Farm Foundation

# Regenerative Ranching DATA ROUNDUP

## Summary of August 24, 2021 Meeting Discussion

Regenerative Ranchers manage for beneficial outcomes across the multiple interrelated systems that touch—and are touched by—food production on rangelands: healthy animals and nutritious food, healthy soils and diverse microbial communities, and resilient ecosystems, businesses, and communities. Regenerative ranchers care not only about *the* environment but also *their* environment: the local, regional, and global context of their ranch management. *The need to plan, track, and measure the effects of their practices and communicate outcomes all the way to consumers is a key goal for this sector.* The burgeoning community of regenerative practitioners in an otherwise well-established commodity ranching industry highlights a distinct gap of data capabilities and calibrations, both among practitioners and

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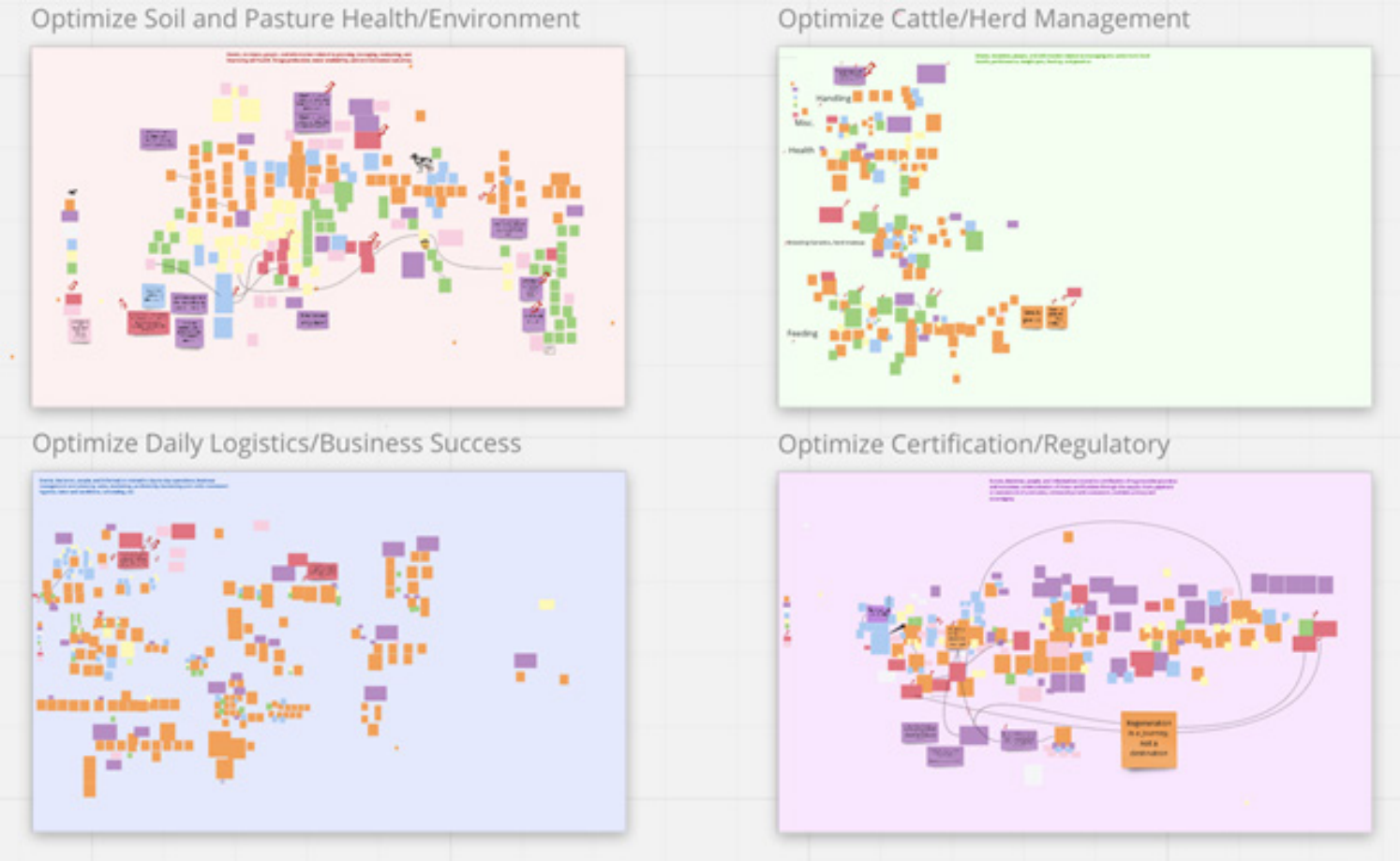



with consumers, a gap that is typically found within younger industries.

On a hot, humid evening (for some), a cool sunny day (for others), and a clear night (for still others), a truly global group of passionate regenerative ranchers, value chain partners, software providers, conservationists and land trust representatives, scientists, academics, and more gathered for The Regen Ranching Data Round Up. Participants spanned the United States from east to west and called in from London, Brazil, Australia. Nearly 100 individuals dedicated 3 hours of their evening, afternoon, or morning to share and gather knowledge about how the industry works from those who participate in it.

**https://miro.com/app/board/o9J_l3HQ9jU=/**

Regenerative Ranching Data "Round Up" Miro Board

***The goal of this event was to form a community-led understanding of the regenerative ranching sector and to identify common pain points*** to be addressed in a follow-up "Rodeo" to help solve them. Participants jointly identified actions, actors, and data exchanges that occur, or need to occur, across the regenerative beef value chain—from soil to steak, ranch to ribeye—through a method known as "Event Storming." The resulting Miro board with the sticky-note-based industry map can be found here: https://miro.com/app/board/o9J_l3HQ9jU=/

# Event Storming Background

Traditional "event storming" tries to understand the big picture of a process by focusing on the "events" that take place and their approximate order in time. In a pre-pandemic world this meant writing past-tense verbs ("events") on orange sticky notes and sticking them on a wall as a big, in-person group of domain experts. In an attempt to approximate the rich conversational environment of in-person sessions, the Regenerative Ranching industry was segmented into 4 separate but overlapping "optimization timelines" groups of sticky notes designed around optimizing a particular group of activities or goals. The larger group of event stormers was broken into 4 groups, each rotating through those segments while placing stickies and sharing their experiences and processes with the group. The four optimization timelines were: *1) Soil and Pasture Health/Environment, 2) Cattle/ Herd Management, 3) Daily Logistics/Business Success, and 4) Certification/Regulatory.*

In addition to events (represented with orange stickies), purple stickies represent "hot spots": disagreements, ambiguities, etc., and white stickies indicate "terms" that arise which comprise part of the domain language.

Finally, once the basic event flow has been established, blue stickies are added to represent decisions, questions, or "triggers" that are relevant to the people involved with the events in the timeline. The people themselves are shown on yellow stickies, and any data or information needed to make those decisions, answer those questions, or pull those triggers was added on green sticky notes.

The resulting "big picture" timelines give insight into what happens, who is making decisions, what questions need answered, and what data is needed at which points in time.

*Orange - Events (past-tense verbs)*

*Purple - Hot spots (disagreements, ambiguities, etc.)*

*White - Terms*

*Blue - Decisions, questions, triggers*

*Yellow - People*

*Green - Data or information needed to make decisions, answer questions, triggers*

# Optimization Timeline Overviews

The virtual small groups succeeded in triggering some robust conversations, and the group as a whole produced very rich event maps. We had a large and diverse group of participants, including ranch owner/ operators, co-op style aggregators, software providers, academics, scientists, and supply chain actors. It was clear that most were passionate about helping their sector grow and improve, with many conversations focused around measuring outcomes, making and communicating better decisions, and improving communication through the supply chain.

## Soil Health / Environment

*Events, decisions, people, and information related to planning, managing, evaluating, and improving soil health, forage production, water availability, and environmental outcomes.*

This timeline was first because one of the defining characteristics of Regenerative Ranching is having a primary goal of regrowing healthy soils, improving

water availability and quality, promoting healthy biodiversity, improving resilience to severe weather, and storing carbon. It is therefore not surprising that the overall timeline took on a distinct flavor of set goals, measure metrics, take actions, evaluate and adapt goals and practices, repeat. Goals can be per-pasture as well as across the whole of the ranching operation, and those mentioned include:

- increasing/maintaining percentage of plant productivity and foliar cover;
- increasing/maintaining/balancing biodiversity (number and vitality of plant species);
- increasing soil carbon levels;
- improving or accurately estimating "carrying capacity" (how many animals a pasture can support);
- and improving water infiltration.

Key to goal setting is determining the metrics to track and establishing a baseline for those metrics from which to improve. For an individual rancher, this can be difficult to achieve alone due to lack of past data, limited past experiences, and the associated costs and labor of monitoring:

- Is my sensor calibrated?
- Would two labs give me the same results for the same sample?
- What is the typical variance in this number between labs?
- What should "normal" be for this metric on this pasture?
- How should my baseline or goals move given rainfall or other variables out of my control?

The MySOC project was mentioned as an existing initiative to help in the area of combining data to help establish datasets and baselines.

As a clear reminder that soil and environmental goals are part of a bigger picture that includes raising cattle and sustainable businesses, sprinkled throughout this primary timeline are many practical considerations of a regenerative ranch, such as: available capital, market and processing access, return on both financial resources and time invested, and unpredictable environmental conditions, i.e., What if it doesn't rain? What if grass doesn't grow? Investments in these goals must be justified or paid for primarily through the sale of cattle, and hence planning and goal setting often takes the form of optimizing a system subject to the constraints of trade-offs between goals.

Beyond seed and equipment, "investments" (time, labor, and money) revolve around gathering and tracking measurements, either through soil sampling, sensing, or time/labor to manually gather samples. Measurements may include:

- forage height (sampled manually via ruler);
- rainfall;
- stream/water quality (lab results);
- soil structure (manually assessed);
- soil samples (lab results);
- soil organic carbon;
- soil cover;
- species and vitality of plants (manually observed);
- and water infiltration rates.

Matching pasture goals to animal stocking density is a difficult and uncertain undertaking. Software exists to help ranchers with this, including MaiaGrazing and PastureMap. Ranchers can take actions to manage their pastures such as matching livestock production to the forage growth curve (which starts with the calving and breeding season), adjusting weaning time, splitting or merging herds, rotating herds between pastures, and overseeding deficient species of plants.

This timeline illustrates the many different people who affect each of these parts, from extension agents to ranch managers to ranch hands to soil scientists and software companies. Importantly, planning and goal setting is often done by different people (managers) than those that take measurements and carry out chosen courses of action (ranch hands).

## Cattle / Herd Management

*Events, decisions, people, and information related to managing the cattle herd, herd health, performance, weight gain, feeding, and genetics.*

Sales of cattle is the primary income which enables the ranch to operate, and therefore it is important for the ranch to be effective at herd management. Since cattle are sold primarily by "grade and yield", i.e., price is determined by the weight of the animal after initial slaughter (yield) and the quality of the meat (grade), managing a profitable pasture-raised herd tends to prioritize maximizing animals weight gain (the most pounds per head and/or per acre), yielding the highest quality meat, and keeping supplemental feed and other input costs as low as possible. This requires maintaining herd health, optimizing genetics, providing quality feed/forage and maintaining healthy soils, properly matching available pasture space to incoming cattle to avoid under- or over-grazing, and maintaining enough labor to make it all happenThe herd management timeline's events ended up falling into 3 main categories:

- Feeding
- Breeding / Genetics, Herd Makeup
- Animal Health & Handling

## Feeding

A distinguishing feature of "ranching" compared with other forms of raising cattle is the use of large blocks of pastureland—hard-fenced, temporarily electric "hot"-fenced, or via emerging virtual fence technology—into smaller pastures for appropriate impact as the primary feed source for animals. While each ranch is different, they all require management of pasture and water as critical for their herd. Some ranches birth calves and feed through to finish, some sell calves before finishing as feeder calves, and others buy feeders to raise them through to fat. This distinction is critical for herd management on pasture as it is harder to change the course of a ship on a 2-year journey than it is on a ship that will only be out 3 months. The plan for how many animals a pasture can support 12 months from now is highly dependent on an unpredictable rainfall and growing season—and

increasingly unpredictable wildfire seasons, extreme droughts and intense storms and weather events.

Provided high quality, *diverse* forage, livestock will graze to their nutrient requirements; they have the ability to select the plants required to meet their nutritional needs. The ranch manager is responsible for identifying if anything is missing from the pasture to meet the nutritional needs of the herd and for providing any non-pasture-based feed or nutrient content and trace minerals as a supplement if necessary.

Managing feed on pasture means managing the quality, vitality, and diversity of the plant life in the pasture. Regenerative ranching focuses closely on building soil health and quality, which in turn supports better feeding. Healthy soils also have additional benefits, such as greater water capture, that can help build resilience to extreme weather. Regenerative ranching requires an on-going commitment and effort from the rancher to develop a sensitive relationship with the land and animals she stewards. Instead of maximizing a single goal, regenerative management uses careful adaptive management to best align timing, location, duration, and intensity of grazing and other agricultural activities with the multiple economic, social, and environmental goals the rancher and stakeholders have set.

Pasture recovery and rest are two of the most important tools for rebuilding soil health in a pasture system and are highly influenced by the timing, intensity, location, duration of grazing. Since cattle utilize their tongue to rip forage loose, adequate height of forge given the plant mix, species and time of year is crucial. Cattle more efficiently harvest taller forage (more pounds of forage per bite) than very short forage close to the ground. Requiring cattle to graze short forage, i.e., closer to the ground, can increase exposure to internal parasites. Sufficient pasture rest and/or recovery between grazing periods helps provide healthier, higher forage and supports healthier cattle.

And that means a lot of work planning and monitoring things: visually assessing how “full” cattle look to determine if they are getting adequate forage, measuring pasture height, assessing the number of plant species and whether cows are selectively grazing some over others, and many more things. A few selected data types related to feed from the Miro board are:

- Biomass
- Percent foliar cover
- Daily intake
- Rainfall
- Body Condition
- Illness
- Finish age
- Manure quality
- Breeding seasons
- Rate of gain
- Conception rate
- Weaning rate
- Death loss
- Animal impact
- Forage adaptability
- Forage availability

## Breeding / Genetics, Herd Makeup

Regenerative ranching requires understanding the context in which you are ranching to identify the best livestock mix to fit the ecological and economic context of the enterprise. While on the surface it seems like a successful breeding/genetics program is achieved prior to conception, the Miro board indicates a successful genetics program is really managed over the full life of the animal. Genetics determine the potential of a given herd; pairing the right bulls with the right cows to select for chosen traits, birthing a healthy resulting calf, evaluating the resulting calf's traits and genes, and raising that calf through to take part in the next generation's reproduction are all part of a successful breeding program.

Critical to the success of a regenerative breeding program is matching the livestock to the land. The species of livestock selected should be adapted to the landscape and the forage produced by the pasture upon which they will graze. Environmentally adapted livestock better utilize the available forage to cycle more carbon and feed the soil microbes with their waste (improved ecology) and require less inputs (better economics). Breeding decisions are also affected by estimates of available land, water, and forage, the selected breeding season, and decisions about whether to cull under-performing animals.

The long time horizon of this process means it is difficult for a human to keep track of mentally: data recording, storage, and analysis methods are therefore key to success. One item on the Miro board indicated that "more digitization of this process" would be a benefit to ranchers.

While the focus of our event was cattle, there were comments made that we need to recognize the role other livestock can play in regenerative ranching. All livestock bring different sets of skills and capabilities—cattle are grazers, sheep mix it up, goats are browsers, hogs will graze and root, poultry can provide much needed input of fertilizer while lowering the parasite level of ruminants. Using multiple livestock on the same pastures is a practice known as "stacked agriculture" and it can allow ranchers to unlock additional ecological and economic benefits.

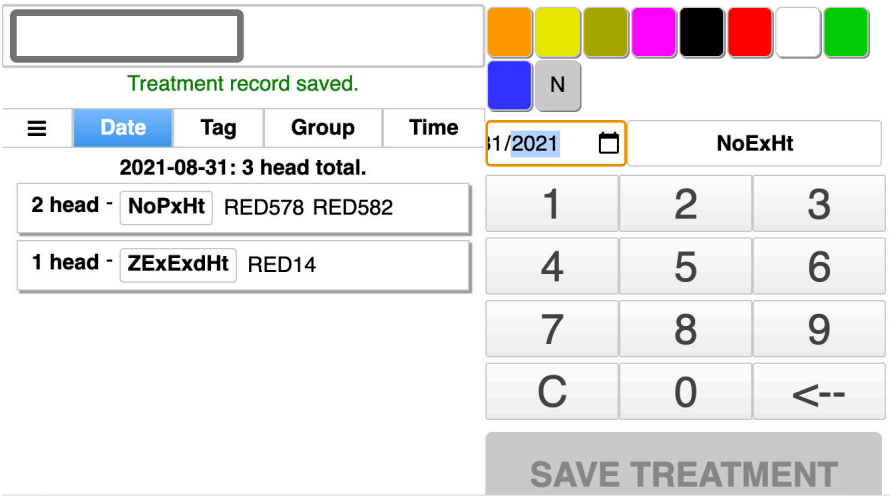
## Animal Health & Handling

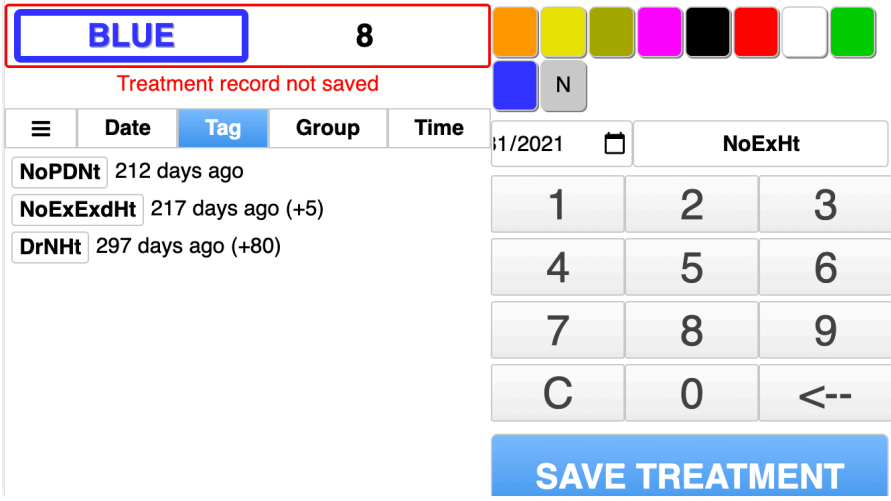
Much of the daily work on the ranch is focused on animal health and wellbeing. Unlike people, cows can't tell you if they are feeling a little off and don't want to come in to work today. In the wild, the one animal in the herd exhibiting any signs of sickness tend to be the ones singled out and sorted off by predators, so cattle, often like many of the ranchers who raise them, have a built-in aversion to showing weakness.

The rancher must be adept at recognizing these obscured signs of sickness, bullying, lameness, inadequate forage, lack of water, or other health considerations early before disease or stress push the calf past the point of no return. Often, health factors are tied together: a calf may have originally had a mild case of mycoplasma that triggered a little mucus in their throat that got exacerbated by a couple of days of inadequate feed, but then a more deadly pasteurella made its virulent home base in the mucus and that ends up killing the calf even though the original cause was a different bug and a temporary environmental stress. Any sick or injured animal should

be humanly cared for. That means first asking if an intervention is necessary to reduce animal stress or pain. Then the rancher must identify the root cause: ecological conditions, genetics, inadequate nutrition, poor immune system, management practices, or other.

The best management for herd health is prevention. As illustrated on the Miro board, that starts with developing a vaccination protocol. (We want to recognize an earlier point: matching livestock species to the ranch environment is critical for healthy herd outcomes) Typically, animals will begin a series of vaccinations for common cattle diseases that begin either at birth for cow/calf operations, or on any incoming animals purchased as feeder cattle. High nutritional health promotes high overall immune system health, a feedback loop that decreases the incidence of disease.




Overall forage nutrition provided to the cow/calf herd should be studied to identify deficiencies in any given pasture. Intestinal parasites may be picked up which affect the animal's ability to properly utilize the food they eat; these parasites become a health problem when the immune system of livestock is depressed due to unhealthy conditions or inadequate nutrition. In the event an animal's health is not able to be improved, it may need to be culled from the herd. Any offspring of the impacted livestock should be watched carefully to see if their similar genetic makeup perpetuates similar health issues.

Manure texture observation is a valuable tool to identify early signs of many health issues such as protein/carbohydrate ratio surplus or deficiency, coccidiosis, and detrimental parasites. Manure samples can be taken and sent to a lab to analyze the parasite load in that animal. The nitrogen, phosphorus, and potassium content of the manure that comes back in the same sample results are also key to understanding how well the animals are returning nutrients to the pasture. Examining manure across livestock in a herd can help identify differences in parasite load and may indicate a need for adapted management practices. A note on the Miro board mentioned value that can be gained from tracking manure samples over time. Manure texture, pasture residue, pasture quality all need to be taken into account for managing herd moves, timing, intensity and duration.

When sick animals are identified, records must be kept of any antibiotics given to those animals. Ideally, those records are available upon any re-occurrence of sickness to inform the rancher of which drugs have already been tried on that animal, which drugs seem to be efficacious in a current outbreak, and which have not been tried much recently. As a shameless plug, OATS has a simple, free, open-source app that helps in this treatment process that has been used daily in production for several years. Additional open-source apps help with weighing and reporting rate-of-gain and tracking death loss. Screenshots of the Treatments app below:

# Daily Logistics & Business Success

*Events, decisions, people, and information related to day-to-day operations, business management and planning, sales, marketing, profitability, harvesting and cattle movement logistics, labor and workforce, scheduling, etc.*

As a very rough estimate, a steer will eat approximately 2% of their body weight in dry matter each day. At a finish weight of 1350 lbs, a birth weight of 100 lbs, and an average gain of 3 lbs/day, that means an average steer will be fed for 417 days and consume an average of 14.5 lbs dry matter each day, for a total of approximately 6,000 lbs of dry matter. That means each animal will consume (ballpark) between 10,000 and 15,000 pounds of feed to reach maturity. The sheer quantity of food makes ensuring a consistent supply of quality food into one of the biggest daily concerns of a ranch, followed closely by managing herd health. Accurate projection of forage quality and quantity and matching livestock to the feed are some of the biggest concerns.

Regenerative ranching is focused on both regenerating environments and profitably raising cattle. The interaction of these two distinct yet interrelated goals make planning, measurement, tracking, and evaluation in all aspects of the ranch important components of dual success toward both goals. However, all the planning and goal-setting in the world is useless without the ability to execute. This timeline is about where the “rubber meets the road” in juggling the daily logistics that prioritize which proverbial fires get put out each day and which are left to burn for another day. It therefore overlaps all the other timelines as it represents the execution of the goals set in those specific timelines.

With regard to daily logistics, the clear picture that emerged here was that there is no clear picture. Daily logistics on the ranch touch on many different areas that may only be related by the fact that they all need to be done. Hiring, sales/marketing/shipping, facility care, pasture care, incoming cattle protocols, reporting/certification, monitoring, feeding, herd health management, interacting with landlords, and using software all made an appearance on the Miro board, resulting in more of a mosaic of daily logistics than a single picture.

## Certification/Regulatory

Some data collection tasks overlap. For example, data collected while monitoring pasture health or during irrigation can be used in reporting. Various certifications and regulatory reports were mentioned, including:

- Reporting updates to management practices if participating in a marketing collaborative
- Water use reporting (for state water board)
- Water quality monitoring reporting (for EPA)

- Irrigated lands regulatory program (for regional water board)
- Wildlife habitat condition reports
- Soil organic carbon reporting for carbon markets
- Animal handling certifications
- Age and source verification of incoming/outgoing cattle
- Livestock quality assurance certification

Certification and reporting in particular have a seemingly detrimental position in daily logistics: they take time and resources away from executing on the task of actually improving soils and raising cattle. Of course, doing a good job with cows and the environment is less valuable if no one knows you're doing it or you don't get credit for it, but that knowledge doesn't always help a rancher who has to finish filling out the forms due today instead of attending to another task in the field.

While certifications and reporting may seem like work for which there is not much credit given, later in this document we discuss "Certification/Regulatory" items related to ecosystem services and consumer preferences where data collected and communicated through the supply chain could lead to financial compensation to a regenerative rancher.

## Harvest/Post-Harvest

Harvest begins with estimation of when cattle will be "finished" for the targeted market for the ranch (feeders vs. fats). Cattle can be sold on contract, on the spot market, in specialty local markets, as a group in cooperative marketing pools, and still other options. Cattle nearing finishing weight are generally sorted visually to separate them from others not quite ready and then weighed. Trucks get scheduled to the processor, then animals are delivered on a previously-scheduled delivery date. Processors then slaughter the cattle and typically provide individual carcass statistics (on paper forms known as "kill sheets") back to the rancher. Tying that data back to all the individualized or group data from the ranch leading up to that point is difficult due to many factors, not the least of which is the fact that the kill sheet is typically a physical piece of paper and requires manual entry back at the ranch. Of note in this section was the Protein Path (aka Harvest Path) software being developed internally at Richards Grassfed for performing this sort of correlation and tracking.

## Facilities/Pasture Care

Fences, waterers, and "problem" weeds took center stage in this section. Fences and waterers have to be checked and fixed often. Besides physical fences, virtual fences need to be considered where they may be most appropriate. There are numerous existing tech tools for monitoring water at the source and at the drinker, with notifications sent via text or email.  Further incorporation into the industry and development of these tools are essential in drier times, as are increasingly becoming the norm.

Management of weeds varies. Weeds are a great indicator of soil health as their role is to address bare soil, mineral or fertility imbalances etc. Some choose to spray herbicide, till or mow. Others look to avoid sprays,

tilling and mowing by analyzing what the weed is saying about deficiencies in the soil that might be addressed through introduction of competitive plants, minerals, microbes or other soil fertility imbalances. Digital tools that can aid ranchers in identifying weeds, linking the detection of weeds to likely soil imbalances, and recommending practices to address deficiencies would be helpful.

## Interactions with Landholders

Not all pasture is owned by the rancher, and therefore maintaining relationships with landholders is important, including land trusts or agencies like the U.S. Bureau of Land Management. Some pasture land may also not be permanent. Rather a landholder can lease land for temporary grazing, or a farmer may allow cattle to graze their own cover crops in between their cash crops as an added source of revenue.

Regenerative ranching's focus on healthy soils should be an asset in attracting landlords as the benefits to the soil accrue to the owner of the ground: rather than stripping land of nutrients and moving onto the next property, regenerative investments in the soil pay future dividends. Communicating the benefits of regenerative ranching to landholders was indicated as a gap that could be improved. There is existing data that supports the grazing of cover crops, post harvest residue etc. and the positive impact on the land and benefits to subsequent crops.

## Monitoring

There seem to be two main areas of "monitoring": pasture/soil and livestock. Monitoring can be digital in the case of soil sensors, manual in the case of measuring forage height with rulers, detailed in the case of sending plant or soil samples to the lab, and sensory with assessments of soil texture, smell, earthworm count, etc. Most of the herd monitoring seems to be manual and visual, with a key indicator being the "fullness" of the animal as an indicator of forage availability and/or overall animal health. Weighing of cattle on a regular basis is a good measure of pasture production and genetic ability to convert.

## Software

Most ranchers used software, with "Excel" as the most consistent refrain. Given the complexity of planning, monitoring, and adjusting herd rotations based on forage conditions, two pieces of specialized software were mentioned in particular that help with management of matching pasture supply with stocking density demand: PastureMap and MaiaGrazing. Quickbooks was also popular for accounting.

# Certification / Regulatory

*Events, decisions, people, and information related to certification of regenerative practices and outcomes, communication of those certifications through the supply chain, payment or assessment of premiums, relationships with consumers, and data privacy and sovereignty.*

There was a clear message from many participants that regenerative practices, if properly communicated

through the supply chain, should be able to add premiums and additional market benefits. However, there is a streak of general mistrust of regulation and certification in agriculture, and it appears regenerative ranching is no exception. The regulated/certified party often ends up on the receiving end of demands from vague, unaccountable, sometimes ad-hoc bureaucracies that can leave lingering questions over time of whether all the effort is worth it.

Added value from certification seems to have two main flavors: **carbon markets** and **consumer preferences**. Participating in carbon markets means accurately measuring, calibrating, and communicating, and getting paid for increasing soil organic carbon (SOC) levels. Increased carbon in the soil comes from plants that extract it during growth and leave it underground in their root systems. High-carbon soils happen to also be the highest-producing soils due to a host of tangible benefits including improved water retention, less compaction, better infiltration, less erosion of topsoil through more stable soil structure, and vastly improved microbial activity.

Benefits of increasing soil organic matter can be so pronounced that gaining income from carbon markets need not be a primary driver for a rancher to take action, and it can add monitoring and reporting overhead to daily logistics. In addition, the most logical structure for carbon markets is to tie payments to actual measured amounts of carbon sequestered in soil. This presents two problems: different labs and sensors are not calibrated against each other for such measurements to inform payments on an absolute scale, and ranchers have uncertainty over the exact expectations of soil carbon increase from their practices and yet still need to pay for their practices and reporting efforts even if the practices on their ranch result in unexpected under-performance.

Soil regeneration has a long time horizon, much longer than the lifespan of a single animal.  Attaching practices to cattle in order to garner premiums will inevitably therefore involve some level of “expected” benefit in the future from practices implemented during the lifespan of the animal. What if those benefits do not quantitatively materialize quite as expected, but the consumer has already consumed the meat?

On the **consumer preferences** side, there appear to be two fronts to the effort: creating demand among consumers through education and marketing of regenerative practices, and producing the certifications necessary to communicate those practices to consumers. Participants clearly felt that ranchers need to work together and be included in the certification discussions, enabling them to influence the standards dialogue during such evolution.

Physical challenges exist to propagate the certification message forward through the supply chain: processors would have to segregate meat with individual certified characteristics, packaging must communicate certification, distributors need to market the certified products accordingly, and retailers need to feature such certifications in order to engender consumers to pay premiums.

Certification also involves data collection, validation, and sharing, even if only sharing the “checkmark” on the resulting product. Ranchers want to remain sovereign over their own identifiable data while still communicating that practices used with the livestock they sell have adhered to applicable standards. Remaining engaged in the standards dialogue will definitely help ranchers to buttress themselves to protect their data privacy.

There was also a sense that the necessary standards are still lacking in this area and much work was yet to be done to both create standards, relate new standards to existing standards, market those certifications, and simplify/streamline reporting, sharing, and record keeping. As another shameless plug, the OATS Center has developed a technology-based certification algorithm known as AGAPECert, built on the open source Trellis Framework, that enables an industry to generate certifications that can be automated, trusted, and private which might prove useful in this discussion moving forward.

# Focus Areas and Ideas

The concluding session of the event used arrows to denote areas of the board where solutions should be focused, and red stickies to suggest ideas, projects, or paths forward in those areas.

## Ideas for Soil Health / Environment

- Data sharing, comparison, and discovery seemed to be an important area of interest around soil health. Specific ideas proposed were:
- Public datasets clearly linking measurable practices to quantitative outcomes would be valuable to ranchers.
- Calibration of sensors and lab results
- A platform for a rancher to benchmark their ranch vs. others
- Software to help match “current” data w/ “past” data for quick decisions through actionable insights
- Payments or premiums for practices, data, and/or ecosystem services

Since soil/environment health is the most distinguished feature of regenerative ranching, it is not surprising that so many ideas for capitalizing on related opportunities emanated from this section.

## Ideas for Cattle / Herd Management

A few focus area arrows on Miro were dedicated to the feeding/forage process, but the red-sticky note ideas here centered around more digitization of records and the record-keeping process, adding human elements to the list of metrics, and improving how we evaluate customer satisfaction of the end meat product. Since regenerative ranching and other forms of ranching share similar herd management needs, ideas here could find fellow travelers and support from beyond the fold. Improved digitization and interoperability in order to automate record keeping and analysis is a common refrain all over the agricultural world.

## Ideas for Daily Logistics / Business Success

Given the “in the now” nature of daily logistics, it is perhaps not surprising that ideas here include automation (i.e. saving time) by reducing data entry cost, reducing data re-entry through interoperable systems and feeding “audit

data" back into decision support tools, and improving data analysis capabilities through machine learning that could be scaled regionally where similar conditions tend to be encountered. A desire to better base decisions on data was evident from conversations, including improving the ability to use estimates of "pasture recovery" as a primary driver of in-the-moment decision-making. Also, one idea was to provide some data/support for informing landlords of the benefits of regenerative ranching as an asset derived from their lessees.

Basically, it is hard to take time to record and analyze data in the moment on the ground. The relationship between data quality and value derived from data is such that data which is not immediately useful for making a decision is not likely to be very accurate because the person responsible for recording it will not work as hard to ensure accuracy if they do not need it soon. If the water sensor is malfunctioning, and you know it's not terribly important this week, you'll just bypass it so the cows can still get something to drink and come back to fix the sensor later when there's more time.

While there was no explicit idea from the group around harvest and post/harvest communications, the "Harvest Path" software being developed at Richards Grassfed was clearly focused on trying to better collect and capitalize on data, including data received back from processors. An industry focus on streamlining the rancher/processor communications might prove fruitful in stimulating innovation and starting the conversation about more value-added certification opportunities. It also could serve as the building-block for interoperability among pre-harvest systems as they could result in a common post-harvest data interface. Finally, one idea/focus area was the creation and availability of public datasets that farmers can use to evaluate practices, compare their farms to others, and aid in planning/decision making.

## Ideas for Certification / Regulatory

Ideas here included:

- developing baselines for consumer-focused certifications;
- streamlined reporting that can feed into multiple certifications;
- machine learning techniques for more efficient analysis;
- improved data re-use between audit data and operational decision making;
- turning audits into machine-readable data files rather than PDF's or paper; and
- institute a collective marketing campaign to educate consumers on the benefits of beef to the planet

Many of the certification goals are clearly going to need some baselines around how to reliably measure and report environmental practices and outcomes, including better calibration between labs and sensors. Several of these ideas also relate to ideas from earlier sections around digitization, automation, simpler record keeping, and communication through the supply chain to reach consumers and garner premiums.

# A Path Forward: Follow Up Rodeo

As we shared during the Regenerative Ranching Data Round Up, our next event will be the Regenerative Ranching Data Rodeo. We will gather coders to write real world code to make real world software to help solve some of the data challenges identified in the Round Up and support regenerative ranchers across the country.

What became apparent to the organizers of the Round Up event is there are many "table stakes"—i.e., low-hanging fruit required before other goals can be addressed—necessary to digitize regenerative ranching in a meaningful way:

- providing digital tools to ranchers working the land and caring for the cattle;
- communicating between ranchers and processors;
- developing accessible public datasets for calibration between soil labs and sensors; and
- simplifying the ability for data used in software for operational decision-making to be automatically re-used for certification data.

Convening software providers and aspiring coders to pilot such a system might generate enough buzz to open some educational channels with consumers and improve momentum to include several critical supply-chain participants.

Amongst the many possible targets there are two high-impact challenges the organizers are considering to wrangle at the Rodeo:

**1. The standardization and calibration of soil sampling data and analysis.**

**2. Enhance the communication of the value of regenerative ranching practices (through digital certifications) to buyers and consumers.**

The form of the rodeo will likely follow the path of producing soil lab analysis data in a standard, machine-readable format, utilizing that data to compare and calibrate, and consume the resulting data via a standardized API to produce privacy-preserving certifications that can be automatically communicated through the supply chain.

Once this summary is published, we will be reaching out to Round Up participants to gather feedback on these ideas and input to design an impactful next event.