**Reflections from IGER’s Technology Transfer Initiatives**

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The Focus Farm programme in Wales has now been running for four years. During that time we have gained some invaluable experience about the process of transferring research outcomes to the farming industry and about how farm businesses see their needs from research.

**Technology adoption**

We have attempted to take the lead from the host focus farm and their associated farmer groups in determining a programme of technology transfer. This encouraged a participative process and ensured that research outputs were applied to real farm business issues. This review of some of the most frequently occurring subjects of farm improvement will illustrate the nature of this adoption process and the benefits of a more direct ‘research into practice’ relationship.

**Soil and forage analyses**

Soil and forage analyses were a standard part of the initial focus farm assessment. This generated strong interest within the farmer groups and led to planning of fertiliser and feed programmes where both new and some older technologies were brought into play.

These analyses can impact quickly to the benefit of production economics and also environmental protection. Soil analyses, for example, were used to more effectively target fertiliser and animal manure applications. On organic farms, questions were raised about the methodologies and parameters of soil and forage analyses and these deserve further research examination. Mineral nutrition of crops and livestock is a major area of farmer interest and input expenditure. Re-examination of older research and some new research may be needed. Collaborative
efforts, particularly with veterinary practices but also with feed and fertiliser suppliers, have been successful features of farmer group programmes.

**Grassland reseeding and regeneration**

The general separation of grassland from arable cropping in the UK during the late twentieth century diminished ‘ley farming’ as a route into any regular or rotational reseeding. Technologies which improved the utilisation of longer term grassland during this period also diverted attention and resources away from this practice. More recently the impact of increasing costs, particularly in silage production, has re-focused attention on the relationship between grass yield and costs, and on the importance of quality in a higher cost product. The same factors have contributed to an increased interest in alternative forages for winter feeding, especially on dairy farms (maize and whole-crop cereal, legume silage), and to a re-examination of purchased feedstuffs, cheapened under the influence of low commodity grain prices. As a result there is currently great fluidity in farmer attitudes to forage production and a capability to use a wider range of feeds, for example, through the use of total mixed ration equipment. There is a demand for more yield and quality from home-grown forage crops but, in some situations, low grain prices have moved reliance on grass forage in the opposite direction.

Thus, on one of the focus farms, situated in an upland grassland, non-arable area, winter feeding of the suckler herd is now based on purchased straw and bi-product feeds. This approach has been a topic of discussion and assessment in other focus farm groups.

**New crops and varieties**

New crops and varieties have proved to be particularly successful examples of technology transfer because; (a) they can be easily introduced at a test scale for ‘local’ proof of performance; (b) the ‘seed’ together with an ‘agronomy guide’ represents a complete technology transfer package; and (c) they can usually be readily monitored and evaluated, physically and economically, within the farm system.

**Red clover** - a traditional UK crop, now subject to new applications on both organic and conventional farms. It has been introduced to seven focus farms as a specialist silage crop for a high yielding dairy herd and on livestock farms as a lamb ‘finishing’ crop and beef cattle silage (Fig 8.2). Similarly, on two organic focus farms it is used as a dairy silage crop and cattle/sheep forage together with its role as a fertility-building rotation crop. These developments have utilised a wide range of research outputs from...
crop agronomy, through animal nutrition into animal product quality. Applications on focus farms has ensured that the crop have been introduced where it is appropriate and where disadvantages (e.g., unsuitability for winter grazing; oestrogen content, lack of persistence, bloat) can be properly managed.

**Oats** - The new IGER bred oat variety ‘Millennium’ was introduced as an alternative to winter barley at one focus farm. Here its performance in producing high yields of grain and straw, together with lower production costs relative to other cereals, as demonstrated (Fig 8.3). The grain was fed to sheep and as the cereal component of an intensive bull beef ration, and confirmed the research information about the enhanced energy value of this variety's thin-husked grain. Other Focus Farms have now taken up use of this variety.

More recently, research at IGER on Lupins as a protein crop for livestock is now being evaluated on a number of farms with a range of soil and climate conditions in Wales.

**White clover** - A more consistent and reliable contribution of white clover to livestock production systems continues to be a topic for farm improvement. There is a wealth of improved varieties and research information covering all aspects of agronomy and animal nutrition. However, as in many other areas, there is a continuing challenge to translate research levels of performance into more consistent outcomes on farms. White...
clover exploitation occurs across a complex of pasture types, all subject to differing management conditions. It can therefore be difficult to observe and evaluate successful management prescriptions within the overall farm system. Another factor, important in the Welsh uplands, may be the year round intense grazing pressures due to high sheep numbers and high sheep : cattle ratios. There remains a need for some new initiatives if the potential of white clover for semi-intensive and extensive livestock production is to be achieved in practice.

Environmental management
Environmental issues have featured in these programmes, including research outputs concerning manure management and crop introductions associated with Tir Gofal and organic farming systems. However, we have noted a greater interest in agricultural production issues compared with environmental management issues. We speculate that this may be for two reasons:

1. Farmers are not sufficiently engaged in the decision processes applied to environmental management. Environmental performance increasingly contributes to farm revenues both directly through environmental enhancement schemes (e.g., Tir Gofal; SSSIs) and farm tourism enterprises and indirectly through marketing initiatives (e.g., Farm Approval schemes). However these returns are based primarily on adherence to prescriptive conditions of management. By comparison, they owe little to the results of farm-based initiatives and decisions. Farmers are, to an extent, less likely to seek information or ideas related to environmental management.

2. There is insufficient attention given to the integration of environmental and production objectives. Livestock are an essential component of good environmental land management, and sustainability of ‘production and environment’ systems depends on agricultural outputs meeting market quality and value criteria. Agricultural and environmental objectives need to be seen as complementary parts of one farm business (Fig 8.4).

Conclusions
There has been a clear demand for a more direct link between IGER and the users of its research, and these programmes have expanded the flow of information in both directions. Farmers have determined a substantial part of the agenda for this process but, in practice, the best programmes have arisen when both sides have contributed ideas. Continuing development will reflect this partnership approach and will build on all our experience of coordinating these programmes.

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