

Solving the Mystery of How to Treat Nilgai for Cattle Fever Ticks

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Nilgai antelope (*Boselaphus tragocamelus*) are challenging to hunt and are prized for their quality meat. Where they occur, mostly in South Texas, they are generally free-ranging, and ranchers are able to generate revenue from their hunting or commercial harvest. Nilgai do have some drawbacks. They can wreak havoc to fences and they compete for forage with both native wildlife and cattle. But perhaps the most negative drawback is that nilgai can be a major cause of the spread and infestation of rangelands by cattle fever ticks. This puts cattle ranching operations at risk, and as of yet, there are no effective treatment options for controlling cattle fever ticks on nilgai.

Treatment options for fever ticks on cattle are straightforward, successful, and remain largely unchanged for more than 100 years. Treatment for cattle requires frequent gathering for six to nine months when cattle are treated with a pesticide or pastures can be vacated of cattle for an extended period of time. White-tailed deer (*Odocoileus virginianus*) tick treatment options are also well understood and involve the deployment of treatments through corn feeders, which deer regularly use.

The “elephant in the room” are nilgai antelope, which are very capable hosts for cattle fever ticks, but unfortunately do not use feeders where pharmaceuticals can be delivered at a central location under free-range conditions.



Nilgai are large Asian antelope native to India, Pakistan, and Nepal. They were brought to Texas in the 1920s and 30s by the King Ranch. After taking hold in the 1940s, the nilgai population continued to thrive in the South Texas environment. Fever ticks are also native to the same countries and the tick-host relationship has been reformed in South Texas.

Given that so little is known about nilgai within their introduced range of South Texas, despite being present for over 80 years, our big question was...if there were a pharmaceutical treatment for controlling fever ticks on nilgai, where would we be most successful in applying it? In other words, without being able to attract nilgai with feed (like deer) or round them up (like cattle), can we consistently predict where nilgai can be treated? Based on what we've learned, we considered two options - nilgai latrine piles and fence crossings.

Option 1, Latrines – Nilgai are attracted to the smell of other nilgai for communications. Nilgai form large latrines, or dung piles, which are specific locations where nilgai defecate repeatedly over time. However, little is known about the role latrines play in nilgai population ecology and social dynamics.



Figure 1. Lisa Zoromski behind an average sized nilgai latrine at East Foundation's Santa Rosa Ranch near Riviera, Kenedy County, Texas in March 2019.
Photo Credit: Lori Massey



Figure 2. Repeated crossings by nilgai and other animals results in a recognizable opening and path under the fence, a fence crossing at East Foundation's Santa Rosa Ranch near Riviera, Kenedy County, Texas.
Photo Credit: Lisa Zoromski

Option 2, Fence Crossings – Nilgai regularly use common fence crossings. While nilgai can jump fences, they prefer to crawl beneath, often causing damage by pushing up the bottom wires of the fence. Surprisingly, for how common nilgai fence crossings are, research into animal movement rates through fences is extremely limited.

We conducted research on three ranches – Russell Ranch in Cameron County, and East Foundation's El Sauz and Santa Rosa Ranches in Willacy and Kenedy counties.

We recorded latrine visits and fence crossings for two years and repeatedly walked over 30 miles of transects to locate off-road latrines during this time. We deployed trail cameras for one year at 24 latrines and 20 fence crossing locations to record nilgai and other animal visits. We also conducted genetic sampling at latrine sites to confirm how many individual nilgai were using latrines.

Option 1 Findings – We knew latrines were common, but we did not expect to find a latrine every three to seven acres. This is an exceptionally high density. For example, our estimates resulted in over 10,000 active latrines on East Foundation's El Sauz Ranch alone. Logistically and financially, this would be far too many latrines to attempt cattle fever tick treatments. During the time of surveys, El Sauz had an estimated nilgai density of one per 20 acres, a common density throughout their South Texas range. From this information, it is clear that individual nilgai are using multiple latrines and that latrines would not serve as suitable sites for targeting nilgai with treatments aimed at controlling cattle fever ticks.

Latrine camera sites revealed far more information on nilgai behaviors than we could have imagined, while also supporting the previous notion of the impracticality of attempting nilgai treatments on latrines. We recorded 10,101 animal visits at latrines, and only 15% were nilgai visits. Other common species visiting latrines were cattle, coyotes (*Canis latrans*), white-tailed deer, and feral hogs (*Sus scrofa*). Latrines are normally visited by nilgai every two to three days, most often (75%) from 5 p.m. to 5 a.m., and they would defecate on the latrine about once a week. Some latrines would see daily defecations for a short time, and then be rarely used afterwards. Nearly 90% of all defecations were from large-bodied adult bulls. Often, defecations were from the same individual, but sometimes two bulls shared a latrine. Of the 20 photos of cow defecations, 65% resulted in a bull defecating on the latrine with 24 hours. One latrine was shared by two bulls, and after a cow-calf



and after four months the bull broke the panel open.

We found 50% of the fence crossing sites to be adjacent to previously patched locations at East Foundation's El Sauz Ranch. It appears that animals are persistent in recreating fence crossings in the same locations after being patched. Because nilgai only make up approximately 12% of the crossing events, any tick treatment option applied at fence crossings would need to account for the high level of non-target wildlife that utilize these sites.

Moving Forward – Now, back to our big question...where are the best locations to treat nilgai with a pharmaceutical to control cattle fever ticks? The short answer is neither latrines nor fence crossings alone would treat enough nilgai to help control cattle fever ticks.

Figure 3. Nilgai antelope bull investigating a latrine at East Foundation's El Sauz Ranch near Port Mansfield, Willacy County, Texas in March 2019. Photo Credit: Lisa Zoromski

group defecated on the latrine, a few days later the bulls fought over the latrine site. We suggest latrines are being used by cows to communicate reproductive status, and by bulls to publicize territories and dominance.

Option 2 Findings – We documented 10,889 attempted fence crossing events by 14 species of wildlife. Nilgai accounted for 12% of all wildlife fence crossings, with the most common animal crossing being white-tailed deer (54%). We recorded three to four animals crossing events per day at a given fence crossing site. Nilgai attempted to cross every two to three days on average. All sex and age groups of nilgai used fence crossing sites, with a 50–50 split between bulls and cows. Despite their large size, we recorded an adult nilgai bull fitting through a crossing only 17 inches tall. But, as you may predict, we found that larger sized crossings often received more crossing events.

Each of our study ranches grazed cattle, so when fence crossings become too large, they were patched with a panel of wire fencing. Early on with our camera monitoring effort, two of the crossing sites were patched, providing an opportunity to assess how animals would respond. This resulted in animals digging, climbing, and pushing at the patch. The patches seemed to only limit deer and nilgai from successfully crossing. A large nilgai bull spent time on several occasions pushing at the patch,

Specifically, placing nilgai tick treatments at latrine sites would be impractical due to the abundance of latrines across the landscape. Also, it would be non-effective for a large-scale treatment of nilgai because latrines are mainly visited by a few bulls. Despite this, latrines are an important part of nilgai social communication, and further research on latrines could provide us with better insight on nilgai social structure and movements patterns.



Figure 4. Nilgai antelope bull passing beneath a net-wire livestock fence at an established crossing site on East Foundation's El Sauz Ranch in June 2018. Photo Credit: Lisa Zoromski

Furthermore, could fence crossings be the answer? Fence crossing sites appear more promising for placement of tick treatments than latrines because nilgai of all ages and sexes utilize fence crossings.

However, nilgai only accounted for 12% of wildlife crossings through fences. A nilgai-specific tick treatment system would need to be developed to efficiently treat nilgai (and only nilgai) for ticks at fence crossings. On the plus side, ranchers have control over the number of fence crossings sites available to wildlife in a fence, and this could be used in future tick control strategies.

Rancher's efforts to eradicate cattle fever ticks have been and will be an ongoing battle in and around the Permanent Quarantine Zone along the Rio Grande. The East Foundation, Caesar Kleberg Wildlife Research Institute at Texas A&M University-Kingsville, Las Huellas, and other partners will continue to apply scientific principles to produce needed information and solutions to these, and other, big problems. For the East Foundation, this is just a part of promoting the advancement of land stewardship through ranching, science, and education.

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