LIVESTOCK PREDATION PREVENTION PROJECT (LPPP)

LIVESTOCK GPS SYSTEMS FOR PREDATOR MANAGEMENT

As tested by Manitoba producers cooperating with the Manitoba Livestock Predation Prevention Pilot Project

MANITOBA BEEF PRODUCERS

mbbeef.ca | 204-772-4542

Global Positioning Systems (GPS) have become part of nearly every production system in the world. GPS is now showing promise to help producers manage livestock and help detect and deter predator activity that could harm the herd/flock. Livestock GPS testing was completed on nine Manitoba farms during the years of 2021-2023. Results indicate that monitoring livestock with GPS helped producers do wellness checks and could also be an alert to producers of problems in the field.

Background:

The concept of GPS systems that track livestock movement is intended to help producers by facilitating four processes:

1. Livestock tracked by GPS are easy and quick to find for wellness checks. This is particularly helpful in large extensive pastures which may include bush, hills or swamps that make locating livestock difficult or time consuming. This technology allows ranchers to find the animals location on smartphone and drive to the spot.
2. Activity alerts sent from the GPS can alert managers to rapid movements that could indicate predator pursuit or other challenges.
3. Review of tracking locations may show that livestock are congregated in un-natural locations due to fear or herding by predators.
4. Geofencing which is a virtual pasture perimeter on your computer will help you know when your livestock or guardian animal exits your land base. This can potentially help you avert predators, rustlers, or collision accidents with your animals.

Livestock GPS for Predator Management Statistics:

1. Tested on 13 commercial Manitoba farms.
2. 11 beef farms, 2 sheep farms; included guardian donkey, and guardian dogs
3. Herd or flock size varied from 100 to 700 head.
4. 4 systems were used: Digitanimal, Ceres, Lonestar and Tractive.
5. 100% of producers could successfully track their livestock upon installation.
6. 67% of producers did not complete the season without at least some failure of equipment to report locations.
7. 86% of producers believed the use of GPS allowed for better livestock management.
8. 78% of cooperators would purchase equipment again if theirs was lost.

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Design for pilot project:

1. Deployed GPS systems on roughly 5% of mature animals in a pasture.
2. Deployed GPS systems on a guardian animal, either a dog or donkey.
3. Use a computer or smartphone to track locations of livestock or guardian animals to find the location of animals at any time of day or night.
4. Set up geofences on the laptop. This is a perimeter that you set up on a map on your computer which will cause an alert to come to you if an animal strays outside of the geofence.
5. Set up alerts on your smartphone. Alerts can be to notify of unusual behavior such as running or bucking, or could be an alert of animal exiting your geofence.
6. Review travel patterns of herd/flock to determine unusual behavior.
7. Wellness checks were quick and easily completed because herd location would be known prior to entering pasture.

Digitanimal GPS Collar With a Sigfox Base Station

The Digitanimal GPS collars wrap around the neck of cattle, sheep or donkeys, but are too heavy for use on dogs. The collar uses a non-rechargeable battery which is replaced yearly along with a subscription to the tracking service, so there is no way to get more than one year out of a battery. The Digitanimal collar gets GPS fixes and transmits its information to a Sigfox network receiver.

A Sigfox antenna is required in or near your pasture. The location needs power and a cellular phone signal. Cell signal can be improved greatly by installing the Sigfox receiver and cellular communicating dongle high up on a pipe or tower. Most pastures in Manitoba are usable if you go high enough above the ground. The signal from the cow collar to the Sigfox antenna can vary based on thickness of trees, and rough topography, but on flat land with some trees, a 4-miles radius is reasonably attainable.

A cell phone dongle is required to communicate information back to the internet. A dongle is a small item the size of a memory stick that essentially is a cell phone that transmits data to the cell system. Yearly fees are $150 per year for the single dongle of the base station. You can add as many collars as you want to a base station without the cost of service going up.

Pilot Project Summary of Costs (2021):

One-time Purchases

Item	Cost
10 Digitanimal collars	$2,170
Sigfox base station	$950
Cellular dongle	$105
100-watt solar panel and 12 v battery	$700
Total without labor	**$3,925.00**

Annual Costs

Item	Cost
2nd year subscription and batteries	$525
Cellular Dongle service plan	$150
Total	**$675.00**

Total for 2 years service **$4,600 or $460 per collar**

Power to the Sigfox station and dongle is minimal and can easily be powered by a 100-watt solar panel and a deep cycle 12-volt battery. If your pasture is close to electricity it is recommended to just plug in a 12-volt adaptor and hook it up to the Sigfox antenna box.

Digitanimal GPS collar on cow on pasture.

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Digit animal base station on pole above a solar panel and battery power supply.

The Digitanimal system arrives as a package and you will receive the collars as requested, plus the Sigfox antenna, and the cell phone dongle. There will be batteries in the collars, and all should work for 12 months until the next cycle of renewing the subscription and replacing the batteries in collars.

Digitanimal provides an email link to you and you can start logging in the locations of your animals on either a smart phone or computer. GPS locations update every 30 minutes and will display on a map the animal's locations, temperature, and activity alert if the animal is abnormally aggressive. You can view trails the animal has made over time to observe movement and locations. On the same map program you can set up property borders and when an animal moves out of the borders it can be set to send you an alert so that you can monitor for a broken fence, a theft, or a fence crawler. If your animal dies or the collar falls off the animal it can send an inactivity alert too.

Collars did fall off during the pilot project due to the loose fit, but were generally found in quick order, because the GPS keeps on transmitting the location. Animals which grow can be a concern as collars get tighter around the neck as the animal hydrates, and grows or fattens over time. This is a fine-tuning process that should be watched carefully over time.

Digitanimal collars were quite reliable and only one collar was broken in the first two years. The plastic case was broken and let in moisture. A replacement GPS provided by Digitanimal appeared to have a strengthened box and might be more durable. The four Sigfox antennas and dongles worked flawlessly for two years whether the power was supplied by solar panel and a deep cycle battery or by 110-volt power with a 12-volt adaptor.

The computer and smartphone program performed well, and user controls and aerial photography all worked very well. The program was generally intuitive to use, but needs some studying to make the most of the data.

Digitanimal systems are sold out of Spain, and can be ordered on the internet from the Digitanimal website. There are no North American distributors, so you must deal with the website. English is a second language to Digitanimal staff, but they are able to troubleshoot and work through issues. Systems should be ordered well in advance of pasture season to make sure all items are in place and working.

The pilot project purchased the Digitanimal system in the spring of 2021 and there were some growing pains being an early adopter in Canada. The dongle supplied was a European model that did not work with a Canadian cell service. This issue should be solved now, but asking for clarification is a good policy.

Purchasing a Digitanimal system requires converting Canadian dollars to Euros, and accessing your shipment from a courier. Make sure you have an adequate location to receive your package. The package is quite valuable and you would not want to risk loss.

Yearly battery replacement is necessary, and batteries are purchased with the yearly subscription. As such Digitanimal couriers batteries to Canada. In 2023 batteries were sent, and returned to Spain as they were dangerous goods. They were re-sent by an alternate courier, which did deliver the batteries, but did not provide them until the second week in July which did not work well for pasture turnout timing.

Summary of Performance:

The Digitanimal system was the most complicated system to install and work with as there are multiple parts. However, it was the most reliable system that we tested. It reliably provided GPS fixes every 30 minutes in all conditions. Producers generally parked the collars for the winter to reduce wear and tear, but the collars would perform in almost all temperatures all winter. The Sigfox antenna and dongle are entirely unaffected by cold weather and may perform better in months when leaves fall off trees. Having the antenna high on a pole, pipe or tower is a good policy to receive the signal and transmit it back to the cell system of Manitoba. The website and mapping worked well without failures.

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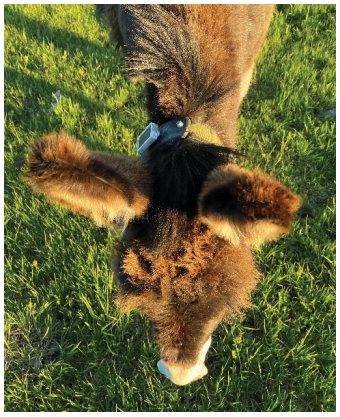
Ceres GPS Tags

Ceres GPS tags are small GPS enabled ear tags that weigh 32 grams and are intended to be used as an ear tag on cattle or large ruminants. Ceres tags can also be purchased for wild animals; however, we did not test the wild tags.



Ceres tag on a donkey collar.

Ceres tags have a lot of technology in a small package, with a functioning GPS, a thermometer, an accelerometer, a battery, a satellite transmitter and a solar panel to power the tag. There are no interfaces on the tag to allow moisture or air into the tag. The tag is initiated when you swipe it with an applicator or hand-held activation tool. Ceres has introduced a tag which can be removed and reapplied to an alternate animal with a purchased tether. This new tag with a replaceable tether is still used as an ear tag. The tags that were tested were purchased in 2022, and were two-pin tags which could not be reapplied to alternate animals.

As this project was a pilot project on various herds, flocks, community pastures, donkeys and even dogs, the tags were applied to nylon collars which could be removed from the animal once the season was complete. Permanent application might have caused less wear as the ear might be more sensitive to aggression by animals than the neck, however there is some concern that a 32-gram tag which is rectangular and loose fitting might be snagged and pulled out of the ear with bale string, fence wire and aggressive behavior of cows and livestock. Community pastures indicated permanent tagging of patrons' cattle would not be wise.

Ten Ceres tags were purchased and nine were applied to cow-length nylon collars which had a ring affixed to the bottom to keep the tag on the upper quarter of the neck, so that the sun could charge the solar panel. The remaining tag was applied to a dog collar with the buckle as the extra weight was needed to hold the tag upright. The nine tags were allocated to three beef herds with three tags per farm. The dog tag was used on two separate dogs – a herding dog and a livestock guardian dog on a sheep farm.

Beef farm 1: Tags and collars were applied to two cows and one donkey. The tags communicated to the internet very well, with nearly constant fixes on a regular basis from June 2022 through to September. In September the fixes started missing occasionally to regularly, depending on the cloudiness of the sky, due to the length of day shortening, and cloud cover reducing solar reception. Two collars fell off, but both were located and replaced on animals with slightly tighter collar adjustments. GPS fixes were accurate and easily found upon search with handheld GPS. The client made good use of GPS reporting and activity alerts due to aggressive behavior of the donkey, which yielded finding a fleeing black bear being pursued by an aggressive donkey. This cooperator was very happy with service; however, they would prefer GPS fixes more often than every six hours, and in September and October service was unstable and not useful. All three tags fell dormant in October and never woke up the following spring. Tags that perish after being applied do not carry warranty. Ceres provided replacement tags for the second year of the pilot project.

Pilot Project Summary of Costs for 10 Ceres Tags (2021)

One-time Purchases

Item	Cost
10 Ceres tags incl. applicator	$3,712
Shipping to North America	$1,080
Total without labor	**$4,792.00**

Annual Costs

Item	Cost
Mapipedia Map Software yr. 1	$391
Mapipedia Map Software yr. 2	$391
Total	**$675.00**

Total for 2 years service	**$5,574 or $557 per tag**

Beef farm 2: Tags and collars were applied to three cows on a community pasture. The tags initially communicated very well with the internet and fixes arrived at the computer and smartphone.

The community pasture manager noted there is great appeal in knowing where the cattle were at all times.

The tags which functioned all summer started to lose power and stop reporting fixes in late September and October. All of the tags were stored facing the sun for the winter, however turned off in November and never woke up the following spring.

Beef Farm 3: Tags and collars were applied in mid-June 2022 to three cows on a very large tract of remote pasture away from cell signal and in difficult to access agricultural Crown land. The tags initially communicated GPS locations very well. In June Manitoba has excellent day length with officially 17 hours and 22 minutes of it. This long day length is excellent to charge Ceres solar powered tags. However, winter use of solar panel charging is far less successful with December falling to 7 hours and 10 minutes of sunlight, with the sun very low on the horizon. Low sun in the sky is a strongly negative factor for solar charging as the sun must travel through more atmospheric filter to arrive at solar panels. Also, because cattle continuously move, the tag is facing in the non-south direction 270 degrees of the 360 degree horizon on an average of ¾ of the day's length. As well, cows in Manitoba in winter have extremely long hair that obstructs solar panel coverage to some degree, depending on the breed of cow, and many factors. With these issues considered the tags on Farm 3 performed similarly to all other ceres tags and ceased working in October, with limited service in September. Two collars fell off cows due to the loose fit. One was found and was replaced, while the remaining collar was lost in fall of 2022 during poor GPS reporting times, and one has not been found. One Ceres tag which remained affixed to the collar had the case smashed by the cow in an unknown way. The tag was permanently destroyed.

Ceres was contacted about warranty coverage. We were advised that tag warranty ceases when the tag is applied to an animal by any means, which is disappointing given that the tags were being used for their intended purpose.

Ceres Tag on a Dog's Collar: The dog collar tag was initially applied as a test on a farm dog in May 2022, on a collar with the steel buckle being used as a counterweight on the lower part of the neck to keep the Ceres tag upright. This worked successfully with the solar panel normally facing upright, but it could be rotated with some movement. This tag reported well, and the geofencing feature was especially useful to record the dog wandering off of the property. In July 2022 the tag was transferred to a sheep farm with a great Pyrenees dog which functioned as a livestock guardian dog. The farm is close to a provincial highway and the fear is that the dog will be injured or killed due to traffic at highway speed. The tag initially worked successfully in July and August, with some effort to clip long hair on the dog. However, as September and October prevailed, the tag quit communicating due to low battery. This farm would prefer to keep using the tag and collar all months of the year, as traffic does not stop in fall and winter. This cooperator returned the tag as it did not perform adequately for his needs.

Summary of Performance:

The Ceres Tag is a very compact, light GPS with excellent capabilities of GPS locating, geofencing, and accelerometer for activity alerts. The computer and smartphone application for Ceres tags can vary between a number of mapping providers. This project chose Mapipedia, with has a very good interface and is accessible on both smartphone and computer. Mapipedia has good current mapping and good historical record keeping. Alerts are also useful. Mapipedia was able to be reached for questions and reacted and updated some capabilities which our clients deemed helpful.

The challenge with the Ceres tags is that the battery capacity and charging ability would be deemed to be underperforming in Manitoba due to hours of sun, angle of sun above the horizon and reliability in cool to very cold weather. At this time, it appears that the Ceres tag may only be primarily usable during April through August. Tag strength and build also appears to be in question as one tag in 10 was destroyed in four months of use, with no possibility of warranty. The final area of concern is the 6-hour interval between GPS fixes. Six hours may help locate your herd if you have multiple tags in the herd and the reporting time varies throughout the day, so you will likely find your herd when the most recent tag has transmitted its information in the last 30 minutes. However, if the last tag report is nearly 6 hours old, the information is outdated and cows are likely to have moved in that period. More frequent GPS fixes would require greater battery and solar panel charging strength, which is already limited at best. Activity alerts may be sent when unusual activity is sensed. However, activity alerts are not sent when the battery is nearly dead or dormant.

The pilot project experienced communications difficulties with the Ceres company when we tried to convey to it our concerns about tag functionality and performance in the fall and winter months, and to seek possible solutions. After considerable attempts to discuss winter failure of the tags, Ceres agreed to provide ten new tags at no cost to the pilot project.

This project found that the Ceres tag had excellent technology for rural and poor cell phone areas, however the poor charging and infrequent fixes makes it only practical for April to early September conditions in Manitoba .

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Tractive GPS Dog Tracker

The Tractive GPS dog tracker is a very small GPS tracker that weighs less than 35 grams and should be attached to a dog collar. The Tractive dog collar regularly reports GPS locations of a dog through a connection to the local cellular phone system. The Tractive tracker has many features such as virtual fence, battery warnings, activity and fitness, and can even turn on a small light on the device and emit a sound for locating lost trackers.

Tractive GPS trackers can be purchased online through the Tractive website or multiple general and pet online retailers. Setting up the Tractive collar is very easy and is more user friendly than the livestock GPS products tested. It is easy to notice that it is a consumer-friendly interface of set-up and the website's operation. The product came quickly and was in stock. Very little wait time was required. The website addresses the cost of equipment very prominently, but only exposes the cost of upkeep of the associated website once you have already volunteered your address and email on their website. In order to receive GPS fixes and any of the services you need to subscribe to the My Tractive website.

The tracker is very small and comes with a short charging cord that can be charged with the associated charger or a USB standard outlet. The charging will be a frequent endeavor as the advertised battery life is between two days and seven days. Local experience in rural Manitoba with good cellular phone service indicated that the Tractive collar will generally call for a battery charge at 48 hours of use. Using certain features could reduce the length of charge. The batteries are integrated into the tracker and cannot be switched or renewed. There are no options for external battery hookup during use on the dog. As such the tracker must be removed from the collar or dog every time the battery needs charging which could take a minimum of at least two hours.

The tracker is small, smooth and not obtrusive to the dogs; many people would not realize that the dog has a tracker unless they knew what they were looking at. The tracker is also well shielded from moisture and should not be a problem outdoors or if temporarily in water.

The tracker is intended to be attached to your collar with a soft rubber mounting sling, that attaches to four small hooks on the tracker. While this could be okay for temporary in-person use in urban environments, farm use with dogs which interact with nature and difficult situations would likely warrant extra securing to the collar. This project chose black electrical tape wrapped around the tracker and the collar, positioned in a way that would allow for charging. As such the tracker has not been lost and has been in nearly daily use in summer and winter in the year of 2022 and 2023

The My Tractive app has a very good mapping function and can display current and historic locations of the dog. The My Tractive app also allows for live tracking which gives a GPS fix very frequently so that you can actually follow your dog with your smartphone and locate it very quickly.

The virtual fence is very good for alerting the owner of the dog leaving the user set fence area. This would be very helpful for situations near highways, or with neighbors who

Pilot Project Summary of Costs of a Tractive Dog Tracker (2021)

One-time Purchases

Item	Cost
Purchase of 1 collar (Needs charging every 2-7 days)	$117
Total	**$117.00**

Annual Costs

Item	Cost
Annual Subscription yr. 1	$108
Annual Subscription yr. 2	$108
Total	**$675.00**

Total for 2 years service	**$333**

Tractive collar on a dog.

have dogs, or if there are concerns about potential harm to your dog if it has wandered off of your property.

The Tractive dog collar has an exemplary My Tractive app, and would accomplish nearly all wishes or needs that a dog owner would want other than managing your dog to make it come back to the virtual fence area. The feature of returning a dog to a virtual fence idea is available on other GPS collars, but is generally for very valuable dogs which are working dogs. The price for a collar which will urge the dog to come home is in the $3,000to $4,000 Canadian range in 2023. For more information on this service please check InvisibleFence.com

There are two downsides of the Tractive dog tracker in rural Manitoba:

1. Battery life for commercial livestock guardian dog use is short. While this may be acceptable in some environments, others will deem that charging every two to three days in rural Manitoba is too often. However, the cost of each Tractive tracker is reasonable, and it may be deemed that owning two collars for one dog or three collars for two dogs and switching collars every second day is an adequate tradeoff for the excellent other aspects of the collar.
2. Cell phone coverage area is a must for the Tractive GPS to work. Weak cell coverage causes additional battery drain which may mean very short usage times. And, if the dog is outside of coverage area the collar will not report location. The cell coverage zone is actually smaller for a dog collar than for a cell phone operated by a person, because the dog generally stands or lays down with the antenna within a couple inches of the ground to a maximum of three feet off the ground. This causes greater signal losses to the cell tower due to hills in the direct line or more trees and foliage between the antenna and the towers.

(Note: most compact GPS trackers available on the market are cellular service based and have similar limitations to the Tractive device. If you are purchasing any of these trackers familiarize yourself with the cell service strength in your intended zone of use.)

Livestock guardian dogs that need to fight wild canines and felines may be very rough on the Tractive tracker, as often canines bite around the neck where the tracker resides. As of this time this has not been a problem for the tracker purchased for the project, but this may be a weakness in difficult predator situations. The application of black electrical tape is a positive both as a support and as armor for the tracker.

The Tractive collar remains in use after 24 months of semi-regular use, as of writing in November 2023.

A Tractive collar with a longer life battery and a toughened sling and protection would be an excellent GPS tracker for livestock guardian dogs.

Lonestar GPS Tags

Lonestar GPS tags are small GPS enabled ear tags that weigh 24 grams and are intended to be used as an ear tag on cattle or large ruminants

Lonestar GPS ear tag on a gram scale

Lonestar tags have a lot of technology in a small package, with a functioning GPS, a thermometer, an accelerometer, a battery, a satellite transmitter and a solar panel to power the tag. There are no interfaces on the tag to allow moisture or air into the tag. The tag is easily applied to a cow with a button with a regular Allflex or similar button tag applicator. The tag is intended to be applied to the front of the ear, and is intended to hang down like a pendulum. This orientation should reduce snagging with twine or wire, however, the long term retention is undetermined at this point as tags with buttons do not historically stay in cows permanently due to snagging, or failure of the button due to sun damage. Four Lonestar tags were purchased in summer of 2023, but were only used temporarily in the fall of 2023, before being removed for storage until 2024.

Pilot Project Summary of Costs for 4 Lonestar GPS Ear Tags (2023)

Item	Cost
4 Lonestar GPS ear tags	$1,476
Shipping to Canada from Texas	$283
No annual subscription costs for three years of maximum allowable service.	
Total for 3 years service	**$1,759 Canadian dollars or $439 per tag**

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Summary of Performance:

The Lonestar tag is a very compact, light GPS with excellent capabilities of GPS locating, geofencing, and accelerometer for activity alerts. The computer and smartphone application for Lonestar tags works well and is called Lock-on GPS. This system can also be used for other GPS devices such as dog collars and vehicle trackers. The challenge with the Lonestar tags is that the battery capacity and charging ability would be deemed to be underperforming in Manitoba due to hours of sun, angle of sun above the horizon and reliability in cool to very cold weather. At this time, it appears that the Lonestar tag may only be primarily usable during April through August. The final area of concern is the six-hour interval between GPS fixes. Six hours may help locate your herd if you have multiple tags in the herd and the reporting times vary throughout the day, so you will likely find your herd when the most recent tag has transmitted its information in the last 30 minutes. However, if the last tag report is nearly six hours old, the information is outdated and cows are likely to have moved in that period. More frequent GPS fixes would require greater battery and solar panel charging strength, which is already limited at best. Activity alerts may be sent when unusual activity is sensed. However, activity alerts are not sent when the battery is nearly dead or dormant.

This project found that the Lonestar tag had excellent technology for rural and poor cell phone areas, however the poor charging and infrequent fixes makes it only practical for April to early September conditions in Manitoba.

Lonestar GPS Yabby3 Dog Collar Tags

The Yabby3 GPS collar is a small box attached to a provided dog collar that is intended for mid- to large-size dogs as the box weighs 183 grams or 0.4 lbs.

Lonestar tags have a lot of technology in a small package, with a functioning GPS, a thermometer, an accelerometer, and three changeable AAA lithium batteries. The Yabby3 was ordered with 15 minute updates which is a very quick update time for GPS trackers. This is helpful, but may deplete the battery quicker than models with less frequent GPS fixes.

The Yabby3 was purchased in the summer of 2023, but was only used in the fall and winter of 2023. Lithium batteries are recommended for cold weather. During the winter of 2023/24 the collar will be evaluated on a livestock guardian dog that protects sheep.

Pilot Project Summary of Costs for 1 Yabby3 Lonestar dog collar (2023)

One-time Purchases

Item	Cost
1 Yabby3 Dog Collar	$337
Shipping to Canada from Texas	$283
Lithium Batteries $5 per battery X 3	$15
Total	**$635.00**

Annual Costs

Item	Cost
Annual subscription costs/year 2	$134
Annual subscription costs/year 3	$134

Total for 2 years service **$903 Canadian dollars**

Summary of Performance:

Lonestar GPS ear tag on a gram scale

The Yabby3 collar is small and very appropriate for larger livestock guardian dogs. The GPS has excellent capabilities of GPS locating, and geofencing. The computer and smartphone application for the Yabby3 can be run on the same app as Lonestar ear tags, works well and is called Lock-on GPS. This system can also be used for other GPS devices such as vehicle trackers.

This project found that the Yabby3 from Lonestar had excellent technology for rural and poor cell phone areas, and that the batteries were strong enough for a couple of months at a time during summer weather. Winter performance will be determined through the winter of 2023/2024.

Project Participant Feedback

"The Digitanimal GPS system was so helpful that I bought an additional box of collars for my other distant pasture. That way when I go to check the cows I can drive straight to the herd, check, and get back to haying or other needs."

– Moosehorn beef producer

"The GPS system is working. I can find the patrons' cattle much more quickly. With more collars we could improve grazing patterns and graze more efficiently. The system worked for two years, one GPS was case got cracked and it stopped, but was replaced. The system is quite dependable."

– Association of Manitoba Community Pastures pasture manager using Digitanimal GPS

"The Ceres GPS ear tag did work and wasn't reliant on cell service which is weak in our area, but low light days diminished the battery charge in fall, so the GPS fixes were unreliable. The lack of regular GPS reporting made it too unreliable to count on."

– Miniota sheep producer using Ceres GPS on a guardian dog

"The Tractive collar gave us up-to-the minute locating when we wanted to track the dog, the geofencing sends alerts when he exits the farmyard, but the battery only lasts 2 days in our location. Other than the battery charging it works excellent."

– Moosehorn beef producer

The Lonestar ear tag GPS did work in spring and summer, but by late September the sun was not high enough to keep the battery charged and reporting the GPS location regularly. The ear attachment is a simple button, and I am not confident the tag will be strong enough to remain in the ear for the whole winter. I think it is best to remove the $400+ tag in fall and re-apply it the next spring."

– Moosehorn beef producer using Lonestar GPS ear tags on beef cattle

Summary of Livestock GPS Collars and GPS Collars for Livestock Guardian Dogs:

All producers agreed that GPS tracking of both cattle and dogs was interesting and useful.

All producers could see positive outcomes and more efficient wellness checks of animals with the use of the GPS trackers.

All producers could see value in evaluating behaviors and grazing patterns to see if their animals are being stalked and hazed by predators.

Reliability is an issue that is critical, as once you are using a system, you don't want it to fail in mid use. Or, finding out that an alert is missed, or you cannot find your animals when they are missing is costly and frustrating.

The Digitanimal system is complicated but was quite successful. Producers were concerned about cost and the number of items used to keep both collars and base stations working.

The Ceres system worked everywhere and had a good producer interface, but did not report GPS fixes often enough (6 hours), and consistently failed to report regularly by late September and through the winter in Manitoba conditions. Standard warranty with the ceres system does not cover tags that failed over the winter or are damaged by animals. Ceres provided replacement tags for year two for the pilot project for tags that failed over winter.

The Lonestar system worked everywhere and had a good producer interface, but did not report GPS fixes often enough (6 hours), and consistently failed to report regularly by late September and through the winter in Manitoba conditions. Long term reliability will be analyzed in 2024 and 2025.

The Tractive system for dog tracking worked very well, and was very cost effective for tracking livestock guardian dogs. It could be improved with a longer battery life. It also should be noted that the Tractive system only works in areas with continuous cellular coverage.

The Invisible Fence Brand dog tracking and management system was not tested in this project but anecdotally Manitoba livestock guardian dog users have reported positive results, but are concerned about the cost of purchase.

For more information on the Manitoba Livestock Predation Prevention Pilot Project and other Risk Mitigation Practices please visit https://mbbeef.ca/

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