

# **Screwworms and Stewardship: Lessons from Arizona's Past Battle to Keep Cattle Healthy and Our Out-of-State Markets Open**

By Gary A. Thrasher DVM, Hereford, AZ    Nov. 1, 2025

USDA's Sterile Insect Technique (SIT) with sterile screwworm (NWS) pupae and fly releases were developed way back, just after WWII, and used successfully ever since both in the U.S., the Caribbean, and Central America. But things got out of control down South in recent years.

There is almost nothing written about screwworms in the histories of the Arizona cattle industry. Apparently, there were bigger fish to fry, but most Southern Arizona ranchers had seen or heard about NWS as far back as the territorial days and right up until the 1980's. Local Arizona ranchers learned and knew the most about living with NWS in the 1960's and 1970's.

Those that remember from then and pay attention to what's happening elsewhere currently know a lot more now about NWS, or we think we do, but a lot has probably been forgotten.

NWS got as far north as South Dakota in the 1930's and the Midwest in the 1940's (Chicago Stockyards, etc.), even to Virginia, mostly due to cattle shipments. Texas started publishing and promoting their NWS control efforts in the early 1940's, not just because it was so damaging and expensive to their home state producers, but also because they were blamed for spreading it elsewhere. They remembered the armed quarantine lines some states' cattle producers established blocking their cattle drives and rail shipments to northern markets in the 1880's because of Texas' cattle fever ticks. The Texans didn't want to relive that.

So, with all the hype and headlines about "flesh eating worms" currently, if NWS arrives here in Arizona again it's not likely just going to be our local or state ranch management changes and cattle care problem & expense we'll have to contend with. As it has been for decades now, 85-90 % of our beef weanling, stockers, and feeder cattle end-up out of state to be fed and finished. It's our out-of-state calf, stocker, and feeder cattle markets too that we've got to try to defend and protect.

When we last had a screwworm issue in Arizona, Arizona feedlot capacity peaked at 500,000 head in 1976, and most were beef-type breeds in those feedlots. By then, most cow-calf ranchers and stocker grazing operations' calves and yearlings stayed in Arizona to be fed and

finished and there were a number of slaughter plants in Arizona and nearby California to send finished beef type cattle as well as cull cows and bulls.

Now, Arizona's feedlot capacity is less, around 300,000 head, and nearly all of them source their feeders to finish primarily from dairies. There are more dairy cows in Arizona than beef cows for the feedlots to source feeder cattle from now. At the same time, those dairy-type finished feeders are the most efficient for the only large-scale slaughter plant left in the whole state, and it runs at capacity with dairy steers, only accepting a few fed beef culls on occasion.

So now, almost all of Arizona ranch-raised beef calves, stockers, and culls have to go on-the-hoof through marketing channels out-of-state to the Panhandle, Great Plains, West Coast and Midwest. Those individual states often set their own state restrictions on live cattle imports if they perceive a health threat to their own state's cattle industry. We didn't have much of an issue with that in the 60' & 70's when most of our ranch production stayed home in Arizona feedlots, but it could be a marketing wreck now.

NWS has been a pest in the Americas forever, it's still endemic and probably always was in South America, but not every year around here even when it was prevalent. If not controlled here and far South of us, they'll come and go in cycles. NWS can be almost as bad for ranchers' bottom-line as the drought cycles that are inherent around here.

Drought and NWS cycles can overlap, but NWS years are often the worst in good monsoon years. It's more of a tropical pest. Sometimes both those cycles can last a decade, and we've had to adapt our ranch operations accordingly to survive in business for either one or both. Our weather, local topography, and how and when we manage and process cattle are the biggest factors to consider when deciding what we can do about NWS even with a USDA SIT fly program.

Eradication is a term that probably shouldn't be used with pests and diseases. Every time something is declared eradicated, we forget and get complacent (In 1966 USDA declared NWS "eradicated" in all the U.S.). But "control" and living with it, with vigilance is attainable.

South Texas was always the hotbed for NWS in the U.S. and that's where the biggest immediate threat is now, but distant transport of infected animals is so rapid now, it could show up almost anywhere and get established again if climatic conditions and weather are right.

NWS might even have been why there was less opposition in AZ to the Beef Checkoff and Beef Council than you'd expect when it was becoming federal law. Almost a decade before that, in 1962 Arizona Cattle Growers Association and County Cattlemen's groups pushed hard for a state-wide policy requiring \$0.50/head from all producers to go to SWAHF ("Southwest Animal Health Foundation") to help fund the Douglas, AZ SIT fly distribution facility and sterile NWS arial fly drops in Arizona, New Mexico and Southern California. Some AZ cattlemen from south of the Mogollon Rim even lobbied for a law and \$1/head to be assessed for that purpose. More than \$1.2 million was raised for the SWAHF effort. Its success made the Beef Checkoff seem less offensive, after-all, the original Beef Council law only assessed \$0.10/head.

I saw NWS for my first time on a stay in AZ in the 1960's. Even in one of the worst years (1972) for AZ, when almost all counties had cases, it was sporadic. Cochise and Santa Cruz counties were the hardest hit by far. But many ranches in the area never saw a single case and never saw boxes of flies being dropped on their places. Others, just a few miles down the road, were plagued with NWS troubles and their places were littered with perforated cardboard SIT fly boxes dropped out of the sky. One even landed in the bed of my truck. Elfrida, Hereford, Fairbank, Bonita, Elgin, Lochiel, Amado, Duncan, and the San Bernadino Valley are AZ locations that had NWS problems that I remember well.

In the mid 1970's the USDA, State Vets, University Extension, and the Mexican government put on a blitz tax-payer-funded NWS "eradication campaign" and promotion called "Mission 77" to eradicate NWS in the U.S. and Mexico. By gosh, in 1977 Arizona had less than 400 cases, but then the summer of 1978 was the worst on record again. Then the winter of 1978 came with a longer than usual hard and deep freeze, and screwworm was almost gone from AZ thanks to SIT, ranchers' efforts, and Ma Nature. Less than 40 cases were reported in the whole state in 1979, and most of northern Sonora had little problems as well.

During all that time while we were battling NWS, USDA never restricted interstate movement of cattle out of Arizona and thankfully we had Arizona feedlots buying most of our calves and stockers anyway. Only a few individual states put restriction in place.

At the time, USDA also never closed the Mexican border to cattle coming into the U.S. because of NWS either, but prior to 1988 there were U.S. export quotas that in affect limited Mexican cattle imports somewhat and bunched them primarily to December, January and February during our coldest season when screwworms were the least active at unlikely to get a foothold in most areas. But there was always a concern about Mexican imported steers grazing short-term filaree in Arizona's cactus deserts and those stocker operations dealt with it successfully.

The Douglas SIT fly distribution facility was closed and flights ended in 1980. Now, USDA has already closed the Mexican border to livestock imports this time around in response to just the threat for Arizona. Who knows what USDA or other individual states will do about restrictions on interstate shipments of cattle if NWS does arrive again in Arizona.

In September of 1978, on a Wednesday, I sent some NWS maggot sample in to the State Lab in Phoenix via U.S. Mail and gave directions for a fly drop near the San Pedro River at a ranch adjacent to my own, but the flight never came. That flight crashed on that coming Sunday in Bisbee's Mule Mountains, killing both workers on board. They weren't the first funerals I went to related to the NWS sterile fly drop program. Paul Kane, a good friend and well-known cattleman from the PO Ranch in the San Rafael Valley took a job with the USDA while they were setting up a sterile fly distribution center in Hermosillo, Sonora. To avoid Mexico's roads, they were flying loads of SIT pupae to Hermosillo in old military C-45s rather than trucking them in refrigerated trailers like they did from Mission, TX to Douglas, AZ back then. He died in MX in one of those SIT plane crashes too.

The SIT and fly drop program with ranchers' vigilance and care worked well back then because everyone involved took it seriously and gave their all in the effort. We got quick turn-around results from the State lab, and almost immediate fly drops even on Sundays and holidays. Even the U.S. Postal Service managed to get the sample tubes to Phoenix in a day or two. All we had to do as producers and veterinarians was to be vigilant, send good samples and locations, try to manage our operations to prevent cases, and treat cases faithfully before it was too late.

Also, at that time, livestock industry issues in Arizona were the purview of the seven-member, Governor-appointed "Arizona Livestock Sanitary Board" that had 87 brand inspectors, the State Veterinarian with four veterinary inspectors overseeing the State-Federal Brucellosis, TB, Hog Cholera, and Scabies eradication campaigns, a state meat inspection staff, and a separate "screwworm inspector," and few other things. The board were all active livestock producers and directly attune to producer needs and concerns as well as practical ways to resolve issues.

The Livestock Sanitary Board membership was later diluted, then the Board disbanded by legislation and its function, budget, and control became a program of Arizona's Department of Agriculture in 1990. Whether that proves to be a good thing if NWS arrives in Arizona again is yet to be told.

But can we manage again, while we pray for a hard freeze and wait for another USDA SIT fly drop program? Grandma and Grandpop did it, some aging Mom and Pop outfits are still around that did it. What's else changed? If most of AZ has always been the range of NWS at least since the Spanish conquistadors' times, how did the early homesteaders and ranchers cope through a century of screwing with screwworms until it was gone in 1980?

Among the things that also got removed from the equation, little-by-little, since just fifty years ago, are enough of the right kind of horses and monotonous time in the saddle looking, and watching herds of cattle calmly, up close and personal, almost every other day during the warm season if screwworms were around.

Ranchers didn't go to a four-day roping or a week's jaunt to see their congressmen in D.C. unless they were blessed with riders they could trust to go through their herds looking for evidence of screwworms if not daily, then religiously every-other day. Few ranchers today do that, nor do they have enough help to do that today. It's time consuming, expensive, and apparently there's too many distractions and other demands in today's world. It just can't be done right from behind the windshield of a truck, on a 4x4, on a cellphone, or in front of a computer. The tell-tale signs of early NWS infestations are often hard to discern, even for some experienced feedlot pen riders that can spot a single "off," uncomfortable, or droopy calf to pull, examine, and treat out of hundreds.

Also, long-gone are the wadies and friendly cow dogs that learned quickly to sniff-out the distinctive scent of a screwworm infested wounds. But once you get a whiff of that smell, you probably wouldn't forget it. For a reference to a similar sweet stink, go into a poorly cooled meat locker that ages beef three weeks or more, that's similar.

Disappearing too, and I'm guilty of promoting the departure of the age-old tradition in this high desert climate, is a strict mid-January thru March calving season and a tight April, May and June breeding seasons. That age-old "tradition" missed the nutritionally ideal time for best cow fertility in these high desert parts, which is early fall to take advantage of post-monsoon range condition when native grasses' nutrition peaks. But warm season calving is ideal fly season and just opens the door for fresh calves' navels and under cows' tails to attract screwworms if they're around. Likewise, that change from tradition promotes branding and castrating calves in the late summer and early fall when flies are abundant and most active. The change might have helped fertility a tick or two, but it's not a good formula for screwworm prevention. I fell for the USDA's declaration that NWS were "eradicated" in the U.S. and a

barrier would be easily maintained in perpetuity at the Darien Gap narrows in Panama. Now, I guess I shouldn't have promoted a deviation from that old breeding season tradition.

If screwworms are threatening, it would be better to fall back to a traditional January-February-March calving season with an April-May-early June breeding season even if fertility suffers a bit, it takes some time for cows to cooperate, and more fall and winter feed supplements are needed to compensate, but late Spring and Summer calving or year-around calving, and extended breeding seasons are asking for screwworm troubles.

The old-timers knew what they were doing even if they didn't realize it. But I have a 1942 (two years before I was born) USDA "Yearbook of Agriculture" text that prescribes almost exactly that among its recommendations for control of the screwworm "problem" occurring in South Texas eighty-five years ago. Notice, back then they called it a "problem," not a disaster, even though there were ten thousand or more cases in South Texas alone that year.

One of the many other things and techniques lost to time that we used in Arizona fifty years ago to remediate and reduce screwworms was the use of a "*Burdizzo*" emasculatomes for "bloodless" castrating without leaving an open wound. They are still available and come in different sizes, but it takes a little know-how to do it right and for them to do the job. Burdizzos are as scarce as fedoras and folded-up cuffs on Levis' now, but I'm beginning to think maybe we should buy a truckload and put on some ten-minute instructions about how to use them.

In the 1970's we also tried and used a number of less-traditional branding methods, irons, and ways to treat fresh and peeling brands. We tried to avoid burning through calves' thin skin with old and worn sharp-edged irons, avoided blotching or repeated tries to get the brand "just right" and tried to reduce prolonged scabbing and peeling that attracted screwworms. There was a reason that grumpy old Grandpa wanted to do the branding himself.

Freeze branding with liquid nitrogen, close clipping hair at the brand site, electric branding, reducing the size of the brand, thicker metal and rounding the leading edge of branding irons, heating irons to hotter temperatures for quicker branding, registering and using "simpler" one-site brands in better locations on cattle, avoiding additional "year brands," I.D. number brands, and ear marks, stopping dehorning, and reducing any processing of yearlings and replacements if possible until February were just some of what we did at the time.

Better, more careful restraint of animals being branded and castrated was more important back then than it is now and "dragging" calves on rocky or hard ground longer distances for branding

often caused scrapes and abrasions that attracted screwworms. That was a serious consideration in malpais locations. All of it slowed the pace of processing cattle to a more careful clip to prevent screwworm from getting a foothold.

Some of what was going on in the area at the time, but that we don't have much of now, contributed to screwworms getting a hold. We should be happy we haven't seen psoroptic mange (scabies) for a while, and cattle grubs or heavy lice infestations are less common due mostly to the use of pour-on ivermectin and such. We don't do much required and untimely brucellosis whole-herd blood testing, heifer spaying, "Bangs" vaccinating, official metal ear tagging anymore, nor do we see horses with fistulous withers since AZ was declared "Brucellosis Free" since 1986. And we don't see as much livestock and wildlife with wounds from escaping predators. Either the many years of responsible predator control helped, or wildlife numbers are better balanced. We also have less cattle to dehorn now and fewer white-faced cattle with cancer eye.

Those all caused some additional screwworm issues from more cuts, scratches, open wounds, needle sticks to draw blood, and metal ear tags that tore out easily or got infected, but scabies was a big problem in the 1970's too. Scabies was a screwworm magnet. Don't confuse it with "scrapie" in sheep and goats; that's a brain problem.

Cattle with scabies mites itch terribly and incessantly rub on anything. Ranches with heavy infestations were easy to identify from the road back then. You didn't even need to see the cattle. Their barb wire fences leaned outward because T posts bent from cattle scratching their itch on the barb wire and posts. Little balls of hair decorated each barb for miles. Telephone poles in the pastures were rubbed shiny or worn away at cow levels. Some poles and trees looked like giant beavers had chewed them skinny. Any skin break, scratch or abrasion from the cattle rubbing attracted screwworm flies.

Some veterinarians, producers, and the state veterinarian had enclosed, self-contained and portable, "spray-dip" boxes on wheels to haul around to "spray-dip" individual cattle, one at a time, with insecticide to treat scabies as part of the scabies eradication campaign going on then. At the AZ International Livestock Show in Phoenix, every animal from affected counties went through the State Vet's spray-dip contraption and procedure on arrival at the fairgrounds. Some ranches still had actual below-ground dip vats to swim affected cattle thru insecticide baths and many still had high pressure, 300 gallon + "Bean" spray rigs to spray corrals crowded with cattle.

The dipping and spraying also helped with screwworm control even when the cattle didn't have scabies, as long as they didn't spray the sterile flies. Coumaphos ("*Co-Ral*") organophosphate, was the favored insecticide and formulas of it are still available today. It's still what USDA uses to dip Mexican cattle before they're imported into the U.S.

Hanging Co-Ral dust bags and home-made or commercial- made 'back rubbers' soaked in oil-based insecticides were common fly and external parasite control measures that we seldom see today.

We don't have the old reliable "*Peerless Screwworm Killer*" (chloroform/naphthalene), "*Lindane Screwworm Spray*," "*Smear 62*" (diphenylamine), or "*EQ 335*" (lindane) anymore, but we have a slew of other injectable and topical meds being approved and coming available now that may work just as well and last longer.

USDA'S SIT NWS sterile fly varieties are genetically "new and improved" now too, they have been genetically selected for virility and are "sexed" so that only male flies are released. In the past both male and female flies were released and the sterile males didn't have to go far to find a mate. Now the fly drops will be all males and they'll have to look farther for a mate right where they're needed. That should be more efficient.

At the same time, I'm told that entomologists (bug studiers) are trying to select and/or somehow genetically modify NWS varieties used in colonies to produce SIT males that are more responsive and attracted to the pheromones that virgin NWS females start to release to attract males as they mature. The pheromones released by virgin female flies can be volatile or non-volatile chemicals that act like aphrodisiacs on the males. The females only breed once in their lifespan, so the quicker it's done, the better.

My hope is that the NWS colonies now used for SIT male fly release have kept current with any multi-generational genetic evolution or mutations that might have occurred in the "wild" NWS now spreading through Mexico. Are they exactly the same bug as fifty years ago? I have my doubts, but they should know what changes might have occurred over the years

I've questioned what causes the female NWS fly that bred with a wild non-sterile male to be attracted to places on animals to lay their eggs. Sure, the edges of open wounds are the most common site, but not the only site I've seen them lay eggs and get started. I'm told it's the distinct smell of blood, but I'm not sure that's all.

I've been called to treat freshly and seriously lacerated horses and cattle at ranches with multiple NWS affected animals and swarms of distinctive NWS flies, but where sterile flies hadn't been dropped yet. I'd think, if any of those flies were attracted to just blood for a place to lay eggs, that the still bleeding wounds and pools of fresh blood would be covered with female flies sitting for a minute or so to deposit their eggs, but that's not what I've seen with really fresh wounds. The flies deposit 200-300 eggs at a time when they do, surely it takes more than a few seconds on a glob of clotting blood to do that. They sure swarm to the fresh blood, dip-in for a second or two but fly off again almost immediately, apparently just getting a mouthful, it's not the adult flies' favorite nectar. They don't stay long enough to deposit their eggs.

But, when called to a similar place to treat a day, or days-old wound, NWS eggs were in sheets on and around those wounds and caked blood if nothing had been done to repel the flies. The exceptions were when those wounds had been dusted or packed with antibiotic powders that were common and available over-the-counter in those days.

Nitrofurazone ("*Furacin*"), Neosporin, Sulfanilamide, and Tetracycline were a few of those powders. Apparently, those antibiotics didn't work quite as well if applied in liquids or ointment forms and just drying agents in powder forms didn't either unless they were caustics.

That use of antibiotic powders led me to believe that both its drying effect on quick growing molds and the antibiotics prevented a rapid bacterial and/or mold growth starting that interfered with whatever attracted NWS females to places to lay their eggs.

Flushing and spraying wounds with copious amounts of hydrogen peroxide or vinegar also seemed to discourage NWS from laying eggs on wound edges. That may also inhibited early mold or bacterial growth from starting too.

So, I don't think it's just blood from fresh wounds that attracts female NWS flies to egg-laying sites. They like the wounds or other sites to be a little stale, but it only takes a day or two to get that way. They'll also lay eggs on mucous membranes, inside nostrils, in the corner of eyes, in penis sheaths, in vulvas, on scurfy skin, and at apparently already-sealed skin puncture sites (i.e. injection sites, sucking lice or tick bites, etc.) where there are no obvious breaks or fresh blood.

I think it takes a little bacteria or mold growth starting on a live animal to attract females to lay eggs, then they hatch and the tiny first-stage ("*1<sup>st</sup> instar*") skinny maggots that can find a way to

burrow in to pourts that aren't open wounds yet and grow into the bigger 2<sup>nd</sup> and 3<sup>rd</sup> stages that have the screw-shaped look and do their dirty work and eat huge ugly holes.

They say dead carcasses don't attract NWS flies and NWS maggots will stop their development and maturing if they were present and infesting the critter before its death. That may be true even if the NWS caused the death, once the carcass goes cold and through rigor mortis. But if the NWS maggots were active somewhere on the animal before it dies and the maggots are in their final third instar stage they can apparently keep feeding and maturing just long enough before rigor sets-in to drop out to develop into pupae and another round of flies to cause problems later on, a week to two months later depending on temperature and moisture conditions.

So, don't just dump or drag-off fresh deaths when screwworms are around. Look for any NWS infestations on freshly dead animals and roll the carcass over to examine both sides and kill any NWS maggots found. Rigor mortis usually starts 6-12 hours after cattle die and lasts up to 36 hours depending on conditions, and I'm not sure that is what stops third instar development. It's just an observation remembered.

Where deaths occurred with NWS infestations in the area, the SIT fly drops were effective in stopping more infestations for a while, but often they were back at the same location within two months. I suspect the fresh carcasses left without killing NWS maggots on them had something to do with it.

The third stage maggots drop out unto the ground, burrow a few inches in the ground, become fat brownish pupae that become flies a week to a few months later depending on weather conditions. Sometimes that is after the sterile flies dropped in the area are long gone, and a whole new round of NWS infestations can start at the same location.

When actual NWS infested wounds were found, the affected animal was usually caught and brought to a corral near home to continue treatment. In those early days of my vet practice, it was very common for ranchers and farmers to have a flock of chickens, guinea fowl, or even peacocks around their home places, barns, and corrals. I encouraged it because they feed on NWS and other fly pupae including cattle grubs, as well as ticks that molt on the ground. The yard birds aren't commonly seen anymore.

Among other reasons, now the fowl need to be fed a lot more or they won't stick around, probably because of all the pour-ons, dewormers and pyrethrin insecticides we use now often

reduce maggot, pupae, and internal parasite stages that spend part of their life cycles on the ground, on vegetation, or in manure.

Many of those treatments (ivermectin/eprinomectin/doramectin, etc.) for cattle parasites even kill dung beetles and such that helped feed the fowl, helped disperse manure and incorporate its nutrients into soil, and improved range conditions. Moxidectrin (“*Cydectin*”) probably has the least impact on dung beetles and doramectin (“*Dectomax*”) is a far distant second choice to protect dung beetle population. But wouldn’t you know it? *Dectomax* injectable is now the preferred choice to treat NWS and a new label for its use to treat NWS has been conditionally approved saying it’s effective for up to three weeks along with its normal use for parasite control. So, my recommendation to use *Cydectin* instead of the other treatments will probably bite the dust if NWS arrives here again. Even dung beetles and range condition improvement might take a hit from NWS.

We don’t see as many cow-sitting egrets, noisy grackles, and pesty yellow-winged blackbirds around here now either, and most ranches have gotten skunks around home under control. All those actually helped reduce maggot and pupae populations even if they were a pain to have around. They’d be welcomed to have back if NWS returns, but I doubt we’ll see them as thick as they were.

USDA has plans and is in the process of spending big bucks to re-establish a modern NWS SIT irradiation & production facility near where NWS would probably show-up first in the U.S., (lower Rio Grande Valley) in Texas if it isn’t stopped from coming north in Mexico. They’re already opening an SIT fly distribution facility in south central Mexico and pushing the Panama plant to its limits.

From what I can gleam from the elaborate and bureaucratic draft NWS “Response Playbook” recently put out by USDA for comment, there aren’t currently any plans or funds allocated to re-open a SIT sterile fly distribution facility in Arizona as we had in the 1970’s. So, I’m hoping either they think odds-are that NWS won’t get to Arizona this time around, or they’ll stop it before it does.

If NWS does sneak or creep into Arizona again somehow, we’ll be sucking hind teat without at least a contingency plan in the works for re-establishing an SIT distribution facility in Southern Arizona.

During the last NWS outbreak in Arizona there was always some confusion among producers and even veterinarians about how to best collect and send good maggot samples with or without kits. In the past, the larger 3<sup>rd</sup> stage maggots that hadn't been doused with insecticides or anything with a dark coloring agent were preferred. The old "*Peerless Screwworm Killer*" and clear colored lindane sprays made the maggots turn loose and drop out of wounds, but then often you had to chase them through the hair, dirt and goo to capture good samples. I preferred to pick good samples, fully alive, before killing them, directly from the wound if possible. But removing them alive, one at a time with a tweezer or toothless thumb forceps mashed a lot of them too. So, I bought a bunch of cheap 6-8" plastic 1/2 cc size semen straw tweezers that are made for pulling artificial insemination frozen semen straws out of liquid nitrogen tanks. The inside tips of those tweezers are cupped so they don't mash the semen straws and don't mash the screwworms either and are small enough to easily put the samples in a test tube. On occasions, I also used a disposable 60 ml "catheter tip" syringe to suck them out of the wound and push them into the test tube.

At the time, the test tubes provided in the kits were about 1/2-3/4 full of 70% alcohol and the labs didn't want formalin, 90% alcohol, or anything else used. So now, if a new kit isn't available, check first what the lab the samples are going to want used if you're making-up a kit on your own. By the way, even 80-proof Vodka is only 40% alcohol if you're wondering. I have had screwworm samples brought to me that way.

Some wonderings and possible suggestions I've had recently about screwworms:

- 1) In recent years I've been extremely impressed with convenient veterinary devices and iPhone APPS now available for insect, plant, parasite, parasite egg, and mold identification, even complete microscopic semen evaluation for all species of livestock (i.e. "*iSperm*", etc.) with a small handy hand-held that has almost done away with the need for a microscope and someone experienced to do the evaluations for each microscopic parameter. Why couldn't a similar APP or device be developed quickly to accurately, but preliminarily, identify NWS larvae from wounds and/or adult NWS flies from traps in the field before waiting for USDA-NVSL laboratory confirmation? And preliminary NWS 3<sup>rd</sup> instar and adult fly identifications can be done visually with good specimens by those with a good eye and a little experience, an approved APP or similar device could add credibility.

- 2) State departments of agriculture, universities, or approved private industry could plan, create, and develop smaller, more local, SIT production facilities, possibly using only cheap, safe, and readily available x-ray for slower and less efficient, but less costly, SIT production and release in their state, rather than arranging and waiting for distribution of pupae from only Mission, Texas. With Texas and other states possibly having a much more severe and widespread outbreak and way more livestock threatened, a smaller Arizona outbreak might be a lower priority for SIT allotments from time to time. Likewise, a refrigerated truckload of SIT pupae was known to have troubles and a wreck on the way from Mission, TX to AZ, a thousand miles and 15- hour trip, delaying distribution and requiring costly large- volume air shipments in the 1970's. It could certainly happen again and delay an important early response to an outbreak in Arizona and allow the outbreak to quickly spread to a larger area.
- 3) State Agric. Dept. via brand inspectors, University Extension Agents and local accredited veterinarians could also release SIT pupae on the ground to affected premises.
- 4) Very remote or ground non-accessible locations could be accessed by a series of large commercially-available drones rather than just manned flights. If Amazon can deliver packages to homes that way, why not a program to drop SIT pupae in a similar manner if flights can't be arranged?
- 5) Another possibility, where official two-piece EID electronic ear tags are used in a NWS threatened area is to have at least the "button back" or "stud "with the extended ear-piercing stem impregnated with a long-acting insecticide or repellent to help discourage NWS from laying their eggs at the ear tag puncture site.

'Nuff said for now...

Gary A. Thrasher D.V.M.  
Hereford Veterinary Service  
P.O. Box 196  
Herford, AZ 85615  
(520) 508-5731  
hvs@mindspring.com