



Fencing of the Future

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For generations, my family has ranched in traditional ways. We use the basic pasture rotational grazing system technique that has been used all over the country for years. We have always built the traditional, five- strand, barbed wire fence that you see stretching on for miles in every direction. As all ranchers know, building and repairing barbed wire fences is by far one of the least enjoyable parts of ranching. Unfortunately, by Colorado state law, this is a necessity for my fence-out state. What if there was another way to keep your livestock contained, other than the dreaded barbed wire fence?

A few cattle producers scattered across the world are beginning to implement a new fencing system; virtual fencing. Virtual Fencing is still fencing, but without the material fence. This technology isn't as widespread as traditional fences, as it was only created in the last couple decades. VENCE, a company based in San Diego, is the forerunner of this technology. Additionally, there are other producers such as Nofence, who are creating the same product. Other companies with similar ideas, such as underground fencing for dogs, have been around since the early 70's, but the idea was just recently opened up to larger livestock. This new technology is being applied globally, not just in my small corner of the world. In Australia, virtual fencing is one of the most available ways to manage your livestock. If you look among the grasslands of Queensland and Tasmania, you will see entire herds of cattle wearing the collars needed for virtual fencing to keep the livestock contained. In America, you are more likely to see the usual barbed wire fencing, but a few ranches are trying out the new technology. For instance, in Southern Colorado, the Bow and Arrow Ranch implemented this new fencing system in 2020. Along with another producer on the Western slope of Colorado, the Luark Ranch manager is using technology from VENCE to manage his Bureau of Land Management

property. With this advancement, he is able to keep his livestock off of a section of land that needed time to rest and regrow. This allows the rangeland to become healthier which will in turn help the rancher. These two producers aren't alone in using this new technology, as many others across the nation are looking to retire their fencing pliers and equipment.

So how does this present-day technology work? It all starts with the online software. You use a computer program or an app to set your boundaries. Next, using the global positioning system, add coordinates to place your fence lines where you want them. Once you have set your fence lines, the data gets sent off to a satellite. The satellite holds all the boundary data and sends the signals to a transmitting tower. The tower then directly communicates with the collars as long as the cattle are in range of the signal. On the side of the box that is touching the cow's neck, there are small prongs that send out electric pulses to the cattle when they approach one of the virtual fences. The electric shock is very similar to that of a hotshot.

All of your cattle will be equipped with a collar that has a receiving box on it. Before the shock happens, a sound is emitted from the box. If the cattle do not respond to the sound, they are shocked three times. If they still don't react, the shocking stops with the animal's welfare in mind. The producers of this technology worked with many specialists, such as Temple Grandin who is a professor of Animal Science, when they developed the collars. This ensured the cattle were completely safe and were in no way harmed by the device. If the situation arises where the shocking stops, the receiving box also acts as a tracker. You can see where your cattle are in real time, even if they leave your fencing boundary.

The science behind controlling the cattle is quite simple. For example, if a cow hears a sound that is random and unpleasant to them, they will definitely not go towards it. That explains why the sound is emitted first when the animal nears the virtual boundary. This is the first step of deterring the animal. If they are confused by the sound and don't respond to it, the irritating electric shocks come in. The electricity is not meant to harm them, only disturb them to discourage them from continuing on that specific path. Cattle are smart animals and realize that if they do not respond to the sound, an unpleasant reaction follows. They learn this through repetition and prediction of the possible outcome. If they do not respond to the original stimulus, which was the sound, the shocks will follow.

Virtual fencing poses many benefits to the overall health of the rangeland. Due to the versatility of this method of fencing, more of your land can be used. In areas where regular fencing is difficult, such as rocky or mountainous areas, VENCE shines through. You are able to utilize this land and the grass it possesses because your cattle will still remain contained. Furthermore, you can control the quality of your land. For example, one of the ranchers I mentioned in the above sections uses VENCE operations to give a 600 acre pasture a regrowth period.

Another present advantage is the ability to high-intensity graze. This method of land management is largely implemented on the Bow & Arrow Ranch. High-intensity grazing benefits the range in many ways. First, it increases the biodiversity of the native grasses. The cattle are forced to eat all of the available plants in the paddock they are placed in. This allows for more regrowth of the native plant species. Any remaining plants are trampled into the soil surface which increases its organic matter. Better soil health will also result in plants with more

nutritional value to the cattle. A key part to healthier rangelands is the rest period the plants receive. The longer the rest period, the higher the quality of the land. You can accommodate your land and your management practices to get your optimal results through the ease of virtual fencing.

Back in December of 2021, I had the opportunity to tour a ranch in Southeastern Colorado; The Bow and Arrow Ranch. I interviewed Michael Lacey, the ranch manager, about his experiences with virtual fencing. He began implementing a virtual fencing program in 2020 and applied it again in 2021. High-intensity grazing was his main focus while using VENCE's technology. Individual pastures were stocked at rates of 30,000 pounds per acre, and were frequently rotated. This program allowed the plants to be grazed on phase two of growth, which is optimal for cattle and the plants. While the plants are in their second stage of growth, they are packed full of nutrients that are not yet being used to grow their leaves and stems, all while still maintaining healthy root systems. This is best for your livestock because the vegetation is tender and desirable to eat and gives the greatest amount of nutrient enrichment. The less desirable plants were smashed into the ground and used to aid soil health by adding organic matter. Mr. Lacey ran this program with virtual fencing as described for a little over eight months before he realized a few issues with the collars. He saw that the collars were getting flipped over, meaning that the side that communicates with the cattle were no longer making contact. Another apparent issue was the collars becoming confused when the cattle were in a tight group. He gathered all of his cattle and took the collars off, then began looking for improvements. When he re-implements the collars, they will be of different design, in hopes that the outcome is different. Prior to the issues with the collars, the ranch saw many benefits on the range. Using virtual fencing as a tool to

high-intensity graze, the health of his land greatly improved. Native grasses were returning, along with species of insects that used to inhabit the area. With all of these positive changes, the overall quality of the rangeland ecosystem improved. Finally, the cattle were significantly easier to manage while under the virtual fencing program. They were moved easily, which lowered the stress levels for the animals as well as the ranch manager.

With a technology as new as virtual fencing, there are the positive as well as negative aspects. To begin with the positives, this new product can be used to improve the overall health and quality of the rangeland. You can manage your cattle in ways that are specific to your grass's needs, whether that is an extended rest period or more intensive grazing on a site. The outcome of these practices will result in better soil health and biodiversity, which in turn leaves healthier rangeland. All of these management methods can be implemented easily through a computer program. This brings me to my second point, which is the reduction of labor. Since all of your fencing is done online, the only physical labor you must perform is the installation of your base towers and the collaring of your cattle. This isn't even comparable to the work you must put in to build miles and miles of traditional fence. To move your cattle, the fenceline must only be moved on the computer program. This means you do not have to physically move them from pasture to pasture on horseback, using dogs, ATV's, etc. If you run a large amount of cattle, you usually must pay ranch hands to help you manage the livestock. With VENCE, you can eliminate that cost because you can do it by yourself. Another positive is the ability to track your cattle. You can learn their grazing patterns by being able to see where they are in real time. Once you have this knowledge, you can modify your grazing plan to fit their natural rotation. Cost effectiveness is a bit of a gray area. Whether or not you get a return on investments between

virtual and traditional fencing depends on the size of your ranch and the number of cattle. On one hand, it may be cheaper to build traditional fences because you have less land and less cattle. On the other hand, regular fencing on a vast area may greatly outweigh the cost of a virtual fencing program.

On the flip side, some negatives about virtual fencing are recognized. First, VENCE is still a startup company. They have ten engineers with relatively limited agricultural experience. This poses some issues in the practical application of the product on an actual ranch. To begin, some problems were discovered with the collars. The cattle would rub on them and flip the box over. Once flipped, the receiving box no longer communicates with the cattle because the prongs weren't touching the animal. Additionally, when cattle gathered in high numbers, the collars could become confused and would not send the stimuli out when the livestock approached a boundary. A concern about the weight and size of the collars also arose on the Bow and Arrow Ranch. They were originally very bulky with large, thick straps. New models that are smaller and more compact are coming in the future. The producers of VENCE have been working diligently to try to fix these issues and make virtual fencing a reliable and efficient way of cattle management.

This progressive method of cattle management is one that I believe will be seen more prominent as time goes on. Advancements in technology will continue to be made, such as the issues with the collars. VENCE already has improved designs for them that are being implemented and tested. Additionally, as more ranchers try this technology, the benefits of using this technology will become more apparent. Using high-intensity grazing, the diversity of native

plant species will increase. Along with this, organic matter will be stomped into the soil, giving the plants a healthy environment in which to grow. As our world continues to change, cattle producers and agriculturalists must learn to change with it. With new technology such as virtual fencing on the horizons, the positives and the negatives of startup programs are seen. In the future, I see new and progressive methods of cattle ranching becoming more abundant in my area of Colorado, as well as in our nation as a whole. So, which side of the virtual fence do you stand on?

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