratory setting. An additional activity included interacting with the host nation public and private veterinarians and field staff to determine both small and large animal concerns regarding various disease conditions and treatments.

The first two weeks of the Program were spent with GLDA administration and field staff, visiting private farms and agriculture related industries. In the field, volunteers observed management practices of livestock operations, interviewed farmers and family members, and provided livestock health and management advice to both GLDA field staff and farmers. On several occasions, volunteers assisted the GLDA field veterinarians in performing outbreak investigations through examination of affected animals and assessment of the environment. A total of 41 visits were made to various types of operations, from private farms to industry-related operations, such as wildlife export stations (Table 1).⁸ The four most populated coastal regions

of the country were targeted, with much of the time spent at GLDA facilities in Region 4 (Table 2).^{3,8} Interactions with the GLDA staff and administration largely focused on veterinary capacity building, including evaluation of the veterinary diagnostic and reproduction laboratory. The volunteers conducted training sessions for the GLDA staff covering topics, such as surveillance and monitoring, outbreak investigations, avian diseases, necropsy technique, artificial insemination, and reproductive metrics for insemination programs. The final week was spent interacting with members of the Caribbean Veterinary Medical Association (CaVMA) as well as GLDA staff and private practitioners.

Table 1 F2F Operation & Region Visits

Table 1.

Type of operation	# of visits
1=private	25
2=industry	8
3=GLDA	6
4=other	2
Total Visits	41

Table 2.

Region	# of visits
3	12
4	19
5	8
6	2
Total Visits	41

Hosts

Three different groups hosted the volunteers during the assignment: The Partners of the Americas Farmer-to-Farmer staff (POA F2F), the Guyana Livestock Development Authority (GLDA), and the Caribbean Veterinary Medical Association (CaVMA). The POA staff served as the in-country coordinators for the volunteers, providing guidance and logistical support throughout the three-week period. The first two weeks of the Program were spent with administration and field staff of the GLDA, visiting private farms and industries. The final week was spent interacting with members of the CaVMA as well as GLDA staff and other private veterinary practitioners.

2.3 Products Developed

A Farmer to Farmer Program Guyana Trip Report was prepared during the final stages of this project and forwarded to the USAID Guyana project manager.⁹ Additionally, a Volunteer's Recommendations Report was prepared as a result of the veterinary team's assessments. Technical Power Point presentations were also developed and delivered during the course of the veterinary program in Guyana. These recommendations are provided for the GLDA to internally evaluate areas to address and direct future steps within their organization. This information may be utilized across Guyana ministries to acquire additional legislative support for necessary program function. Project reports may also provide the technical backing for future funding proposals and capacity development missions. Ultimately, the product of these recommendations should lead to valuable surveillance and other animal health data collection which may also be shared with local and bordering country public health officials.

Various information collection, assessment, and goal-setting frameworks have been developed to assist capacity development missions. Samples of these frameworks have been provided in the appendix.¹⁰ Logic model frameworks are commonly utilized by organizations, such as USAID, for ongoing country projects with defined goals. These models help clarify near- and long-term goals as well as assist in identifying the inputs and outputs necessary to achieve desired outcomes. Veterinarians planning for overseas capacity building missions should familiarize with existing stakeholder project models or frameworks in order to guide effective efforts.

Chapter 3 - Capstone Project/Culminating Experience

Background

As globalization rapidly connects developed and less developed societies, tailored support for those needing assistance can benefit the entire world. Veterinary capacity building is transferring technical knowledge and skills to individuals in an effort to create sustainable change that improves productivity and reduces food insecurity. In developing countries, animal source foods are a vital part of the nutritional security of the population. In many ways, livestock can serve as a source of insurance or income when economic times are difficult.

Generally, veterinary capacity building efforts focus on the livestock production sector in many resource-poor areas. Frequently, the challenges that exist are similar across many developing countries. Poor animal nutrition is often a primary limiting factor toward optimizing food animal condition and production. A lack of adequate feed sources for livestock throughout the year can hinder production and immune status, increasing risk of disease. Other challenges include limited resources related to the market value chain. These resource limitations may involve transportation, trained veterinary personnel, diagnostic testing and laboratory capabilities, and market limits due to lack of cold storage or adequate slaughter facilities.

A wide variety of opportunities exist for international development efforts to improve food security and public health in developing countries. This report examines meat sanitation challenges encountered by veterinary capacity building missions in developing countries. The goal is to provide insight related to a holistic approach and methods for effective capacity development. My Guyana field experience will highlight some common challenges that exist in many low-resource countries. The issues related to food production and hygiene will be contrasted with methods utilized in production systems in developed countries, such as the United States.

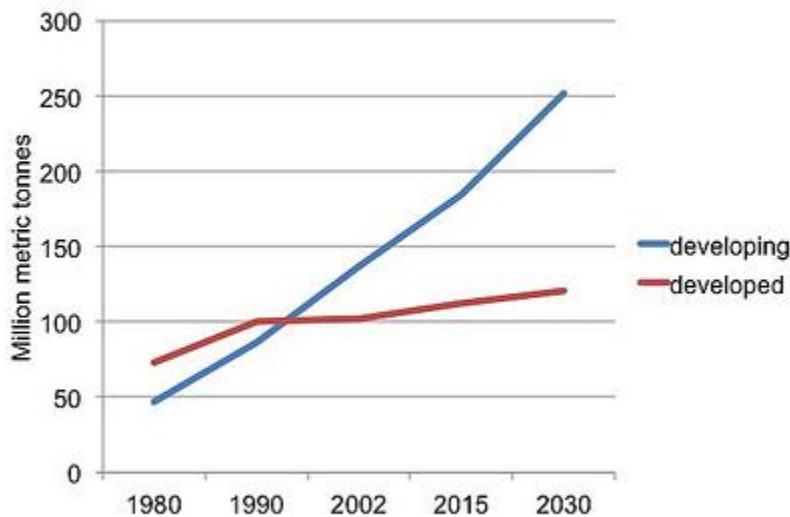
3.1 Food Safety Challenges in Low-Resource Settings

In many developing countries, food chain challenges exist at multiple levels that may expose the population to a variety of food sanitation and zoonotic disease risks. The nature of these risks is closely linked to the livestock production and market systems in place within a country. It is important to understand who and where the producers are and why the production system exists in the current fashion. Additionally, an understanding of the common livestock marketing structure and slaughter methods is important when embarking on a veterinary capacity building mission.

The scope of food safety challenges is a global One Health concern as the demand for animal source foods increases with rising world population. As noted by Gebreyes, “the resulting increase in population density will only exacerbate problems of transmission of virulent pathogens.”¹¹ Specifically, urban population expansion, along with increasing income levels in developing countries, pressures the agricultural sector to produce more meat-based protein food sources as individuals strive to improve their quality of living. Interestingly, over the past 25 years the trend for meat consumption has dramatically increased at a much higher rate in developing countries compared to developed countries (Figure 3.1).¹² The health benefits that meat-based protein sources provide through a balance of amino acids and other micronutrients may be lacking in cereal grain diets frequently consumed by the undernourished has been well recognized. The 2015 Food and Agriculture Organization of the United Nations has in fact reported a decrease in the percentage of undernourished in developing countries to 12.9% (779.9 million) in 2014-2016 from 23.3% in 1990-1992 despite a growing global population. While the undernourished in developed regions of the world remains at less than 5% during this same period.¹³

Nevertheless, reducing food insecurity in undernourished populations around the globe remains challenging and relies on maintaining vibrant economies. In developing countries, improving the productivity and income of small stakeholder farmers can feed directly into local economies to generate sustained progress. Capacity builders must recognize resource limitations that are barriers to efficient food production and marketing. These may involve limitations related to human capacity, transportation, land access, and general financial availability.

Gains in meat consumption in developing countries outpace that of developed countries



FAO 2006

Figure 3.1 Meat consumption in developing countries¹²

Problems

Many of the problems present in Guyana related to food safety can be linked to environmental limitations; however; there are opportunities to alter human behavior to reduce important risk factors. Occupational and foodborne risks exist at multiple levels from farm to slaughter. The foodborne risks associated with meat safety generally stem from exposure to biological agents, unsanitary meat processing procedures, and undetected chemical residues (e.g., residues due to livestock exposure to pesticides, antibiotics, or inhaled lead). In Guyana, many farming systems include small stakeholder farms producing milk, eggs, and meat from poultry, small ruminants, and swine. These subsistence farming systems are designed to feed the family unit and to sell left-over product in the local market.

The common livestock systems in Guyana include extensive, semi-intensive, and intensive (Table 3).¹⁴ The majority of livestock grazing is extensive without confinement or fenced pastures; rather, grazing occurs openly along roadsides. This local practice leads to issues of over-grazing, animal rustling, and livestock exposure to indiscriminant environmental toxins from sources, such as lead from vehicle exhaust or flooded grounds. Semi-intensive livestock

systems include confinement at night to avoid rustling or predation with a return to free range or semi-confined grazing practices during daylight hours. Small sectors of the livestock industry in Guyana operate under intensive production systems with total confinement and feed management. Sectors of the poultry population are currently raised in more intensive layer or broiler pens, while others are maintained as household flocks. A segment of dairy and swine operators are also produced in intensive systems.

Table 2 Main livestock systems and animal types in Guyana¹⁴

Animal Type	Extensive	Semi- Intensive	Intensive
Beef	√	√	
Dairy		√	√
Sheep	√	√	
Goat	√	√	
Pig		√	√
Poultry		√	√
Horses	√	√	√
Donkeys	√	√	
Buffalo	√		

Unsatisfactory meat sanitation issues result from the local practices of slaughtering on site and selling directly to the consumer with the absence of appropriate hygiene and inspection. As a result, consumption of carcasses infected with a variety of zoonotic parasites, bacteria, and viral pathogens create significant health concerns. In many low-resource countries, zoonotic disease cases may be undercounted due to limited surveillance data identifying the prevalence of zoonotic diseases of public health concern, such as tuberculosis, brucellosis, and cysticercosis. However in Nepal, “human taeniosis and human and porcine cysticercosis are reported among the major zoonotic diseases and studies with different ethnic groups in the country indicate very high prevalence’s for human taeniosis and porcine cysticercosis.”¹⁵ Other reports for Latin

American countries have also determined a significant prevalence of *Taenia solium* infection in residents which may allow infection in pigs through poor sanitation environments and exposure to human waste.¹⁶ Poor or underdeveloped disease surveillance both at the farm level and slaughter facility contributes to unknown zoonotic threats to workers and consumers. Resources may not be available for adequate disease detection programs both due to limitations in trained personnel and diagnostic lab capabilities.

In addition to the lack of adequate meat inspection procedures, processed carcasses may be mishandled leading to meat waste, bruising, and gross contamination that further reduce food availability and safety. The transport of meat from local butchers to the consumer is often unprotected, without refrigeration, and may frequently be in the trunk of a car (Figure 3.2).¹⁷



Figure 3.2 Local Slaughter Practices

A lack of adequate slaughter facilities is a common resource limitation. In Guyana, there is a single outdated abattoir present in the capital, Georgetown, which was built in the 1930's and does not achieve adequate sanitation standards.¹⁸ Currently, approximately 50 head of cattle per

week are slaughtered in the abattoir; however, this represents a small fraction of the total number of cattle slaughtered countrywide. Typically, slaughter location and timing is market-driven to allow for immediate sale due to the lack of adequate cold storage facilities and conveyances. Local consumer expectations may demand that meat products be freshly processed based on local culture.

For veterinary capacity building efforts to be effective, it is important to understand the limits of the existing market structure. Efforts to increase livestock production may go unrewarded if the local market has limited ability to sell, consume, or store the net increase in meat processed. Additionally, increasing milk production from local dairy farmers may result in waste due to a lack of milk processing plants and refrigeration in developing countries. These problems need solutions, which frequently require legislative support and cooperation across all food production participants to better develop the infrastructure components of the local market system. Improving capabilities to efficiently process meat and milk products in a sanitary manner may ultimately enhance local food security as well as cultivate export market capabilities.

3.2 Food hygiene challenges in developed settings

Technological improvements in food production in advanced societies have alleviated many foodborne public health risks; however, many traditional and emerging hazards continue to surface in meat production.¹⁹ My participation in recent U.S. commercial food establishment audits with the U.S. Army Public Health Activity provided additional public health field experience and sanitation from the perspective of a developed country food production system. During these audits food plant records were reviewed with quality assurance supervisors to validate acceptable sanitation standards and ratings from other inspecting agencies, such as local water potability and state inspections (Kansas Department of Agriculture). The audits included pre-audit reviews of the methodology that entails the general business information, physical facilities, food protection and sanitation, product processing procedures, storage, distribution, and food defense programs. A audit walk-through was conducted while the plant was in production to evaluate acceptable sanitation standards.²⁰ Visits to modern food processing plants demonstrated efficient use of automation and robotic controls while processing and packaging a

variety of ready-to-eat products. Public confidence and safety assurance in the U.S. are maintained by designated teams of trained quality assurance plant representatives that monitor daily food production operations. Quality assurance actions include finished product sampling and contact surface swabbing for detection of bacterial organisms, such as *Listeria monocytogenes*, which is capable of contaminating the ready-to-eat food products many consumers demand. Effective surveillance and monitoring systems are needed to address new foodborne threats created by consumer demands for ready-to-eat products in addition to historically important hazards. The development of hazard analysis critical control point (HACCP) programs is a common practice among food producers in developed settings. Critical control points are determined by quality assurance officials and may include potential cross-contamination sites or detection of physical contaminants requiring the use of metal detectors or critical temperature logs. Quality assurance officials also conduct mock recall exercises to evaluate the efficiency of the HACCP program and ensure a proper food safety response is in place. These exercises enable plant officials to determine their internal capabilities to trace back contaminated products to their raw ingredients. Documenting these exercises and the time required for trace back allows plant operation managers to detect weaknesses in areas of production.

Despite advancements and close monitoring systems within food processing plants, food hygiene challenges exist at different levels in developed countries. The most reported consumer concerns related to meat safety may be related to microbial pathogens, pesticide residues, antibiotic resistant microbial pathogens, as well as animal/pathogen traceability, environmental impacts of production, and bioterrorism concerns. While similar issues exist at different levels in developing countries, the impact of efficient mass processing systems may create hazards that impact a larger number of people in the U.S and our trading partners. When comparing slaughtering facilities that can process 2,400 head of beef cattle per day (Nebraska Beef Ltd. 2013) versus 50 head per week in a developing country, such as Guyana, a food safety problem at one production or processing site can become an explosive foodborne epidemic quite rapidly in the U.S.²¹

The current U.S. concentrated feedlot system has evolved to provide a cost effective method to produce a larger volume of consumable meat for the public. However, the concentration of large numbers of cattle in such a confined setting can increase the risk of

carcass contamination through cross contamination of bacterial pathogens. Pre-slaughter cleaning and carcass decontamination treatments currently in place can reduce many of these known risks. A deeper challenge for food safety public health officials is accurately identifying healthy animals presented for slaughter which may be harboring new or emerging pathogens.

3.3 Solutions through capacity development

Veterinary capacity building provides the opportunity to facilitate solutions to many of the common meat hygiene problems in developing countries. An effective approach should consider the broad market chain but focus direct efforts on specific links. These solutions include pre-slaughter interventions at the farm to reduce microbial or chemical contamination burdens. Government and field extension veterinarians can improve animal husbandry knowledge of livestock producers through training about interventions to minimize contamination through clean pens, sanitary feed, and chlorinated water to minimize contamination. An organized system of meat inspection procedures training should be implemented for butchers, meat handlers, and both public health and veterinary inspection personnel. This training should incorporate a national or local government certification requirement, or both. The improvement of sanitation and slaughter site standards may include the construction of basic slaughter facilities that are designed for simple waste disposal to minimize environmental contamination. These local slaughter slabs should provide for urban and rural meat marketing using local livestock or butcher cooperatives, associations, or other private groups. The encouragement of local livestock associations may enhance other economic benefits through bulk feed purchases, animal husbandry knowledge transfer, and infectious disease awareness within the local community.

Slaughter sites and hygiene standards should be adapted to local capabilities of the communities they serve based on the existing resources. The construction of simple facilities that can be operated and maintained in the current socio-economic system will provide sustainable benefit. Important resources include capable veterinarians to inspect the meat of a particular community region. Enforcing minimum standards for hygiene, sanitation, and meat inspection procedures with veterinary participation through government supported legislative actions will reduce zoonotic threats and improve the sanitary processing of meat products.

Improving meat inspection procedures and providing simple laboratory testing capabilities will also assist in determining disease prevalence statistics for developing countries. Donor agencies have often provided construction for diagnostic laboratories, which may offer state of the art capabilities; however, sometimes they fail to be utilized due to the inability to maintain testing reagents or properly trained staff. A focus to improve basic diagnostic capabilities to identify endemic diseases will allow livestock development officials to prioritize disease control or eradication programs. Additionally, improving clinical diagnostic skills of field veterinarians will allow for more accurate assessments of common ailments within the region. The unofficial or illegal transboundary movement of animals, which may be difficult to regulate in many developing countries, also poses disease import concerns. Enhancing diagnostic capabilities, in turn, prepares these field veterinarians to better recognize new or emerging potential disease threats, which may affect livestock and public health.

Success can be achieved with surveillance programs for zoonotic diseases, such as tuberculosis, based on lesion detection by properly trained veterinary public health meat inspectors. Training inspectors who understand the guidelines for animal and carcass detection of tuberculosis should be a clearly defined component of slaughter inspection procedures.¹⁵ The ability to conduct slaughterhouse surveys of diseases can serve as a cost effective model for directing further prevalence studies and program funding. Information gained from such surveys must also be cooperatively shared among health and agriculture ministries. Disseminating valuable animal disease information down to the farmer, cooperative, or livestock association level will help invest necessary program participation and commitment. As indicated by consultation experts, “the success of such a pilot program will depend on the commitment of farmers, agencies and organizations involved; the input and close cooperation of veterinary and medical agencies; and the availability of appropriate funds.”²²

The Way Forward

Veterinary capacity building in low-resource settings can have many avenues of approach to improve public health, meat hygiene, and food security. Approaching capacity building in an integrated manner to synchronize efforts with animal health officials can enhance meat safety both in developing and developed country environments. Increased global demand for capacity building food safety support requires a country-specific approach to identify all the risks

throughout the food chain in a particular animal population. The human health hazards from unsanitary meat production can be prevented, eliminated, or controlled with proper educational interventions, including pre-harvest farm management activities and post-harvest antemortem and postmortem abattoir inspections. Activities that build veterinary human capacity to construct sanitary slaughter sites, conduct proper meat inspection procedures, and perform simple diagnostic testing can provide lasting results, which ultimately improve disease surveillance and biosecurity. The production of safer food products within a country will improve the local population health while gaining access to regional and international food markets.

The broadening experiences gained during capacity building missions allow for intervention opportunities at a variety of levels to serve the larger world. As a participant supporting a capacity building mission in a low-resource setting, it has been valuable to examine the animal production systems and establish the international networks with partnering country veterinary officials. These partnerships will become more important to prevent the transmission of transboundary and emerging diseases as the globalization trend continues into the future.

References

1. United States Agency for International Development. The John Ogonowski and Doug Bereuter Farmer-To-Farmer Program, 2016.
2. Central Intelligence Agency. The World Factbook: South America: Guyana, 2017.
3. Wikipedia. Regions of Guyana, 2016.
4. Merrill T. *Guyana and Belize : country studies*. Washington DC: Library of Congress. Federal Research Division, 1992.
5. Wigboldus S, Nell AJ, Brouwer J, et al. Making sense of capacity development: discussion paper for the seminar on international capacity building-recipes for success, 28 January 2010, The Hague: Wageningen UR Centre for Development Innovation, 2010;1.
6. Graham TW, Turk J, McDermott J, et al. Preparing veterinarians for work in resource-poor settings. *J Am Vet Med Assoc* 2013;243:1523-1528.
7. Still Brooks K. Professional Planning for Overseas Veterinary Missions. *AVMA Conference*. San Antonio, TX, 2016;4.
8. Houston C, Johnson, Eugene, Knobbe, Marc. Partners Farmer-to-Farmer Program - Guyana Trip report November 2016 In: Americas Pot, ed, 2016;4.
9. Farmer-To-Farmer Volunteer Assignment Form In: Americas Pot, ed, 2016;2.
10. Ball L, Ball D, Leveritt M, et al. Using logic models to enhance the methodological quality of primary health-care interventions: guidance from an intervention to promote nutrition care by general practitioners and practice nurses. *Aust J Prim Health* 2016.
11. Gebreyes WA, Dupouy-Camet J, Newport MJ, et al. The global one health paradigm: challenges and opportunities for tackling infectious diseases at the human, animal, and environment interface in low-resource settings. *PLoS Negl Trop Dis* 2014;8:e3257.
12. Smith J. Livestock, livelihoods and the future of India's smallholder farmers. *12th Agricultural Science Congress*. Karnal, India: ILRI, 2015.
13. Food and Agriculture Organization of the United Nations. The State of Food Insecurity in the World, 2015;8.
14. Food and Agriculture Organization. Draft Country Report on the state of animal genetic resources of Guyana, not provided;33.
15. Joshi DD, Maharjan M, Johansen MV, et al. Improving meat inspection and control in resource-poor communities: the Nepal example. *Acta Trop* 2003;87:119-127.
16. K.D. Murrell KDaP, Z. Capacity building for surveillance and control of *Taenia solium*/cysticercosis, in *Capacity building for surveillance and control of zoonotic diseases*. Food and Agricultural Organization of the United Nations 2006;37.
17. Johnson E. Local Slaughter Practices 2016;Picture of observed local swine butchering practices in Guyana, South America.
18. Johnson E. Personal communication In: Guyana Livestock Development Authority, ed. Discussions with GLDA veterinarians familiar with the Municipal Abattoir

in Georgetown, Gy and personal observations suggest physical facilities lack proper sanitation (November 4, 2016). ed.

19. Sofos JN. Challenges to meat safety in the 21st century. *Meat Science* 2008;78:3-13.

20. United States DoD. Department of Defense Standard Practice: Sanitation Requirements for Food Establishments. Mil-Std-3006C ed, 2008.

21. The Market Works. Top 30 Beef Packers 2013: Cattle Buyer's Weekly 2013;CBW's annual ranking of the Top 30 Beef Packers is based on maximum daily slaughter capacity at U.S. plants that operate under common ownership and/or management. .

22. Berrada J. Capacity building for surveillance and control of tuberculosis. Food and Agriculture Organization Consultation Report 2006.

Appendix A -

Logical Framework Template: Basic

Narrative Summary	Indicators	Data Sources	Assumptions
Project Goal:			
Project Purpose:			Affecting the purpose-to-goal link:
Outputs:			Affecting the output-to-purpose link:
Inputs:			Affecting the input-to-output link:

INSTRUCTIONS | Logical Framework Template: Basic

A basic Logical Framework includes four levels: Goal, Purpose, Outputs and Inputs. This template allows you to create a four-level Logical Framework. The Logical Framework you create can be cut and pasted into a PAD. As you work, cells will expand somewhat to accommodate text. However, we suggest keeping your completed form to one page or less in length.

How to Use This Template

Open the template in Adobe Reader. If you don't have Adobe Reader, you can download it free from <http://www.adobe.com>.

Enter your data into the template and save it as a PDF to your computer. You can edit the template title, row sub-headers and body cells. Use the buttons to customize the template to your needs. All of the buttons will hide when you print the PDF template directly from Adobe Reader or Acrobat, but you will need to use the picture editing crop tool to crop out the white page margins and utility buttons when you embed your template into a Microsoft Word document.

Once saved, you can edit your data in the PDF, email, print and/or embed it into a Microsoft Word document. To insert your template into a Word document, embed it as an Object or use the Windows "snip" tool to select, copy and paste the parts of the template you need. For more detailed instructions, please visit <http://usaidprojectstarter.org/content/help>.

Hide Instructions

Show Instructions



an interactive toolkit developed and implemented by:

Office of Trade and Regulatory Reform
Bureau of Economic Growth, Education and Environment
US Agency for International Development (USAID)

For more information, tutorials and additional templates, please visit <http://usaidprojectstarter.org> or email projectstarter@usaid.gov.

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Farm Assessment Form

This assessment form should be used in close coordination and review with key members of the community (example: the village authorities, community leaders, local health staff, religious leaders, local community based organizations) and take into

1. Assessor Information				Date:
Assessor	Organization	Phone Number	Email	
2. Community Information				
2.1 Location				
Community:		District:		Province:
Country:		Latitude (Y)*:		Longitude (X)*:
2.2 Community Leader(s)				
Name	Title/Position	Phone Number	Email	
2.3 Community Demographics				
Number of Households:		Male Population (%):		Female Population (%):
Primary Ethnicities:		Primary Religion(s):		
Displaced Persons/Families:				
3. Farm Information				
3.1 Is the farm operational? YES		3.2 Farm Type: Crops Livestock Mixed Tourism Other:		
3.3 Farm Ownership: Household Leased Partnership Cooperative Community Corporate Other:				
3.4 Owner/Employee Name	Address	Phone Number	Email	NGO/GO
3.5 Farm Employment Total: ___(men) ___(women) ___(children) Outside Household: ___(men) ___(women) ___(children)				

3.6 Farm Size	Total Area: <1 ha 1-2 ha 2-5 ha 5-10 ha 10-20 ha >20	Is the farm consolidated? YES	Number of sites:	
	Livestock Area: <1 ha 1-2 ha 2-5 ha 5-10 ha Other:	Grazing Area: <1 ha 1-2 ha 2-5 ha 5-10 ha Other:		
	Crop Land: <1 ha 1-2 ha 2-5 ha 5-10 ha Other:	Forested Area: <1 ha 1-2 ha 2-5 ha 5-10 ha Other:		
3.7 Farm Dwelling None Single Family () Multi-Family () Other:				
4. Farm Production				
4.1	Type(s) and Amount (kg produced per year/season)	Consumed	Sold	Market(s)
Grains				
Fruit				
Vegetables				
Nuts				
Plant Fiber				
Forestry				

Meat				
Fish				
Eggs				
Dairy				
Animal				
Other				
Other				

4.2 Storage	Number	Dimensions/Capacity	Latitude (Y)*	Longitude (X)*
Barn				
Shed				
Cellar				
Warehouse				
Silo/Tank				
Refrigerator/Freezer				
Other:				

4.3 How are products transported to market? Not Transported Farm Vehicle Middleman Market Vehicle Other:

4.4 Which markets are products sold at? Household Community City District Name(s):

4.5 Primary source(s) of water? Lake/River (Name:) Well (Number/Depth) Municipal Other:

4.6 Irrigation method(s)? None Sprinkler Drip Flooding Furrow Manual Other:

4.7 Fertilizer/Pesticide

Type Utilized	Source	Quantity On-Hand

4.8 Chemical application method(s)? Hand Sprayer Backpack Sprayer Towed Sprayer Aerial Sprayer Other:

4.9 Equipment Hand tools Tractor-Number/Type: Plough-Number/Type:

Harvester-Number/Type: Draft Animals-Number/Type:

Vehicle/Trailer-Number/Type: Other:

5. Farm Support

5.1 Agricultural Associations

Association	Point of Contact	Location

5.2 Farm Supplies

Vendor	Owner/Point of Contact	Location

5.3 Has the farm received any outside assistance or support? NO YES

Organization	POC	Assistance Provided	Date

If NO, are there any current plans to receive assistance?
5.4. What do the farm owners/employees identify as their greatest needs?
6. Remarks

Veterinary

Assessment Form AA

1.1 Assessment Team	Team Name	1.2 Date of Assessment	MM/DD/YYYY
1.3 Report Title	Text	1.4 Report #	Assigned by unit

Directions: Complete Form A before completing this form.

White Blocks – Always Collect	Light Grey Blocks – Collect if time permits	Dark Grey – Collect if specifically requested
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Block 3: Veterinarian Capabilities

3.1 Who provides the majority of animal care?	Text		
3.1.1 Where is the veterinary care received?	Text		
3.1.2 Has an animal census been conducted for this country?	Circle one Yes No	3.2 Who conducted census	Text
3.2.1 When was it done?	MM/YYYY	3.2.2 Is census data available?	Circle one Yes No
3.3 List the current animal health programs and initiatives.	Program	Sponsor	Status
	Text	Text	Text
	Text	Text	Text
	Text	Text	Text
3.4 What are the limiting factors	Factor	Why Limiting	Mitigation
	Text	Text	Text
3.5 List national veterinary laboratory	Text	3.6 Is wildlife conservation a national priority?	Circle one Yes No
3.7 Is wildlife a major reason for tourism?	Circle one Yes No	3.8 De-worm: Season / Month	Text
3.8.1 Name of vaccine / anti-parasitic	Text	3.9 Ectoparasitic: Season / Month	Text
3.9.1 Name of vaccine / anti-parasitic	Text	3.10 What is the animal and animal product market?	Text
3.11 List the top five (5) animal products for this country.	Text 1)	Text 2)	
	Text 3)	Text 4)	
	Text 4)	Text 5)	
	Text 5)		
3.12 Are animals inspected at slaughter?	Circle one Yes No		
3.13 List national surveillance programs.	For What Diseases?		Program Coordinator
	Text		Text
	Text		Text
3.14 Are disease outbreaks readily reported to OIE?	Circle one Yes No	3.15 Quarantine procedures for animals ENTERING the country	Circle one Yes No

3.16 Quarantine procedures for animals LEAVING the country?	Circle one Yes No	3.17 Can the Ministry of Agriculture put a farm or area under quarantine?	Circle one Yes No
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Block 4: Vet Support Income

Position	Last Name	First Name		
4.1 MoA Director of Livestock / Veterinary Services:				
4.2 USAID Agriculture / Economics POC:				
4.3 USAID Veterinary / Livestock Specialist:				
4.4 USDA – APHIS – IS Representative:				
4.5 List active veterinary programs	Text			
4.5.1 Programs POC:	Last Name	First Name		
4.6 Describe “Other” that run active veterinary programs:	Text			
4.7 Are there any NGOs working in the area providing veterinary support?	Text			
4.7.1 NGO POC:	Last Name	First Name		
4.8 Are there programs / projects being conducted by USAID or USDA	Circle one Yes No			
4.8.1 Program	Text	Sponsor	Circle one USAID USDA Other	Explain Other

Block 5: Vet Support Income

5.1 Does the country have accreditation procedure?	Circle one Yes No	5.2 How many are accredited by other countries?	Numeric		
5.3 Veterinary Schools	School Name		Location	Accreditation	
	Text		MGRS 8-digit Grid	Text	
5.4 Are veterinarians required to obtain a license to practice?		Circle one Yes No	5.5 Is continuing education mandatory for license renewal? Circle one Yes No		
5.5.1 Is this enforced?	Circle one Yes No	5.5.2 Is it readily available in country?	Circle one Yes No		
5.6 Who provides continuing education?	School Name		Location	Accreditation	
	Text		MGRS 8-digit Grid	Text	
5.7 Agriculture, Veterinary, Farm Associations?		Association		Function	POC
		Text		Text	Last Name, First Name
5.8 Which three (3) countries educate the majority of the veterinarians?		Text 1)	Text 2)	Text 3)	
5.9 Who pays for the education of	Text	5.10 Number of veterinarian schools	Numeric		

veterinarians outside the country			
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Block 6: Domesticated Animals

6.1 Are corrals or pans available?	Circle one Yes No	6.2 Are chutes available?	Circle one Yes No
6.3 Are chutes temporary or permanent?	Circle one Temporary Permanent		

6.4 List Domesticated Animals Present:

6.4.1	Land Animals	Number	Primary Use	Secondary Use	Birthing Season
	Text	Text	Text	Text	Text
6.4.2	Aquatic Animals	Number	Primary Use	Secondary Use	Birthing Season
	Text	Text	Text	Text	MM
6.4.3	Winged Animals	Number	Primary Use	Secondary Use	Birthing Season
	Text	Text	Text	Text	MM

Comments or Additional Information

Submitted by:	Name, Rank, Title	Signature	Date
VETERINARIAN ASSESSMENT FORM AA		Classification _____	Page ____ of ____