

Veterinary Public Health Essentials To Deployment Health Surveillance: Applying Zoonotic Disease Surveillance and Food/Water Safety at SOF Deployment Sites

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ABSTRACT

The Special Operations Force (SOF) medic must have a public health and environmental awareness mind-set while conducting operations in any AO. Whether deployed at a Forward Operating Base (FOB) or isolated outpost, the SOF medic can specifically apply two U.S. Army veterinary public health mission priorities – zoonotic disease surveillance and food/water safety. The SOF medic should be knowledgeable of and perform continual surveillance for zoonotic disease(s) present within animals in their AO that may affect the deployed SOF team, other American or host-nation Soldiers, and civilians. Likewise, the critical nature of ensuring safe food/water requires the SOF medic to aggressively and continually apply food/water safety principles in all deployment settings. SOF deployments to South America and Afghanistan have confirmed the need and benefits of employing a U.S. Army veterinary public health mission focus. This article is a reference for the SOF medic to expand his overall veterinary public health and environmental awareness skill-set thereby enhancing the varied, intricate, and, often times, political SOF missions.

INTRODUCTION

Deployment health surveillance (DHS) is critical to current and future military operations in order to protect deployed personnel from disease and occupational and environmental hazards.¹⁻³ DHS begins during the medical intelligence preparation of the environment as a part of the mission planning process. During the predeployment process, potential hazards are identified by performing a health risk assessment and risk management through use of information such as previously performed Occupational and Environmental Health Site Assessments (OEHSA), preliminary hazard assessments, industrial hazard assessments, environmental baseline surveys, and other medical intelligence products. This should occur as a predeployment planning process; however, some planning constraints such as time or availability of information, may limit this predeployment process and require execution once on the ground. Additionally, DHS is a continuous process that needs to occur from predeployment through post deployment.

The SOF mission is especially enhanced by integrating veterinary public health and environmental assessment contributions to DHS requirements into operational planning. The SOF medic must be aware of the importance of health surveillance and stress the importance to the team leader and SOF planners at every level.

This article's intent is to give the SOF medic a guide and examples to reference before or during a deployment in order to integrate U.S. Army veterinary public health, specifically zoonotic disease surveillance and food/water safety, into the mission. The 7th SFG(A) first described zoonotic disease and other infectious animal disease surveillance in a SOF environment.^{4,5} Operational Detachment – Alpha (ODA) medics supported the discovery of the zoonotic disease, ehrlichiosis, in Colombian military working dogs.⁴ Another infectious disease surveillance study with equids determined the presence of equine infectious anemia (EIA) in Colombian military working horses.⁵ Although not a zoonotic concern, EIA is a highly contagious and debilitating disease in horses.

Based on these findings, recommendations were made to enhance SOF operational planning, improve working animal health, and build rapport with the host nation.^{4,5}

Other notable researchers have similarly reported valuable information from disease surveillance studies in Central and South American environments,⁶ and potential SOF AOs in Brazil⁴ and Ecuador's Galapagos Islands.⁸

Food/water safety and quality assurance is a guiding mission principle for the U.S. Army veterinary services and will be discussed in detail as to how the SOF medic can apply this principle when deployed to any AO.

Breakdowns in the spread of zoonotic disease and/or food/water safety control can have devastating effects to a FOB and the SOF mission due to troop health decline. Similarly, the effects on the local civilian population can be devastating in the short term with the potential for longer term impacts. Breakdowns in either or both of these events can likely lead to SOF mission delay, disruptions, or failure. Therefore, the SOF medic's focus should be to determine an emerging zoonotic disease or imminent health hazard before it impacts U.S. personnel or civilians. To do this is to help ensure mission accomplishment as well as to address the politics of winning hearts and minds. Therein lays the critical nature of this topic.

Sample Supply List

Needles/syringes: 3cc, 22 gauge, 3/4"
Latex gloves
Alcohol swabs, gauze
EDTA blood collection tubes – purple top
IDEXX SNAP 3Dx or 4Dx tests
Coolers and packaging materials

Sterile water collection bottles (500mL, 1L)
Food thermometers (bi-metallic or digital¹⁰)

MISSION EXECUTION

The SOF medic must plan for the DHS prior to deployment. This predeployment preparation includes developing and briefing the plan to the SOF mission planners, researching endemic diseases and environmental hazards in the AOR, and coordinating for materials and supplies (see table of sample supplies).

Within a support company or group, SOF units have organic medical, preventive medicine, and veterinary assets to support specific DHS planning or opera-

tions. Utilize these assets before and/or during the deployment to provide professional guidance and assistance with the plan.

After deploying to any SOF deployment site, i.e. FOB, the first step in the SOF medic's public health study or analysis is to conduct an initial environmental baseline survey and OEHSA. During the OEHSA, the SOF medic's focus is on two veterinary priorities; zoonotic and infectious disease control and food/water safety.

After site familiarization and if mission permits, the SOF medic initiates the zoonotic and infectious disease surveillance. The local animals in the areas surrounding the FOB (areas where U.S. personnel will be) will be tested as part of the surveillance plan. The testing sample can include dogs, cats, and equids (horses, mules, donkeys). The medic should meet with local health officials or representatives to discuss known and suspected endemic zoonotic and infectious diseases. Discussions will determine what local studies have been performed and if the local health officials have personnel to support the SOF medic's disease surveillance plan. It is very important to open good lines of communication with these officials to plan coordinated testing and to emphasize that the zoonotic disease surveillance will aid in the local population's overall well-being. Emphasizing the benefits to the locals in a SOF combat zone may be crucial in gaining their support, and winning hearts and minds. In most SOF deployment sites, the value of an animal such as a horse, donkey, or mule cannot be overestimated. The importance of horses and pack animals in combat to the Northern Alliance and specific American SOFs (SF ODAs, CIA, and Delta Operators)⁹ in Afghanistan is well documented, especially in detailed accounts throughout the book *Horse Soldiers*.¹⁰ Horses allowed for greater flexibility and speed of movement through rugged terrain which contributed to the Taliban defeat. Healthy horses and pack animals such as donkeys and mules were value-added assets and force multipliers. The SOF medic's consistent disease surveillance in a herd of horses can detect potentially catastrophic infectious disease states, such as equine infectious anemia (EIA).⁵ Mission failure is the obvious concern with this disease and other diseases that lead to horse health and performance decline in a combat setting.

During disease surveillance, animal blood samples can be collected in EDTA tubes for later testing. Data for each animal should include species, breed, sex, approximate age, weight, and subjective statement of the animal's overall appearance. Samples

may be tested at the FOB or may be sent to the Department of Defense (DoD) Food and Diagnostic Laboratory (FADL), Fort Sam Houston, TX, for more in-depth testing (i.e. horse blood samples to be tested for EIA, etc).

At the FOB, the SOF medic reviews the FOB's food, water, and ice safety plan, determining what exactly the FOB personnel are consuming and how. The goal is to ensure safe food, water, and ice is being served to U.S. personnel and that steps (control measures) are in place which will continually ensure this. U.S. Army and host nation cooks should be questioned on the sanitation procedures and cooking/holding temperatures (see temperature chart). Potentially hazardous foods (PHFs) should be identified (see PHF chart), and control measures applied to reduce the health hazards of improper storage, handling, and/or cooking. Moreover, a food and water risk assessment

(FWRA) can be developed based on the types of food being consumed. The *Veterinary/Medical Supplement* to the *Technical Guide (TG) 248* is the reference when formulating the FWRA. Bottom line, control measures must be emplaced and monitored by US personnel to reduce food/water risks at any site and for any number of U.S. personnel. In addition, water samples from the kitchen and any other water source site on the FOB should be obtained and submitted to the DoD FADL for microbiological and chemical testing.

In Afghanistan, it has been documented that local water wells were intentionally poisoned and contaminated by the Soviets, Taliban, and other local warring tribal factions.¹⁰ While there in 2001, a forward deployed SOF team was sickened (vomiting and diarrhea) and incapacitated for days during combat operations after drinking from local water sources.¹⁰

TEMPERATURE GUIDELINES*	
Food	°F
Ground Meat & Meat Mixtures	
Beef, Pork, Veal, Lamb	160
Turkey, Chicken	165
Fresh Beef, Veal, Lamb	
Medium Rare	145
Medium	160
Well Done	170
Poultry	
Chicken & Turkey, whole	165
Poultry breasts, roast	165
Poultry thighs, wings	165
Duck & Goose	165
Stuffing (cooked alone or in bird)	165
Fresh Pork	160
Ham	
Fresh (raw)	160
Pre-cooked (to reheat)	140
Eggs & Egg Dishes	
Eggs	Cook until yolk and white are firm
Egg dishes	160
Leftovers, Casseroles	165

Potentially hazardous foods are foods that require time-temperature control to keep them safe for human consumption.

Contains moisture - water activity greater than 0.85
 Contains protein
 Is neutral to slightly acidic - pH between 4.6 and 7.5

The U.S. Food and Drug Administration (FDA) Food Code identifies the following examples of PHFs:

- Meat (beef, pork, lamb)
- Poultry (chicken, turkey, duck)
- Fish
- Shellfish and crustaceans
- Eggs (except those treated to eliminate Salmonella)
- Milk and dairy products
- Heat-treated plant food (cooked rice, beans, or vegetables)
- Baked potatoes
- Certain synthetic ingredients
- Mushrooms
- Raw sprouts
- Tofu and soy-protein foods
- Untreated garlic and oil mixtures

Since these foods can harbor pathogenic microorganisms and permit their growth or the production of toxins, special care must be taken to keep them out of the temperature danger zone for as long as possible. Time is another factor that can be controlled to minimize the chances of pathogenic outbreaks.⁸



Tests confirming one weak and two strong positives for *E. canis* alongside test insert.

DISEASE SURVEILLANCE RESULTS

The following results are examples of two disease surveillance studies conducted at SOF deployment sites in South America. The first site was at sea level along the Colombian coast, while the second test site was at significantly higher elevation in an Ecuadorian valley 7,850 feet above sea level. Working and non-working dogs were the test subjects at both sites. To the author's knowledge, there are no military studies or reports of zoonotic or infectious canine disease surveillance studies conducted in Ecuador. Likewise, as noted in a recent infectious disease study on the Galapagos Island of Isabela, university researchers and authors are aware of only one previous heartworm disease study (early 1980s) in the Ecuadorian Galapagos and no prevalence reports from mainland Ecuador.⁸

On the Colombian coast, coordination was made with a local kennel of seven working dogs. Due to the high temperatures, humidity, presence of ticks and mosquitoes, crowded kennel runs, and no heartworm/flea/tick preventive, the working hypothesis was that the dogs would test positive for tick-borne disease as well as heartworm disease.

Test results confirmed three working dogs were positive for the tick-borne infectious and zoonotic disease ehrlichiosis (*Ehrlichia canis*). Specifically, two strong positives and one weak positive for *E. canis* (see photo above).

There were no heartworm antigen positive test results. These most recent surveillance findings in Colombian working dogs – zoonotic tick-borne disease and no heartworm disease – are similar to the surveillance studies documented by 7th SFG(A) in select SOF and Colombian jungle outposts in 2005.⁴

At the second site in mainland Ecuador, coordination was made with a local shelter of 60 non-working dogs. Most of these dogs were caught as strays and

housed communally. Being a good representative sample of the local canine population, these dogs can provide valuable infectious disease insight. At this altitude, the temperature is more moderate during the day and cool at night. Shelter personnel indicated that mosquitoes and ticks were around, but uncommon. Dogs were tested on-site for heartworm disease and the tick-borne diseases *E. canis* and Lyme disease. It was not common practice in either areas for local veterinarians to test for these diseases or to prescribe heartworm and flea/tick preventive. All of the dogs tested in Ecuador were negative.

WATER SURVEILLANCE RESULTS

Additionally, as part of an overall OEHSA of a SOF deployment site, local water sources were inspected and samples obtained to be sent to the DoD FADL. Water may be sampled at host nation kitchens, hotels, barracks, community wells, or wherever water is being consumed or used in food/juice/ice preparation. Water sample size submitted for safety analysis should be a volume of at least 3L. Water test results are normally returned by the DoD FADL in two to three weeks due to the detailed testing. These and all results may be provided to the participating host nation officials for their use and awareness. See the example of the SOF deployment site water sample results returned by DoD FADL (Note: in this example, the manganese level exceeds U.S. EPA drinking water standards). The DoD FADL can supply select amounts of sterile water collection bottles when requested.

Report Number: F09-		
Sample ID: F09-	Submitter's ID:	
Product: Tap Water	Description: Water collected from hotel kitchen	
Arrival Condition: Good	Radiation Screen: Negative	
Test	Result	Flag
Fluoride	<0.40 ppm	
Lead	<1 ppb	
Manganese	298.8 ppb	14
Mercury	<0.5 ppb	
Molybdenum	<1 ppb	
Nickel	<1 ppb	
Nitrate as Nitrogen	<0.45 ppm NO3 as N	
Pesticide Confirm	None detected	
Pesticide Screen H2O	None detected	
Phosphate	<3.00 ppm	
Phosphate as P	<0.978 ppm	
Reason sampled	Surveillance	
Selenium	<5 ppb	
Silver	<1 ppb	
Sulfate	20.51 ppm	
Thallium	<1 ppb	
Turbidity in Water	<1.00 NTU	
Uranium	<1 ppb	
Vanadium	4 ppb	
Zinc	22 ppb	
----- FLAG EXPLANATIONS -----		
14 -- BOTTLED/DRINKING WATER STANDARDS/GUIDELINES		
This result exceeds the EPA/FDA standard/guideline for bottled or drinking water.		

Water Test Results: Example water test result from DOD FADL. Flagged for high Mn levels.

DOD FADL, 2472 Schofield Road, Bldg 2630, Fort Sam Houston, TX 78234-6232
Phone 210-295-4210

DISCUSSION

Blood samples were either packaged appropriately to be tested upon return to fixed facilities or were tested on-site. The IDEXX SNAP® 3Dx® Tests were used¹⁴ (IDEXX SNAP® 4Dx® is now more applicable with its added test for the zoonotic tick-borne disease anaplasmosis).¹⁵ The tests did not detect the presence of heartworm antigen in any of the samples. The tests detected the presence of *E. canis* in the South American working dogs. The positive results came from working dogs at sea-level in a coastal area of Colombia. The weather and humidity contribute to the higher populations of mosquitoes and ticks in these regions and therefore, a higher prevalence of associated disease. Conversely, infrequent mosquitoes and ticks found in the cooler and higher elevations of Ecuador, led to negative surveillance results in the non-working dog population. Future heartworm and tick-borne surveillance and prevalence studies should be conducted in the warm/humid Ecuadorian coastal regions such as Guayaquil, Manta, or Esmeraldas, where mosquitoes and ticks are more prevalent.

The findings of this research reconfirm the presence of a zoonotic tick-borne disease, ehrlichiosis, in a SOF deployment area of South America. Therefore, SOF medics must educate and ensure tick preventive measures for all U.S. personnel operating in these areas. SOF medics can recommend DEET-containing repellents and other measures such as keeping ACUs/pants tucked into boots. For working dogs in these areas, recommend Frontline Plus® or Advantix®. The latter has permethrin, which gives the added repellent benefit. *E. canis* positive working dogs can be treated with doxycycline by the local or military veterinarian.

Food/water security and the SOF medic's application of a FWRA is a must in the SOF deployment AO. The inherent risks with certain foods (i.e. PHFs) and water must be determined and known. Additionally, food and water vulnerabilities have to be considered as targets of opportunity for enemies of the U.S. It is documented that at the Al-Farooq training camp, Al Qaeda soldiers are taught to shoot, throw a grenade, and poison water, food, and people.¹⁰ Intentional or unintentional food/water tampering or poisoning can incapacitate a large number of personnel at any one time (i.e. at a SOF FOB). Recall the SOF ODA sickened and thereby incapacitated during combat operations after

drinking local water deemed to be safe by Afghan allies.¹⁰ These and other examples emphasize the point for knowledgeable SOF medics and the need for consistent and timely food/water surveillance.

The goal of this article is to increase the SOF medic's knowledge and skill-set specifically in DHS. Further, this article displays that zoonotic and infectious disease surveillance and food/water assessments are critical in a deployed AO, whether in combat or not. These programs must be consistent and continual in order to ensure overall success. In these AOs, SOF training or combat missions are indeed intricate and sometimes political. This article describes alternative means for SOF, specifically enabled by the SOF medic, to win local hearts and minds in conjunction with or without the standard Civil Affairs (CA) or Non-Governmental Organization (NGO) operating procedures. These alternative means focus on two areas in which lives are dependent in these AOs – food/water and families' animals. Offering safe or improved food/water techniques and healthy animals to a developing host nation community or combat torn region is absolutely invaluable. This will improve the human condition in these areas and ensure the safety of U.S. personnel. This is the SOF commitment, to liberate the oppressed – *De Oppresso Liber*.

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Dr. Michael McCown is a graduate of the University of Florida College of Veterinary Medicine and served as a U.S. Army VCO thru 2006. He had the honor and privilege to serve with the U.S. Army Special Forces while on active duty. Dr. McCown is honored to have worked with all of the Special Forces NCOs, especially with Ben and Jeff (SFCs G and Rada). They are the best of the best, great Americans who live duty, honor, country. Ben was wounded in action: Jeff gave everything – he gave his life while serving something bigger than himself. These NCOs are warriors, they are professionals, they are an inspiration forever. These NCOs should be recognized for the work they do everyday and should be the ones highlighted in this study and journal article.



SFC Benjamin Grzeszak is a Special Forces Medical Sergeant currently assigned to 7th SFG(A). He has served three combat tours with 7th SFG(A) in Afghanistan in support of the Global War on Terrorism and two deployments to South America.



SFC Jeffrey M. Rada Morales entered the U.S. Army in April 1995 as an animal care specialist. He then served at JFKSWC&S, Fort Bragg, NC, as an animal care NCO and a SF medic veterinary medicine instructor. SFC Rada played an integral part in the overall education of current and past SF medics. His motivation and initiative to excel drove him to compete for and earn the coveted Green Beret in 2007. After achieving Special Forces Qualification and training as SF medic (18D), he was assigned to 1st Bn, 7th SFG(A) as an ODA senior medic. While deployed to Afghanistan, SFC Rada died June 28, 2008 in support of combat operations in the Arghandab District, Kandahar province.

The *JSOM* Fall 08 Vol 8 Ed 4 was dedicated to SFC Jeffrey M. Rada Morales. Jeff was an inspiration as a Soldier, NCO, and a person. His legacy continues to be an example for all that knew him. He will always be remembered for his intuitive and sincere input into the lives of many and for inspiring this and other research projects. This one's for you Jeff! Thank you.