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Pathways less travelled to forage legume practice change

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Abstract

Land condition decline, pasture rundown and dieback are significant issues for beef businesses in central Queensland. Perennial pasture legumes play a role in preventing and remediating these conditions, leading to improved beef production and business profitability. Adoption of perennial legume pastures by beef producers in central Queensland is low; however, there is renewed interest in legume plantings since they have been promoted as an option for greenhouse gas reduction. An extension strategy was developed to use carbon-focused peer-to-peer learning workshops to generate interest in one-on-one support to introduce perennial pasture legumes. Workshops were delivered in three locations in central Queensland in 2023 and were designed with a mixture of group learning activities and presentations. The workshop delivery team included a carbon scientist, carbon project advisor and an experienced extension pasture specialist. Feedback collected from the workshops indicated that 10% of producer respondents intended to make a change on-property involving legume pastures on 3,387 ha. 41% of producer attendees participated in one-on-one action plan support on-property after the workshop, where a total of 16 actions plans for 2,297 ha were documented on 10 properties. In the 11 mo after the initial workshops, producers who participated in the action plan process reported 561 ha of practice change. This change was considered to be incremental towards legume planting and included practices such as soil and seed testing, timber clearing and cultivation. Despite the documented practice changes, the one-on-one support method was labour intensive. Ongoing engagement with producers is continuing into the legume-planting season, such that more data can be collected on practice change. Overall, the strategy of using carbon-focussed events to garner interest in perennial legumes and producer practice change was successful and will be repeated.

Introduction

Beef producers in northern Australia face three significant threats to the long-term productivity of perennial pasture systems – land condition decline, pasture rundown and dieback. Often these conditions occur simultaneously and compound the impacts on the grazing business. In the central Queensland region for example, it is common for pasture dieback to occur in rundown Gayndah buffel (*Cenchrus ciliaris* cv Gayndah) pastures, which then become colonised by weeds or undesirable grasses resulting in poor land condition (Buck 2017).

Perennial pasture legumes play an important role in the cost-effective remediation of pasture rundown due to the nitrogen cycling benefits to soil fertility (Peck et al. 2011). They are also unaffected by pasture dieback, which means they provide cattle feed when grass is dead and are an important component of seed mixes when resowing tolerant species in dieback-affected areas (Buck et al. 2023). Furthermore, they are important 3P (productive,

palatable and perennial) species when assessing land condition and have been well documented to increase stocking rates, liveweight gains and grazing periods (Bowen et al. 2018).

Cattle eating perennial tropical legumes such as *Leucaena leucocephala* and *Desmanthus spp* have increased daily liveweight gain and reduced methane production (Stifkens et al. 2022, Suybeng et al 2020), and aged leucaena-grass pastures accumulate enough soil organic carbon to mitigate methane production from cattle grazing them (Radrizzani et al 2011). The positive impact of perennial legumes is recognised by Meat and Livestock Australia (MLA) that has a target for the red meat industries (beef, lamb and goat) to achieve carbon neutrality by 2030 through a range of activities that support the avoidance and reduction of greenhouse gas emissions, including 25 million ha of new legume plantings nationwide (MLA 2020). As a result, industry interest in carbon emissions and the role legumes play in reducing them, has increased.

Sowing perennial legume-grass pastures results in more profitable beef businesses, despite the initial costs of establishment and associated financial risk, compared to having a grass-only pasture system (Bowen and Chudleigh 2018). However, adoption rates of perennial pasture legumes in Queensland Australia are currently low (Peck et al. 2022).

Several extension methods are effective in Australian agriculture including facilitated groups, technology development, training and group presentations, information provision and access, one-on-one individual farm advisory, best management practice frameworks, E-extension, co-innovation and social marketing (Coutts et al. 2017). Nettle et al. (2022) concluded that the strongest effect on adoption was achieved through small group-learning and one-on-one consulting; however, the combination of methods that addressed the human and social elements of the adoption process produced the largest impacts.

Our first aim was to test the methodology of using carbon as a workshop topic to generate producer interest in sowing perennial legumes. The second aim was to create engagement with a one-on-one advisor support process to achieve producer practice change.

Methods

Three workshops titled ‘Carbon, cattle and sustainability’ were delivered to beef industry audiences in central Queensland at Gayndah, Moura and Emerald in December 2023. Attendance data was collected including number of producers and the businesses and properties they manage.

Workshop topics

Workshops delivered information on the carbon cycle, insetting and offsetting carbon emissions, emission intensity in beef production, the impact of pasture legumes on emissions and carbon projects. Topics were chosen to give an industry audience a background understanding of carbon emissions and how practices on farm can influence them. Carbon project information was presented in a way that allowed a producer audience to decide if a carbon project was suitable for their business.

Workshop delivery team

Workshops were delivered by a multi-disciplinary team which included a scientist currently researching carbon emissions in commercial beef operations; a carbon project advisor with experience in managing carbon projects in the beef industry; and two extension specialists with skills in adult learning and peer-to-peer facilitation techniques as well as technical knowledge in pasture management and development, and cattle nutrition and husbandry.

Workshop peer-to-peer learning techniques

Workshop rooms were set up in group tables of 4-6 people where participants were asked to meet others at the table by introducing themselves, providing some background information on their beef operation and then answering an icebreaker question. This process was then repeated with the whole room. Groups completed an expectation activity on flip chart paper answering the questions 'What do you want to learn today?' and 'What concerns you about carbon?' After a presentation on the carbon cycle, insetting and offsetting emissions and carbon baselining, a 'bus stop' activity was conducted using the method described by The Facilitators Network (2024). Questions included: 1) How can you improve weight gain of cattle? 2) How can you improve the efficiency of a breeder herd? 3) What can you do to improve soil and pasture health? and 4) What can you use to keep farm records? Participants were prompted to record learnings in a 'Carbon property plan' which provided space for practices to implement to reduce carbon emissions. After a final presentation on carbon farming projects and some final group discussion, participants were asked to individually share their key 'take home' messages from the day.

Workshop feedback

Participants completed a feedback sheet with a series of questions including rating their knowledge and understanding before and after the workshop, and their intention to make a change in their practices (including what it is, how likely they are to do it and on what area of land).

One-to-one support action plans and practice change

Participants were offered one-on-one support for pasture management and improvement to occur after the workshop and property visits were arranged. When on property, advice was documented in a pasture action plan which included detailed instructions on fallowing and planting techniques, species selection and fertiliser rates. When re-engaging with producers after the property visits, if practice change had occurred the area of land and activity undertaken on the property were documented.

Results

A total of 52 participants attended the three workshops including producers and industry advisors (public and private). Feedback forms were completed by 30 producer respondents whose knowledge and understanding of carbon increased from an average score of 2.5 to 4.8 out of 7. 80% of respondents said they intended to make a change after the workshop and 10% of these said the change would include pasture development with legumes on a total of 3,387 ha.

During the 'bus stop' activity at each workshop, legumes and pasture development were listed by attendees as farm practices that can improve breeder performance, cattle weight gain and soil health.

Properties that were visited to develop pasture actions plans after the workshop are summarised in Table 1. Practice change was recorded in the first 11 mo after the workshops. In total, 16 producers (41% of producer attendees) who managed 10 properties requested property visits. Some properties developed action plans for more than one paddock. Practice change activities were recorded in 5 action plans and included planting an annual forage crop, timber clearing, fencing, and seed quality testing, all of which were steps outlined in action plans. A further two action plans were ready to enact when the seasonal conditions were right.

Table 1. Summary of properties and action plans developed from attendees in Queensland Australia of 'Carbon, Cattle and Sustainability' workshops in December 2023 and the resulting practice change 11 mo later.

Workshop location	Participating properties (no.)	Action plans (no.)	Action plan area (ha)	Action plans with progress (no.)	Practice change area (ha)
Gayndah	4	8	1,242	2	501
Moura	2	3	67	0	0
Emerald	4	5	988	3	60
Total	**10**	**16**	**2,297**	**5**	**561**

Discussion

Workshop success in increasing interest in legume pastures

The workshops were facilitated to maximise group sharing and learning as described by Coutts et al. (2017) as opposed to workshop deliverers teaching concepts. The increase in knowledge and understanding of carbon by the feedback survey respondents demonstrated that the workshop delivery format and combination of technical presentations and several group sharing activities was successful. The introductory activities which included an ice breaker question and a 'Hopes and Concerns' activity allowed participants to feel comfortable with each other and openly discuss the positive or negative impact farm practices have on their carbon emissions. The 'bus stop' activity allowed attendees to contribute ideas for farm practices that increase breeder performance, cattle weight gain and soil/pasture. Legumes and pasture development practices were consistently included in each list across all workshop locations. This demonstrated that attendees understand the concepts taught earlier in the day around emissions intensity, and the overall benefits of perennial legumes to a beef operation. This was despite few having already implemented the practice themselves.

Feedback data indicated that 10% of producer respondents intended to make a change of introducing legumes; however, 41% of producer attendees requested one-on-one support after the workshop. This discrepancy may be due to some respondents prioritizing other practice changes when completing feedback surveys. Regardless of the discrepancy, it is clear the workshops successfully generated interest in the development of pastures with perennial legumes.

One-on-one support action plans and resulting practice change

One-on-one support action plans resulted in 561 hectares of practice change in the first 11 months after conducting property visits, demonstrating the positive impact of providing individualised advice and support for graziers. This is consistent with producer survey data reported by Peck et al. (2022) where most graziers said they preferred one-on-one interactions with advisors to implement perennial legume introduction. Practices implemented by producers after action plan support, included several practices needed to successfully sow legumes into a pasture. However, due to the limited time in which the practice change data was recorded no legumes had been sown and some had not begun any activity as seasonal conditions were not sufficient for the planned actions. This is consistent with best practice recommendations on seasonal fallowing and planting times for the central Queensland region, Australia (Peck et al. 2022) so it was not expected that any plantings would have occurred in this period.

The one-on-one support action plan process was labour intensive for advisors due to the following reasons: every property was located 100 to 400 km away by road travel, took 1 to 4 h on farm to complete plus more time planning visits and documenting action plans, and was attended by at least two advisors. It is theorised that despite the personalised support provided, not all producers who engaged in the action plan process will implement a change long term and the top two barriers to adoption as reported by Peck et al. (2022) of cost and climate/seasons are likely to be applicable here too.

Combining extension methods

Combining peer-to-peer learning workshops and follow up one-to-one support activities has led to an increase in trust between producer participants and advisors, which is an important aspect of facilitating practice change and is an example of the success of stacked extension strategies. Stacking of extension methods involves combining several methods (e.g. facilitated groups and one-on-one support) into a cohesive package for producers (Nettle et al. 2024).

Facilitated small peer-to-peer learning group workshops on perennial legume establishment techniques were conducted by Peck et al. (2022) with success in achieving large areas of legume plantings. However, those workshops were aimed at teaching legume establishment concepts to producers who were already interested in the topic. The carbon workshops delivered in this study, demonstrate the effectiveness of appealing to the values of producers who are also interested in natural capital markets that combine environmental sustainability, product provenance for consumers and the opportunity for niche sales markets.

Conclusion and recommendations

Overall, the strategy of using a carbon-focussed workshop to generate producer interest in the benefits of perennial pasture legumes and garner interest for one-on-one advisory activities was successful and incremental practice change was recorded. Due to the short time since the initial engagement with producers at the workshops, it is recommended that contact between advisors and producers is maintained so that ongoing support for practice change can be provided. More 'Carbon, cattle and sustainability' workshops are being planned for 2024, allowing the strategy to be repeated and the results confirmed.

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