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Regenerative Grazing and the Benefits of Livestock on Soils in Northern New South Wales

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Abstract

Conventional cattle grazing has received criticism for environmental degradation in the past. Regenerative grazing and the principles of regenerative agriculture show encouraging signs that proper livestock management and planned grazing can reverse degradation and mitigate climate change. An emphasis on soil health and increasing soil carbon and organic matter levels reveals positive feedback for environmental health, the economic security of farmers, and nutritional health of consumers.

In this study I looked to investigate the benefits of regenerative agriculture, reasons why it is being practiced, and the extent it is practiced within the grazing in comparison to traditional methods within Northern New South Wales. In times of climate unpredictability, struggling economic conditions of small farmers, and declining nutrient value in foods, regenerative grazing and agriculture is an alternative strategy to pursue in resolving all of these. In order to gather data to support the claims, I spent 145 hours sending out an electronic questionnaire (gathering 16 responses), consulting background literature, visiting 7 farmers' properties, conducting both formal (1) and informal interviews (6), and attending one workshop.

I found that in the Northern NSW area grazers are implementing a variety of regenerative strategies within their paddocks, that have resulted in improvements in both health and productivity of their grazing enterprises, closer ties to their community, and it is a movement deserving of more converts. Yet, the extent of regenerative grazing in the area is variable, with conventional enterprises still holding dominance in numbers. I argue that with these results, regenerative grazing is a dramatically better strategy and system to employ opposed to the current state of contemporary, conventional grazing. With regenerative grazing: soil health is improved, paddocks are more resilient to climate variability, a more nutrient dense food supply is produced, water retention increases, GHGs are sequestered, livestock received a happy amount of feed, dependence on chemical inputs is reduced, beneficial microbial life is brought back to the rhizosphere, and biodiversity improves in the form of native plants and animals. Results reflect that RAgr grazers also feel more in-touch with their local communities and economics. Thus, I contest that RAgr grazing is a sustainable enterprise as it meets the triple-bottom lines of sustainability with the economy, environment, and social components.

Keywords: soil carbon, regenerative grazing, conventional grazing, climate change mitigation

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List of Abbreviations

- RAg= Regenerative Agriculture
- SOM= Soil Organic Matter
- NPK= Nitrogen, Phosphorous, Potassium
- HM= Holistic Management
- GHG= Greenhouse Gas
- NSW= New South Wales

¹ See figure for full bibliographic information

² See figure for full bibliographic information

³ See figure for full bibliographic information

⁴ See figure for full bibliographic information

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1. Introduction

1.1 Review of Existing Literature

1.1.1 20th Century Grazing

Following the end of World War II, many world powers were left with “massive stockpiles of munitions, a lot of them phosphorous and nitrogen-based, and a lot of massive stockpiles of poison gas and other chemicals” (Massy, 2019 p. 34). This leftover supply led to the creation of modern industrial inputs, such as synthetic weedicides and pesticides (Massy, 2019, p. 34). Dependent on grass cover and a secure supply of feed, many grazers were enticed by the benefits of the revolutionary advances and results the NPK (Nitrogen-Phosphorous-Potassium) inputs were bringing to their paddocks (Mead, 2006, p. 10). When yields were lower than optimal or the paddocks weren’t performing, most were informed to add more fertilizer to compensate and supplement for the lack; the “more-on” philosophy (Mead, 2006, p.10). Yet, over time studies reveal that farmers experience declining nitrogen efficiency with yield use increasing dramatically over time (Hatfield and Prueger, 2004). With this emphasis on encouraging N, P, and K levels in the grazing soils, other essential minerals have been overlooked (Mead, 2006, p. 10). Christine Jones states that with high rate NPK use and synthetic fertilizers “we inadvertently blow the microbial bridge” within paddocks and cropping fields (Jones, 2015, p. 2).

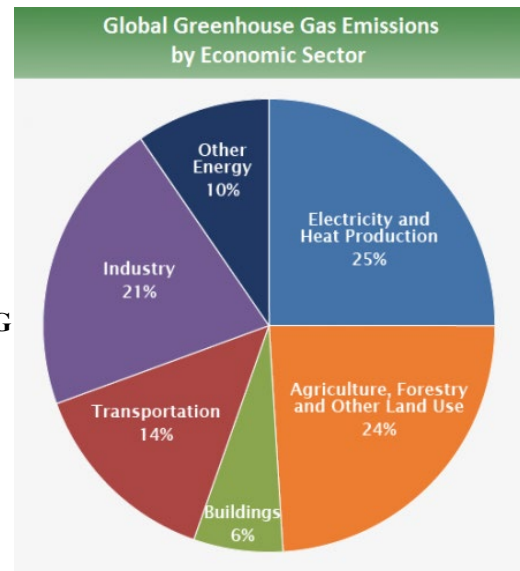
1.1.2 Environmental Impacts of Conventional Grazing

Some studies have revealed that the conventional grazing of domestic livestock has greatly degraded many Australian ecosystems and left a long-lasting scar for decades to come (Lunt, Eldridge, Morgan, & Witt, 2007, p. 401). Impacts of conventional grazing include, but are not limited to: “habitat loss, surface soil loss, salinity, and soil and water quality issues” (Freilich, Emlen, Duda, Freeman, & Cafaro, 2003, p. 760). Poor soil health leads to erosion and leaves waterways susceptible to erosion in riparian zones, which contributes to an excess of sediment deposition that prove damaging to areas like the Great Barrier Reef (World Wildlife Fund, 2018, para. 2).

Globally, the grasslands that livestock graze on constitute 6.2 billion hectares; within Australia grassland covers 60% of total land mass, mostly dominated by livestock grazing (Earl, 2019, para. 4). Due to poor management most of the land is now considered degraded and in unfavorable growing conditions.

Moreover, it is estimated that Agriculture and Forestry comprise almost 25% of total greenhouse gas emissions (see Figure 1), with livestock grazing making up a significant portion (FAO, 2014, p. 22). Allowing conventional grazing to go unchecked would pose catastrophic consequences. For these reasons, alternative practices are gaining ground as a way of mitigating the degradations.

Figure 1. Global GHG Emissions by Sector



Conventional Agriculture and Forestry make up almost 25% of GHG emissions, with grazing contributing a fair amount towards the statistic.

Source: *Climate Change 2014 Mitigation of Climate Change*, 2014, Cambridge University Press, New York, NY, 2014

1.1.3 Regenerative Agriculture

1.1.3.1 Defining Regenerative Agriculture

They are many components that go into the conceptual foundation that creates RAg. Essentially and simplified, RAg aims to continue farming, but do so in a fashion that improves or restore soil health (Serle, 2017, p. iii). In turn, with the improvement and restoration of soils the water quality, vegetation health, land-productivity, resiliency, biodiversity, and economic security of the farmers will improve as well (Rhodes, 2017, p. 80). It is a “holistic land management practice that leverages the power of photosynthesis in plants to close the carbon cycle, and build soil health, crop resilience and nutrient density” (Regeneration International, 2019, para. 3). Gabe Brown notes that regenerative agriculture is “one of observation” where the farmer must be “adaptive” and listen to what the ecosystem is telling them (Brown, 2018, para. 9). A regenerative system as a whole aims to minimize external inputs and external impacts that prove detrimental and degrading to the health of an ecosystem (Pearson, 2007, p. 409).

The main focus is on soils, and as Charles E. Kellogg puts it, “...all life depends on the soil, there can be no life without soil and no soil without life; they have evolved together”

(Kellogg, 1938, p. 863). Yet the scope of the soil work intends to reach a multitude of other fields. *See section 1.1.4 for further detail on soil health.*

1.1.3.2 History of Regenerative Agriculture

Prior to the 1980s scientists and farmers had discussed soil-health focused strategies, but the field and philosophy of RAg had not yet taken form. Robert Rodale is given credit for the term “regenerative agriculture” as he used it in his writing and speeches on American agriculture in the late 1980s (Rodale Institute, 2019, para. 1). However, it didn’t pick up much attention outside of academic literature until the 1990s. The 1990s witnessed a surge in RA practitioners, mostly with the realm of Permaculture (Haggard, 2016, p. xxix). As climate extremes became more frequent and more small farmers were at threat, RAg’s popularity has risen greatly over the past decade, but still is dominated by agro-industrial “conventional” practices. Charles Massy’s 2017 publication, *Call of the Reed Warbler: A New Agriculture, a New Earth*, gained recognition as pivotal point in the RAg movement. He speaks from personal experiences from his own transition into the field, and sheds light on how RAg has the potential to “save” the planet. The book has catapulted RAg into more conversations on food sustainability and has drawn more farmers from across the globe to join the movement (Chenery, 2017, para. 3).

Despite the term “regenerative agriculture” being a fairly new term in the sphere of agriculture, the principles and conceptual foundations are much older. Livestock have been utilized in holistic farming systems for 11,000 years beginning with goats and sheep (Chessa et al., 2009, p. 532). Cattle have been a domesticated part of the system for 10,000 years (McTavish, E., Decker, J., Schnabel, R., Taylor, J., & Hillis, D., 2013, p. 1398). In fact, according to Christine Jones:

“Ruminants including buffalo, goats, wild sheep, camels, giraffes, reindeer, caribou, antelopes and bison existed in greater numbers prior to the Industrial Revolution than are present today. There would have been an overwhelming accumulation of methane in the atmosphere had not sources and sinks been able to cancel each other over past millennia” (Jones, 2010, p. 5).

The term “conventional” and “traditional” describe agricultural practices that didn’t begin till the mid 20th century (Mead, 2006, p. 26).

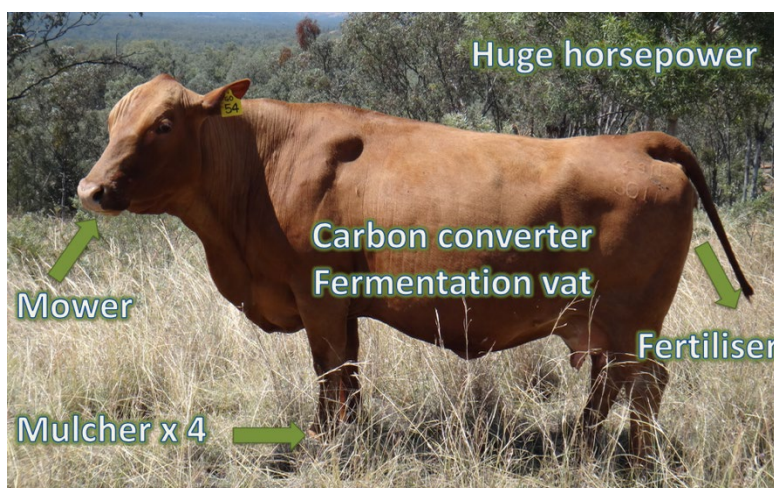
1.1.3.3 Regenerative Grazing Principles

“Grazing livestock are the most powerful tool we have available to regenerate land” (see Figure 2) states acclaimed soil scientist and farmer Judi Earl (Earl, 2019, para. 1). Notable rangeland expert and father of contemporary rotational cell grazing, Allan Savory, argues that using a balanced and moving mob of livestock to “mimic” nature can heal the

environment, and that only livestock can heal desertification (Savory, 2013). Livestock, predominantly cattle and cows have the unique ability, under proper and holistically managed systems, to recharge soils (Savory, 2013). Proper management requires adherence to a set of principles that view the system at hand in a holistic manner. One group (Resource Consulting Services, 2019, para. 8) has distilled Dr. Terry McCosker’s first iteration of grazing principles (McCosker, 1991) from his Churchill Fellowship study in 1991 as:

1. Plan, monitor and manage your grazing activities
2. Give plants adequate rest to recover after grazing
3. Match your stocking rate to available carrying capacity
4. Manage livestock effectively for optimal performance
5. Use animal density as a toll for change
6. Manage for diversity of plants, animals and microbiology life

Figure 2. Powers of Cattle in Regenerative Agriculture



Cattle are naturally equipped with many of the functions contemporary machinery perform

Source: *Grazing for Soil Health Workshop*, by Judi Earl, 2019, reprinted with permission

1.1.4 Soil Health

As mentioned in previous sections, RAg places a large emphasis on soil health, as “regenerative farmers believe that soil health, environmental health, and human health are inextricably linked” (Densham, 2019, p. 9). If a healthy soil is in place than soil fertility, texture, water retention, and food for tiny life forms exist (Densham, 2019, p. 9). In times of drought and unpredictable weather, carrying capacity and storage of water is essential and builds resiliency into farms (Brown, 2018, para. 17). Healthy soils have increased soil carbon levels as they are one of the top terrestrial sinks the world has for sequestering carbon. Grazing lands are estimated to account for one fourth of potential carbon sequestration in

world soils (Follett & Reed, 2010, p. 4). According to a 2017 Food and Agriculture Organization of the United Nations report:

“Grazing has a number of ecological functions and roles, including biomass removal that fosters regrowth by preventing accumulation of dead material, prevention of wild fires, regulation of hydrology and water quality by producing diverse landscapes, conservation of rich grasslands biodiversity and pollinators, dispersal of seeds through ingestion and release in dung, but also of organic matter and nutrients. Grasslands are estimated to contain globally 343 billion tonnes of carbon, nearly 50% more than is stored in forests worldwide” (FAO, 2017, p. 5).

This transition into making soils a net sink opposed to a net source of carbon begins with weaning off of the collective \$100 billion annual spending on synthetic nitrogen fertilizers (Jones, 2015, p. 4). Soils’ carbon sequestering abilities have long been overlooked because studies were performed on already poor soils with a lack of a healthy and biologically active fungi network (Jones, 2015, p. 3).

Increasing soil carbon levels has many benefits that follow:

- Significant financial burden lifted off farmers as they no longer have to pay the burdening prices for synthetic fertilizers, pesticides, herbicides, etc. (see Figure 3) (Jones, 2015, p. 4)
- Increased nutrient density in foods, benefitting the consumers of the crop (Densham, 2019, p. 9)
- Increasing biodiversity; both with microbial and insect life within soil as well as with larger fauna (Earl, 2019)
- Improved productivity of land; RAg grazing operations reveal healthier stock levels (Earl, 2019)
- Financial and food security for farmers in times of unpredictable climatic patterns (Jones, 2015, p. 4)
- Reduces dependency on agricultural corporations and keeps money in local economies (Massy, 2019, p. 28)
- Sequestering of both CO₂ and CH₄ (methane), thereby reversing the emissions of agriculture and returning it to soils to help the cycle continue (Wang et al., 2014, para. 1)
- One of the many solutions, argued to be the best, to reverse anthropogenic climate change
 - *“It would require only a half percent in soil carbon on 2 percent of our agricultural land to sequester all of Australia’s CO₂ emissions”* (Jones, 2015, p. 9).

Along these lines, proper livestock grazing management offers a multitude of interconnected and promising solutions to alleviate many of our pressing issues the world faces today. Regenerative grazing creates a *sustainable future* for agriculture and the overall health of the planet.

Figure 3. Dung Beetle activity



Dung Beetles integrate nutrients back into soil and naturally fertilizer crops

1.1.5 Importance to and Defining Sustainability

Sustainability does not have one objective definition, it varies between who you ask and in what context. The idea of sustainability at-large is defined by the UN World Commission on Environment and Development as follows: “sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (Bruntland Commission, 1987, p. 427). Thus, at the core of sustainability is meeting needs of the present AND future generations; intra- and intergenerational equity. Withal, this definition implies that development is necessary for sustaining life, which is debatable, but this project does not aim to get involved with that discussion.

Sustainability in the context of livestock grazing and this study aims to continue to support food production that meet the demands of the local consumers, but to support and produce the food in a way that maintains a healthy and natural ecosystem, or improves a degraded one, brings together community, and preserves small farmers’ livelihoods indefinitely. In proper and sustainable management of livestock we can avoid the depletion of a critical resource—soil (Heinberg, 2007, para. 24). Further, the substances introduced to the atmosphere via grazing have the potential to be rendered harmless due to sequestering abilities (Heinberg, 2007, para. 47).

With these ideas the hope is to create a sustainable *culture* that exists symbiotically with all forms of life and foster a system of *governance* that follows the movement.

1.1.6 Brunswick Valley Landcare

The BVL is a “volunteer organisation supporting and encouraging effective natural resource management (NRM) in the Byron Shire in northern New South Wales” (Brunswick Valley Landcare, 2019, para. 1). The Brunswick Valley Landcare (see Figure 4) operates under the umbrella Landcare movement of Australia that began in the 1980s (Landcare Australia, 2019, para. 2). The Landcare organisation is a non-profit that works at many different levels and with myriad parties to actively care for the land and water that sustains Australia (Landcare Australia, 2019, para. 1). In the last 11 years, the group has undertaken numerous natural resource management projects and are now interested in looking at RAg in the local grazing community. They’ve held multiple workshops and seminars with veteran RAg grazers to help spread the word on benefits of RAg grazing (Brunswick Valley Landcare, 2015, p. 3).

Figure 4. BVL Logo



The Brunswick Valley Landcare is a volunteer organization operation as a local branch of Landcare Australia

Source: Brunswick Valley Landcare Inc., 2019, retrieved from <http://brunswickvalleylandcare.org.au/>

1.2 Rationale for Research

This research was completed in order to ***“Investigate the benefits of regenerative agriculture (RAg), the reasons why it is being practiced, and to what extent it is being practiced with livestock management in regards to traditional methods in Northern NSW?”***

This research looks at the sustainability of grazing, food systems, soil health, and the mitigation of a number of environmental degradations, making it an interdisciplinary engagement. The study and collection of data prove relevant to the ongoing ecological debates surrounding the livestock grazing arena. This research emphasizes and looks closely at regenerative agriculture as a viable alternative to conventional grazing. Many environmentalists have historically cited the detrimental costs of livestock, yet point to the conventional tactics practiced. This lens on alternative grazing intends to exemplify that

regenerative grazing not only can reverse this supposed trend, but also improve and perpetually sustain our existing environment, local economy, and the well-being of humanity.

The results from the study will be put to immediate use with the BVL, as they would like the data for future seminars to the locale and would like to take bits and pieces of my findings to potentially incorporate into their newsletters. Broader than reaching the Brunswick Valley area in seminar rooms, the study results will hopefully exemplify the benefits of RAg and convince more farmers to join. The more farms join on the more it will have a “domino effect.” A domino-effect would then lead to a more holistic, regenerative, and sustainable future for our planet and all life that call it their home.

2. Methods & Ethics

2.1 Geography

I chose to carry out this study in the Northern parts of New South Wales. The study was mostly performed within the Northern Rivers region. However, a visit to a farmer near Inverell in the Northern Tablelands region, as well as some questionnaire responses from other locales in greater Northern NSW area expanded the study area. The grazers in the Northern Rivers region, while still experiencing the impacts of recent drought, were not nearly as dry as the Northern Tablelands area.

2.1.1 Reasoning for Geographical Selection

The Northern Rivers area is and has been an area where livestock has been a major agricultural sector and is important to the local economy. Visibly, travelling around the area, I was observant of the significant number of cattle, sheep, goats, and chickens that dotted the landscape. These both were major components in my choice to look into this area. However, I also chose this area of study because: 1) the Brunswick Valley Landcare expressed interest in getting a better grasp on regenerative grazing in the area, 2) the BVL introduced me to a few grazers and I quickly saw the potential of a larger network unfolding, 3) many grazers and farmers in the area are transitioning to more regenerative approaches, and 4) I was able to visit farmers without considerable distance from my home location.

2.2 Participants Involved in Study

I chose to engage with livestock grazers due to my prior work done in the United States with cattle ranchers in the Rocky Mountain region. Although the exposure at home was minimal and more human-geography focused, I felt as though my previous interactions with grazers would prove beneficial in carrying out the study. All of the grazers involved in the Australian study were practicing some forms of , or in some stage of transitioning into, a regenerative agriculture system. There was no calculated measure in how or who I was involving in the study. I simply took the chance to include anyone and everyone that was willing to participate and to some degree practicing regenerative grazing.

2.3 Time Frame of Data Collection

All of the data collected fell into a four-week window, between the dates of April 5th and May 4th of 2019. During this time, while still below average rainfall for the year, the Northern Rivers region was the recipient of generous precipitation, effectively removing them from

drought-status. However, the Northern Tablelands is still very much parched by the lack of rainfall.

2.4 Techniques Employed in Data Collection

I chose to gather data by way of background research, a survey/questionnaire (see Appendix B), formal and informal interviews, and some field observations. The questionnaire was sent out and delivered via email using a Microsoft word file and/or social media (Facebook and Instagram) using the SurveyMonkey service, and proved to be the most effective in gathering the greatest volume of data. The responses to the questionnaires were then compiled into a singular “master sheet” where each question was followed by all the answers corresponding to the question posed.

Interviews were carried out on the actual properties of the farmers. The one “formal” interview was conducted indoors and was recorded using an application on my smartphone. Informal interviews took the form of a casual Q and A with the farmers as we walked or drove through the paddocks. Notes from these interactions were jotted down on a pocket notepad and expounded on upon getting back to my laptop later in the day.

The informal interviews occurred concurrently with the field observations. Observations were also noted in the notepad as I moved through the paddocks, however with being new to the field my observations were typically precluded by an inquiring question on what I was seeing. Upon receiving the answers, I was then able to draw a clearer picture on what I was seeing. Moving forward I was then equipped with the knowledge to make observations more independently. Observation notes were supplemented with pictures and videos taken with my mobile smartphone.

2.4.1 Reasons for Selecting Data Collection Techniques

Collecting background research was vital to my study project. Reading through available literature on regenerative grazing and soil health formed a sturdy foundation to move into the field. Background research was carried out *throughout the entirety* of the four-week period as I was sent material and suggested to consult various journals, interviews, newsletters and articles from helpful and enthusiastic participants. In turn, this supplemented my field data with new ideas as well as solidified notes and observations. Much of the material consulted was literature produced by experts that influenced and led to the conversions of the farmers to be regenerative.

Initially, my plan was to do only interviews and field observations. I quickly realized that this would prove difficult for harvesting adequate data. From early on I observed that

logistically getting out to my desired number of grazers would be tough, given that schedules can be busy and the Easter holiday was wedged in the middle of the study period. Thus I transformed the interview into a questionnaire to be sent out electronically to potential participants. *I choose the term questionnaire, opposed to survey, because none of the questions were multiple-choice or closed-ended.* Instead, they allowed for more open-ended responses and granted freedom in how participants chose to respond. It was in this way that I could integrate the responses more smoothly with interviews, creating a tandem of data that would lend itself to a qualitative analysis.

The initial desire to engage and focus in on interviews was that it would allow for more intimate and in-depth data collection. It was my hopes that the interviews would grant the ability to go off on tangents with the interviewees and open up new data pathways that were outside of the structured question framework. Although only one formal interview took place, both the formal and informal interactions did certainly prove to be more personal and detailed, with delightful tangents in between questions.

Observations were chosen as they would allow me to see the differences in regenerative and sustainable grazing systems versus those that adhered to conventional, industrial strategies. There was a learning curve in the first few visits, but I felt more comfortable with my abilities to note what I saw as the study progressed. As much as interviews and questionnaires provide useful and quality information, I knew that getting out into the paddocks would bring another dimension to not only to my personal experience, but to the study as well. Getting out and involving my senses—sight, smell, touch—brought life and meaning to the words compiled.

2.5 Analyzing of Data

Data collected was entered into a master sheet with questionnaire responses constituting most of the space, and observations and transcribed interviews coming below. In looking at the data, I was keen to find out the number of times participants mentioned certain principles or strategies they were applying in their respective grazing/farming operations. In all questions I was looking to see the general frequency of certain answers, whether participants were alluding to them or explicitly mentioning similar responses. The data was not analyzed in a deeply statistical manner, as I concluded that the lacking volume, due to time constraints, of responses deemed this approach inappropriate. Instead I searched for themes of answers, and analyzed them accordingly. The thematic approach proved more beneficial for my own understanding of the data, but also I believe for the final product of the study—the report.

Due to the nature of leaving the questionnaire open-ended, participants were not cornered into responding a certain way. In this light, language used and the nature of responses varied. With careful discretion, answers were interpreted with the language used to place responses in categories for the limited statistical analysis that did take place.

2.6 Limitations and Shortcoming of Data

The biggest limitation of gathering data was time. The four-week data collection period proved to be rather hindering in establishing a strong network of contacts and participants. It likely would've been more successful and helpful not only in terms of volume and quantity of data but in the detail of data as well. Establishing relationships and building trust are paramount to many research endeavors and the brief face-to-face interactions, or simply electronic interaction, was not sufficient time to cross this bridge with some participants. Relationship and trust-forming rolls over into the community as well, not just individuals.

Alteration of the questionnaire structure may have proven to pool in more responses. Possibly beginning with an introductory questionnaire that took less time to complete and then moving into an optional, more in-depth set of questions thereafter would have yielded more responses.

Social media proved somewhat useful, but created obstacles as well. I made the mistake of not looking towards social media as a source of data collection until the last week. Social media was not on my radar, as I was unaware of the regenerative agriculture groups on Facebook and other platforms. In retrospect, I would have posted my questionnaire the first week—that would certainly have boosted the volume of responses. Moreover, after receiving advice, I was suggested to supplement my word file with an alternative SurveyMonkey link in the event people did not want to download and upload the questionnaire. This advice proved beneficial as it was a simpler process and more accessible for participants to fill out. These were both novice mistakes.

Some sampling bias with the questionnaire also surfaced during the study period. All participants involved were known to me as actively practicing regenerative or sustainable grazing strategies. None were consulted from the other end of the spectrum, which is the “conventional” side. The aim of the study was not to look into these type of grazers, but nonetheless the focus on solely regenerative grazers does not fully depict the accurate nature of Northern New South Wales grazing sector. Questionnaire deliveries and organizing field visits were exclusively done via email, mobile phone, and social media. This neglects the potential to involve those that may not have access to computers, or do not have email

accounts. Moreover, many of the participants were either members of regenerative agriculture groups (i.e. Regenerative Agriculture Group on Facebook) or I had the opportunity to meet at the 2019 Soilcare Workshop “Grazing for Soil Health” in Grafton, NSW. Again, this points to the bias in only consulting grazers and farmers already taking part in regenerative grazing or with a vested interest in starting.

2.7 Participants Involved in Questionnaire and Interviews

Formal Interviews: 1

- **Mike McCosker**, beef cattle farmer, Wallangra, NSW

Informal Interviews/Farm Visits: 7

- **Brian Latham**, beef cattle farmer, Mullumbimby, NSW
- **Kieran Livermore**, buffalo dairy and meat farmer, Binna Burra, NSW
- **Tony Margan**, beef cattle farmer, Monaltrie, NSW
- **Mike McCosker**, beef cattle farmer, Wallangra, NSW
- **The Mulder Family**, beef cattle and sheep farmers, Keith Hall, NSW
- **John Scarrabelotti**, Blue Trading PTY LTD, beef cattle farmer, Fernside, NSW
- **David & Josh Wilson**, dairy farmers, Bexhill, NSW

Electronic Questionnaire:

- Sent directly to—30 contacts
 - 8 responses
 - response rate= 26.7%
- Groups shared with on Facebook—2 (*Regenerative Agriculture Group and Northern Rivers Young Farmers Alliance*)
 - 8 responses
 - unable to calculate response rate with unknown variable of how many viewed the questionnaire’s posting (*see Appendix C*)

2.8 Ethics

Prior to engaging and starting on this study I received ethics approval from the Local Review Board (LRB) on April 3rd, 2019 with no conditions imposed. All participants engaging in the questionnaire and interviews gave written consent for responses. While out in the field on farm visits, consent to note observations or take photos was asked in person and granted verbally. In one instance a participant granted consent after reviewing material with the potential to include in report; this was obtained in written form a few days after the visit. Aside from this instance, no ethical issues surfaced, and the process of obtaining or not obtaining consent ran rather smoothly.

3. Results and Discussion

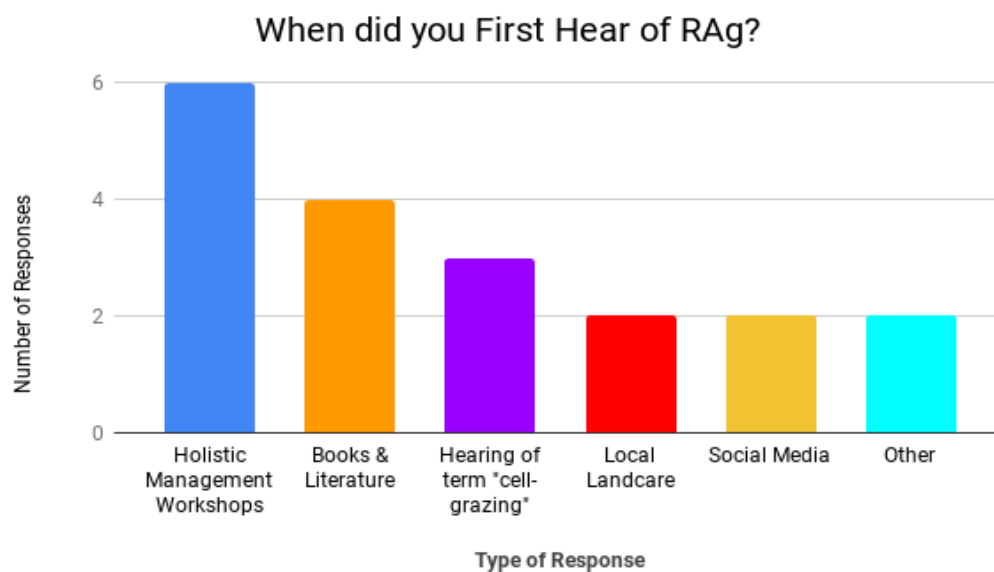
3.1 Emergent Themes

Relying most heavily on questionnaire responses, with supplementation of interviews and observations, six themes prevailed: 1) influences and motivations, 2) measures and strategies implemented, 3) results and outcomes, 4) initial obstacles and future plans, 5) ideas on spreading, and 6) the extent of RAg in NSW.

3.2 Influences and Motivations to Move into RAg

When asked “when did you first hear of regenerative agriculture?” most responses were able to be placed within categories for statistical display (see Figure 5). Of all questions asked and themes emerged this was best to look at quantitatively due to its lack of room to expound more interpretively. Nearly all participants, nay for a few, *first heard of RAg within the last decade*.

Figure 5. Graphical Display of Initial Hearing of RAg



Responses varied, but most heard through the network of HM

The HM workshops, literature, and term “cell-grazing” all fall under the umbrella of Holistic Management. Many attribute their influence and motivation to transition into RAg systems as Allan Savory, the founder of HM (Inside Outside Management, 2019, para. 3). Essentially, HM is a decision-making model that ensures our decisions meet the triple bottom line of environmental, social, and economic sustainability (Holistic Management Educators, 2019, para. 4). Livestock plays a large role within HM, and the framework as a whole aims to not only sustain, but regenerate degraded land. RAg and HM are not mutually exclusive, but differ in some regards.

Aside from influence from Allan Savory, there were various responses in what ultimately led farmers to transform their systems to RAg-based, or if new to farming—start with RAg to begin with. Those various responses included:

- Observing poor conditions with the farm (i.e., runoff, lack of feed)
- Decline in health of stock
- Economic burden of continued and increased use of NPK inputs
- Knowledge of environmental impacts of NPK inputs
- Weather (i.e., drought)
- Observations of other farms employing RAg measures
- Advice and workshops from experts (as mentioned previously)

3.2.1 Discussion on Influences and Motivations

In light of these responses pooled in from questionnaire results and interviews, it is evident that farmers are experiencing threatening problems and are seeking alternatives to sustain a healthy livelihood. There were experiencing problems farming within the conventional framework, suggestive that the “mainstream” model is not the best system. Thus, the search for alternative strategies, such as RAg is taking ground. Most motivations were not sought out to simply try something new, but were sought out because the way they were taught was doing more harm than good.

The varied responses are also related in some way or another. Historically poorly managed grazing paddocks in tandem with unfavorable weather led to a lack of feed and groundcover. The lack of feed led to poor stock health. The lack of groundcover led to poor soil-water retention and hence the run-off (Jones, 2015, p. 8). Conventional agronomists and advice suggested more NPK to compensate. This led to more money being put into production out of the farmers’ pockets; this is what some coin the “more-on” approach as a play on words. Moreover, the increased inputs led to the further breakdown of the soil biology and increased dependence on them (Rodale Institute, 2014, p. 6).

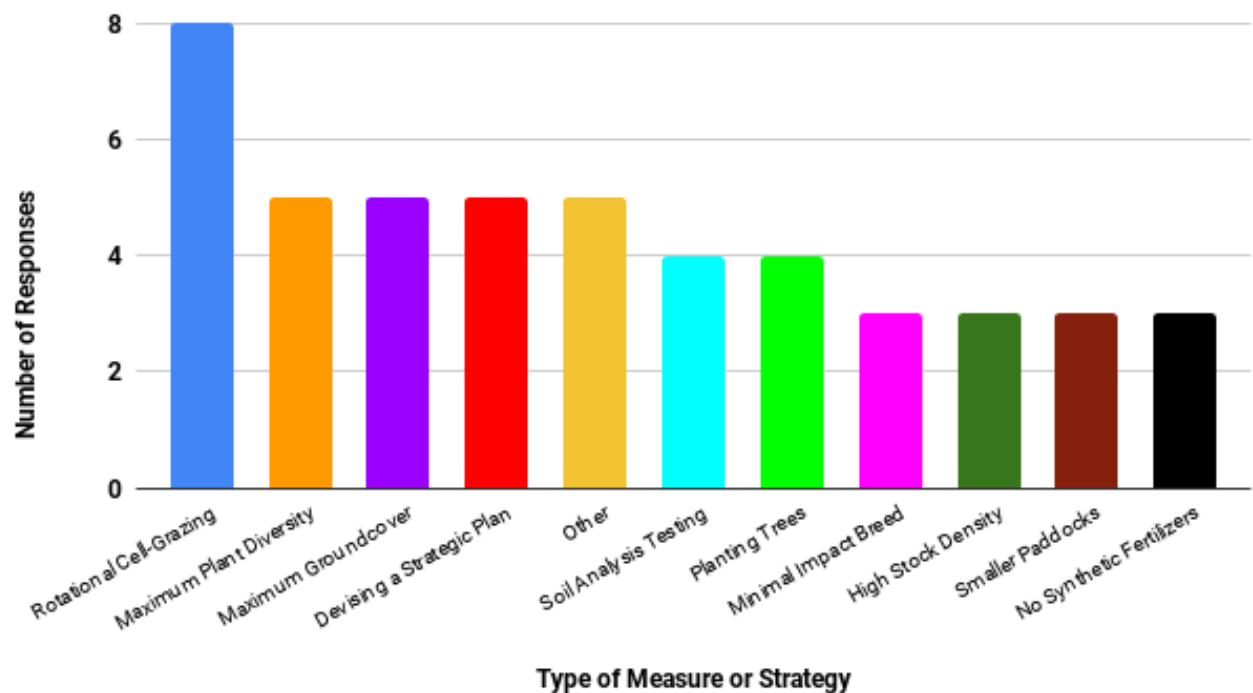
In looking at the data collected within this theme, it is clear that conventional farming and grazing tactics do more damage than benefit on some properties. This study is far too small to make a broader claim that extends to agriculture universally, but the motivations to seek the uptake of RAg can be extrapolated. Furthermore, the recent trend in the uptake, as most caught wind of RAg within the last decade, hints that the movement is on the rise.

3.3 RAg Measures and Strategies Implemented

This emergent theme contained the highest volume of responses across the board. The strategies and measures implemented covered a wide range (see Figure 6), but all fell within principles of RAg outlined in studies and literature. It should be noted that grazers responded that they are implementing *a collection* of strategies. Also, from personal knowledge, many of the grazers are implementing measures that they did not explicitly mention in the questionnaire. For example, almost none of the farmers use synthetic fertilizers, pesticides, and herbicides. However, without direct quantitative evidence the statistical analysis is unable to broadcast such data.

Figure 6. Graphical Display of Strategies Installed

Measures & Strategies Practiced by Regenerative Grazers



Strategies were installed and stacked simultaneously within paddocks

3.3.1 Discussion on RAg Measures and Strategies Implemented

Rotational cell-grazing is the subdivision of larger paddocks into smaller cells. The mob of livestock is then rotated through the cells to allow ample recovery and growth periods for the grass (McCosker, 1991). Maximizing plant and vegetation (trees) diversity and avoiding conventional mono-cultures fosters a healthier soil biology and microbial network. Groundcover increases water retention and organic matter levels (see Figure 7) (Milner-Smyth, 2014, p. 4). All of these and other responses are working as a functioning team to

improve the health of the soil which then leads to healthier and reliable feed amounts. With this, grazers secure the productivity and economic support from their livestock while simultaneously restoring degraded ecosystems for a more regenerative future. No one measure or strategy is the solution, instead it is employing many, if not all, of these principles at once. If one claims to be “regenerative” and is not integrating most of these strategies, their credibility is in question. Understandably, in initial transition phases grazers will be progressing in the process of stacking these regenerative enterprises.

Figure 7. Paddock Cover and Diversity



A handful of grass and legume species are visible in this 100% covered paddock radiating a lush green on Kieran Livermore’s buffalo dairy farm.

These results were expected to some degree as prior background research introduced the idea that measures and strategies of RAg grazing cannot be implemented in isolation. Despite expectations, the pattern observed with grazers stacking these strategies in the paddocks was still wonderful to observe. The diligence and discipline of the grazers is commendable, as they stray from the “norm” of what grazing “should” be.

3.4 Results and Outcomes of Measures and Strategies Implemented

Every single questionnaire response returned back or conversational interaction has experienced positive feedback with their paddocks since implementing the measures and strategies listed above. Those results and experiences include:

- *Soil moisture retention increased*
- *Noticeably better cattle health*
- *Vastly improved groundcover*
- *Less undesirable weeds*

- *Improving root mass*
- *More worms, dung beetles, insect life within soil profile*
- *Increase in carbon and soil organic matter levels (done by soil analysis testing)*
- *An overall improvement in soil health*

Moreover, while the recent dry period indeed hit the entire area hard, RAg grazers focused on soil health claimed they:

- *Fared better in comparison to conventional grazers*
- *Kept more of their stock (avoided destocking significantly)*
- *Had quicker and more positive response to rainfall events*
- *Maintained healthier stock*
- *Spent much less money on bringing in additional feed, or brought none in at all*

With no access to concrete statistical information, I took the grazers word for their statements. Responses on positive feedback on soil health were however supplemented with field observations. Bexhill dairy farmers, David and Josh Wilson, reported having their paddocks' carbon levels below 2%. Now, after testing they have improved their property to have their lowest paddock at 4% and their highest at 7%. Their soil was noticeably darker in organic matter, smelled full of microbial life, and felt healthy to the touch (see Figures 8 & 9). Mullumbimby cattle farmer, Brian Latham, report having a soil carbon increase from 3-12% in his soil!

Figure 8. Removing a block of soil



Josh Wilson and I removed a block of soil from a paddock with 7% soil carbon levels

Figure 9. Healthy soil



The dark humus color and deep root mass (difficult to see) are signs of a healthy soil

3.4.1 Discussion on Results and Outcomes of Strategies and Measures

Again, it was expected to see some positive results, or at least hoped for, based on studies consulted prior to embarking on this project. Increases in soil carbon, organic matter, and soil health were seen across the board. These patterns emerged due to the principles and strategies applied—no synthetics used, rotational grazing, plant diversity, etc. What is striking though is the experiences of the grazers throughout the drought. Much of the RAg literature touts the benefits of resilience through increasing unpredictability of weather and climate (Rodale Institute, 2014, p. 3), and it was certainly on display with these livestock grazers. With experiences such as these it's difficult to grasp why more conventional grazers are not jumping on the movement. Nonetheless, with the evidence collected during this study period, albeit small in time duration, it is clear that RAg grazing benefits and improves soil health, carbon, and organic matter levels. Hence it is clear that grazers can wean their operations off dependence on the chemical-farming industry and move them into a system that is more holistic and sustainable, with promising results that meet the triple-bottom-line.

3.5 Initial Obstacles and Future Plans

The grazers that have experienced positive results and outcomes did also experience initial obstacles in transitioning to a regenerative and holistic system. The largest being the initial financial burden in making the switch. Others noted the “patience” and “waiting” required, difficulty in changing their “way of thinking”, and the lack of support from their conventional counterparts.

They followed their responses on challenges and difficulties with statements alluding or explicitly mentioning that it is “a work in progress.” They have future plans such as: increasing their dung beetle activity, making more cells in the paddocks, adding more compost, amongst others.

3.5.1 Discussion on Initial Obstacles and Future Plans

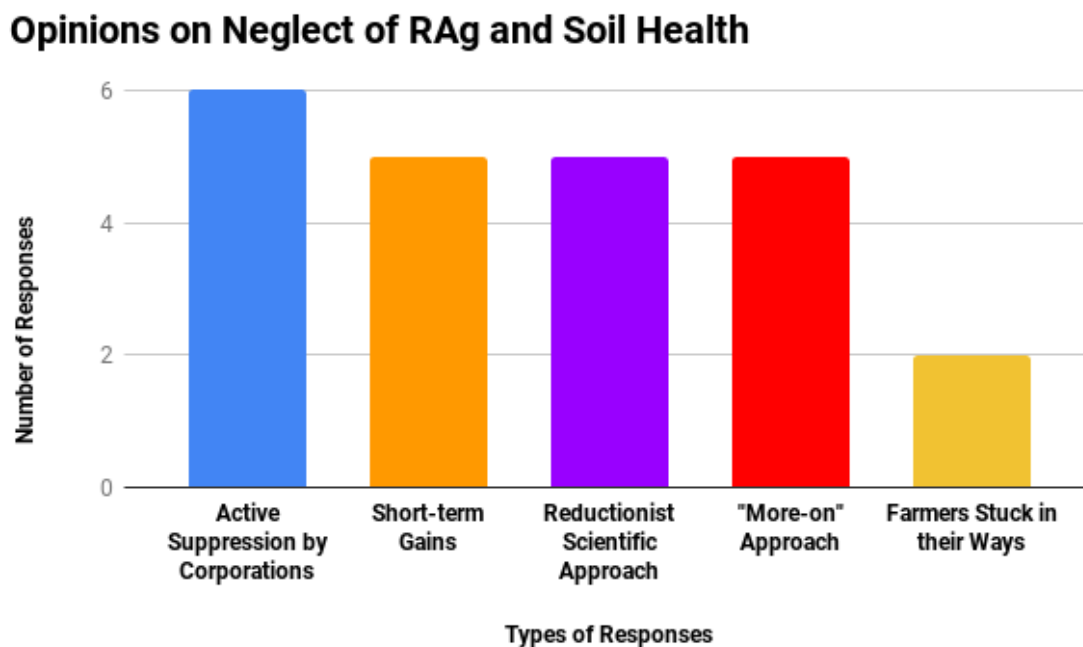
Analogizing the soils and grazing paddocks to a drug addiction is helpful in discussing and understanding the transition to a regenerative system. In quitting and recovery periods from a long duration of NPK and chemical inputs, grazers and farmers would've experienced initial backlash in productivity. Moving away from any dependency is difficult and requires new strategies to be undertaken and willpower to be on display. In the end, after these hurdles and difficulties in breaking free from a dependency on unnatural substances, the overall health is vastly improved.

In retrospect, this should've been expected on my behalf, but with all the studies I had consulted on the positive, few touched on the obstacles one may face. It is indicative of the long-term thinking approach that RAg farmers and grazers take. While initial challenges may be experienced, the end result is a much healthier and profitable working landscape. Moreover, the process of transitioning to being regenerative is one that really never ends. Gabe Brown (Brown, 2018, para. 9) and others are constantly observing their stock, weather, soil, and other factors and adjusting their game plan from those judgements. It is a constant evolution that creates a more intimate connection with surroundings, opposed to an agronomist simply advising a grazer to add more of a collection of different chemical inputs. In this way, it can be argued or extrapolated from this study that regenerative grazers are much more in-tune with their "sense of place."

3.6 Spreading RAg Movement

Prior to moving into what grazers see as the best avenues to pursue in order to spread awareness and gather more supporters and practitioners, reasons why RAg and soil health have been neglected must first be displayed. Figure 10 displays the opinions of those participating in the study as to why they believe it has been neglected.

Figure 10. Graphical Display of Ways Soil Health has been Neglected



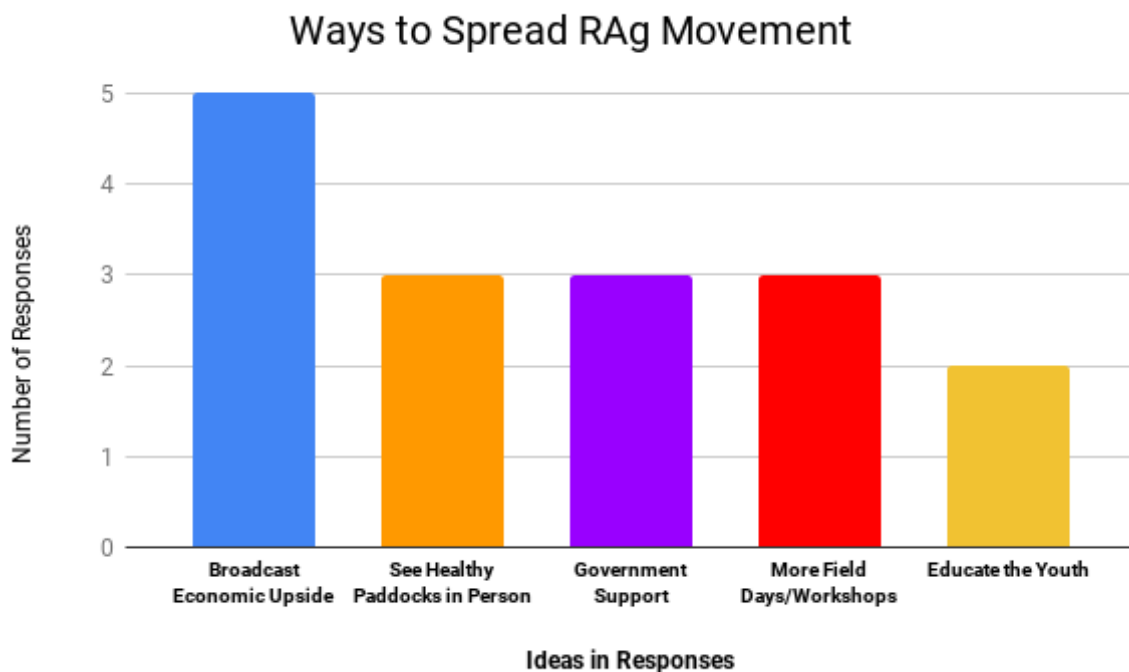
Contemporary suppression by corporations and Western science prevailed

While all answers are fairly close in number, it was evident in the formal and informal interviews and visits with farmers that active suppression by corporations and a reductionist

scientific approach stood out. Suppression by corporations allows them to manipulate the food system in a fashion that favors their gain. They retaliate against organic, regenerative, and alternative methods in attempts to silence them, and instead move with the “conventional” methods that put money in their pockets (FarmAid, 2019, para. 5). In reductionist science, interactions and entities are distilled down into separate parts, as opposed to a complex, holistic, interdependent system. Judi Earl recalls university experiences where lecturers cast RAg and HM as a fad, while continuing to teach from a reductionist point of view. Dairy farmer David Wilson mentioned that the reductionist, “more-on” approach (more NPK input) is still being taught as best practice at the university level. Wallangra cattle farmer, Mike McCosker, owes the university lecturing to the defunding of independent research by the Australian Government. Instead, research dollars were being funneled via Agro-industrial corporations such as Monsanto, who were protecting their interests of profit.

Yet with this neglect many are positive and are actively working to change this situation. Questionnaire responses and conversations opened up for ideas on tactics to employ to spread the RAg movement (see Figure 11).

Figure 11. Thoughts on ways to spread RAg movement



Financial incentives pooled in the highest volume of responses

3.6.1 Discussion on Neglect of RAg and Ways to Spread

Responses and interactions regarding this area of RAg reveal the belief that corporate entities need to disentangle with agriculture and our food systems urgently. The health of our land, nutrition, and local economies are concurrently deteriorating with the financial profiting on behalf of large, multinational, agro-industrial corporations. RAg shows signs of reversing all of those mentioned—restoring the environment to its natural, healthy state, producing food for humans that are not stripped of vital nutrients (Thomas, 2003, p. 81), and weaning reliance on corporations' chemical inputs and product market.

Looking at the recent rise in followers of RAg, our food systems are moving in the right direction. The movement is working; there is some positive signs of encouragement. However, this change is something that requires urgency, with estimates of arable topsoil to grow food to not exist by 2050 (Regeneration International, 2019, para. 3). Thus, the spread and education is vital. Most farmers are concerned with sustaining a livelihood, and often look to short-term economic gains. Yet, in only a few years the economic upside of switching to RAg are shown to astronomically outweigh conventional, especially in the increasing unpredictability of weather. One farmer informed me that he spent \$40,000 total over the last 18 months on bringing in external feed for their more drought-impacted western paddocks. Meanwhile his neighbors allocated \$100,000 a month and opted to buy an additional property for more feed.

Government support for carbon sequestration credits are also a much-touted solution to get more on board, again revealing the unavoidable, enticing lure of dollars. If that is what it takes, then the farmers saw it as a very promising strategy to spread RAg to more people. The tangibility of money alongside the visual observability (see Figure 12) of a healthier paddock may very well get more on board. Further, most mentioned that it would prove unhelpful to point fingers and tell conventional grazer what they're doing wrong. Meet them where they are and use all evidence available to lead them into the *transitioning* process. It does not have to be “cold-turkey” for the NPK-glyphosate-addicted soils, but instead a transition.

Figure 12.
Observability of RAg
vs conventional
methods



The paddock on the left (RAg) has dramatically more groundcover, than that managed conventionally on the right.

Source: Sheldon Frith. (2017, March 15). *Regenerative Agriculture in South Africa*. Retrieved from <http://www.regenerateland.com/organic-agriculture-in-comparison-to-regenerative-agriculture/>

3.7 Community & Extent of RAg within New South Wales

A major aim to this study was to gather a consensus on the extent that RAg is being practiced within NSW, with a focus on the Northern regions. Most responses were one or two words and posed difficulty in assessing much further. However, most responses, when answered, received were:

- “Not really.”
- “Somewhat”
- “Spread out”
- “A movement happening”

Others suggested other areas such as the Atherton Tablelands, Victoria, and South Tablelands as being bigger hotbeds for RAg. Farmer Chris Mulder noted that the farms are scattered, but being an area that embraces a more alternative approach, it is possible that it may be. Soil scientist Judi Earl mentioned that the New England region of NSW was dominant in “terms of adoption of cell grazing/ holistic management”, yet in many cases they have failed to adopt it properly.

Despite Northern NSW not necessarily standing as a “hotspot” for RAg, many have found that joining the movement have tied them closer to their community. Albeit, this community is typically of “like-minded” people as Josh Wilson said in conversation. Nonetheless, 9 of the 16 questionnaires returned all said that joining the RAg movement has fostered a greater sense of community in them. The community-building has been done via Landcare groups, workshops (see Figure 13), social media, and an overall expanding network with others in the field. Withal, one of the founders of Soilcare Inc., dairy farmer David Wilson, expressed experiences of initial ostracism from the conventional dairy arena for his uptake of RAg. This

is not *as* much the case now, but still occurs. Overall, responses reflected a more positive connection to their local community upon moving to RAg.

Figure 13.
Soilcare
workshop in
Grafton, NSW



Workshops, such as this pictured in Grafton put on by Soilcare Inc., is a way some have found helpful in connecting with their community.

3.7.1 Discussion on RAg Extent in NSW

Northern NSW is no exception to the current status of RAg and regenerative grazing worldwide. It is scattered, with no true region able to claim rights to a concrete position as a “hotspot.” There are areas where it is practiced more so than others, but conventional grazing and agriculture tend to still dominant in comparison. Pete Ryan, president of the BVL, put it nicely when describing the RAg movement as “simmering.” It is rising in pockets, but has not reached a point yet in the realm of agriculture to call it thriving or notably popular, such as the organic movement. With this in mind, it is out of this research study’s abilities to make further claims on the regional consensus of RAg in NSW due to the lack of conclusive data. Reasons for conventional agriculture’s dominance is discussed more in detail in section 3.6.1.

Nevertheless, many of the spread-out, “pocketed” practitioners of RAg grazing still find that community-building is underway. This is paramount towards the growth of the movement. Whether it’s a virtual community, such as Facebook groups, or established locally, creating the network to share and spread ideas, as mentioned in section 3.6.1, makes for a stronger backbone to RAg and grazing.

4. Conclusion

4.1 Summary of Findings

The goals of this study were to: investigate the benefits of RAg grazing, discover the reasons why it is being practiced, and examine the extent to which it is being practiced in Northern NSW. Over the course of the month-long data collection period and consultation of background literature portions of the study goal were achieved with more validity than others.

The benefits of RAg grazing and reasons it is being practiced, with evidence in the questionnaire responses, previous academic studies, and farm visits, are myriad. The benefits all follow the improvement of soil health, soil carbon levels, and SOM levels. When the soil health is improved, paddocks are more resilient to climate variability, provide more nutrient dense food supply, increase water retention, sequester GHGs out of the atmosphere, sufficiently feed livestock a happy amount of feed, reduce dependence on chemical inputs—a financial plus for farmers as it relieves the burden of paying for fertilizers, brings back beneficial microbial life to the rhizosphere, and encourages biodiversity of native plants and animals. Results reflect that RAg grazers also feel more in-touch with their local communities and economics. Thus, it can be said that RAg grazing is a sustainable enterprise as it meets the triple-bottom lines of sustainability with the economy, environment, and social components. With future spread of the movement, it is hoped that RAg can establish itself not just as a movement, but as a culture that is sustained as well.

Findings on the extent to which RAg grazing is being practiced in comparison to conventional methods, however, lacks sufficient data within this study to make a claim. RAg is on the rise, but the nature of that question proved too large to tackle in the time allotted.

Evidence of this study suggest that livestock grazing and agriculture at-large should look to RAg as an alternative strategy to contemporary conventional methods. In doing so, the health of the land, health of the animals, and the health of humanity would be in benefit both today and in future generations to come. RAg is in urgent need of reaching a larger following.

4.2 Management Recommendations & Future Directions

While the study did provide valuable takeaways, amendments are needed that would prove for more successful research. Those include: more follow-up posts on social media, providing an introductory questionnaire before sending out the full version, attend more workshops and lectures to network through the community more, and establish relationships

to build trust amongst participants. All of these would benefit with additional time to conduct the study in.

Recommendations for future studies building on the research include: the creation of a network within the Northern Rivers area for more RAg grazers and farmers to connect outside of social media pages, obtaining or conducting soil analysis tests on RAg properties and analyzing, an in-depth comparison of conventional vs regenerative grazing and farming in NSW, or looking at potential avenues to get RAg farmers in more local businesses. Time permitting these would have been valuable additions to the study.

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6. Appendix A

Consent Form to Participate in a Research Study

Title of Study: *Regenerative Agriculture and Livestock Grazing in Northern NSW*

By: Raymond (RJ) Mooney

Introduction and background purpose: see page 1

Information:

- 1) Participants fill out the questionnaire, engage in interview, or allow for tour of property.
- 2) The information gained from this questionnaire, observation exercise, or interview will be incorporated into a written report that will be submitted for an undergraduate class and will be included in the program library and *may* possibly be published on the internet. It will also form part of a short oral presentation that I will make to my class. The Brunswick Valley Landcare *may* also use the information in future workshops and/or seminars.

Risks: Studies that involve only surveys/interviews may not pose obvious physical risks to subjects, but may pose potential concerns over emotional distress—embarrassment or discomfort when answering questions, breach of confidentiality, legal, financial, or employment risks. Confidentiality, if subject chooses to remain anonymous, will be *strictly* followed to ensure these are avoided.

Benefits: Participation in this study may not benefit the respondent directly. However, the knowledge that we obtain from your participation, and the participation of other volunteers, may help us better understand regenerative agriculture and grazing. Spreading awareness, creating broader networks, and displaying the benefits of RA are my speculated benefits in conducting this study.

Confidentiality: You have the option of either remaining anonymous or of having your contribution to the study acknowledged. If you choose to remain anonymous, the information in the study records will be kept strictly confidential and will be available only to myself. No reference will be made in oral or written reports which could link you to the study. If you would like your responses to be included, but your name not to be, please note that in the appropriate lines of the questionnaire form.

Participation: Your participation in this study is voluntary; you may decline to participate. If you decide to participate, you may withdraw from the study at any time. You may also decline to answer any specific question. If you withdraw from the study at any time the information already obtained from you will be destroyed.

Sign below if you agree to participate in this research study.

Subject signature: _____ Date: _____

*would you like to remain anonymous? YES or NO (circle one) *

Researcher's signature: _____ Date: _____

7. Appendix B

Questionnaire Questions:

- When did you first hear of regenerative agriculture? Regenerative grazing?
- Who or what was your biggest influence or motivation to get started?
- What types of different measures and strategies have you begun employing to manage the land in a regenerative fashion?
- How have the results fared? (soil health, grass cover, stock health, production, etc.)
- Do you plan to continue as you are now or is there a next phase or stage you'd like to reach?
- What was the transitioning process like to a more regenerative system? Biggest obstacles faced?
- Where do you sell your product? Who is your biggest consumer base?
- What were your experiences in the recent drought like compared to others in the region?
- How has soil health come to encompass so many other benefits? Why do you think it was long overlooked or not given the deserved attention?
- Do you think it is feasible to feed the world's population with grazing and farming strategies that follow RA principles?
- Is the Northern NSW area a hotspot for RA or have you seen other areas of the country grab onto it?
- Ideas to get more grazers and farmers on board in the RA movement?
- Has transitioning to more RA-based grazing and/or farming connected you more with the local community? If so, how?
- Any additional information or contacts you think may be of use to this study:

8. Appendix C

Posted questionnaire to:

- Northern Rivers Young Farmers Alliance (twice posted)
- Regenerative Agriculture Group (twice posted)