Testimony of Eric D Ahlness, Colonel US Army (Ret)
Full Committee Hearing of the U.S House Agriculture Committee: "Agriculture and National Security: On the-Ground Experiences of Former Military Leaders"
July 7, 2016

Chairman Conaway, Congressman Peterson and distinguished members of the House Agriculture Committee, thank you for the privilege and honor of sharing my story and answering questions today. I especially thank Congressman Peterson and Walz for their stalwart support of the Minnesota National Guard over the years.

In 2008, the National Guard implemented the Agribusiness Development Team, or ADT, strategy to engage the largely rural population in Afghanistan to increase farmer prosperity and ultimately greater security as villages connected to valued government extension services make lasting and sustainable difference. Five years ago, I led ADT for a year-long deployment to Zabul, Afghanistan. Zabul is northeast of Kandahar and is a high desert plateau bisected by the Tarnak River. Zabul is very rural, very poor, illiterate, and very traditional. Local villages lack access to government agricultural services and knowledge of good agricultural practices.

Our ADT had three main missions - First was to increase crop production and farmer livelihoods. Second was to build government agricultural extension capacity at the provincial level. And, third was to improve market access for famers and spur further value chain development. To accomplish these missions we developed an inter-agency approach, worked with the U.S. Embassy platform in Kandahar, and held regular meetings with USDA in Kabul.

The ADT gained the trust and access where others faced stoic or armed resistance. Arghandab is a remote, rural district in Zabul province. The villagers are conservative members of the Pashto tribe. Our military had tried to extend governance in this remote area but locals resisted, not seeing the benefit against probable Taliban retributions. However, when offered veterinary services and farmer training, the elders of the community rapidly accepted the invitation and veterinarians and agronomists flew to

Arghandab to provide livestock inoculations and training to the locals. This mission facilitated an opening of doors that were previously closed to us and our partners.

Another very successful program trained widows to operate an egg business by providing them 5 hens, feed, and training to run a business which provided them food and income for their families. One of our graduates returned to tell us that she had 62 hens and made $6.75 per day which is almost $3 more than average day-worker makes in Zabul. This is a prime example that a small investment in hens, feed and training creates a sustainable, value-based, growth business that is scalable and repeatable.

We also increased crop production by using bees to pollinate crops more effectively. Numerous efforts to introduce European bees failed as the bees fell prey to wasps, were vulnerable to mites, and had a difficult time foraging on the local fauna. The hives collapsed as a result. We re-introduced Asian bees in the province for non-commercial pollination which increased local crop yields. The positive results prompted broader use of Asian bees and our partners in the USDA spread the technique to other provinces.

Of special note is the work that was Afghan inspired and led, was the development of a provincial chapter of the Afghan Chamber of Commerce. This cooperative brought together 270 traders and business leaders to set business priorities and goals for the province. This signaled the successful transition from US lead to Afghan inspired leadership and strengthening of the agricultural value chains in the province. This initiative supported efforts to reduce post-harvest loss by converting excess shipping containers for grain storage in remote areas and efforts to create a greater Kandahar trade zone where high value goods, such as pomegranates, were exported to the Mideast.

The ADT strategy was a success because it took the approach that we can prevent the seeds of conflict, by planting seeds of hope and prosperity. It took the ADT at the point of the spear, virtually all my soldiers qualified for combat badges, it took inter-agency partners to array the many aspects of power, knowledge and influence, and Afghans willing to risk their lives to implement the programs. This collaboration led to

an outcome where farmers were empowered with knowledge, local agricultural extension capabilities were enhanced, and infrastructure developed so locals could own a sustainable approach to rural development. Our deployment was captured in a documentary produced by Minnesota Public Television and the link to the video has been submitted as part of my written testimony. This documentary of our deployment was aptly named, Bridging War and Hope. That is what we did. Thank you.

Extended remarks and background information from Eric D Ahlness, Colonel, US Army (Ret)
Full Committee Hearing of the U.S House Agriculture Committee: "Agriculture and National Security: On the-Ground Experiences of Former Military Leaders"
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Introduction

Chairman Conaway, Congressman Peterson and distinguished members of the House Agriculture Committee - Thank you for privilege and honor of sharing my story and answering questions today. I especially thank Congressman Peterson and Walz for their stalwart support of the Minnesota National Guard over the years. I had the pleasure of working with the Minnesota delegation for more than five years as the Government Relations Officer for the Minnesota National Guard and was continually impressed how the delegation balanced the needs of the country alongside the priorities of the state.

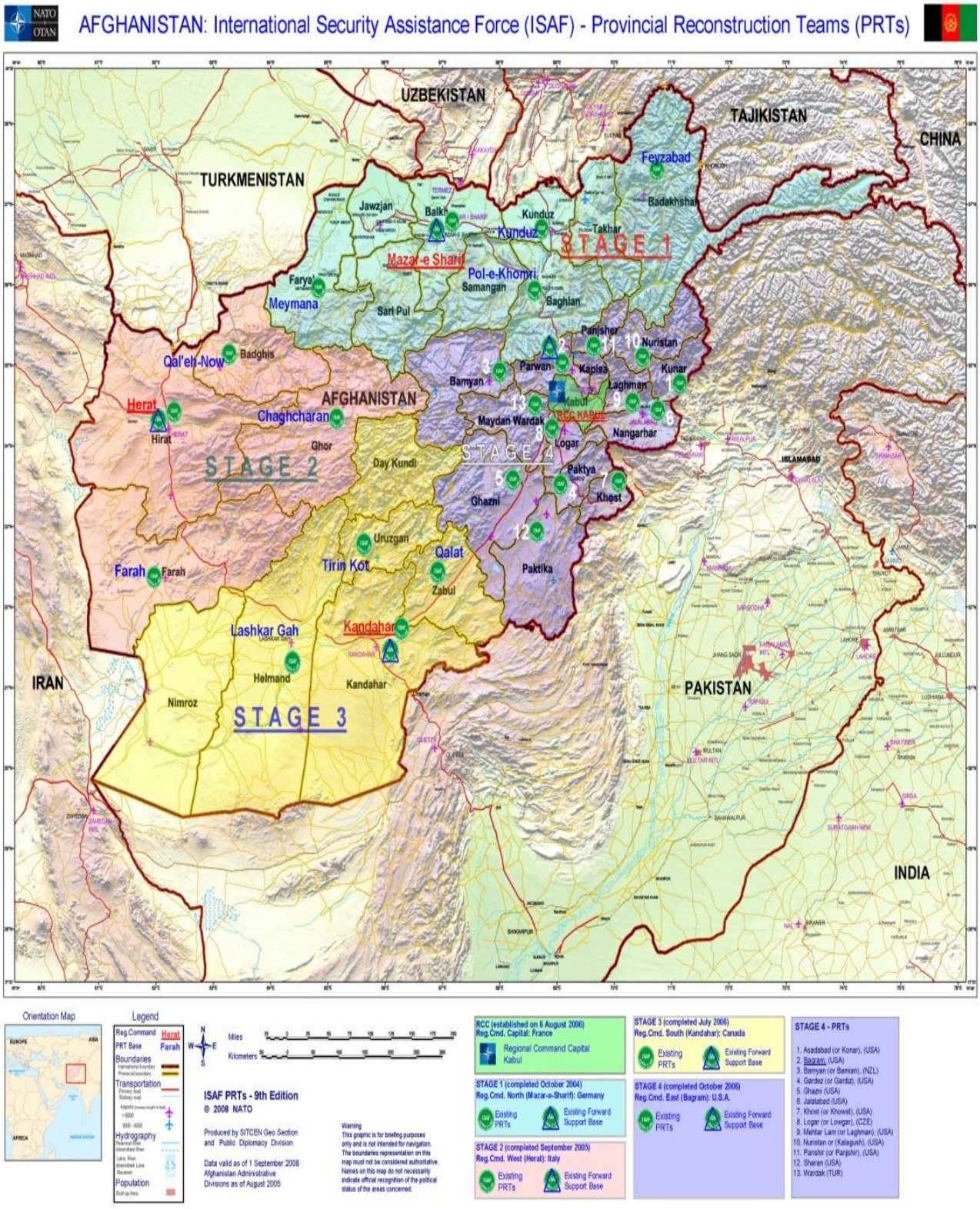
Background

The Reserve Component of the US Military has a unique capability that the Active Component is unable to replicate. That is the set of civilian skills that reservists develop as a part of their civilian career. For example, I had soldiers who were also value chain experts, beekeepers, and agronomy experts. The National Guard Bureau recognized the critical role that agribusiness skills could contribute to increased security in Afghanistan and in 2008 implemented the Agribusiness Development Team concept. This is strategic as 80% of the Afghan economy is dependent on agriculture and more prosperous farmers and villages tend to be less extreme. This is especially true if the village has positive connections with the government. The ADT concept includes fielding 58 person teams with a core of a dozen agricultural experts to serve in sequential year-long deployments over a five year period within a specific province. The agricultural experts could be selected from the Army or Air National Guard or through an intra-component support process to include members from the US Army Reserve. The positions were rank-immaterial as our focus was on securing uniformed members that would use their civilian acquired expertise to impact the mission.

The teams initially established relationship with the DAIL, the Ministry of Agriculture, Livestock and Irrigation provincial leader, to build government capability, and started providing training to local villages to increase the prosperity of the farmers. One of the provinces selected for this training was Zabul.

Zabul is northeast of Kandahar and is a high desert plateau with a range of mountain to the south on the border with Pakistan and to the north with the Hindu Kush range which dominates central Afghanistan. The Afghan ring road, the main communications artery of the country runs along the Tarnak River which is fed from the snow run-off of the Hindu Kush and serves as the irrigation source for the peoples of Zabul. Zabul is very rural, very poor, illiterate, and very traditional. The population is between 250,000 and 750,000. The high school graduating class in 2011 was 255 for the province. My team was the third ADT team in the province. The first teams established the relationships, provided training to the DAIL and villages; whereas, our role was to start transitioning lead to the DAIL and strengthen relationships with USDA, DOS, and NGOs as the military mission was reduced. The mission was successful and the

fourth ADT team closed the mission in 2013 recognizing that the provincial capability, civilian agency oversight, and NGO partnerships were adequate to maintain momentum and success.



Source: http://www.exploretheworldmaps.com/zabul.html

Mission Goals

Our ADT had three main missions - First, was to increase crop production increasing prosperity of the farmers, Second was to build government training capabilities at the provincial level and we assumed a third mission to improve the value chain to help increased crop production made it to markets. Our reasoning was that if you increase production without a corresponding improvement in the value chain and markets the benefit to the producers would be minimal.

U.S. Agriculture Assistance Strategy for Afghanistan

According to the U.S. Department of Agriculture (USDA), the U.S. agriculture strategy for Afghanistan mobilizes support for the Afghan government, MAIL, and the private sector to revitalize Afghanistan's agriculture economy and increase income and jobs. Shared objectives of MAIL and the U.S. government (USDA, U.S. Agency for International Development [USAID], ADTs, and the U.S. Army Corps of Engineers) within the context of national agriculture development framework include the following:

- Goal 1: Increase agriculture sector jobs and income.
  - Increase agriculture productivity by increasing farmers' access to inputs and effective extension services.
  - Invigorate agribusiness by increasing linkages between farmers, markets, credit, and trade corridors.
  - Rehabilitate watersheds and improve irrigation infrastructure.
- Goal 2: Increase Afghans' confidence in their government.
  - Increase MAIL's capacity to deliver services and promote the private sector and farmer associations through direct budget and technical assistance.
  - Promote Afghan agricultural commodities via intranational and international commerce.
- Guiding principles:
  - The Afghan government leads.
  - Agriculture assistance will have a strong focus on counterinsurgency objectives and investment in sustainable agriculture growth throughout Afghanistan.
  - Government involvement in markets should focus on regulation and enabling the private sector.
  - Projects should be linked to key value chains where possible and to communities, with technical guidance from provincial agriculture working groups.

Source: Center of Army Lessons Learned, Handbook No. 10-10, dated November 2009, Agribusiness Development Teams in Afghanistan: Tactics, Techniques, and Procedures. http://usacac.army.mil/sites/default/files/publications/10-10.pdf

Agribusiness Development Team (ADT) Engagements

To accomplish these missions we developed an inter-agency approach where we worked closely with the military Provincial Reconstruction Team, The Department of State, USAID, and the Department of Agriculture. We conducted weekly working group sessions and daily coordination to insure our efforts were synchronized, sustainable, and as time progressed increasingly Afghan inspired and led. We also worked with the Embassy platform in Kandahar and had regular engagements with the USDA in Kabul. We moderated our expectations based on what was sustainable in a province where the literacy rate was less than 10%, life expectancy was 47 years, and the only publicly generated power was funded by the US Government for part of the provincial capital of Qalat.

The ADT gained the trust and access where others faced stoic or armed resistance. Arghandab is a remote, rural district in Zabul province. The villagers are conservative members of the Pashto tribe. Our military had tried to extend governance in this remote area but locals resisted, not seeing the benefit against probable Taliban retributions. However, when offered veterinary services and farmer training, the elders of the community rapidly accepted the invitation and veterinarians and agronomists flew to Arghandab to provide livestock inoculations and training to the locals. This mission facilitated an opening of doors that were previously closed to us and our partners.

This mission was conducted early in our deployment so we served as the lead element for the mission with the veterinarian and agricultural staff for the Department of Agriculture Irrigation and livestock (DAIL) working in support. As became increasing common throughout our deployment we partnered with the local military forces to provide the majority of the security during the mission. The ADT had the capability to conduct independent missions with our organic security platoon (34 soldiers). However, we found we could conduct more missions and build stronger relationships with the locals if we deployed small teams of agricultural generalists with a small personal security team in forward areas. We then flew our agricultural experts (i.e., vet, beekeeper) to the areas when we wanted to provide the capability. This also reduced our vulnerability to the most dangerous threat during the first half of our deployment – the Improvised Explosive Device (IED).

The DAIL staff served as the lead team for delivery of training to the local villages. The ADT staff observed and used interpreters to monitor the sessions and peak with elders and local farmers about the issues that they faced in their area so we could better plan future engagements and work with the district governor to develop policies and deliver services to the locals. The veterinarian team inoculated animals that local famers and nomads brought to the area. We also enlisted the aid of the local para-vet (a trained individual who provided animal care in remote areas) to administer the inoculations. The DAIL charged a nominal fee for each shot so to insure the locals were personally invested in the effort and gave the proceeds to the local para-vet to compensate him for his efforts and to avoid an unintended consequence that our efforts cause 'unemployment' or loss of work for the para-vet.

Over time, the DAIL increasingly took the lead in delivery of training and providing resources to the farmers for these events. By the end of our deployment the DAIL had conducted 17 independent agricultural seminars supported by Afghan military and police.

A very successful program conducted by ADTs and partners involved training widows to care for egg laying hens, provide them 5 hens and feed, and encourage them to run a business to provide them food and income for their families. One of our graduates returned to a follow on training to inform us that

she now had 62 hens and made about $6.75 per day which is more than average day-worker in Zabul. This is a prime example that a small investment in hens, feed and training creates a sustainable, value based, growth business that is scalable and repeatable.

We were also very interested in increasing production by using bees to pollinate crops more effectively. Numerous efforts to introduce European bees failed when implemented on a small scale as the bees were prey to wasps, were vulnerable to disease and mites, and had a difficult time foraging on the local fauna. The hives often collapsed as a result. We re-introduced Asian bees to the province for non-commercial pollination which increased yield and resisted the other threats to the hive. The initial positive results prompted broader use of Asian bees. Our partners in the USDA were key in spreading lessons learned to other provinces.

Of special note is the work that was Afghan inspired and led, was the development of a provincial chapter of the Afghan Chamber of Commerce. This cooperative brought together 270 traders and business leaders to serve as a lead in business priorities and goals for the province. This Afghan initiative signaled the successful transition from US lead to Afghan inspired leadership and strengthening of the value chain in the province. It also created a new and positive connection between a poor, remote province to the national capital and its business community.

Finally we worked daily with the USDA to increase the capability of the Afghan agricultural staff. Training spanned the spectrum of agriculture and extended onto cooperative design, budget planning, and office productivity. During the year we were in Zabul, we shifted from leading agricultural training, to facilitating and enabling training, to promoting the efforts of the afghan staff. We partnered especially closely with the Department of State in ensuring that funds funneled through the central government would be available to the provincial staff to insure their ongoing viability and vitality after conclusion of the ADT mission. During Ramadan, in recognition of the shortened work days, we conducted office productivity training ranging from email protocols to work group dynamics.

ZADT Mission 010 Veterinary & Marketing Seminar - Arghandab

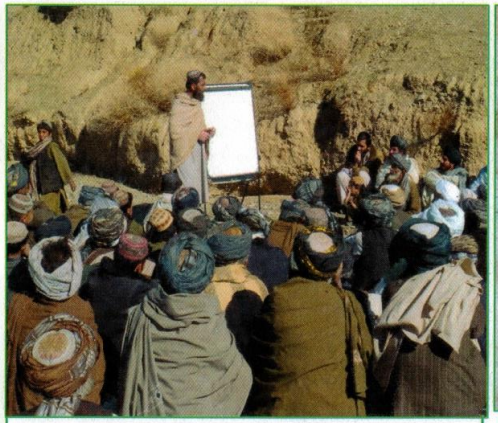
UNCLASSIFIED

Who: Zabul ADT, DAIL Staff, and **Zabul Civil Affairs (CA)**
What: Zabul ADT members in conjunction with DAIL Staff, and Zabul CA conduct Vet Sem, Animal Vaccinations, and Marketing Sem in the Arghandab District from 28 Nov to 02 Dec 11.
Where: Arghandab District
When: 28 November to 02 December 2011

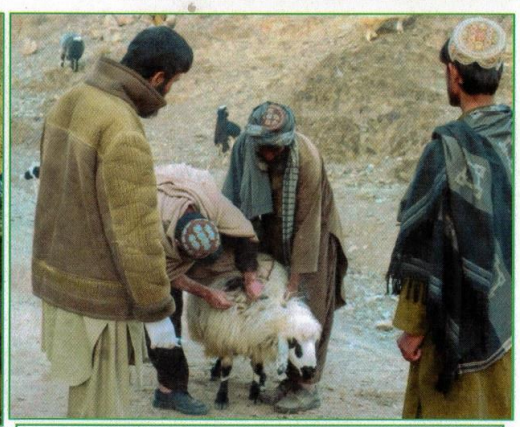
Result/BLUF:
• DAIL staff trained local villagers on animal disease, vaccination, marketing, and identified a Collection Center site in conjunction with Zabul ADT.

Summary:
• One day each of vet and marketing seminars and three days of vaccinations
• **DAIL Para Vet** trained 71 villagers about animal disease and vaccination benefits
• **DAIL Para Vet** and **Assistant** vaccinated approximately 392 sheep, goats, and cattle for enterotoxaemia, anthrax, FMD, & de-worming
• **DAIL staff** conducted marketing and collection center training. Worked with local Key Leaders to identify a potential site for the center.

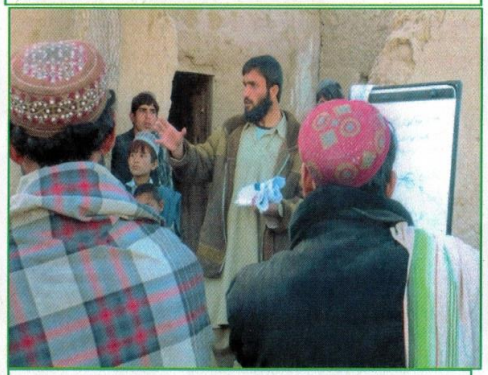
Going forward:
•Coordinate another trip with DAIL and CA for additional veterinary seminars
• Work with DAIL to station an Extension Agent in Arghandab district
• Coordinate trip with DAIL to further develop collection center and coop concept
• Coordinate trip with DAIL for agriculture seminar to plant disease and pest control
•Trip scheduled to assess water issues in January 2012 .



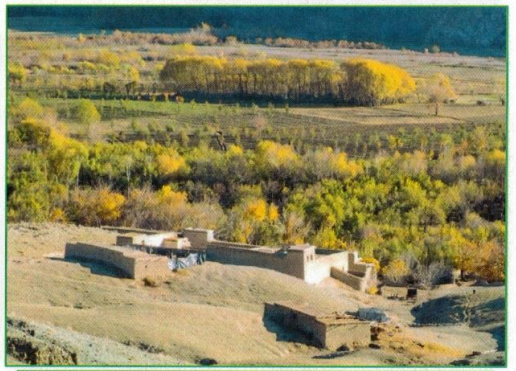
DAIL Para Vet delivers animal disease information to local livestock owners and explains the benefit of vaccination.



DAIL Staff and local farmer vaccinating sheep



DAIL Agriculture Specialist providing marketing training to local farmers and merchants



Local farm and orchard

UNCLASSIFIED

DTG for Event
180900JUN12 to 191200JUN12
Zabul ADT MISSION 198

Zabul ADT; DAIL Women's Poultry Training Qalat; Zabul Province

UNCLASSIFIED

Who: Akram Nayab (Provincial Management Specialist); Dr. Abrahim (DAIL Livestock Manager), and 25 Afghan poor women
What: Women's poultry training
When: 180900JUN12 to 191200JUN12
Where: DAIL nursery
Why: Provide poultry training and supplies to widows and women.

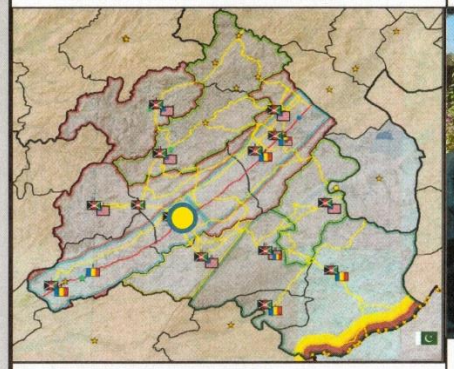
Summary:

• On the first day of training, Dr. Abrahim instructed participants on poultry diseases and vaccinations. On the second day, he discussed poultry hen rations. Hens and feed were distributed to class participants following the completion of training. Akram Nayab served as the monitor and evaluator for both days.
• Twenty-five (25) women participated. Widows and other poor women were selected to be participants. At the end of the training, each trainee received five laying hens and 25 kg of feed. This is the equivalent of 5,300 Afghanis (approximately $110) in value. The women were pleased to receive the hens and feed.
• Participants said there are many women in need in Zabul, and that the poultry training provides them a sustainable means to generate food and income for their families. One woman attendee who had participated in a training last year, stated she had received twelve hens and 50 kg of feed. She now has 62 hens and gets 50 to 57 eggs every day. This provides income for her family. By Akram's calculation, the income generated is 321 Afghanis per day (approximately $6.68), which is more than the average wage of a day-worker in Zabul.

Context:
• This is the second poultry training conducted by the DAIL in Qalat this spring / summer. The DAIL is particularly dedicated to providing programming and resources to women of the province. In 2010, the DAIL, with ISAF partners, implemented a garden project at the Qalat Girls High School. The DAIL has also been active in the garden project at the Directorate of Women's Affairs compound.
•Program is currently supported by CERP but as the DAIL budget improves the program will shift to on-budget funding.

Dr. Abrihim teaches the poultry class

A boy helps his mother with her chickens



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A woman prepares to leave
With her chickens and feed.

Commander's Assessment:
• This was a completely DAIL-planned, led and implemented event. The DAIL staff recognize the need to be proactive in planning seminars to reach their intended target audiences. They have successfully planned a number of seminars and have often been using the Qalat DAIL nursery as a seminar location. This allows for seminars for farmers and other constituents from areas without a current extension agent.
• Andetocal evidence suggests providing training and the initial resources of laying hens and feed can provide a sustainable source of food and income for women.
• The importance of classes such as is reported here to the residents of Zabul is further evidence of the importance of filling DAIL tashkil positions throughout the province, budgeting, and accessing funds for trainings.

DTG for Event
290900JUN2012
Zabul ADT MISSION 201

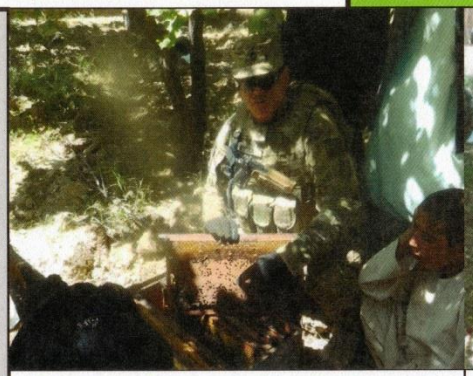
Zabul ADT; Beekeeping Training; Foladgay, TWJ; Zabul Province

UNCLASSIFIED

Who: Zabul ADT
What: Beekeeping training for Asian honeybee demonstration project
When: 291000JUN12
Where: Foladgay, Tarnek wa Jaldak District, Zabul Province, Afghanistan
Why: To enhance agricultural production

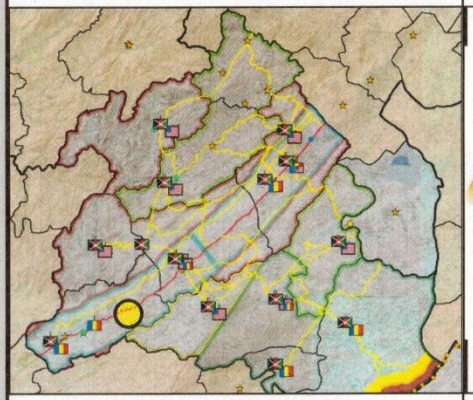
Summary:
• Conducted mounted movement to Foladgay.
• Provided follow-on beekeeping training on hive inspections, swarm management, pests and diseases, how to move hives, and honey collection.
•.The villagers stated that the **bees were killing the wasps** that tried to enter the hives. This pest has destroyed previous bee keeping efforts using the European bee.
• Hive inspection found healthy hives actively storing new pollen and honey. **No sign of varroa mite infestation noted**
• Queens either spotted or their presence indicated through new larva.
• One hive was full of dead bees. The hive was apparently delivered with a dead colony. The cause of the deaths appears to be stress from moving. It will be replaced by a colony from the demonstration farm.

Context:
• Foladgay is the first village to receive colonies of the native Asian honeybee (Apis Cerana). Previous beekeeping projects used the imported European bee (Apis Mellifera).
• DAIL extension agent identified the demonstration location but lacked expertise to conduct the training, he is not interested in further development of these skills.
•.The goal of this project is to demonstrate the sustainability of the native Asian honeybee and restore traditional Afghan beekeeping practices. Previous village-level **European bee projects in Afghanistan usually fail due to varroa mites and wasps.** The native Asian honeybee has evolved active defenses against local pests.



ZADT Apiculturalist explaining brood cell types

Learning to use smoker to enter hive



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European bee (left) Asian bee (right)

Commander's Assessment:
• The Asian honeybees are better suited for village level projects than their European counterpart. The European honeybee is better suited for large-scale, commercial, mobile beekeeping operations.
• The Asian honeybee is tolerant of local environmental conditions that destroy European colonies without active intervention.
• The Asian bee project will increase production and improve quality of key agricultural products in the village such as almonds, pomegranates, and apricots. It will improve food security by increasing garden and forage yields.

DTG for Event
291500AUG12
Zabul ADT MISSION 242

Zabul ADT; Zabul Trader's Association ; Qalat District; Zabul Province

UNCLASSIFIED

Who: ZADT, USDA (Robert Eaton), Zabul Provincial Advisor (Aziz Jamilzai), Director of the Zabul Trader's Association (Abdul Akbary) and his Deputy Director (Abdul Ali).
What: KLE with Zabul Trader's Association Leadership
When: 29 August 2012
Where: Governor's Compound, Qalat, Zabul Province, Afghanistan
Why: Determine current status of Zabul Trader's Association application package, and discuss trader's plans.
Summary:

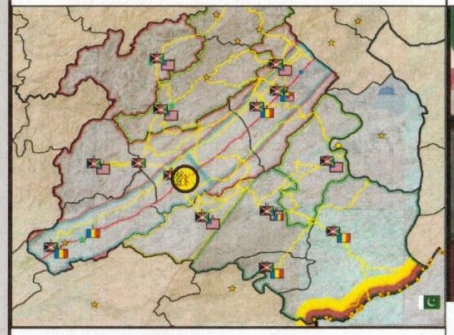
• The team met with Abdul Hay Akbary, the Director of the Zabul Trader's Association, who owns a market in Qalat. Also present for the meeting was his deputy director Abdul Ali, who also manages a cooperative in Qalat. Abdul Ali stated that the cooperative has 1,300 members, but that they are uneducated and the cooperative does not receive GIRoA support. Membership investment funds have thus far only been used to trade almonds. Farmers and traders are open to mentoring. Abdul Ali stated, "we will push the direction if we are shown the way."
• Currently the men, acting as individual traders, work with farmers throughout Zabul province who sometimes transport their farm products to Qalat cooperatively (e.g., farmers from one village jointly hire a transport). There is no plan to begin a farmer's organization in Dey Chopan as has been reported.
• Both men expressed an interest in credit access. Abdul Ali said he had creditors interested in investing with him until they discovered that his property (collateral) was owned jointly by multiple brothers.
• Both men expressed a very strong desire for cold storage and initiated a discussion on this topic. They stated there are significant price gains within a month of harvest. Roots of Peace was introduced as a potential facilitator to link Zabul traders and owners of existing cold storage facilities in Kandahar. The traders agreed to meet with Roots of Peace and try and set up a visit to cold storage facilities in Kandahar.

Context:

• Sayed Aziz Jamalzai and Mohammad Daoud Popal (Zabul Agricultural Advisor) originated the concept of introducing a trader's association in Zabul province. They worked with GIRoA officials, ZADT, ZPRT, USDA and traders to gauge interest and develop a plan . Association leadership was selected, application materials have been submitted and signed by the Zabul Director of the Economy and currently await a letter of support from the provincial governor. The documents will be submitted by applicants to ACCI (Afghan Chamber of Commerce and Industries). See the storyboards for ZADT missions 102, 107, 115, and 133.

Robert Eaton and Aziz Jamilzai listen to the director and deputy director

Abdul Ali makes a point while Abdul Hay Akbary listens



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Documents about marketing channel success in Kandahar brought for further review.

Commander's Assessment:

• The Zabul Trader's Association has a strong team of leaders although they report that individual members do not have a history of working collaboratively. Support and mentorship from the provincial government and ACCI will help them learn the value of working cooperatively and how to do so to gain value in the marketing channel.
• Farmers and traders maintain a strong interest in cold storage. Roots of Peace has helped grow cold storage facilities within RC-S. NGO experience and potential support, nearby facilities to visit, and the ability for lessons learned from existing cold storage managers in Kandahar have potential to help direct those in Zabul.

DTG for Event
020900AUG12
Zabul ADT MISSION 230

Zabul ADT; Professional E-Mail Writing Workshop; Qalat; Zabul Province

UNCLASSIFIED

Who: ZADT, TF-21 CIMIC, 9 DAIL staff members.
What: Professional E-mail Writing Workshop
When: 02 August 2012
Where: DAIL compound, Qalat, Zabul Province, Afghanistan
Why: To instruct the DAIL staff on effective and professional E-mail procedures, format, and functions.

Summary:

• A workshop on Professional E-mail writing was conducted with nine DAIL staff members on 02 Aug 2012 (0900-1100). Major Jonathan Pike was the instructor along with the assistance of an interpreter.

• A PowerPoint presentation as well as student handouts, greatly enhanced the learning process. ZADT provided notebooks to organize the training materials, and also supplied pencils and paper for note taking.

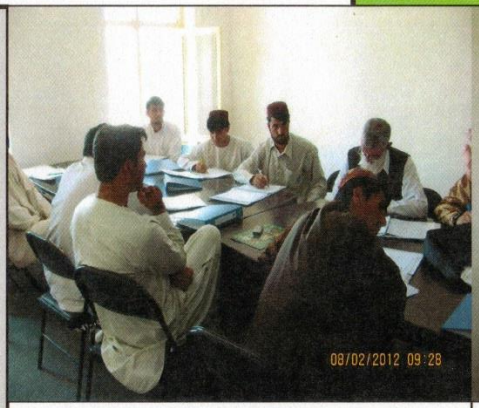
• Various topics were covered in the workshop, to include: Etiquette, E-mail format, subject, address, greetings, opening sentences, body, closing, and signatures. A discussion on why E-mail is important and how it relates to them as DAIL staff employees were also objectives of the lesson. Practical exercises were given to reinforce the lesson by using blank email worksheets reviewing their new skills.

• At the conclusion of the workshop, ADT issued certificates of training to each of the participants. These documents were very much appreciated by the staff.

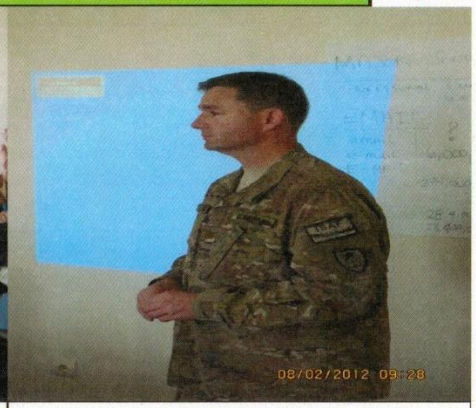
• The students were attentive and participated in many of the discussions. Out of the nine students, three had limited E-mail knowledge prior to the class.

Context:

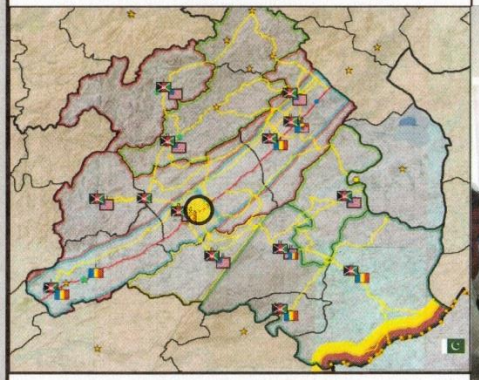
• The Professional E-mail workshop continues to build and scaffold the series of business related topics offered by Zabul ADT.
• The intent of the Ramazan courses is to continue positive mentorship of the DAIL staff and provide examples of effective management tools for the future. The classed were requested by DAIL to increase the professionalism of his staff.



DAIL Staff listening intently and taking notes



ZADT Instructor listening to questions



Zabul DAIL Compound

Students in discussion about a plant disease

Commander's Assessment:

• Professional E-mail writing is essential in any organization. This skill will continue to promote good practices and professionalism among the DAIL staff, developing a sense of pride and job validation.

•The end result is the development of a more effective government network and an increased opportunity to provide services to the people of Zabul Province.

The five examples above highlight the 249 agricultural mission reports that the Zabul ADT files during the year-long deployment. The Zabul ADT completed more than 800 distinct missions outside the gate throughout the province, in the Kandahar region and to Kabul. By projecting a forward presence, building strong relationships with local government, elders, farmers, and business leaders, and implementing pragmatic force protection measures, the Zabul ADT was able to excel at its mission while setting the conditions to return to the US without casualties.

The Zabul ADT comprised of a command, staff and agricultural experts from the Minnesota Army National Guard, a security platoon from the Mississippi Army National Guard, and veterinarians from the Army Reserve in Missouri and Washington states. We also received a mid-tour replacement from the California Army National Guard. The maturity, competency and integrity of the individuals allowed us to successfully deploy small teams to accomplish the mission. Several examples of excellence are:

- Sergeant First Class Hunter from the Minnesota National Guard (Value Chain development expert at Cargill, Inc) lead the effort to turn over control of our southern demonstration farm to Afghan officials while insuring its continued sustainability and viability with local resources. He also supervised the evaluation and mentoring of a new cooperative and served as the NCOIC (NCO In Charge) of our southern team.

- Sergeant First Class Banta and Specialist Crutchfield from the Mississippi (Security Platoon Sergeant and designated marksman) lead an immediate response to a 'blue on green' (Afghan Army member attack on US service members) which secured our base and eliminated the threat without further loss or injury to US or coalition members.

- Master Sergeant Doten from the Minnesota National Guard (Geologist, Hydrologist, Beekeeper) studied and analyzed the soils of the province and determined that the textbooks were incorrect about the formation of the soils in the province. Rather than being composed by the rocks breaking down over millennia he found that the soils were actually blown up from the deserts of Kandahar over tens of thousands of years. This greatly influenced our advice on use of water and crop inputs for farmers. His introduction of Asian bees in Zabul was also a ADT best practice.

- Major Wachenheim from the Minnesota National Guard (Agricultural Economics Professor) served as the daily liaison with the Department of Agriculture Irrigation and Livestock, The inter-agency team, and lead our female engagement team effort in the provincial capital.

- First Lieutenant Robertson from the Minnesota National Guard (Laboratory Technician) emerged as one of our most effective leaders to engage local Afghan leaders, elders, and farmers. She pioneered the effort to provide agricultural (garden) training to a girls school and lead engagements in two of our most remote and dangerous areas.

- The Mississippi Army National Guard Security Force as a whole. The nature of the work demanded that the leadership and agricultural experts meet with and conduct training without their protective gear and focusing on the agricultural message. The security team provided or managed personal, inner security and external security for more than 800 missions. Despite operating in a combat environment, we never had a casualty from enemy action.

Training for Mission. The following article was written to highlight the experiential learning conducted to prepare the ADT for its mission in Zabul, Afghanistan. (Source: Prepublication article for NACTA Journal)

Experiential Learning for a Combat Deployment

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Abstract

Traditional military pre-deployment training for the Zabul Agribusiness Development Team was supplemented with externally-led training specific to their assigned agriculture mission. A training plan was developed using Dewey's Experimental Learning Theory. The Team fostered partnerships within academia, with an Amish community and with both a small technology firm and the nation's largest agricultural cooperative to provide this training. Academic training at North Dakota State University included lessons on and hands-on experience with livestock, plants and the associated production considerations such as plant pathology, use of chemicals, soils, and bee-keeping. Faculty offering training focused on the environment and agriculture common to Zabul, the province to which the team would deploy. This training was supplemented by regional partners. Viticulture and tree crops, both common in Zabul Province, were covered in training offered by the Agricultural Development for Afghanistan Pre-Deployment Training Program in California where the soil and climate are similar to those found in Southeastern Afghanistan. To help the team adapt to differences in technology, lessons were sourced from an Amish Community and Adaptive Technologies, Inc. Cooperatives training was offered by CHS, Inc.

Introduction

The Zabul Agribusiness Development Team (ZADT) of the Minnesota Army National Guard received orders for a one-year deployment to southeastern Afghanistan. The team consisted of twelve agricultural experts as defined from their education and / or their civilian work experience. They were augmented by a support team of twelve including the commander and his staff, and by a security force from the Mississippi National Guard comprised of thirty-four soldiers. The assigned mission was to mentor the Director of Agriculture, Irrigation and Livestock (DAIL), his staff and extension personnel, cooperative leadership, farmers, and agribusiness entrepreneurs and to otherwise assist the province in growing their agricultural capacity. Irrespective of the combat environment, this mentoring would take place in a region without supporting infrastructure such as adequate roads, electricity, or credit and without technologies commonly used in countries with a developed agriculture to include machinery and equipment, irrigation, improved seed varieties, commercial pesticides, and artificial insemination. Adding to the challenge was that the presence of familial education where agricultural techniques are passed down from generation to generation was reduced by thirty years of war.

The team was to be deployed to a location with a different history, culture, and especially climate than their home region. While team-members were collectively familiar with a multitude of crops as well as commercial cow/calf, cattle, hog, sheep, and poultry operations, they were unfamiliar with many of the crops grown in Zabul, including pomegranates, almonds, and grapes for raisins. The team also had no experience with livestock breeds common to the region or with technologies currently employed including hand tillage, hand seeding, trench water holding combined with drip irrigation, and hand milking and slaughter. With the resources of the military and team-member networks, and under the noted challenges and constraints, the team was directed to leverage all available resources so as to ensure they were mission capable and mission ready. This paper describes the comprehensive education and training plan developed and implemented towards this end following the Dewey Model of Experimental Learning (Dewey, 1938) in which the social environment serves as the background within which learning occurs. The plan included training, networking, and building reach-back capability. Key partners included industry, non-profits, 60 government agencies, and universities.

Objectives for Training

Two overarching decisions drove development of the training plan. The first was the scope and depth of training. The question was which of two approaches would be more mission-supporting: a broad training approach which would expose team members to the wide array of conditions, products grown, and technologies utilized in Afghan agriculture, or a more narrow training focus that would provide the team and perhaps individual team members in-depth training on specific products, markets and technologies with promise in the region.

The second decision was to what extent to involve external parties. Generally soldiers are trained for deployment by military personnel or those directly contracted by the military for that purpose. This includes military-designed training for those who will work with local-nationals on development-related projects either because of their Military Occupational Specialty (e.g., combat engineer, civil affairs) or because of their specific mission (e.g., Provincial Reconstruction Teams). There is, however, not a training designed for teams assigned agricultural development, which is an important reason the military sought agriculture expertise based on civilian experience among National Guard soldiers. Expertise has its limits, however, especially given the difference in agriculture between the Midwestern United States and Afghanistan. The leadership therefore concluded the team would need to resource outside expertise; expertise that could greatly leverage the military's training and team members' knowledge and experience. Concerns associated with external involvement in training included creating a dependence on others who may not be accessible when needed or who may not have the on-ground information necessary to make the right recommendation, and the time, expense and social capital involved with recruiting external consultants for one unique mission.

The leadership decided on a hybrid model that would empower the team with a broad brush of knowledge as well as provide them an understanding of the in-country environment prior to leaving the United States. Military training was supplemented by committed partners willing and able to share their time and expertise both prior to and during the deployment. The intended training outcome was a practical understanding of agriculture in Afghanistan and how additional knowledge, know-how, or technologies could be actively employed and sustained within Zabul Province.

The plan was comprised of multiple individual training missions conducted outside of and in addition to the required warrior training associated with moving and working in a combat environment.

Regimented pre-deployment training was provided by the Minnesota National Guard and the U.S. Army, including, but not limited to, individual and group warrior tasks, language and cultural training, and maintenance and operations training for a range of vehicles, weapons and equipment. This paper focuses on the external training designed and implemented by the ZADT leadership specifically for this mission. In planning the training, the key objectives were to obtain:

- Exposure to the agriculture and supporting infrastructure in Zabul province;
- A developed understanding of the evolutionary path of and constraints facing the same;
- Knowledge of tools, machinery and equipment, and physical and operational technologies appropriate for the existing infrastructure;
- Experience in developing plans for sustainable agricultural production systems employing these assets in conditions found in Zabul Province; and in educating and training farmers, agribusiness entrepreneurs, and supporting government and non-government organization participants to implement them; and
- Access to outside expert assistance throughout the deployment.

Theoretical Background

Experiential learning can be broadly defined as a pedagogical process that includes an action by a learner that has consequences (Dellaportas and Hassall, 2013). The ZADT training was designed to focus on experiential learning and, in planning the training, leaders adopted the framework proposed by Dewey (1938). Experiential learning guidance has been refined and expanded since formally being introduced by Dewey in the 1920s and outlined in his book entitled "Experience and Education" (Dewey, 1938). Specific contributions by Kolb (1984) and Lave and Wenger (1991) were incorporated into the plan.

Dewey's work identifies four key learning environment attributes: (1) learning takes place within a social environment; (2) knowledge and content of organization should put students in an environment that allows them to develop social relationships, learn, and solve problems; (3) learning should include a relevant experience that reflects the intended pedagogical objective and should occur in an environment including a well-defined teacher's role and a framework of student learning; and (4) learning outcomes should include reflection and represent that the student is better able to acquire knowledge because of the learning process.

Kolb's model defines the pedagogical process to include the following four key elements: (1) concrete, personal experiences; (2) reflective observation; (3) abstract conceptualization, wherein students are expected to think logically and make decisions or draw conclusions from the learning process itself; and (4) active experimentation, wherein students are able to apply the concepts learned from one experience to a different experience. Kolb's contribution of explicitly defining the role of active experimentation is important because soldiers would be applying concepts learned during training to a variety of situations in Afghanistan.

Situated Learning more explicitly includes the social interaction and collaboration components of Dewey's initial model. In Situated Learning, the social process is a key element of the process of acquiring knowledge in one situation and transferring it to other situations (Dellaportas and Hassall, 2013). Situated Learning shares the definitional component and philosophy of other experiential learning models that learning is best when the student is actively engaged in the process, and, although less thoroughly stressed, when students thereafter reflect on the process.

Added to the framework provided by the aforementioned models of experiential learning was consideration of the unique culture of the military learning environment. Characteristics of military education result from the nature of the military structure and culture and the mission-focus of most military exercises. The special nature of the soldier-student has implications for the relative effectiveness of training (Moon and Schma, 2011). Smucny and Stover (2013) identify the unique characteristics of military learners to be their focus on the mission and an assumption of duty inherently associated with this mission ("mission first"); their comfort with a well-defined hierarchy; adherence to discipline; an expectation of hard-work and team-work by all members; and an advanced level of comfort with a high-stress, uncertain environment. We argue that this makes less important the need to make students interested in the learning process as presented by Efstratia (2014) and others. If it is being taught; military members are trained to assume it is important and what they need to know about why or how it is important will be shared if and when dictated by their higher commands.

The Training

With the theory of experiential learning at its core, and keeping in mind the unique culture of the military, the supplemental training program for the ZADT was defined. The plan consisted of academic, university-led training; low-technology agriculture hands-on learning; cooperatives training; and additional cultural training to augment that provided by the military. Each of the components is discussed in turn including resource needs and how the training contributed to individual training objectives and the overall goal of access to the knowledge, experience and resources necessary to train and mentor the team's Afghan partners.

University Training and Reach-back Support

A week-long training session focused on agriculture of importance in Afghanistan was held at North Dakota State University (NDSU). [A detailed training schedule for this and other training can be obtained from the corresponding author.] The training was led by NDSU professors and extension specialists and included one to four hour blocks of instruction on alfalfa production, wheat production, vegetable production, soils, water, plant pathology, beef production, animal health, entomology, bee-keeping, chemicals and fertilizers, and machinery and equipment. As none of the faculty and staff leading the instruction was an expert in Afghan agriculture, providing this selfless contribution required considerable learning on their part in preparation to teach us.

Examples of the resulting training included livestock specialists in beef and sheep covering the animal husbandry techniques appropriate for important breeds in Southeast Afghanistan. An alfalfa specialist covered the historical varieties used in the target region of Afghanistan and discussed how thirty years of war had changed this crop (and others, especially perennials). A four-hour block of instruction on evaluating and working with different soil types, including a two-hour laboratory, helped put in context the soil-dependent instructions from the plant science experts instructing the team.

The added advantage from the university training was that the subject matter experts agreed to serve as reach-back resources for the team, and did so. For example, the instructor on bee-keeping was able to evaluate and come up with a solution to problems in bee-hive establishment and in controlling pests (wasps) once the team faced these challenges while in-country. A plant-sciences instructor was able to identify a fungal infection in a vineyard using close-up pictures and a detailed explanation of the environment and the infestation and its evolution.

Dewey's model and the predicates of the Situated Learning Model stressed the importance of building this social environment. Doing so was a unique challenge for this military unit. While there are a number of extensive operations that involve collaboration with outside entities in planning and mission implementation, and these increasingly and more formally include civilian partners, including external civilian expertise as a pivotal resource for a specialized mission is still unique for military units at the level of the company-sized element. In this case, part of the training plan was for the unit to become somewhat dependent on a group of voluntary civilian experts. The experts became part of the soldiers' social environment and remained as such during the deployment period.

Because North Dakota has little poultry production and no known working camels, NDSU did not have experts in these species. To supplement the NDSU training, the team therefore reached out to others in the region. The Red River Valley Zoo (also in Fargo) provided instruction on camels. And, a large local egg layer provided instruction on poultry care. The added advantage of the latter is that the family also owned a winery and grew a wide variety of grapes, another key crop in Afghanistan.

As there is also a notable lack of orchard crops such as almonds, walnuts and pomegranates, and of vineyards in the Midwest, the team also participated in an a revised version of the Agriculture Development for Afghanistan Pre-deployment Training (ADAPT) offered by a consortium of universities led by the California State University system, and offered on a regular basis on or near two CSU campuses. ADAPT includes both classroom and field training and demonstration. Details regarding the history, objectives and offerings of the program are presented in Groninger et 218 al. (2013).

Briefly, ADAPT is led by field-experienced researchers, extension specialists and those with in-country time, many of whom are available during deployment for technical assistance and advice. The training considers the wide diversity of environments in Afghanistan including heterogeneity created by vast differences in altitude, water availability and kinetic activity. The program goes beyond teaching and demonstrating appropriate agricultural practices to include lessons about interacting with and assisting Afghan farmers and officials such as extension specialists. While the program is designed for 40 hours over five days, the team's training requests were specifically designed towards those crops common in the deployment province and for which technical specialists were not available at NDSU. The team asked that the training focus on tree crops and grape production. They spent three full days in with subject matter experts. Training included classroom lessons as well as hands-on tours of and experience at regional farms and vineyards and discussions with farmers about the nuances of production, storage, and logistics of specialty crops. Details are shown in Table 1.

Amish Farms Visit and Support from Compatible Technologies, Inc.

A second training focus was on agriculture without modern technology; without tractors, combines, sprayers, and the like; something for which team members had no frame of reference. They found such an environment in a local Amish community near Utica, Minnesota. The team spent three days with the Amish learning about animal and crop production without modern diesel-powered machinery and equipment, and about generator powered technologies necessary as a means to operate tools and machines without electricity. This training proved invaluable, and it was not just the know-how the team took away. Working with the Amish reminded team members that there remains an incredible innovative spirit among farmers and that there are solutions to nearly every challenge if one is willing to flex their mind a bit. For example, a visit to an Amish harness shop

demonstrated that electricity is not required to power an industrial strength sewing machine; a generator will do. This later proved to be an important lesson when the team was faced with a lack of and inconsistent electricity once in-country. Another example was the demonstrated lesson that automatic sprinklers are unnecessary in a greenhouse when elaborate drip irrigation systems with water moving by gravity can be developed using simple plastic piping.

Some other tricks of the trade were introduced prior to the deployment by another training partner, Compatible Technology International. This non-profit organization develops technologies for use in developing countries; and other situations without supporting infrastructure. They provided the team with a durable, manually operated hand-grinder and other simple yet very effective technologies. They also reminded the team that technology is not always required. Afghans learn how to sow seed so accurately that the resulting planting populations mimic seeds planted using air seeders.

Following the experiential learning models, this component of the training program was comprised of "real-world" learning exercises where student-soldiers not only would learn by doing, but would be expected to apply the learning to decision-making in other situations. The training specifically included a step that required learners to identify known situations in the Afghanistan agricultural and agribusiness environment, and to apply what was learned during the training to their forthcoming environment. Specifically, learners developed plans on how to improve production efficiency in an environment with a low level of technology adoption and little infrastructure. Finally, including the Amish and Compatible Technology International further expanded the community of partners (i.e., the social environment).

Cooperative Training

The final component of the agriculture and agribusiness training was on the role of cooperatives. Cooperatives were present only in name in Zabul province, but they had considerable potential. CHS, Inc. graciously provided the ZADT with three days of education and practical exercises on the structure and operation of cooperatives, including lessons in strategy development and program implementation. This uniquely designed training was held at their corporate headquarters in Inver Grove Heights, Minnesota. CHS brought in a team including members who had worked on agricultural development in Afghanistan and those who had spent time in Afghanistan working with local entrepreneurs. The focus was on developing a plan for cooperative development, securing and utilizing resources, and implementing a plan for continual assessment. The training content followed closely training objectives, provided here. Training objectives were that the team:

- Learn the structure, function, services offered and history of agricultural cooperatives with a focus on application to Zabul Province and other Pashtun regions of Afghanistan.
- Become familiar with the unique governance of western cooperatives, and the roles and responsibilities of members and the Board of Directors and be able to compare and contrast such with the formation and operation of cooperatives in developing countries. 85
- Become familiar with community development in Afghanistan including the interface between civilian agencies and the military.
- Understand the legal environment in Afghanistan, cooperative law and corporate law and how one can influence legislative change.
- Learn from examples of cooperatives in the Developing World including those in Armenia, Niger, Afghanistan, Central and Eastern Europe, Russia, and Mongolia.
- Gain an understanding of Afghan cooperatives and cultural/environmental issues.

- Be able to advise Afghan entrepreneurs on starting cooperatives or revising their existing cooperative structures.
- Understand and be able to identify means to overcome challenges associated with starting agricultural cooperatives in Afghanistan.
- Embrace the role as a technical advisor including defining responsibilities in development and gaining producer buy-in.
- Know where to find information while on assignment including Cooperative Education Resources, E-Extension demonstration, and Cooperative Network.
- Develop relationships with the training experts to facilitate reach-back efforts during deployment.

Cultural Training Supplemental to U.S. Army Training

Finally, the team supplemented the army's language and cultural training with additional training focused on the Pashtun region taught by Afghan-nationals. These individuals shared a traditional Afghan meal with the team; using experiential learning to make sure student-soldiers had a solid grasp on the cultural nuances. The team spent this time with a former Afghan Minister of Agriculture and his family. He was able to evaluate the agricultural training and provide an assessment of the development plans created during the training. As with the other partners, he stayed in regular contact with the team during the deployment, providing a sounding board and adding advice and interpretation as the mission evolved. Again, the learning objectives well articulate the training content. The learning objectives were to:

- Improve the team's understanding of Afghanistan and its people including the various ethnic groups and the nomadic population.
- Develop an acute understanding of the Pashtun people including the role of the village, the extended family, tribal structure, and Code of Conduct (Pashtunwali), dispute reconciliation, and the role of women.
- Expand the team's knowledge of Afghanistan's geo-strategic importance as well as its history, culture and ethnic make-up.
- Increase understanding of the social, economic, political institutions, and laws in present-day Afghanistan.
- Assist to build awareness, knowledge and understanding of critical situations resulting from communicating and interacting with Pashtun Farmers.
- Enable team members to observe, understand, and participate in personal, cultural and situational behaviors including, cooking and eating, dress, holidays, religion, education, and health care.
- Upgrade knowledge about how to manage across cultures, how to observe and act in particular cross-cultural situations, and how to prevent cross-cultural conflicts while working in various rural Afghan communities.
- Understand cultural dilemma and barriers and identify steps to break down barriers including recognizing communication norms in a tribal society.
- Be familiar with the rural economy in Zabul including the agricultural processing industry.

Role of Partnerships

Much of the training developed was built or otherwise supported by partners from outside of the Department of Defense; partners not generally compensated financially for their contribution. As

defined by Dewey (1938) and others, explicitly recognizing the role of partners and the social environment defining the relationship with them and others is an important component of a successful learning environment. The team asked a lot of their partners and they exceeded even the team's lofty expectations.

One of the important contributions of this paper is its presentation of a successful attempt to leverage limited resources. The team found the most successful strategy to compel partners to provide their time, knowledge, experience and resources and to maintain their support throughout the deployment to be appealing to the value of their contribution. Given that it was a military mission, it was natural to appeal to their patriotism; many individuals and firms want to help serve even if they cannot be directly involved on the ground and in-country. Team leadership and members spent considerable time and effort articulating to their partners the value they brought to the mission and to the lives, not just of the involved soldiers, but of the farmers of Afghanistan. Putting a face on the people that would benefit was effective. While they could and did put a face on the individual soldiers, it was more challenging to personify those Afghans with whom they would work closely. One common marketing strategy employed by charitable organizations operating throughout the world is to allow donors to adopt individual children, animals and even villages. A simple internet search provides an overwhelming number of such opportunities. However, the team was not looking for individual sponsors or even monetary contributions; they were rather searching for partnerships in knowledge. Because of the specificity of need: training and reach-back technical assistance, it was natural for the team to appeal to their partners by being transparent in the belief that few could match their ability to help the team help Afghans; to let them know that the team sought them out because they placed great value on their expertise. All the partners stepped forward as citizens of the world.

Discussion

The components of Dewey's Experiential Learning Model were adopted during planning and implementation of training for the Agribusiness Development Team mission. First, the roles of the unit leaders, soldiers, and civilian partners were carefully and precisely defined. Specifically, the hierarchically defined structure of the unit was challenged and revised so that the student-soldier accepted more responsibility for their own learning and the learning of their peers. The unit also worked to foster partnerships and other relationships.

Second, the knowledge and content organization of the learning was specifically designed to put students in a real-life environment where they could learn and to try out ideas generated during that learning process. For example, the plan designed for students to learn the process, use, and application of soil assessment included multiple steps. Students were first asked to identify soil-related challenges they would encounter in Afghanistan. They then worked to identify solutions to overcome these challenges. The design of these learning exercises also helped the team build relationships with one-another, their reach-back team and others comprising the social environment.

Third was the actual application of experiential learning. This was an adaptation of the mission training and preparation style used by the military and informally termed "crawl, walk, run". In this model, the basic design of a mission is planned and described without much participation by the learners (crawl). It is akin to the lecture style of teaching, and generally includes a diagram or model elements involved in the mission to demonstrate the plan (e.g., rocks used to represent vehicles). The second phase involves a trial run of the mission so actively engaged learners can practice and

the leadership becomes aware of what works and what may not work (walk). Finally, the mission is implemented. One of the most notable learning-by-doing experiences focused on how to conduct a Shura (meeting) with village elders through an interpreter. The exercise resulted in students not just "practicing" applying the techniques they had previously learned, but itself resulted in a set of sequential practice exercises to help the learner define the situation (e.g., importance of meeting participants in the village; dynamic between participants; need for an interpreter), identify the appropriate strategies to conduct the Shura according to the encountered situation; and complete a reflective exercise that was then used by follow-on teams and in subsequent hypothetical Shuras conducted by the student teams.

The final principal in Dewey's model is reflection. It is doctrinal in the military that, after a mission, whether it is an all-day movement across rough terrain to engage the enemy or a two hour class on risk analysis, learners, teachers, and any other participants or observers conduct an After Action Review (AAR). This group form of reflection consists of restating the mission; identifying what went right and what could use improvement; and specifying alternatives for any follow-on missions. These are later filed for consideration by others who will conduct a like mission or compiled with AARs from other missions and units so as to become "lessons learned". In the case of the ZADT training, the use of experiential learning theory moved an AAR from "how did it go and how might it be improved?" to "what did we learn from this activity and how can we apply this learning as we plan for and implement missions in Afghanistan?"

Summary and Conclusions

Traditional military pre-deployment training for the ZADT was supplemented through external to Department of Defense partnerships offering training specific to the team's agribusiness development mission. Training was offered through academic partnerships including broad training by staff and faculty at NDSU on agriculture common in Zabul and supplemented by regional partners to cover animal agriculture not specific to North Dakota. Viniculture and tree crops, common in Zabul, were covered in training offered by the ADAPT program. Training and experience adapting to low-technology agriculture was received through visits to Amish farms and the support of Adaptive Technologies International. Finally, training was offered by CHS and their partners on the cooperative structure, including intensive and hands-on application in developing countries where the cooperative concept is new and the benefits are not yet fully realized. CHS employees and partners shared their Afghan-specific experiences within the context of how the ZADT might help Afghan farmers and officials grow cooperatives to overcome challenges with lack of infrastructure.

The training proved invaluable. The team went on to complete over 800 missions, many joint with the International Security Assistance Force and Afghan military partners as well as with leadership and staff of the Directorate of Agriculture, Irrigation and Livestock and other ministry entities and with cooperative leaders. There were successes including the development of a province-level trading organization and the building of a community slaughterhouse as a public-private partnership, introduction of bee hives as a means to increase yields, repair and redesign of irrigation systems, and introduction of value-added activities such as drying fruit crops and de-shelling nuts. The team worked with local entrepreneurs on projects such- as yogurt production from goat milk and an egg hatching facility. And, they worked with farmers who adopted low-technology practices to improve their productive efficiency.

The ZADT agricultural experts were split among Kandahar Airfield, five forward operating bases, and a combat outpost. Three of the forward operating bases were adjacent to demonstration farms set

up in partnership with the DAIL. The team met weekly by secure internet connection to discuss progress, identify challenges, and share successes and ideas. Team members also had and used reach-back capability, consulting with stateside experts on everything from tree fungi to killing wasps that were depopulating bee hives. They efficiently exploited the social environment they had established during the training period.

Aside from the logistical and security needs due to the combat environment, one of the most pervasive challenges was reluctance among Afghan farmers to make changes in what they raise or how they raise it including livestock, crops, vines, or orchards. Myths had been passed down through hundreds of years that may have at one time in one environment been valid such as not to water trees or plants when they are flowering. Many of their ways of farming were solidly ingrained and used even when they were no longer well adapted to current conditions. For example, farmers continued to use trench irrigation even after irrigation system improvements provided a consistent water source for their gardens. The team also quickly learned that when farmers are raising a subsistence level of food, regardless of the potential of a new and simple to resource and use technology, the known system in place easily trumps the risk associated with change. The cost of failure is very high in a subsistence environment. Finally, most farmers had not been formally educated. So, while the team expected it to work reasonably well to explain in considerable detail how adopting certain production practices would increase yield, their inexperience at formal learning made this method less than effective. If the team could not convince them to try a practice while still in-country, there wasn't much promise for their ability to sustain it once we left.

Key lessons from planning, implementing and assessing the result of this training plan extended beyond what worked to increase the technical expertise of the team. Experiential learning served as an unmatched method to teach and observe the effectiveness of the lesson when there is a short window for learning. This was true as the team learned from their experts and as they taught their Afghan partners. From the training, the team also learned that there are plenty of ways to gain knowledge and experience if you think creatively. The process reinforced the belief that including partners provides multiple benefits including leveraging expertise and knowledge and gaining additional resources, including those not previously considered. That is, that the social environment that exists during the learning phase can be extraordinarily important when the knowledge and experience is later put to test. Obtaining buy-in to the project among the trainers and therefore their willingness to support the ZADT through the training and while deployed involved selling them on the idea that they can help the team, and its individual members, like no one else can and otherwise emphasizing the importance of their participation to the mission. The team quickly realized that the concept that success has to be a team effort extended beyond the unit, and found it not only important, but natural to regularly acknowledge their contributions, not only immediately following the training, but during and especially after they witnessed achievements brought about in part due to their direct involvement. That is, the social environment existing during the training needs to be fostered to be retained.

While this project was unique to training and support meant to augment that provided by the Department of Defense, the planning and implementation process reinforced the reality that external partners not only have an incredible level of expertise and experience to share, but that they generally want to do so; all it takes is a simple request. And, this reinforcement has paid dividends in the college classroom. A member of the ZADT brought back her experiences in leveraging external partnerships to bring her existing partnerships with industry to a whole new level at NDSU. She redesigned her sales class so as to include repeated, direct, and meaningful

interaction between students and professionals; professionals who will actively and with true compassion mentor students through the application of lecture- and book-learned tools and skills, and who are willing to serve as a life-long resource.

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Table 1. Zabul Agribusiness Development Team Training with ADAPT Program Personnel

Day	Location	Training
1	Rominger Farms, Arbuckle, California	Almond orchard development and maintenance, low-volume irrigation, and basics of supporting soil
2, a.m.	UC Davis campus	e-Afghanz; soil properties and grapes; structure and function of roots; and grapevine training and pruning
2, p.m.	UC Davis vineyard, El Dorado County, California	Training and pruning, head, vertical cordon, cane, application to Afghanistan
3, a.m.	CSU Fresno	Viticulture and Enology: the grapevine and cultivar, vineyard establishment, and cultural practices and harvest
3, p.m.	CSU vineyard	Field observation and pruning, raisin processing

The Use of Asian Honeybees for Sustainable Apiculture in Afghanistan
Zabul ADT, MSG James Doten, July 10, 2012

Background
The use of honeybees in agriculture (apiculture) is a well-known technique to improve crop production. In Zabul Province the main agricultural products are almonds, pomegranates, and grapes. Farmers also grow significant quantities of apricots and figs. Pollination is critical for crops such as almonds which require cross-pollination. Natural pollinators exist but successful apiculture can result in a 40% increase in almond yield. Apiculture also significantly increases yields for pomegranates, apricots, and figs. Grapes are self-pollinating and do not benefit from apiculture.
In addition to increased yield, the quality of the product will improve as a result of fully pollinating the flower. An apple requires up to five trips before becoming fully fertilized. Bees are efficient pollinators because of their behavior, known as foraging consistency, in only working one plant species per trip. A bee will visit hundreds of flowers each trip, each bee makes about 10 trips a day. If placed near an orchard the bees will consistently pollinate the orchard during its specific bloom. Growers in the United States take advantage of this behavior by moving hives into an orchard near bloom season. As long as the food source is near the bees will pollinate only the desired plants in the orchard. The bees are then moved to another location to match different bloom times.
Apiculture in the United States uses the European honeybee (Apis Mellifera). This species is suited for moving across the country and is known for its prolific honey production. Hobby beekeepers maintain small stationary apiaries (where bees and hives are kept) containing the European honeybee. The equipment and practices have been standardized in both commercial and hobby beekeeping.
Problem Statement
Attempts to introduce small-scale beekeeping for rural development in Afghanistan have failed. Environmental threats destroyed previous projects using the imported European honeybee. Using the native Asian honeybee (Apis Cerana) shows promise in developing sustainable apiculture by restoring traditional Afghan beekeeping techniques.

Threats
Colony Collapse Disorder
Within the past ten years beekeeping in the United States has been threatened by colony collapse disorder (CCD) and varroa mite infestation (figure 1). CCD has been associated with commercial beekeeping and resulting tendency to concentrate colonies from across the country in one location. It has not impacted isolated apiaries of the hobby beekeeper. One of the theories behind CCD affecting commercial operations is their use of high-fructose corn syrup and an associated pesticide found in the syrup. Hobby beekeepers do not use the corn syrup and thus did not experience CCD to a significant degree.
Sustainable Apiculture 2

Varroa mite
Varroa mites plague bee colonies and can devastate a colony within months. The mite attacks both adult bees and developing larvae. After feeding on the pupa during development, the emergent bee is infested with as many as six new mites, starting the cycle over. The varroa mite problem is growing.

First encountered in Florida in the late 1980's the infestation soon spread. The varroa mite is the greatest threat to apiculture using Apis Mellifera (European). It weakens the bee and also carries the deformed wing virus (DWV). With the mites present, the virus concentrations increase a million-fold. The varroa mite is devastating to European honeybee colonies. The mite wiped out all feral European honeybee colonies in the United States. Since the emergence of the mite problem in the United States, beekeeping as a hobby has been reduced by 50%.

The mite infestation requires active intervention to prevent a colony from being destroyed within months. In the United States, efforts are being directed towards developing a strain of bees that exhibit hygienic behavior in removing infected pupae from the hive. These varieties are not well distributed and are unavailable in Afghanistan. Miticides can control infestation, but these are not a cure and are not available to small scale beekeepers in Afghanistan. Essential oils can also reduce infestation levels but are not available to farmers in Afghanistan. The varroa mite is native to Afghanistan; its presence makes it hard to develop sustainable small-scale apiculture projects.

Mite infested bee

Previous attempts to develop apiculture in Afghanistan followed the US model. Imported European honeybee colonies were used to start small-scale operations that emulate hobbyist beekeeping in the United States. If infected, the varroa mite will destroy these hives within months of infestation.
The varroa mite is native to Afghanistan. It is a pest to its natural host, the Asian honeybee, Apis Cerana (figure 2). Apis Cerana is one of four honeybee species native to Afghanistan, but the only one capable of being kept in hives. The Asian honeybee coevolved with varroa mite and developed a grooming behavior that reduces it from a threat to a nuisance. The Asian honeybee lifecycle, when compared to European honeybee, also does not allow as many mites to develop in the egg-laying stage during pupation.

Wasps

Another threat to European honeybee projects in Afghanistan is the presence of large wasps (hornets) native to the region. The wasps (figure 3) overwhelm the bees' defenses, kill the bees defending the hive, and then steal the larvae and honey. When attacking, the wasps can destroy a European honeybee colony within four hours.
Previous U.S. Army European honeybee projects in Zabul were destroyed by wasps before the varroa mite could have an effect. Interviews with local farmers show that the wasps are prevalent throughout the province. ZADT developed local wasp traps, but they are not 100% effective in preventing hive loss from wasp predation. The wasps are aggressive and make it difficult for farmers to work in their orchards.

Wasp

The wasp is a natural predator of the bees. The imported European honeybee does not have defense against the wasp. They attempt to sting the intruder; however, their stinger cannot penetrate the thick skin of the wasp. The Department of Agriculture, Irrigation, and Livestock (DAIL) employees reported the wasps destroyed their European honeybee colonies soon after starting the project. None of the DAIL apiculture projects using European honeybee lasted more than three months.
The native Asian honeybee coevolved with the wasp and has developed an effective defense despite being 1/3 smaller than European honeybee. The Asian honeybee surrounds the wasp in a ball with 100 to 150 bees. The bees beat their wings to increase the temperature inside the cluster in a defense known as thermal-balling (figure 4). The temperature is raised above a lethal level for the wasp but below that of the Asian honeybee. The wasp will kill solitary foragers of the Asian honeybee without

triggering the defense mechanism. However, when the wasp tries to enter the hive, the Asian honeybee actively defends the entrance. Villagers with colonies of the Asian honeybee reported the bees successfully defeated wasp attacks. ZADT members witnessed this defense at a demonstration project.
Thermal-balling
Sustainable Apiculture

The Asian honeybee has coexisted with these wasps throughout its territory. The Japanese are actively restoring their traditional beekeeping traditions using Apis Cerana in Japan. Part of the reason for switching from the European honeybee is the large Japanese hornet. Japanese scientists studied the thermal-ball defense and were the ones to discover how it works. In Japan the Asian honeybee honey commands a price four times as high as the European honeybee honey. Sustainable apiculture using the Asian honeybee is wide-spread throughout southern and southeastern Asia.
Comparison
Table 1 summarizes The International Centre for Integrated Mountain Development's (ICIMOD) comparative study for small-scale rural apiculture development projects.
Table 1. ICIMOD Apis Cerana versus Apis Mellifera
Parameter
Apis Cerana (Asian)
Apis Mellifera (European)
Initial investment
Very low
High
Colony management costs
Negligible
High
Risk involved
Low
High
Potential for stationary beekeeping
Suitable
Not suitable
Susceptible to mites and predators
Resistant
Susceptible
Eco-services
High
Low
The University of California – Davis (UC-Davis) developed an economic analysis of honeybee business in Afghanistan. The results of the UC-Davis study found that stationary beekeeping with the Asian honeybee is profitable even at small scales. They found it well-suited for small stationary beekeeping projects. They also concluded that the European honeybee requires at least 100 colonies before it is economical. In addition, the UC-Davis study found that the European honeybee was well suited for migratory beekeeping. It tolerates movement around the province to follow key crop blooms.
Once established, the Asian honeybee does not tolerate moving the hive. The Asian honeybee is only for stationary beekeeping. Studies show the Asian honeybee is a more efficient pollinator than the European honeybee. Crop yields are higher using the Asian honeybee. The Asian honeybee operates at lower temperatures, so they begin pollinating earlier than the European honeybee. This is critical in

Zabul Province's almond production which begins to bloom in March. The Asian honeybee is more effective in pollinating key crops and can pollinate a higher variety of plants. With smaller hives and colonies, the Asian honeybee requires less forage for survival.
The European honeybee colonies are larger and produce a large quantity of surplus honey. Asian honeybee colonies are smaller, producing less honey. The foraging range of the Asian honeybee is one half that of the European honeybee. This means it covers only a quarter of the area. However, the range of the European honeybee exceeds the requirements of most villages. The Asian honeybee adequately covers a village and surrounding areas.
Strengths
Apis Mellifera
The European honeybee is well suited for large scale, commercial operations of at least 100 hives. At this scale equipment and maintenance costs are covered by honey production. The species works well for migratory beekeeping. It works best in monoculture environments such as an almond orchard. They have a larger foraging area than the Asian honeybee and produce more honey per hive. Migratory beekeeping on a large scale returns $2 for every $1`invested. The high initial investment and low returns make it unprofitable at smaller scales.
Apis Cerana
The Asian honeybee is well-suited for small scale stationary operation. It is economical at any scale because of the small initial investment, simple equipment requirements, and negligible operating costs. Small-scale
Sustainable Apiculture 5

Asian honeybee projects return $4.5 for every $1 invested. The Asian honeybee is a more efficient pollinator resulting in greater increases in village income through pollination services more than the European honeybee. One estimate cited by UC-Davis claims $14 benefit for every $1 invested due to increased production. The Asian honeybee is native to the region and tolerant of pests and diseases such as mites and wasps that destroy imported the European honeybee.
The equipment is simpler, smaller, and less expensive than that for the European honeybee. By using simple designs such as the Japanese box pile hive, villagers can locally reproduce the hives easier than standard European bee equipment. The Asian honeybee can sustain itself even when orchard crops are not blooming by foraging in the surrounding area for desert flowering plants. The Asian honeybee is known for its ability to survive and thrive in harsh, marginal conditions.

Weaknesses
European honeybee
The European honeybee is an exotic, imported species that is vulnerable to environmental threats such as mites and wasps. It is more expensive than the Asian honeybee to set up and complicated to maintain. It requires a minimum of 100 hives before breaking even. The high initial investment and low returns make it unprofitable at smaller scales. The European honeybee requires migration, intensive management, standardized equipment, and a larger foraging area with a monoculture-based agriculture. European honeybee projects usually fail in Afghanistan despite extensive intervention.

Apis Cerana
The Asian honeybees have a smaller foraging range and are ill-suited for migratory beekeeping. They produce less honey per hive but the honey is considered more valuable in overseas markets. The Asian honeybees cannot be raised near areas where European honeybees are used as they will raid honey from the European hives.
Analysis

Army sponsored apiculture projects previously focused on the European honeybee for several reasons. Past projects concentrated on honey production rather than pollination as the primary desired result. European honeybees are superior honey producers with its larger hives. Also, practices in the U.S. solely use the European honeybee as our techniques were adopted from Europe. The European honeybee is well suited for the type of agricultural practices in the United States. Army practitioners from the United States are only familiar with the European honeybee and are unaware of the Asian honeybee as an alternative.

The Asian honeybee is the traditional honeybee used by Afghan beekeepers, particularly in the mountainous, border areas of Pakistan. Prior to the Soviet invasion, large-scale commercial beekeeping was practiced using the European honeybee similar to the United States. This capability was destroyed in the resulting occupation. Our attempts to rebuild apiculture mimic how we do it in the United States. The focus is on small-scale, income-building for vulnerable populations. Given the high initial costs, these were largely subsidized operations. Given the intensive management requirements of the European honeybee in this environment, the project success rate is likely very low, if not near zero.

Recommendation
Using the Asian honeybee as an alternative provides the Army a sustainable apiculture option that is economical. It restores traditional Afghan practices and is well suited for the environment. The Asian honeybee provides more efficient pollination. This will significantly improve rural income through better yields and improved quality of key agricultural products. It will require additional training of Army personnel to learn about the Asian honeybee and how it differs from the European beekeeping. The Asian honeybee is well suited for small-scale, village level rural development. The European honeybee is still relevant. However, it use should be concentrated on developing large-scale, migratory commercial or cooperative operations.

Conclusion

The ADT strategy was a success because it took the approach that we can prevent the seeds of conflict, by planting seeds of hope and prosperity. It took the ADT at the point of the spear, virtually all my soldiers qualified for combat badges, it took inter-agency partners to array the many aspects of power, knowledge and influence, and Afghans willing to risk their lives to implement the programs. This collaboration led to an outcome where farmers were empowered with knowledge, local agricultural extension capabilities were enhanced, and infrastructure developed so locals could own a sustainable approach to rural development. Our deployment was captured in a documentary produced by Minnesota Public Television and the link to the video has been submitted as part of my written testimony. This documentary of our deployment was aptly named, Bridging War and Hope. http://www.mnvideovault.org/mvvPlayer/customPlaylist2.php?id=23789&select_index=0&popup=yes That is what we did. Thank you.