Partner Farms in multidisciplinary research: The continuing evolution of a research and development methodology

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Abstract. Large-scale research projects in dairy farming systems have developed partnerships with commercial farms .to improve the reach of R&D outcomes on-farm. Such arrangements were conceived by industry research bodies as essential for understanding the commercial feasibility and management complexity of new technologies for farm businesses that research trials and modelling cannot deliver. *Partner farms* is the term used in the dairy industry to describe the most intensive type of partnership, where the farm is considered an equal partner in the overall research programme, contributing as co-developers of knowledge. These partnerships are designed to 'fast track' research efforts by allowing research methodologies, born from trials and modelling, to be 'scaled up' on whole farm systems in order to see if they are of financial benefit in a commercial farming context. Thus, partner farms provide a whole systems context in which new technologies and management practices are implemented on-farm. This paper stems from a guide to investment concerning the partner farm methodology and the relationship between commercial farms, extension and research. The paper discusses the partner farm methodology and then reports on research into the partner farm methodology undertaken by the authors within 2 large multidisciplinary projects in the dairy industry (i.e. the 3030 Project based in South Eastern Australia and FutureDairy based in NSW). The discussion then focuses on the authors' conclusions and recommendations concerning the partner farm methodology and its present and possible future applications.

Keywords: commercial farms in R&D, knowledge co-development, multi-disciplinary teams.

Introduction

Since the early 1990s, dairy farmers have seen great change in their industry. With constant exposure to volatile international markets and increasingly unstable weather patterns, dairy farmers continue to be faced with a challenging farming and business environment. This has brought to the fore challenges concerning management and planning of a different nature than those of previous eras. For instance, where once the use of nitrogen was promoted as a tool for increased production, now alternatives to nitrogen are being sought due to the unabated upward trend in the price of fertiliser. Another example can be seen in the variability of milk prices and grain prices and the availability of fodder from year to year. In an environment where traditional levels of rainfall are no longer reliable and extended drought for much of the country is becoming more frequent, the challenges for research and development in the dairy industry is sharpened, particularly concerning the management of risk in production levels, costs and the farm feed-base. This has meant that researchers have had to understand the implications of their work from both a whole farm systems and fit-to-farm perspective like never before. To this end, large-scale research projects in dairy farming systems have developed partnerships with commercial farms in the co-development of knowledge, management systems and technologies (Nettle and Kenny, 2006).

This discussion concerns the *partner farm* methodology, which aims to position researchers and commercial farmers as equal partners in research and as co-developers of knowledge (Crawford et al. 2007). Partner farms differ from other more common forms of engagement with commercial farms categorised by Crawford et al. (2007) as:

- experimental/trial farms: to trial or assess new technologies for their technical or production merit, driven by research with limited farmer involvement;
- demonstration/focus farms: typically established by interested farmers and sponsored by local industry groups to address a specific technical issue or track a period of change, the main focus being the physical and financial performance of the farm and providing regional examples of how farms set and meet productivity, profitability and lifestyle goals. These farm are not dependent on a partnership with R&D;
- companion farms: the farm plays an extension role around issues of farm management and the research areas of interest.

Partner farms in dairy R&D

As indicated above, the key potential of the partner farm methodology concerns the scaling up of research findings from a trial situation to a whole farm systems level in which appropriate management practices are evolved alongside the technical object under research. This process of co-development comes from researching and doing things together to try and make a

technology/farm management practice work on-farm – or quickly understand why it won't. Partner farms are not trialling the products of research but, rather, are a partner in a research enterprise in which the knowledge products are emergent. These emergent knowledge products include (but are not limited to):

- knowledge about decision making processes,
- ease-of-management issues,
- implications for people and labour,
- farmer perceptions and how they are formed,
- the planning and learning challenges involved for both farmers and advisers,
- the type of advisory support required for farms to innovate,
- the way research and extension need to understand or position the new technology
- the need to modify or change the technical research questions.

Partner farms are established by research project teams to ask questions like: Can this work commercially? If so, how, and what does this mean for the research, for farmers, for advisers and the industry? Partner farms, therefore, aim to increase the return on investment that would otherwise have been achieved from technical/experimental research being conducted on its own. When advisers are involved in partner farms, they are able to use the experience to make inferences about the relevance of the research to particular segments of the farming community. When researchers are engaged and interested in the partner farm's issues, their research questions are often modified and expanded to better address the fit-to-farm issues relevant to farmers. This type of knowledge can only be gained through experience and practice. It is an active pursuit achieving learning outcomes that cannot be had from surveys of farmers, involvement in steering groups or listening to research results.

There has been considerable debate within both the dairy industry and the agricultural research community as to the impact and efficacy of the partner farm model in R&D. This debate has been largely undocumented yet provided the dairy industry the impetus to commission a discussion paper (McGuckian 2008) and to request the Rural Innovation Research Group to draw up a set of guidelines for the use of the partner farm methodology in multidisciplinary large scale R&D projects (O'Kane & Nettle 2008) Interestingly, the debate has been dominated by two distinct rationales. The first of these is that the partner farm methodology places an unrealistic expectation upon the commercial farming partner by relying too heavily upon their willingness to trial technologies that are still in development and, thus, inherently risky. The second view contends that the partner farm methodology must be 'built in' to R&D projects from their onset, as a full research partner, in order for them to reach their potential utility.

There is therefore a need to understand both the impact of the partner farm methodology on the R&D enterprise and the management of partner farms in R&D. This paper explores these two aspects by drawing on research in two multidisciplinary projects in the dairy industry involving partner farms:

- Future Dairy (Garcia et al. 2007) developed to help Australia's dairy farmers manage the challenges they are expected to face over the next 20 years such as large increases in forage and milk production/ha (complementary forage rotations to produce 40t DM/ha) and new technologies to improve labour efficiency and lifestyle (automatic milking).;
- Project 3030 (Chapman, et al. 2007) developed out of farm system modelling work suggesting the possibility of dairy farmers achieving a 30% return on assets from a 30% increase in home grown forage in dryland dairy systems in southern Australia.

The adaptation and modification of farming practice on Partner Farms, as farmers and researchers work together, was observed and interpreted by researchers working within these projects using a combination of data collection methods. In the case of Future Dairy, Nettle presents an overview of the social research conducted in the project from 2005 to 2007. The methodology employed here consisted of planning workshops, partner farm meetings, feedback session and semi-structured interviews. This work has been completed and presented to Dairy Australia and concerns the impact of the partner farm methodology on the Future Dairy research project centred in Camden, NSW. While the project is still ongoing, the social research phase was completed in 2007.

In the case of Project 3030, O'Kane used an anthropological methodology – participant observation – as the principle methodology. However, this was not the traditional long term anthropological engagement typical of ethnographic study. It was, rather, a kind of engagement the author refers to as 'intermittent' field work – where relationships are built firstly through physical proximity and then maintained and strengthened through regular (yet not frequent) participant observation, shared involvement in the project and frequent contact via phone and

email. This type of engagement was found by the author to be the most effective given that the project spanned south eastern Australia and involved three partner farms (in the South West, North East and Gippsland regions of Victoria) the DPI in both Victoria and South Australia, trial farms at Demo Dairy in Terang (Victoria), several private consultants and research teams from the University of Melbourne. Indeed, the physical realities of this multidisciplinary research made full scale ethnographic engagement impossible under the circumstances. However, this kind of anthropological relationship building was complemented by data collected through a series of twenty-five in-depth semi-structured interviews, six project open days, eleven forage insight group meetings, twenty-eight partner farm meetings, three annual project workshops, six program management meetings and two whole of project reviews between 2006 - 2009.

Although the social research components in both of these research projects were conducted in order to better understand how innovation concerning new technologies occurs at the farm level and how this process can be better supported and augmented, this paper draws on their results to explain the role, limits and benefits of the partner farm methodology in order to support decisions about its future use in rural R&D. This discussion addresses questions that have arisen within the industry concerning the value proposition of this intensive and expensive methodology in an increasingly competitive commercial environment.

The first case study will briefly present some of the opportunities for effective R,D&E partnerships that have emerged from the involvement of partner farms and raise some of the challenges to these opportunities that were identified during the course of the Future Dairy research project. The second case study will discuss the different issues that were identified when the partner farm model was operationalised within Project 3030. The paper will then present recommendations for R&D investors, extension and research teams for making the most of research partnerships with commercial farms. The paper concludes with a brief discussion of the potential of the model to deliver better R,D&E outcomes for agricultural industries.

Case Study: Partner farms in Future Dairy

The Future Dairy project, based out of Camden in NSW, centred on three modules of research around forages, feeding and innovations (Garcia et al. 2007). The forages module aimed to produce more home-grown feed from a given parcel of land. The target was the utilisation of over 40t DM/ha/yr sustainably using a Complementary Forage Rotation (CFR) beginning with maize, brassica and legumes (Garcia and Fulkerson, 2005). The feeding module researched alternative pathways to increasing production per hectare by 30-50% and the most efficient way to use bought in feed. Additionally, the innovations module explored technologies that had the potential to improve farm efficiency, labour management and/or lifestyle – with automatic milking systems (AMS) as the main technology under investigation.

As issues surrounding future production systems for increased industry productivity involve technical, economic and social domains of knowledge, a multidisciplinary research design was considered necessary. The central strategy of Future Dairy was to create a platform for different disciplines and knowledge types to co-develop knowledge for improving farm and industry productivity. These ‘knowledge partnerships’ (Nettle and Kenny, 2006) were facilitated through a research-extension interface with links to five commercial partner farms. The interface was coordinated by the project’s extension leader and also involved formal research partnership agreements with farms, protocols for farm monitoring and a detailed physical and financial analysis. One of the outputs from the work of the extension leader was a methodology to create a learning environment for the project partners.

The design included a series of activities between the project and partner farms: a) a partner farm workshop (bringing the farms to the research site to learn about the research and discuss roles and expectations); b) a management planning process with each partner farm to ‘map out’ key farm decision points that could then become a focus for research interaction with farms; c) the establishment of ‘interaction events’ with technical and social researchers on the partner farms around a specific farm issue of relevance to the research; d) ongoing and regular feedback sessions for each partner farm around results from monitoring and research site progress; and e) social research interviews with partner farmers, support group advisors, researchers and extension to identify where co-development of knowledge was occurring and how expectations could be negotiated and aligned.

Within the first year of work with the partner farms on the use of complementary forages the management and risk dimensions of implementing this technology on commercial farms emerged:

> "They [research] say 40 tonnes per hectare. Well 30, or 35 tonnes will be all right if it meant 30% less work…I mean you might have to put so much more input in, to get just a little bit [more] out of it" (Partner farm A)

The perception as to what farmers are willing to trade-off began to emerge – with the returns from the effort required to obtain very high yields being questioned.

> "To me there is no risk [with CFR], simply because if we are growing pasture we're only going to grow 15t anyhow…what I do see as the problem is the hole of not having enough feed for the cows" (Partner Farm B – male partner)
>
> "I'm concerned about the logistics of actually grazing it….it's fairly labour intensive" (Partner Farmer B – female partner)

The demands on management (work planning) and higher level of expertise in feed-budgeting were revealed, which catalysed effort by the farmer, researcher and extension on feed-planning strategies concerned with CFR. Overall the agronomic, feed-planning, work-planning, and risk issues transformed what a "complementary forage rotation" was for farms – and so a focus on the technical attributes of "growing CFR" were insufficient for contributing to the profitability of farms at a wider scale.

In hind-sight, the outcomes from partner farms as a site for co-development in FutureDairy included:

- A rapid accumulation of new knowledge amongst the researchers, extension, partner farmers and support groups, particularly in the new forage systems context.
- The production of management guides for advisers to explore the labour and risk issues associated with new forage options for farms.
- Additions to the technical research design and researcher knowledge (e.g. the experience of a forage partner farmer in managing the grazed and harvested aspects of the crop rotations triggered additional trials at the research site around fully grazed or harvested options).
- Farms in one of the partner farm regions using variations of CFR in their system profitably as a result of interaction with the partner farm and FutureDairy project team.
- The adviser in the region uses the management planning processes developed through the partner farm development work amongst his clients.
- The development of the multi-disciplinary team (e.g. joint activity at partner farms required planning between the project team about the focus, roles and contributions expected from team members, and travel to and from partner farm locations over vast distances provided an opportunity to reflect on and discuss project progress together).

A question that remains amongst investors though is the value of the overall benefit of partner farms to R&D. Although these outputs would suggest a significant return, it is the capacity to innovate that emerges from the knowledge partnerships created on partner farms operating as an innovation platform that would appear to offer the greatest benefit.

Case Study: Partner farms in Project 3030

Project 3030 operates in south-Eastern Australia. The research is premised upon the possibility of achieving for dairy farmers a 30 percent return on assets from a 30 percent increase in home grown forage. The project relies heavily upon the three partner farms located in three non-irrigated dairy farming regions of Victoria. Each of these commercial farms have been contracted as partners in the R&D and in implementing new management principles generated by the research within their own farm systems. The aim is for partner farms to co-develop the successful practices concerning complementary forage utilisation. They are each assisted in this by a regional development group led by a farm consultant and supported by the local Department of Primary Industries (DPI) officer from the Dairy Extension Centre (DEC).

The partner farm role in Project 3030 is to implement promising forage practices identified by the scientific research team and participate in monitoring, adapting and assessing their efficacy on a whole-of-farm systems basis. These groups are thought of as constituting 'Communities of Practice' (CoPs), in which the participants are engaged in the joint pursuit of a shared enterprise through learning as a social activity (Wenger 1998, Wenger *et al*. 2002). As the application of the CoP concept within Project 3030 has been outlined elsewhere (see O'Kane *et al*. 2008) an overview of the main qualities of the CoPs with respect to the role of the partner farms is provided here. Within the CoPs of Project 3030, learning is a social activity achieved, over time, through interaction (Wenger 1998). Over time, these groups generate their own, locally contextualised knowledge about the implementation of 3030 principles and the regionally specific issues that arise in the attempt. The participants create their own way of speaking

about and understanding this knowledge which is, ultimately, the result of their experiences interacting with the information coming out of both the research team and the partner farm.

Importantly, the partner farm methodology dictates that the partner farm CoPs involved in this process do more than simply try to emulate the results achieved by the research team at a whole farm system level. In order to affect a true partnership between the research and the commercial aspects of the methodology, learning from the on-farm application of the innovation must be fed back to the research team in order to inform the present and future direction of the ongoing scientific investigation. These CoPs form a central hub of the research in which scientific information from the 3030 research meets with agronomic perspectives, experiential bias and all of the complexities involved in operating a high functioning farm system. They have provided insights into the ways in which the adaptation and adoption of innovation is approached by researchers, industry professionals and farmers.

Some of the practice changes that have emerged from both local experience on partner farms and the results from the project's trial farmlets at Demo Dairy in Terang (South-West Victoria) have included (Chapman et al. 2009):

- Changes in sowing times for both rye grass and crops such as Oats, Triticale and Rape.
- The refinement of cereal double grazing techniques with regard to timing and residuals.
- Enhanced utilisation of perennial and annual rye grass when combined with complementary forage practices.
- A better understanding of appropriate silage practices accounting for the opportunity cost compared with higher production from good quality green feed.

However, these technical gains represent only a portion of the potential gains from the application of the partner farm model and on their own would represent learning that has come at a considerable cost in both time and money.

Criticism from regional and national industry funding bodies and farmers, both involved and uninvolved in the research, has been levelled at the use and operation of partner farms in Project 3030 with respect to their efficiency and effectiveness in R&D. At the level of the regional partner farms, there has been questioning of the efficiency of the partner farm model in addressing feed base issues in the region more generally. This concerns notions of the reach of findings at a partner farm beyond the farm itself with the belief that periodic farm walks are to the sole benefit of the partner farmers with activities focused on the specific issues raised by the individual farm systems they reside within, rather than a broader discussion of practice outside the partner farm. However, the narrow on-farm focus described above is more a consequence of the way in which the partner farms were first implemented and the stage in the overall life of the project in which they came into being. The partner farms and their regional development groups were underway for a considerable time (twelve to fourteen months) before the research had generated a reliable body of information substantial enough for them to utilise. This meant that the groups, unfocussed initially due to a lack of direction from the project, found their direction within the participating farms and became a very localised discussion group focussed on the broad range of decisions made on the actual partner farms and the implications of these decisions for the other local farmers present. Thus, while complementary forage practices and 3030 principles came under scrutiny at times, they took considerable time to emerge from the general discussion as important themes. Indeed, it is only recently that they have become the overarching group themes that they were intended to be.

The partner farm methodology has also been questioned for effectiveness by the above mentioned parties because the partner farmers proved reluctant to substantially implement 3030 complementary forage principles and practices, particularly on the main milking platform. Indeed, this has led to the perception within the industry that, as the partner farms were unwilling to engage more aggressively with 3030 technology, there is little to be gained from their continuing existence. Additionally, from a farming perspective, the partner farmers and their regional development groups have overwhelmingly concluded that the implementation of complementary forage practices on their main milking platforms introduces too much risk, through more complex management practices, into their farm systems while failing to promise adequate fiscal rewards to justify taking these risks. Hence, while the partner farm methodology has provided some concrete and valuable gains within Project 3030, the way it has been utilised has attracted significant and, in many cases, justified criticism.

As Project 3030 moves towards the end of its fourth year, there have been a number of strategies and processes developed out of partner farm interaction to address these criticisms. Social research within 3030 has worked with partner farm facilitators to develop "Tools for the Advisory Relationship" for extension and rural consultants to build an inclusive practice-based

discussion about the research concerning complementary forages and its implementation in real-time (seasonal ground-truthed knowledge). This approach rests on four foundational concepts:

1. The Community of Practice (CoP) concept (referred to above) through which advisors can locate the participants of their partner farms and regional development groups within a conceptual structure which identifies where each individual sits in the group with regard to their ability to make decisions concerning the feed base and the compatibility of Project 3030 principles and practices with their stated goals. This is further augmented by an approach to practice which emphasises the joint performance of different areas of expertise within the group. This approach, called the Interplay Model (Gemmen 1993, Paine 1997) sees the advisor as playing a mediating role within the group and ensuring that perspectives from each different area of expertise are understood by all.
2. A Risk navigation concept in which a Risk Map is developed in which farmers risk perceptions are recorded and discussed in such a way that advisors and farmers can make a joint decision on the appropriateness of Project 3030 principles for their farming systems and farming goals (i.e. 3030 principles to increase production or navigate risks). This concept originates from Beck's notion of reflexive modernity (1992, 1994, 1998). Beck posits that modern social actors become isolated from each other through a pre-occupation with risk - a processes called 'individualisation'. This notion, while somewhat controversial in the world of social theory due to its defining emphasis on risk rather than social formation, jibes well with the attitudes and decision-making behaviour exhibited by farmers involved in Project 3030. Furthermore, this approach has led us to seek counter-measures to the process of individualisation through processes that support farmer decision-making through the provision of appropriate, regionally focussed discussion of practice and the provision of relevant technical information.
3. The Germinator method, stemming from earlier research conducted by Kenny (2002), in which advisors construct a mental picture of farmer world views with regard to farming practice and management capability. This model has been adapted to our focus on risk and forms the foundation for the above mentioned Risk Map. The main goal here is to ensure that the advisors mental picture of the farmer's farm system and farming practice are actually grounded in an understanding of the farmer's perspective. This is meant to ensure that recommendations made by the advisor are appropriate for each farmer's management capabilities and specific technical problems.
4. Social networks, and the ways in which they facilitate and or impede the flow of knowledge to different groups of rural actors. This examination of social networks (Granovetter 2002, Hanneman 2005), known as Social Network Analysis (SNA), has allowed the authors to recognise different forms of social capital needed to be effective in passing on knowledge and information from one person to another within the networks of the 3030 partner farms. This, in turn, enables the opportunity to seek out facilitators of social network connectivity whilst developing strategies to navigate around those social actors most likely to hinder knowledge transfer.

The use of these strategies and tools in engaging with the industry about Project 3030 principles is part of the final social research phase in Project 3030.

Discussion and recommendations – where to look for returns from partner farms in R&D

From an analysis of research findings and experience with partner farms in Future Dairy and Project 3030, the source of benefits, and therefore where the returns from engagement with partner farms can be found, appear to reside in the R&D processes around partner farms which delivered:

- More and improved knowledge about farm management (including people and work-load) and extension challenges and social implications of new technologies or management systems than experimental research alone. This informs industry of the fit, reach and profit expectations from successful and unsuccessful adaptation around the technical object.
- Reduced errors and costs resulting from the assumption that technical research will automatically be useful or meaningful to farms in it's own right and from identifying inappropriate research questions (for farmers and advisers) early.
- IMPROVED delivery strategies to farms and regions because of the developments emerging from partner farm work.

From our research and experience with the partner farm methodology, we have made a number of recommendations to industry concerning their effective use in RD&E.

1. As partner farms are expensive, involved and take time to mature, we do not advocate their implementation in a research programme of less than a three year duration. This is because the methodology depends upon the evolution of a shared conversation concerning the key practices involved in the research. This can only happen after the group has developed a shared history and, effectively, a shared language within which the expertise and perspective of each member can be understood by the other participants and, thus, add to the development of a group perspective.
2. For the methodology to work, there must be a number of underlying assumptions held in common by potential participants. These assumptions are, that each structural entity (partner farms, research teams, extension teams, etc) believe that a true research partnership is necessary to reach the project's stated goals, that information generated by the project should be shared and discussed freely and regularly and that each group needs to be fully supported by the other groups within the project structure to ensure a dynamic and efficient research process.
3. The selection of farms is crucial to the success of the partner farm model. If selection procedures are not broadly agreed upon and strictly adhered to, the partner farm model will never reach its potential. In the best case scenario, the partner farm model will generate an environment in which easy access to both information and opinions save time and money through efficiency and effective research practice. In the worst case scenario, the reflexive potential of the model will not be harnessed and partner farms will become expensive failures generating little or no research benefit. Among other things, potential partner farmers must believe that the research objectives are worthwhile and appropriate, accept that they will be open to scrutiny from the project and the industry, commit a portion of their resources freely to project imperatives and clearly understand and agree to the roles that they are to play in the life of the project.
4. The roles associated with partner farms and research need careful consideration and be clearly defined. Partnering a major research project places a great deal of added responsibility on the shoulders of farmers. In order to meet these responsibilities, they need to know that they are an integral part of the project research team, to be aware of exactly what will be expected of them (resources, time, commitment, etc), to know exactly what assistance they will be receiving from the team and to have regular opportunities to engage with any of the other project participants (at any level) should they feel the need to.
5. Reflexivity is the core of the methodology and needs to be facilitated well. This is the most dynamic aspect of the partner farm methodology and affects its potential to create a successful research partnership. In order to ensure an adequate level of reflexivity within the partner farm methodology, we recommend that, as preliminary research findings are implemented on-farm, the management practices associated with utilising the technology should be captured, discussed and communicated back to R&D. This whole farm systems perspective can then be used to assess the direction of the research and to efficiently prepare the innovative technology for use on commercial farms. In other words, the partner farm model can shorten the innovation process by preparing scale appropriate management practices in conjunction with effective technologies. However, it must be recognised that the methodology is not bounded by the partner farm but includes the whole of the research project structure. Thus, if messages from the partner farm are either not forthcoming or are not getting traction with the R&D groups, this is an issue for the whole project, not just/or even necessarily a failing at the level of the partner farm.
6. Ensure partner farms are engaged at the appropriate time: They should not be instigated until the research project has generated a significant amount of data which can then be used to get the partnership between commercial farms and research up and running. Starting too early can lead to confusion as to the purpose of the exercise as consecutive meetings with no real focus are held. In other words, partner farms need to start and continue 'at the pointy end' of the research effort. Accordingly, while sufficient time should be allotted for them to really mature and produce results, they should be disbanded as soon as their primary objectives have been reached to keep costs to a minimum.

Conclusion

Engaging commercial farms as research partners in multidisciplinary projects represents an innovation platform whereby reliable knowledge from a diversity of knowledge types can be built using communication cycles that expanded research, farming and extension repertoires to act on complex issues. From the two case studies of the application of the partner farm methodology in the dairy industry, partner farms allow:

- A greater shared understanding of risk and how risk assessment is handled and how it is differently perceived by farmers, extension and researchers. This has implications for how risk is represented to farmers.
- An opportunity to participate in the planning process on-farm that creates a responsibility for research and extension to understand the position of the farmer.
- An opportunity to develop a shared language and shared monitoring that allows for the co-development of research parameters.
- Expanded suite of possibilities for the technical options.
- An understanding of the social context of farmers and how this is influencing the positioning of technical options.

However, partnerships do require active negotiation of learning roles between farmers, researchers and advisors. This requires a unique form of facilitation and interest from researchers and raises the issue of professional development for advisors in successful guidance of this process. Further, making the often invisible and sometimes intangible benefits real to investors will be an ongoing challenge for the methodology and an area for further development.

Three Key Lessons:

1. The partner farm methodology holds great potential where true partnerships between R,D&E and commercial farmers are required to explore complex innovation processes from the research arena to the farm system.
2. As with any R,D&E methodology, we can only expect it to produce the desired results when used in the correct context.
3. There are strategies that can be implemented to address the potential risks of this eminently useful yet expensive methodology.

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