misunderstandings between scientists and operations personnel. In theory, the old tools are extremely effective and should be pushing hard against the 100 percent ceiling under realistic treatment conditions. However, operational people are accustomed to using their standard tools in a wide variety of conditions. Therefore, it is disconcerting to see results showing that those tools are not working well under some conditions, and it is hardly surprising that the results are greeted with disbelief.

Demining Technology in the Future

What if the results are real (i.e., are a real representation of the effectiveness of standard demining tools)? After all, these tools were never thoroughly tested before implementation, and even today, belief in their effectiveness is really just a belief. When researchers are attempting to develop a new demining tool, what kind of effectiveness should they be aiming for? Presumably, they should be getting pretty close to the claimed 100 percent because anything less than 100 percent rapidly becomes unacceptable in a demining tool. But the results presented at EUDEM suggested that well-known and accepted demining tools often give less than 80 percent effectiveness in standardized tests or in experimental situations in which different treatments are being compared. Terevlyan concluded at EUDEM that problogs should not be used. But perhaps a better conclusion is that problogs are no better than new technologies that are not yet in use because they are achieving significantly less than 100 percent detection success. Machines are not yet accepted as a clearance tool, but standardized tests often show them doing better than 90 percent. The results of new technologies are not generally published, but if they are achieving 70 percent or more, they may be performing as well (or standardized tests) as traditional tools (as standardized tests). Some may be performing better.

Despite the mantra that "there are lies, damned lies and statistics," scientific tests do not lie. Certainly, the data can be manipulated, and worse, are regularly misquoted out of context by politicians and others. But if the methodology is clearly described and the statistical analysis is appropriate, then the results tell their own story. Scientists design experiments that ask very specific questions. Some extrapolation from their results and conclusions is appropriate, but should not be taken too far. If a scientist says "under treatment X, I obtained 80 percent effectiveness, and under treatment Y, I obtained a significantly lower effectiveness of 60 percent," it does not follow that the tool was operating at 70 percent effectiveness. What follows is that there is something to be learned from the difference between the two treatments. Readers should treat very cautiously the implication that 80 percent and 60 percent are absolute measurements of effectiveness under operational conditions similar to the test conditions.

A relevant case at the EUDEM conference was that it is time to move away from an emphasis on getting every mine out of the ground, and start addressing demining problems using risk assessment procedures. No demining tool gives 100 percent effectiveness all of the time, so we should not be too surprised when scientists get the sorts of results reported by Mueller, Fjellanger and Terevlyan. It is refreshing to see such studies being reported because they should have been done years ago. They make an important contribution by allowing the demining industry to refine its risk analyses, and may also cast more sensible light on the effectiveness required of new technologies before implementation is considered.

Acknowledgements

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References


The Training Process

Once Giva realized the pigs were good animals for demining he bought five more female pigs. He always uses female pigs because males are very aggressive. "They are almost impossible to train," says Giva. "They want to fight because they think that I am the leader." In comparing dogs to pigs, Giva says, "Dogs are suitable. They are not as focused as pigs are. Pigs are always focused on eating and sleeping. They are very calm and relaxed animals." The most difficult part of training pigs is that the trainer cannot use the same training techniques with pigs as with dogs. He/She cannot spoil kudo. The trainer must be quiet—almost completely silent—and relaxed. The trainer cannot

"Pigs are one more means of fighting against the garbage of the war," says Giva Zin, an animal trainer from Israel whose research on the landmine detection capabilities of pigs is receiving widespread recognition from the mine action community. This article highlights his research on the use of pigs for mine detection.

by Jennette Townsend, MAIC

The Beginning

Pigs may be the newest addition to animal-assisted landmine removal efforts. Israeli animal trainer Giva Zin started his research with pigs about a year ago and has seen promising results.

Giva began with one pig named Chavisa. "She is very smart," says Giva, "and she enjoys what she is doing." Giva first noticed that pigs have a natural "talent" for landmine detection while he was in Croatia, working with the Israeli organization Maavarim. "While dogs can detect landmines on the surface of the ground, they have difficulty detecting mines buried deep in the ground," says Giva. It seemed more logical to use pigs for detecting mines because pigs naturally root for food under the ground.

Giva began his career as an animal trainer in the Israeli army where for two and a half years he used dogs to detect mines and booby traps along roadways in Gaza and Lebanon. After the army, he went to a canine training center in Huntsville, Alabama, and learned more about being a dog trainer. He emphasized that pigs are not like dogs. The time it takes to train a pig seems to depend on the pig, but at this point, it appears that training pigs takes half the time that it takes to train dogs. Giva attributes this difference to the fact that pigs enjoy searching for mines because it is their instinct to root. Giva imagines that if Chavisa could talk she would say, "Not only am I doing something that I enjoy, but Giva pays me as well."
encourage the pig by saying "good boy, good job." "The pig wants to find the mine more than you do because he wants food," says Giva. "This was very difficult for me because I like to speak to the animal during training. But when I speak to Chavisa, she looks at me as if to say, 'Don't do that. Let me do what I need to do.'"

In the first stage of training, every time the pig detects the scent of the explosive, she is rewarded with food. In the second phase of training, the pig must find the explosive with her nose—without seeing the ground and the pig is rewarded when she finds nitroglycerine and the pig is rewarded when she finds nitroglycerine. "Good dogs are for detecting explosives that are above the ground," says Giva.

Pigs, like dogs, could be used for quality assurance in areas where there are metal pipes and metal detectors cannot be used. Another option for their use is to detect mines with plastic and wood components. At present, machines and pigs are used for quality assurance; in the future pigs and machines may also be used. The value of pigs, like dogs, is that they do not tire of searching for landmines as humans do. Pigs have a lot of endurance because searching for mines is so closely parallel to their instinctual habits.

"Pigs are for demining the field," says Giva. "Pigs cannot take the job of watching the dogs in the airports because they are unnatural. Dogs are beautiful and clean. Also, dogs are good for detecting explosives that are above the ground." Also, says Giva, "Jews don’t like pigs. Even Jews who are not religious have a strong aversion to pigs.”

Many in Israel are nonconformist to Giva’s research. He has even been told that he is stupid for working with pigs. Giva realizes that it is a natural human response to doubts and that it is difficult to convince others to give something new a chance. He is confident that those who sell him that his project is doomed will eventually support his research. Giva cites his fisher as an example. "He doubted my research at the beginning. He felt that nothing would happen," says Giva. "But, as the months pass, he is becoming more and more interested in what I am doing. When I began my research, he would ask me questions about my research at the end of the conversation. Now the questions come at the beginning."

"Giva continues to hold on to the idea of pigs being used for explosive detection in Israel. He can see where pigs could be useful, for example, with the search for mines on the border with Lebanon. He mentions that the Jewish religion is not against touching pigs or looking at pigs—only against eating pigs. "I believe that even God likes my idea," says Giva, "because I am using the pig for a good reason. Maybe in the future, after pigs have been used successfully in other regions, or after research confirms that pigs can be used for demining, Israelis will accept them for use on their own land.""

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I would like to thank Eyal Harari for his efforts in contacting Giva Zin.

Contact Information

Giva Zin
Institute for Animal Studies
Kibbutz Lahav, Israel
Mobile: 052-96-2765
Fax (08) 991-6380
E-mail: tronsel@jmu.edu

The Future of Pigs in Israel

"This project is not for Israel," says Giva. "It is for places like Sarajevo, it is a mine clearance device that has been used to improve efficiency and effectiveness in demining operations. This article discusses the benefits of the MineWolf Toolbox System and compares it to other demining machines and technology currently used to clear minefields.

The MineWolf Toolbox System: Ground Preparation to Mine Clearance

The MineWolf Toolbox System, which operates in minefields near Sarajevo, is a mine clearance device that has been used to improve efficiency and effectiveness in demining operations. This article discusses the benefits of the MineWolf Toolbox System and compares it to other demining machines and technology currently used to clear minefields.

The MineWolf Toolbox System

Clearance Methodology

Clearance of mixed APMY minefields is divided into two phases. First, the rolling system detonates or breaks up the AT and AT mines. Then, with a ground penetration depth of 30 cm, the rolling system breaks up the remaining intact mines and reduces the size of components left by the fluid.

Description of MineWolf Technology

MineWolf Technology combines the strengths of the fluid and roller systems to create a more efficient and effective demining system. The following list describes some of the important characteristics of the MineWolf System.

The present roller systems are too heavy (up to 15 tons), too large in size (too

vegetation and the need for intensive quality assurance (QA) with manual
demining.

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