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TECHNICAL REPORT

Translational Research and Knowledge in agriculture and food production

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Prepared for the BBSRC and Defra

The research described in this document was prepared for BBSRC and Defra.

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Published 2011 by the RAND Corporation
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Summary

This report considers how translational research and knowledge exchange can be enhanced throughout the food and agricultural value chain so that best use is made of public and private investment in research and knowledge generation. The project's aims were:

- To generate a robust, generic and transferable methodology for examining translational research and knowledge exchange across an entire value chain;
- To apply and validate this methodology to deliver a robust evidence base for translational research and knowledge exchange in the wheat value chain in the UK;
- To outline mechanisms for maintaining the evidence bases.

The wheat value chain, chosen as the test case for development of the methodology is currently perceived to be under-performing: despite considerable investment in basic science, wheat production has remained relatively static in terms of both quantity and quality.

Approach and Methodology

The methodology developed for this project built on recent initiatives related to supporting innovation in life sciences in the UK Technology Strategy Board, adopting the following definitions:

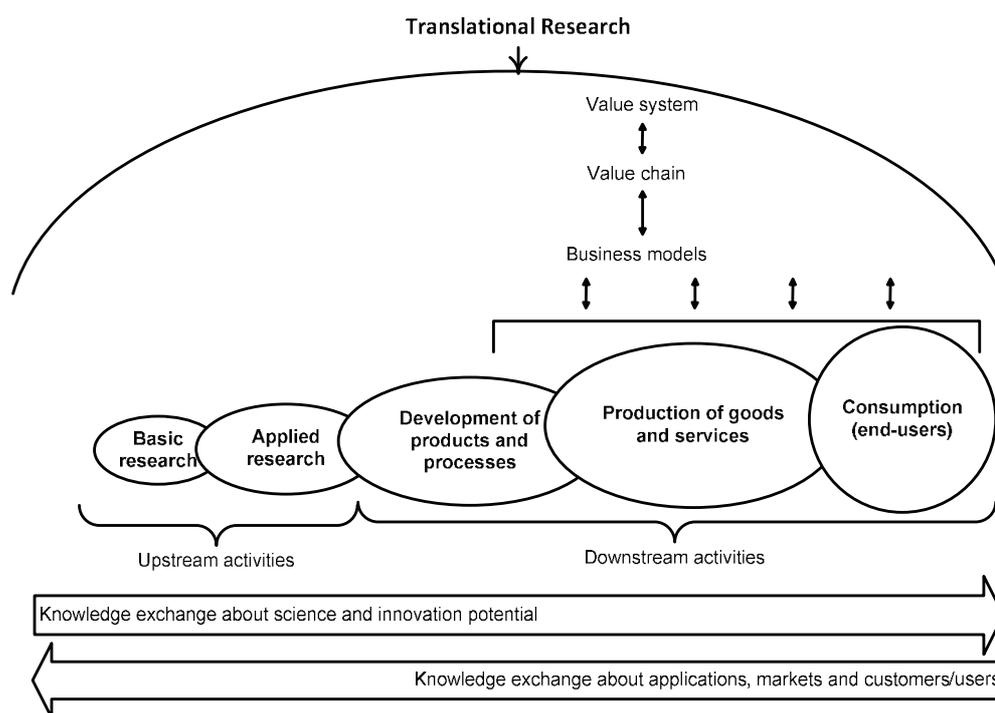
Translational Research - the new scientific methods and technologies, interdisciplinary approaches, and collaborative institutional arrangements being developed to narrow the gap between basic science and its application to product and process innovation.

Knowledge Exchange - the multi-directional flow of information of all kinds that is required as a basis for decision making in the translational research process.

Value chain - the range of activities required to bring a product or service from conception, through the different phases of production, to delivery to consumers.

Value system – the wider system within which the value chain operates including: policy and regulation, finance and markets, and public and stakeholder perspectives.

The following diagram outlines our conceptual approach to the study and indicates interactions relevant to our understanding of translational research and knowledge exchange.



Source: RAND Europe and INNOGEN

Figure 1 Conceptual framework for translational research and knowledge exchange in agriculture and food

The project distinguished four actor roles within the value chain: funders of knowledge generation; knowledge producers; knowledge intermediaries; and knowledge users. In most cases actors took on more than one of these roles in contributing to different aspects of the translation process. In the wheat value chain, knowledge about innovation potential and scientific expertise on how to realise that potential, along with knowledge about applications, markets and consumers' preferences, flows among the four categories of actors through multiple channels and feedback loops. The methodology developed here was designed to chart these interactions and knowledge flows, to identify successful examples of knowledge exchange and to identify blockages and pinch points that inhibit the translational research process.

The project had three key components: literature review, a survey of key actors and a validation workshop.

The literature review provided an evidence base of all relevant actors, their engagement in wheat translational research and all relevant fields of knowledge. Based on these data, two matrices were developed (i) an actor/activities matrix to identify 'who does what' and (ii) an actor/actor matrix to identify 'who engages with whom' in the context of wheat translational research. The project also developed a method for tracking the sequence of interaction nodes over time, where knowledge of different types is exchanged among actors at various points along a value chain.

A survey of key actors (knowledge producers, knowledge intermediaries and knowledge users) was undertaken to enrich this evidence base. Interviewees were asked questions about the importance of different factors in successful translational research, modes of

knowledge exchange and translational research, motivations to engage in these activities, and barriers and enablers of translational research.

The validation workshops brought together additional key actors in all categories to discuss the results from the literature review and the survey, and to contribute new insights to their interpretation.

Outcomes of research

The following were among the main outcomes from these analyses:

- The actor/activities and actor/actor matrices offer an effective means to summarise and present clearly the range of knowledge exchange activities that contribute to a value chain. They also usefully highlight potential gaps in the translational research process that can be explored further with a view to improvement.
- The matrices showed a great deal of translational research activity, including at the near-market end of the wheat value chain. Translational activity by knowledge producers was captured well by the literature review, but interviews more effectively captured information about the less publicised activities among knowledge intermediaries and knowledge users.
- For knowledge exchange, a high value was placed on face-to-face interaction, particularly by knowledge intermediaries and users, reflecting the often tacit nature of the knowledge required for effective translation. On the other hand, for knowledge producers, conferences were the preferred mode of knowledge exchange.
- Price volatility in recent years was seen as a major factor inhibiting translational research in the wheat value chain, making it difficult to assess the economic benefit of uptake of new products and processes.
- The complexity of the wheat value chain, which is long and feeds into many products, was considered a challenge to translational research.
- Other important barriers to knowledge exchange identified by interviewees were: recognition of the need for collaboration but nervousness about losing commercial advantage, particularly at the near-market end of the value chain; a perceived misalignment of interests between knowledge producers and knowledge users; the time and costs required to engage in translational research and the time required for a research programme to generate user-relevant outcomes; policy and regulatory barriers inhibiting basic research and its translation to products and processes; eligibility criteria for public funding of research that (in some cases) give priority to scientific excellence rather than translational opportunities.
- Important enablers of translational research were seen to be: the development of fora to facilitate knowledge exchange and to enable development of a synthesis of existing knowledge on specific topics; involving key actors and targeting end users across the value chain in a more systematic and informed manner; the effective use of policy to drive innovation and knowledge exchange based on a translational approach as outlined here (until recently many policies have advocated reduced emphasis on technology and productivity in farming systems).

Translational research and knowledge exchange in practice

Three examples of translational research in wheat-related areas provided further insights into wheat-related translational research. They draw attention to the difficulties of bringing cohesion to a fragmented value chain and of convincing farmers that investment could bring economic benefits.

- Stimulated by EU legislation imposing minimum standards for mycotoxin contamination of flour, the HGCA promoted the integrated development of risk protocols along with supporting equipment. The clear focus, along with effective investment in knowledge exchange led to uptake of the approach by farmers and millers.
- A project based on genetic markers, led by Campden-BRI, developed methods to measure the processing performance of wheat and to determine the genetic control of baking quality. However, no public funding was allocated to build on these findings and although knowledge generation was successful, its translation has proved more uncertain.
- Using high quality pig and poultry feed increases the quality of the animals obtained but there are few incentives for grain growers to focus on the quality of the feed they produce. This gap in the middle of the value chain could be addressed using equipment developed by the HGCA, but the technique has not been validated for on-farm use and it is expensive. As a result, growers are not getting a benefit from producing higher quality grain although feed producers are using the technology.

Conclusions

This report has offered fresh insights into the conceptual frameworks and methodologies that can be deployed to investigate and promote translational research and knowledge exchange in agriculture and food production in general and specifically in the UK wheat sector. In applying the methodology the report demonstrates the value of the matrix-based data gathering tool as an evidence base on core components of knowledge exchange and translational research. This could be expanded and maintained as an on-line resource to enable policy makers to chart changes in patterns of translational research over the coming years.

This evidence base will inevitably need to be supplemented by information more directly related to practitioner experiences. The interview programme and workshop in this project enriched the insights from the literature review and contributed to understanding of the potential role of translational research in the wheat value chain. This approach would also be essential in the wider implementation of translational research in the agriculture and food contexts.

Translational research in the health care area is providing powerful insights to address many of the kinds of question raised in this report. This project has demonstrated how a translational research approach could be adapted for use in the agricultural and food sectors and how it could deliver benefits that are of value to policy makers.