

Honest Scientific Writing

Jerry R. Cox

At a time when reading an issue of the *Journal of Range Management* is equivalent to multiple sleeping pills before bed, it is difficult to believe that some of our founders were exciting writers. Forty years ago range managers wrote simply, and when publishing their research, included humorous *antidotes*. They also addressed equipment difficulties and the flexibility needed to do field work. Honest scientific writing or "airing one's dirty laundry" identified potential problems, and practical innovations were quickly assimilated by land management agencies and enterprising ranchers.

In the 1960's the "pure science" movement began, and both researchers and applied managers invented and spread a myth of omnipotent science. As a result, scientific writing in the *Journal of Range Management* and elsewhere has come to make our studies appear more precise and reliable than they really are. In an age when

we base natural resource management on statistical probabilities, it is important to understand true accuracy and admit that modern writing in the *Journal* conceals more than it reveals.

To demonstrate the point, let me provide you an insider's view of some of my experiences while collecting soil samples in the Northern and Southern Hemispheres. After gathering samples some were lost, displaced, destroyed or actually collected by someone other than me. Therefore, it must be said that sample size differs among collection locations in Africa, Asia, Australia, North America, and South America. When this study is published, I will include the following "pure science" statement: "Sampling sites within locations are unequal, and data were subjected to analysis of variance with unequal sample numbers." Before your fingers walk to the next article, you deserve the whole story.

Dear Gary Frasier (Editor, *Journal of Range Management*)

When I left the United States, I intended to collect soil samples at 30 sites within each location. I must confess, however, that a few samples were either lost or destroyed and not all samples were collected by me. Before you reject my manuscript or send it to an unforgiving asso-

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Elephants standing near a soil collection site. (Photo by Dr. Chris Grocock, USDA Animal and Plant Health Inspection Service.)

ciate editor who will inform me that the data are erroneous, please consider just some of the difficulties encountered.

After a long day of collecting soils in northeastern Brazil, Jack Stroehlein (University of Arizona, retired) and I decided to leave Sobral and return to Fortaleza. As the sun dropped from the western sky we hit a log in the road. Within a few miles, steam blew from the radiator and we stopped at a chicken farm. The farm foreman inspected the damage and recommended two egg whites to plug the hole. But we had to wait until morning when the hens became "active." Since we had an appointment at 5:00 a.m., and it was now 10:00 p.m., we decided to hitch-hike.

A truck finally pulled over. Jack got in first and I handed the precious samples up to him. As I prepared to board, the driver pushed the gas pedal. There I dangled from the tailgate while Jack yelled in Portuguese for the driver to stop. The driver slowed and, as I gained a foothold he hit the brake and then the accelerator. I was thrown into the truck bed and landed on a rough cargo of bananas. After a few miles we entered a small town and stopped at a cafe. The driver declared the need for whiskey to keep his mind sharp, and disappeared. After a short delay, the driver returned and proclaimed his fitness. During the next few hours I prayed and ate bananas, and when we arrived in Fortaleza I was happy to be alive. Please forgive me *for leaving soil samples in the truck bed*.

My next sampling location was northwestern Australia. As the flight from Perth approached Port Hedland, dark clouds appeared on the western sky. When the plane landed, there were gale-force winds and horizontal rain. Andrew Mitchell (Western Australian Department of Agriculture) had outlined the sampling sites but all were covered by 10–15 inches of flood water. During the next 36 hours, the weather outside resembled some intense winds and rain that I survived in 1971 at a beautiful resort 200 miles north of Saigon; but this time there was no shooting.

It was agreed that Andrew would collect the samples later when soils dried out, and I would fly south to Carnarvon and collect on the Gascoyne and Lyndon Rivers. This proved to be impossible because the Port Hedland airport was under water. The only remaining option was for us to drive through the storm.

After hours of watching water come in one door and exit the other, and guided only by reflector poles on the roadside, Andrew suggested we dress for the occasion. Shorts replaced Wranglers and thongs replaced Red Wings. In the changing process, my suitcase tried to float out the door. It was difficult to remain calm when a tumbleweed carrying a family of lizards drifted into the cab. As my wet feet developed athlete's foot on the dashboard, and the seat of my still submerged pants developed a prune skin pattern, I instructed Andrew to collect 30 soils samples. I still do not understand why he sent 36.

Living conditions in western Australia can be similar to those described by Moses. In one day you can pass from floods to pestilence. After a warm bath and a good night's

sleep, I traveled south to meet Ian Watson and John Stretch (Western Australia Department of Agriculture) at the Lyndon River. As we drove south, two things occurred: first, the mid-day temperatures approached 125° F and second, fly densities increased.

Australian flies are like no other creatures on earth. These disgusting pests have terrible manners. They walk up your legs, inside pants or shorts, play tag in your armpits, and rest in your nose or at the corners of your mouth. After three days of trying to defend myself, and accidentally stomping *six soil samples* into oblivion, John suggested, "Look mate, you must forget these bloody beasts and get on with the work." This fine suggestion was made as mid-day temperatures neared 130° F and we stood sweltering in the sun drinking hot tea.

My search for the origins of T-4464 buffelgrass took me to East Africa, 400 to 500 miles north of Nairobi, Kenya. I traveled with Chris Groocock (USDA-Animal and Plant Health Inspection Service) and family, and on the first afternoon we stopped on the southwest shore of Lake Baringo. After soil collections and supper, we watched crocodiles and monitor lizards swim along the lake edge. There were a series of gin and tonics and stories about a nightly mowing crew of 2,000-pound hippos, and everyone departed for a peaceful night's rest.

During the early morning hours, "Mother Nature" suggested a walk. I put on my tackies (tennis shoes), grabbed the beam (flashlight), and set out for a short stroll in the moonlight. In a few moments I stopped at a large tree to commune. Upon my return, a large object passed before the beam, and I stood nose to nose with a bull hippo. It is difficult to reconstruct the proper sequence of events but someone or something stepped on and destroyed **three soil samples**.

The original A-67 weeping lovegrass seeds were supposedly collected on an escarpment between Mbula and Ngorongoro craters in northcentral Tanzania. After a 3-day search of the area—more than 60 years later—I had collected soils at buffelgrass sites but had not spotted a single A-67 ancestor. Chris and I camped on the Ngorongoro rim and one evening as we ate supper, a fog rolled in and it rained. We forgot the dishes, headed for the tent, and settled in for a quiet night. At 3:00 a.m. I awoke to harsh breathing, and soon realized that an unknown "visitor" and I were separated by 3/16 of an inch. After what seemed an eternity, four padded feet headed to the cooking fire. There was a moment of silence before the camp erupted, but in the next 15 minutes every pot and pan was washed clean, and soap and water were unneeded before our next meal. Spotted hyenas are excellent dishwashers, but while washing they may eat utensils and *and soil samples*.

Around the morning campfire Chris and I discussed our visitor and the day's travel to the bottom of Ngorongoro Crater. During the trip down and on the valley floor there was no weeping lovegrass, and on the return trip I nodded off. At a bend in the road the vehicle slid into a pothole. When I opened my eyes there was a large grass plant on the hill above. Without waiting for the vehicle to stop, I

jumped from the cab and ran up the hill. As I inspected the plant, Chris' hand rested gently on my shoulder. I expected congratulations but instead his voice commanded me to move slowly backwards. Stepping back and raising my eyes, I found myself looking directly into two yellow balls with vertical slits. When my eyes finally focused I could clearly see a tall but thin lioness. My first response was to run but for some reason, I remained frozen; perhaps I knew she would arrive at my throat before I arrived at the vehicle. During the 5-minute trip to the vehicle her tail arched each time my foot touched the ground. After we arrived and she departed, Chris suggested that we return to collect samples. My first response was: *Forget samples, need bath, clean underwear, catch plane, go home to family, civilization.*

While traveling along the southeastern edge of the Kalahari Desert in Southern Africa, I stopped near the town of HOT-AS-HELL to collect soils. A collection was made on both sides of the road and one was placed under a tree while the other was carried to the car. Because it was near noon, I drove to the tree and parked in its shade. With a sandwich in one hand, I collected soil bags with the

other. As I approached the car, the sand beneath the rear wheels began to move, and countless black dots appeared on the soil surface. A few seconds later the movement appeared at my feet and suddenly my ankles were covered by sand ticks. For the next few moments I danced around the car and *over soil samples.*

All in all, I can assure you that least 25 samples were collected in each location, and field notes will be provided for verification if you desire. Two eminent statisticians will testify that 25 samples are almost as good as 30. I hope you understand the encountered difficulties and will not reject the manuscript because I told the truth.

Regards

Jerry R. Cox

The moral of the story is that honest confession and frank discussion of errors, troubles, and limitations would make our scientific papers more fun to read. And if our papers were fun, ranchers, land managers, and even scientists might actually read an article in the *Journal*.

President's Notes (continued from p. 3)

well as for annual and long range planning...(and) to determine how grazing problems that occurred in the current year can be corrected or avoided next year....It also provides documentation for those decisions when management is subject to review by the banker, higher levels of management or the public.

Getting started. Information and assistance is usually available through local offices of the Cooperative Extension Service, Soil Conservation Service, Forest Service and Bureau of Land Management....Interagency teams in several states have developed good monitoring guides.

So come on guys, let's do it. Sure, we don't have enough time or money to monitor as it should be done. Sure, it's impossible to monitor everything. And, sure, the other guy is not doing his part. But a little monitoring is better than none and a little more or better monitoring than we're doing now will quickly pay off in terms of better rangeland management—and greater credibility!

If you want a free copy (or a few copies) of *Rangeland Monitoring*, request them from our Denver Office. If you want a substantial supply for distribution—and nothing would please me more—there may be a small charge made to cover costs.—**Jack Artz**, President, SRM