Regenerative agriculture – quantifying the cost.

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Introduction

This paper is an examination by Holmes Sackett consultants in response to financial analyses presented in the research report commissioned by the Australian Government's National Environmental Science Program (NESP). The report NESP-EP: FARM PROFITABILITY & BIODIVERSITY Graziers with better profitability, biodiversity and wellbeing (NESP-EP report). Authors of the report are Sue Ogilvy, Mark Gardner, Dr Thilak Mallawaarachchi, Dr Jacki Schirmer, Kimberly Brown, Dr Elizabeth Heagney.

Requests by Holmes Sackett for aggregated data from the study to facilitate this analysis were refused by the lead author. This necessitated the development of the analytical methodology used for the comparative analysis in this report.

This paper will:

1. Provide background and outline definitional criteria for regenerative agriculture
2. Compare profitability between those practicing and those not practicing regenerative agriculture
3. Calculate the financial benefit or cost of regenerative agriculture
4. Discuss the importance of delivering appropriate financial terminology
5. Provide advice to researchers and policy makers on the basis of the findings

The NESP-EP paper contains a disclaimer highlighting the preliminary and provisional nature of the research and conclusions. This disclaimer has not precluded the widespread promotion and distribution of preliminary findings.

Executive summary

Holmes Sackett conducted a thorough and rigorous analysis of a high-profile study, funded by the Australian Government Department of Environment and Energy, on regenerative agricultural production systems and their management. The study is titled "NESP-EP: farm profitability and biodiversity. Graziers with better profitability, biodiversity and wellbeing".

This paper is not a criticism of the philosophy of regenerative agricultural systems, it is an analysis of the financial performance of these systems relative to alternative systems.

The NESP-EP paper focussed on the similarity of profits per dry sheep equivalent (DSE) between two groups of producers but it failed to quantify the differences in production and profitability. The key point of differentiation between the groups of producers in the study was their categorisation as practicing regenerative agriculture or not practicing regenerative agriculture based on definitional criteria. Producers who did not meet the definitional criteria were participants in Holmes Sackett's farm benchmarking data set.

This paper delivers a comparison of profitability and imputed whole farm profit between the group of producers practicing regenerative agriculture, as defined in the NESP-EP paper, and the group of producers not practicing regenerative agriculture. Production and profitability comparisons are important when assessing the financial efficiency of farm resource use.

The analysis shows that, over the decade 2007 to 2016, farms in the Holmes Sackett benchmarking data set with ten consecutive years of data, who managed systems not classified as regenerative agricultural systems, generated operating returns or returns on assets managed (ROAM) of 4.22 percent. This compares with the group of producers practicing regenerative agriculture who returned only 1.66 percent.

The average cost per farm, over the decade studied, of regenerative agriculture when compared to farms employing systems that are not classified as regenerative agriculture, equates to $2.46 million.

The average cumulative whole farm profits (EBIT) generated by the group of producers contributing to the Holmes Sackett benchmarking data were $4,050,776 over the decade. Average farm asset values varied from $7.1 to $11.3 million. Cumulative profits for the regenerative agriculture cohort over the decade, had they been managing the same value of assets as the average of the Holmes Sackett database, would have been $1,586,144.

There appears to be no quantification of any environmental differences (or valuation of such) between the regenerative agriculture cohort and the participants contributing to the Holmes Sackett benchmarking database. This is an area of research that would be highly valued.

1. Provide background and provide definitional criteria for regenerative agriculture

1.1. Defining regenerative agriculture

The characteristics defining regenerative agriculture and the criteria for producer inclusion into the regenerative agriculture cohort, according to the NESP-EP paper, follow. "The NESP-EP sample of participating graziers were drawn from a community who have consciously invested in ecological functions to improve the productive capacity and biodiversity of their natural resource base. They were selected on the basis that they have ceased the practices thought to be threatening to grassy woodlands and native pastures and are using grazing and other practices thought to assist with their conservation and regeneration.

Accordingly, this project describes the population of regenerative graziers (in the grassy woodlands biome) as livestock producers who are maintaining or regenerating many of the ecological characteristics associated with healthy grassy woodlands and derived native pastures. The criteria for inclusion in the project were:

- The properties used in production were observed as part of the recruitment process to demonstrate the characteristics of healthy, sustainable grassy woodlands and native pastures. The property had not been subject to recent (within 10 years) nutrient enrichment.
- The landholder described a long-term low-input, regenerative grazing regime and that their management goals included high levels of landscape function (consistent

with Tongway and Hindley, 2004) and biodiversity. Their practices don't include the activities commonly associated with grazing that are regarded as threats to grassy woodlands (NSW Department of Environment, 2010).
- The farm business has been producing wool and livestock at commercial scale for more than 10 years and was prepared to provide multiple years of detailed financial data." (Ogilvy et al, 2018 pg 18).

Participants contributing to the Holmes Sackett benchmarking database have not been categorised using the same approach. The farming systems and management approach of Holmes Sackett benchmarking participants varies extensively between managers.

Holmes Sackett benchmarking participants in medium to high rainfall zones typically invest in fertiliser (organic and inorganic) and soil ameliorants (lime) to increase pasture production and replace exported nutrients. Many participants use feed-budgets to manage feed surpluses and deficits and to assess the extent to which supplementary feed may be required. Many Holmes Sackett benchmarking participants who choose to use supplementary feed intensively use containment areas to maintain groundcover.

1.2. Methodology in the original report

The financial component of the NESP-EP paper conducted two comparative analyses. One analysis compared the financial performance of a sample of sixteen producers using regenerative agriculture principles against a subset of ABARES farm survey participants meeting specific geographical and enterprise criteria. The farming systems and methods of the cohort of ABARES farm survey participants used for comparative analysis were not articulated however it appears from the data they mainly use conventional farming practices.

The other, separate analysis, compared the financial performance of the same sample of producers using regenerative agriculture principles with producers participating in the Holmes Sackett benchmarking program.

Producers contributing to the Holmes Sackett database represent a bias sample as they are not randomly chosen, rather they make a commercial decision to contribute their farm financial and production data to Holmes Sackett for benchmarking. Typically, they contribute their data to identify opportunities for improvement in profitability.

The NESP-EP paper refers to the different comparison samples, or collective groupings of data, using abbreviations. The sample practicing regenerative agriculture are referred to as the NESP-EP sample, an abbreviation for National Environmental Science Program – Emerging priorities. The sample contributing to the Holmes Sackett farm benchmarking data are referred to as the AgInsights sample.

AgInsights is Holmes Sackett's flagship publication delivering the stories behind the numbers. The sample of participants contributing to the ABARES farm survey data are referred to the ABARES sample. This report will use the same abbreviations for each respective sample. This report will also refer to the NESP-EP sample as the Regenerative agriculture cohort and the AgInsights sample as the Holmes Sackett cohort.

Comparisons of profit per sheep equivalent and whole farm profitability, measured as return on assets managed, were conducted between the NESP-EP and ABARES samples.

Comparisons of profit per dry sheep equivalent were conducted between the NESP-EP and AgInsights sample. Comparisons of whole farm profitability between the NESP-EP and AgInsights sample were not presented in the paper. No explanation was provided for the omission of the comparative analysis in profitability between NESP-EP and AgInsights samples.

1.3 Profit is not a measure of efficiency – profitability is.

The authors of the NESP-EP paper used profit per DSE as their key financial metric for comparison. This measure, in the absence of other important information, provides limited information about livestock business performance and efficiency.

The same level of profit per DSE between businesses can deliver very different levels of whole farm profit and profitability between the same businesses due largely to differences in production per hectare.

Profit is an absolute dollar figure while profitability is a measure of resource efficiency. At a whole farm level, profitability, otherwise known as operating return or return on assets managed, measures profit relative to the value of all of the assets employed to generate that profit. In a business like broadacre agriculture, where approximately eighty percent of the capital employed is related to the value of the land, resource efficiency matters.

At the same level of profit per DSE but two very different levels of feed utilisation, profitability will be considerably different. For example, Table 1 shows two systems (A and B) each with the same profit per DSE. Due to efficient levels of feed utilisation system B allows for a higher stocking rate of 15 DSE per hectare compared to system-A where high levels of feed wastage occur.

The investment in land capital is the same regardless of whether the 15 or 7.5 DSE per hectare stocking rate is managed however the livestock investment is lower per hectare in system-A where the stocking rate is lower. Irrespective of having the same profit per DSE, the profitability (4.2 percent) of system B is 1.8 times higher than the profitability (2.3 percent) of system A.

Table 1 The same profit per DSE with poor resource efficiency delivers low profitability

System	A	B
Stocking rate (DSE/ha)	7.5	15
Profit ($/DSE)	**$25**	**$25**
Profit ($/ha)	**$188**	**$375**
Land capital ($/ha)	$7,500	$7,500
Livestock capital ($/ha)	$750	$1,500
Total investment ($/ha)	**$8,250**	**$9,000**
Return on assets managed	**2.3%**	**4.2%**

This confusion in terminology between profit and profitability in the market has already had an impact. Several agricultural advisers have reported instances of producers informing them of the study and its findings showing that the group practicing regenerative agriculture delivered similar levels of profitability to that of the Holmes Sackett benchmarking database. Equivalent profitability between regenerative agriculture and Holmes Sackett benchmarking participants was not a finding of the study and these producers had confused profit per DSE with the term profitability.

What this demonstrates is how easily the facts can be confused. The presentation of comparative stocking rates, production and profit per unit of land area, had it have been supplied, or a profitability comparison, as is delivered in this paper, would potentially have prevented this confusion.

2. Compare profitability between those practicing and those not practicing regenerative agriculture

2.1 Methodology for comparison

An analysis of data has been conducted to compare profitability between the cohort of producers practicing regenerative agriculture and the group of participants in the Holmes Sackett benchmarking database as described in the NESP-EP paper. The analysis uses methodology which is consistent with that used by ABARES in its farm survey analysis. The analysis compares aggregated data from the regenerative agriculture producer cohort with aggregated data from producers contributing to the Holmes Sackett farm benchmarking dataset in all ten years of the period in the NESP-EP study (2007-2016).

ABARES methodology includes market value of depreciation on plant and equipment and imputed family labour costs valued at the Federal Pastoral Industry Award rates. Holmes Sackett benchmarking methodology uses similar depreciation values but allocates imputed family labour at market rates on the basis of its farm salary survey. For the majority of this decade Holmes Sackett valued the first family labour unit at $70,000 while each subsequent family labour unit was valued at $40,000.

As the value of Holmes Sackett imputed salaries per labour unit exceeds the value of the Federal Pastoral Industry Award rates, the imputed family labour costs will be lower for the regenerative agriculture cohort relative to those of producers contributing to the Holmes Sackett benchmarking dataset. This will have the effect of undervaluing Holmes Sackett benchmarked farm EBIT relative to the EBIT of the regenerative agriculture cohort. This means that this report will understate the extent of the differences between the regenerative agriculture cohort and the group of producers contributing to the Holmes Sackett benchmarking dataset.

The square root transformed median return on assets managed (ROAM) of the regenerative agriculture cohort shown in Figure 12 of the NESP-EP report does not allow for direct comparison between cohorts. A request was made to the authors for the same aggregate data expressed as absolute return on assets of the NESP-EP data but this request was denied. The aggregate data, expressed as absolute return on assets of the cohort practicing regenerative agriculture, was provided by ABARES.

2.2 Regenerative agriculture producers compared with Holmes Sackett benchmarking participants

Over the ten-year period from 2006/07 to 2015/16 the average return on assets managed of the regenerative agriculture cohort is 1.66 percent. Over the same ten-year period from 2006/07 to 2015/16 the average return on assets managed of the group of Holmes Sackett benchmarking participants with 10 years of data equates to 4.22 percent (Figure 1).

The magnitude of the difference between cohorts is small in the early part of the decade however it grows in the fourth, fifth and sixth year of the decade. In fact, these three years lead to a cumulative imputed profit (EBIT) difference of greater than $1.5 million favouring the group of Holmes Sackett benchmarked producers. This demonstrates that a minority of years can heavily influence the outcome over a decade.

The regenerative agriculture cohort had far lower variation in returns relative to the group of producers contributing to the Holmes Sackett farm benchmarking database. This shows that none of the upside in returns was captured by the regenerative agriculture cohort. This demonstrates the point that higher volatility typically generates higher return in agriculture, a feature that is of course not unique to this industry.

Figure 1 demonstrates that the Holmes Sackett cohort have a level of financial resource efficiency 2.5 times higher than the regenerative agriculture cohort. The highest return of the decade of the regenerative agriculture cohort was only 2.6 percent compared with over 5 percent for the producers contributing to the Holmes Sackett farm benchmarking. This data shows that the cost of stability of income, a feature the NESP-EP paper highlighted, is foregone profits.

Assuming similar asset values per hectare, then production per hectare of the regenerative farming systems must be far lower than those achieved by the Holmes Sackett farm benchmarking participants. This is most likely due to differences in stocking rate. This low level of production of the regenerative agriculture cohort, which presents itself as foregone profitability, is the real cost of regenerative agriculture. Without data it is impossible to quantify the value of the contribution of any environmental differences between cohorts.

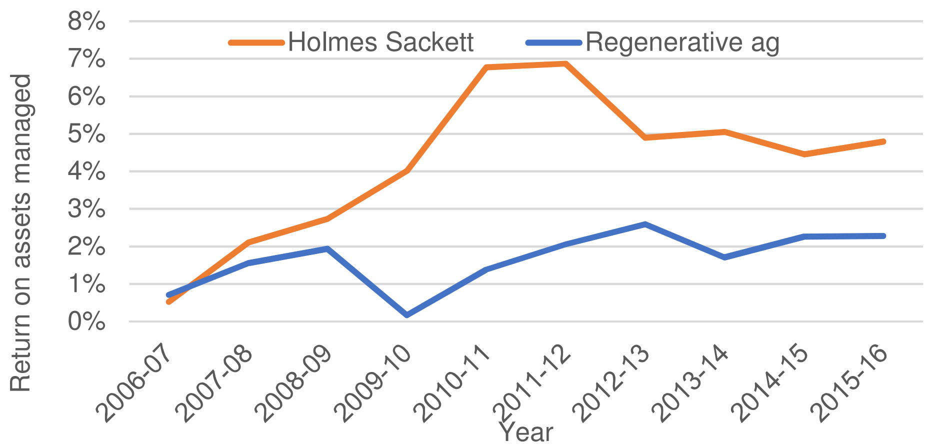

Figure 1 Managers contributing benchmarking data in all 10 years over the period generated operating returns 2.5 times higher than regenerative agriculturalists.

3. Calculate the financial benefit or cost of regenerative agriculture

3.1 The absolute cost of biodiversity and well-being benefits quantified

The ratio, return on assets managed, has been used to assess the cost, at a whole farm level, of regenerative agriculture relative to a group of producers contributing to the Holmes Sackett farm benchmarking database.

A methodology has been used in this analysis to impute average whole farm profit of the regenerative agriculture cohort. It is possible to impute whole farm profit (EBIT) of the regenerative agriculture cohort by multiplying return on assets managed (a ratio) by the total value of assets under management. The assumption has been made that the regenerative agriculture cohort manage the same average value of assets of the Holmes Sackett farm benchmarking database. The methodology is shown in the following equation.

Aggregated average annual return on assets managed (ROAM) of the regenerative agriculture cohort

x

Aggregated average annual asset value of the Holmes Sackett farm benchmarking group

=

Aggregated average imputed net farm profit (EBIT) of the regenerative agriculture cohort

Over the decade, average asset values ranged from $7.1 million to $11.3 million for the group of Holmes Sackett benchmarked farms with 10 years of data. This variation is typical and reflects the capital growth of agricultural land in the farm asset portfolio.

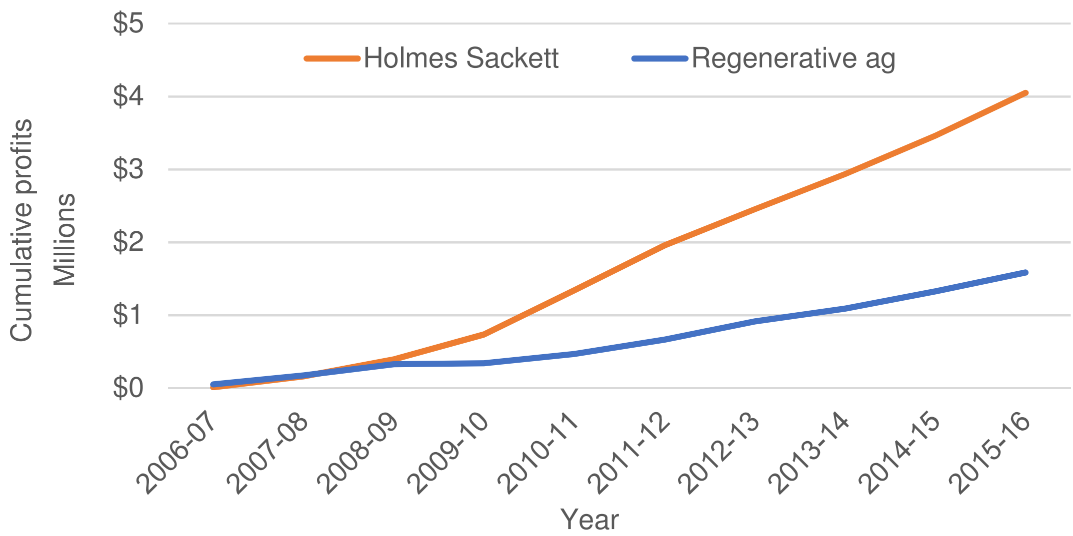

Figure 2 The financial cost of claimed biodiversity and well- being benefits are approximately $2.5 million per decade when compared with long term (10 year) Holmes Sackett benchmarking participants.

The cumulative average of imputed whole farm profit (EBIT) for the regenerative agriculture cohort over the decade, if they were managing the same value of assets as those Holmes Sackett participants with 10 years of data, would have been $1.59 million. This compares with average cumulative profits of producers contributing in 10 consecutive years to the Holmes Sackett benchmarking dataset of $4.05 million over the same period.

The group of participants contributing for ten consecutive years to the Holmes Sackett farm benchmarking data set accumulated $2.46 million more in profit over the decade relative to the regenerative agriculture cohort (Figure 2).

This analysis suggests that the claimed well-being and ecological benefits of regenerative agriculture come at a significant cost. That cost equates to, on average, $2.46 million per farm business over the decade compared.

This poses the question – how can similar profit per DSE, over resources of equivalent scale and value, deliver very different whole farm profit levels? The answer, assuming similar prices received, is that there must be vast differences in per hectare production levels (stocking rate) between systems. Given the disparity in profitability and in imputed whole farm profit, the regenerative agricultural systems in this study must have been significantly less productive than the systems employed by the group of producers contributing to the Holmes Sackett benchmarking dataset.

4. Discuss the importance of the use of correct financial terminology

4.1. Clarifying financial terminology

The following statement was provided as an introduction to the per DSE financial comparisons delivered in the NESP-EP paper (7.2 Profitability).

"Profitability can be examined several ways. In this report we present Earnings before interest and tax per dry sheep equivalent (EBIT/DSE) for the regenerative graziers and a comparison of this with the Holmes & Sackett Aginsights benchmark participants (Holmes Sackett, 2018). We also provide a comparison of the drivers of profitability including income/DSE, supplementary feed/DSE, pasture costs/DSE, animal health and breeding. Preliminary findings of the comparison of ROAM and EBIT per sheep equivalent (SE) for the NESP-EP sample with ABARES Farm Survey contributors in the region follow."

This statement confuses commonly used financial and benchmarking terminology. There is a distinct difference between profitability and profit or earnings (EBIT). The distinction in terminology has previously been highlighted at 1.3 in this paper. The distinction between profit and profitability is important because profitability, as a ratio, measures resource efficiency, profit does not.

The NESP-EP paper claims to provide a comparison of the drivers of profitability between farms contributing to the NESP study and farms contributing to Holmes Sackett's farm benchmarking dataset. Comparisons of the drivers of profitability were not examined in this study.

Profit drivers are factors that have a significant impact on earnings (profit). Income per DSE, supplementary feed costs per DSE, pasture costs per DSE and animal health costs per DSE are income and expenses that are influenced by the production system. While they do have an impact on profit they are not the key performance indicators that would typically be used to assess the business performance of a livestock business over time.

Had profit drivers been assessed, the NESP-EP paper may have delivered value to the extent that it would have been possible to explore why the profitability of the cohort of producers practicing regenerative agriculture was so low when compared with a group of producers who were not practicing regenerative agriculture.

Experience with benchmarking analysis for over 20 years suggests that some of the more important drivers of profit, had they been explored, would have included:

1. Production (kilograms of product) per DSE, per hectare and per hectare per 100 millimetres.
2. Cost of production assessed as dollars per kilograms of product
3. Price received assessed as dollars per kilogram for all production sold
4. Mid-winter stocking rate assessed in DSE per hectare
5. Average annual stocking rate assessed in DSE per hectare
6. Labour efficiency assessed in DSE per labour unit.
7. Labour cost assessed in dollars per DSE

Other useful information may have included timing of lambing, time of calving and time of turnoff of sale animals.

5. Provide advice to researchers and policy makers on the basis of the findings

5.1 Recommendations to researchers

Agriculture is a capital-intensive business. The land resource on which broadacre livestock operations occur typically accounts for approximately eighty percent of the total value of farm assets managed. Financial resource efficiency in southern Australian broadacre livestock farming systems therefore is dependent on optimising per hectare, rather than per head or per DSE profits.

A key recommendation of this paper therefore, where financial measures of farm performance are to be presented by researchers, is to deliver a multitude of key financial and production metrics, rather than single financial metrics in isolation.

The consequences of a landscape that is far less resource efficient cannot be ignored. The consequence of regenerative agriculture, as it is defined in the NESP-EP paper, go well beyond the $2.46 million cost of production foregone and the financial inefficiency. Lower intensity landscapes mean less livestock, lower inputs, lower returns and less farm investment – these are features that have potential implications for rural and regional Australian communities beyond the farm gate.

Conclusion

This paper uses data from the NESP-EP paper, aggregated data from ABARES and data from the Holmes Sackett farm benchmarking to compare whole farm profit and profitability of a group of producers practicing regenerative agriculture with a group of producers not practicing regenerative agriculture.

Assuming the same farm asset value between groups, the cost in foregone profit of regenerative agriculture compared with alternative farming systems, as it is defined in the NESP-EP paper, is $2.46 million over the decade between 2007 and 2016. The most plausible explanation for the difference in whole farm profit and profitability between groups is a difference in production per unit of area.

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