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**Has Farming Connect made an economic impact on the Welsh agricultural sector?**

**Authors**

Berkeley Hill*,
University of London (Imperial College London);

Dylan Bradley
Agra CEAS Consulting Ltd

Eirwen Williams
Menter a Busnes

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*Corresponding author: Berkeley Hill (b.hill@imperial.ac.uk), 1 Brockhill Road, Hythe, Kent, UK CT21 4AB

**Abstract**

*Demonstrating the impact of Knowledge Transfer activities and advisory services aimed at farmers is important to justify their use in the achievement of policy goals and in the spending of public funds. Experience gained in evaluating Farming Connect in Wales, the programme delivering these services using a wide range of activities, is drawn on to illustrate issues faced in detecting economic impacts at farm and sector levels, in particular in establishing the counterfactual. The various methodological tools employed are compared, including the common but 'naïve' approach of asking farmers about impacts on their business, and the 'quasi-experimental' one of comparing samples of beneficiaries and non-beneficiaries. Rather different results are obtained (farmer responses suggesting a far greater level of impact) and reasons for these are sought. Lessons have been learned that need to be taken into account in the future design of monitoring and evaluation and for the selection of the types of activities that receive public support.*

**Keywords** Extension, Knowledge Transfer, Advice, Innovation, Impact

**JEL code** **Q12, Q16, H42, H43**

## Introduction

The predominant contemporary view is that the responsible use of public funds to intervene in any sector has to be accompanied by scrutiny of the outcome from this spending and, where possible, an assessment of its value-for-money (VfM) or Return on Investment (RoI) on the use of public funds. In line with this, Rural Development Programmes (RDPs) in EU Member States are subject to a regular system of evaluations, under methodological guidance from the European Commission, and it is common practice in the UK for separate evaluations to be commissioned by government on specific elements within the Programmes. Terminology is somewhat flexible in its usage, but the 'three E's' (Effectiveness, Economy and Efficiency) for long associated with the practice of evaluation have recently been joined by 'impact', and in particular 'net impact' which removes deadweight to indicate the extent to which changes observed can be attributed to the intervention under examination. The Commission has issued specific recommendations on impact assessment of RDPs (Commission, 2010).

Inherent difficulties in reaching the net impact of rural development is that any particular intervention is almost always accompanied by other factors that could influence indicators, so that observed changes in, for example, farm profits cannot be attributed solely to the intervention under examination. This environment presents a challenge when trying to assess the 'additionality' of any form of intervention. Establishing the 'counterfactual' (what would have happened in the absence of the intervention) is a critical step in reaching an assessment of the net impact of an intervention (its additionality).

Various techniques have been developed to assist in this task. Though scientific experiments under laboratory conditions are generally infeasible in this area of investigation, a 'quasi-experimental' approach may be possible, in which changes seen in a control group are compared with those seen in a group receiving the intervention, care being taken that the two groups are in other respects identical and thus subject to the same external factors. Another possibility is to alternate periods of 'policy on' and 'policy off', though there may be issues with displacement of decisions over time if the individuals are aware in advance of such alternations, and there may be changes in the external environment. A practical, common but methodologically 'naïve' approach is to question beneficiaries of RDP support about behavioural contingences (what would you have done in the absence of the intervention). This approach brings associated problems of achieving meaningful responses (do farmers know what the impact is and the proportion attributable to the RDP-funded activity?) and of 'optimism bias' (such as when beneficiaries wish to show that their past decisions have been correct or assume benefits to justify the time and effort expended by themselves or their advisors).

This paper considers what appears to be conflicts of evidence from 'naïve' and 'quasi-experimental' approaches to establishing impacts as applied to the same Knowledge Transfer and advice programme – Farming Connect in Wales. Assessing impact at the farm level is an essential first step in building up estimates of the aggregate value of the benefits arising from public spending on such a programme, and a lack of consistency in results is unsettling both to evaluators and for governments. Faced with such a situation this paper looks for possible explanations, and these are likely to carry implications for the ways in which results are viewed and, ultimately, for the allocation of public spending.

**Farming Connect and its previous evaluations**

Farming Connect (FC) is an integrated but diverse array of interventions that form part of the Welsh Rural Development Plan (Programme) using resources part-provided under the EU's Rural Development Regulation[1]. These activities include one-to-many activities (including farm walks, visits to demonstration farms and strategic awareness events), group discussions and development sessions (including business clubs and Agrisgôp – an action-learning programme), and one-to-one advice (including planning and succession surgeries, the Whole Farm Plan programme, the Skills Development Programme, and the Farm Advisory Service concerned with compliance and environmental issues – the last three known as the Subsidised Services, as farmers are required to meet 20% of their cost). There are also mass media events and impersonal forms of advice (such as fact sheets and articles in the newspaper directed at farmers). Mindful of the wide differences in messages to be communicated and the heterogeneous nature of the farming community, virtually the complete array of techniques encountered in international literature on agricultural extension is employed within FC.

[1] Funded in part comes from the EU's European Agricultural Fund for Rural Development under Articles 111 and 114 of the current Regulation, and in part from the Welsh Government.

Several evaluations have been commissioned that, *inter alia*, attempt to measure the net economic impact of FC activities. The Welsh Government (WG) commissioned separate evaluations relating to FC in the implementation period 2008 to 2011 from SQW on Agrisgôp (SQW 2011), the Development Programme (comprising demonstration farms, development farms, discussion groups) (SQW 2013a) on the Subsidised Services (SQW 2013b) and from ADAS on Events (ADAS 2013). Among the methods of collecting data, each of these evaluations involved telephone surveys of beneficiaries that included questions on the impact that participation in FC activities had had on their farm businesses, using a single specific indicator. The SQW evaluations asked questions about the change in farm ***turnover*** (not defined precisely but subsequently interpreted as meaning total output), while the ADAS one asked about changes in ***profitability*** (with the implication that farm profit was the focus of attention). Farmers were asked about whether change had occurred and for estimates of the percentage change.

A common experience of these evaluations was that only a small number of farmers were prepared to provide estimates of percentage changes (not more than 50 and, for the Agrisgôp evaluation, only 6 cases) – see Table 1. The use of a single indicator (with no possibility of checking validity against other responses) and small case numbers means that the evidence of farm-level changes is somewhat fragile. This also undermines the subsequent calculations that use them in order to build up estimates of the aggregate value brought about by FC, which can then be set against the cost of providing the service in order to estimate the return on the investment of public funds (RoI). Each of the previous evaluations have attempted such estimates, following basically the recommendations of the UK government for impact analysis (BIS 2009), though the authors are clearly aware of methodological weaknesses and label their results as only indicative and to be heavily caveated.

**The Agra CEAS Consulting approach**

From September 2011 a new delivery system for FC was introduced, with Menter a Busnes (MaB) awarded the contract to deliver the full range of services, replacing a system in which multiple delivery agents were engaged. In 2012 Agra CEAS was commissioned by MaB to conduct an on-going evaluation of their delivery, covering the period from September 2011[2]. This involved, among other activities, telephone surveys of beneficiaries and of a matched sample of non-beneficiaries in 2013 and, in 2014 after an extension both of the delivery contract and the evaluation contract, a pilot for a system of follow-ups in which beneficiaries were approached by FC fieldstaff some 6 months after their participation in a FC activity to explore the changes they had made and the extent to which these were attributable to FC. This timing helps explain why the surveys of beneficiaries and non-beneficiaries and the follow-up survey were not designed at the outset as being integrated part of a single methodology and why there were small differences in questions, though these do not affect the conclusions.

[2] The need to appoint evaluators for this purpose was part of the delivery contract issued by the Welsh Government. It should be noted, however, that the client to whom Agra CEAS (the chosen evaluators) reported was Menter a Busnes (the delivery body) and not the Welsh Government.

## Table 1: Summary of methodologies used to estimate impact of Farming Connect

| | **ADAS (2013) Evaluation of FC Events (look at table 7)** | **SQW (2013) Evaluation of the FC Development Programme** | **SQW (2013) Evaluation of the FC Subsidised Services** | **SQW (2011) Evaluation of the Agrisgôp Management Development Programme** | **Agra CEAS (2014) on-going evaluation of Farming Connect** |
|---|---|---|---|---|---|
| **Date published** | September 2013 | January 2013 | July 2013 | February 2011 | January 2015 |
| **Period covered** | July 2008 to August 2011 | July 2008 to August 2011 | July 2008 to August 2011 | Relates to late 2010/early 2011 but may contain cases starting earlier (2008?) | September 2011 to end 2013 |
| **Number of beneficiaries surveyed** | 189 | 375 | 376 | 40 beneficiaries (20 in completed groups, 20 in current groups) | 1,048<br>*of which*<br>Lot 1: 457<br>Lot 2: 158<br>Lot 3: 433 (*of which*<br>115 FAS; 148 WFP) ;<br>170 SDP; and 62 Agrisgôp). |
| **Indicators chosen** | Profit | Turnover | Turnover | Business turnover | Variable costs<br>Fixed costs<br>Sales<br>Turnover of on-farm diversification<br>Farm profit<br>Labour used<br>Total family income |
| **Percentage reporting positive change of economic indicators** | 19% reported increased profit(ability). | 23% reported increased turnover | Increased turnover<br>WFP 44%<br>FAS 39%<br>SDP 34% | 30% improved turnover, | 26% increased sales (1% decreased)<br>37% increased farm profits (1% decreased) |
| **Number of cases reporting magnitude of change** | 11 (from Table 7; text states 14) | 27 | Less than 50 | 6 | 494 (for farm profit) |

*The pilot follow-up monitoring exercise – a naïve approach*

In the follow-up exercise, the aim was to question 10% of participants, randomly selected, of the farmers listed as having participated in each of the FC activities during the first two years of operation under the management of Menter a Busnes (which started in September 2011); in practice resource constraints limited this to 6% overall, but this still represented just over 1,000 cases. The following FC activities were covered, brigaded into Lots for contracting purposes.

- Lot 1 Knowledge Transfer: demonstration farm meetings, discussion group meetings, workshops, one-off events, farm walks, business clubs, women elite clubs, clinics
- Lot 2 Industry Development and Communications: planning surgeries, succession surgeries, land management training, diversification seminars, strategic awareness events
- Lot 3 Skills Development and Management Development: Farm Advisory Service, Skills Development Programme, Whole Farm Plans

This follow-up included *inter alia* questions on farmers' perceptions of the impact on farm viability, competitiveness, labour usage, the environment and a number of other policy-relevant issues. The results are given in Figure 1 which summarises the perceptions of the various activities' impacts (these differed across the activities).

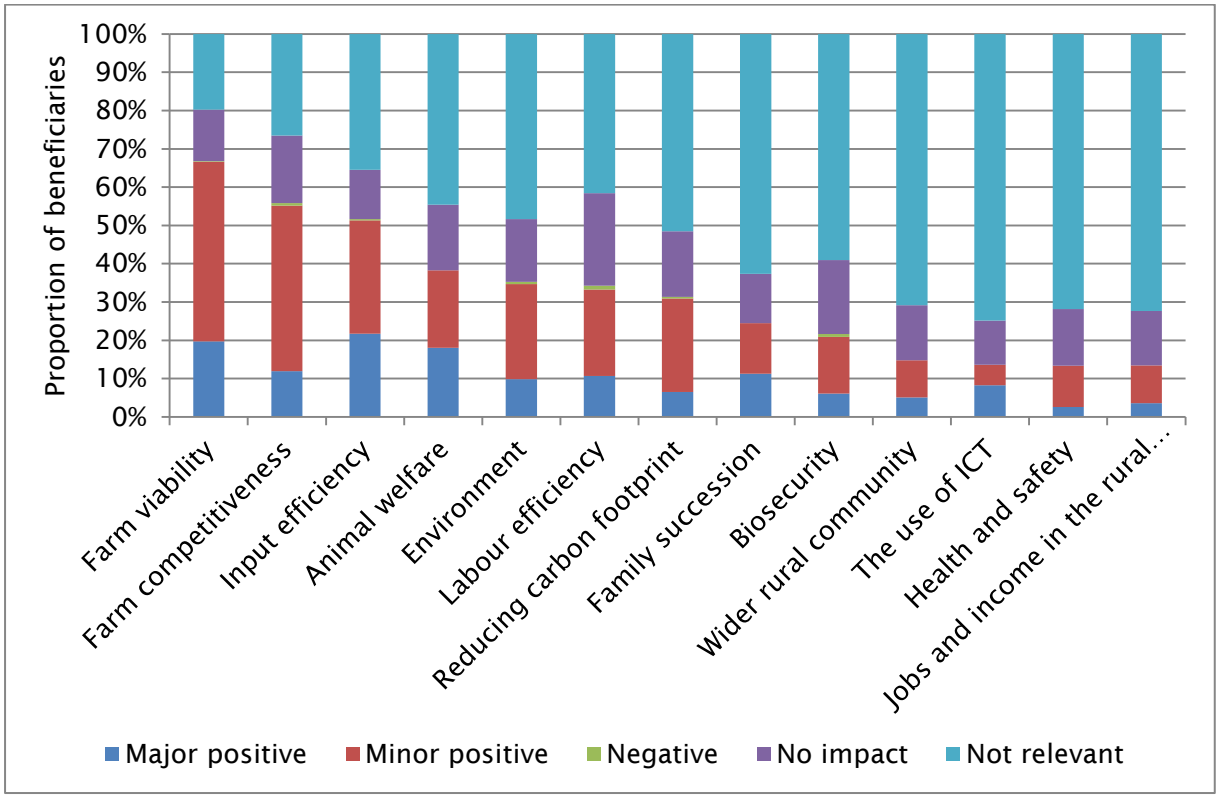


**Figure 1: General impact of changes made as a result of Farming Connect activities**

In addition, and of importance to subsequent estimation of the economic value of FC, farmers were questioned on the changes they had seen in a number of specific financial indicators (variable costs, fixed costs, value of farm sales, farm profit, turnover from on-farm diversified activities, labour usage, and family income). To encourage responses beneficiaries were asked to provide information

about the extent of changes seen following their participation in a particular FC activity by using a set of bands for each indicator. For the purpose of this paper attention is focussed on farming profit and sales. Responses included not only changes in the anticipated direction (positive in the case of farm profit) but many where no change had been made following FC participation and a small number in an unexpected direction (such as lower profits). After presenting the findings in these bands, Agra CEAS calculated an actual impact in percentage terms by converting each range to its central value (thus a range of +5%-10% becomes +7.5%). The extreme bands (changes of more than ±25%) were assumed to be equal to +25% and -25%. Unspecified increases and decreases were removed. Sensitivity analysis was carried out to determine the validity of this assumption by replacing the extreme ranges by higher (lower) figures. Whilst this did have an impact on the findings, this was not substantial, suggesting that the choice of value for the extreme ranges is reasonable. This approach seemed to elicit higher response rates than had been experienced in earlier evaluations; when asked about changes in profits almost 500 farms contributed to the banding exercise.

The estimation of the change following participation in FC activities is a gross one; it was not entirely the responsibility of this participation as some, perhaps all, of the change might have taken place anyway. To address causality the Agra CEAS methodology asked farmers about the extent to which the changes seen in the financial indicators were attributable to their participation in the FC activity in question. Four levels were suggested; where the change was ***only, mainly, partly*** or **not at all** the result of FC participation. Agra CEAS assumed impact s of 100%, 66%, 33% and 0% respectively. This was used to reduce the gross impact to a net one for which FC was responsible.

Figure 2 shows the gross impacts and the changes caused by FC for the main financial indicators. These seem plausible. The impact on sales was larger than the changes in costs, and change in farm profit was larger than that of sales, as would be expected. Family income rose by less than farm profit, which is compatible with rising farming income being combined with more stable off-farm incomes.

Across the sample as a whole the gross impact on farm profit was 1.8% and the net one (the additionality element) was 1.2% (see Table 2). It is important to bear in mind that the values presented represent changes for the sample as a whole, i.e. they include those who did not report an impact. Previous evaluation literature commonly focuses on only those noticing an impact which results in a higher value. We feel that this approach overstates the impact to the casual reader, even if corrected for later.

Again, differences were seen across the range of FC activities. There were some activities, notably membership of Agrisgôp groups and of drawing up Whole Farm Plans (which involves consultants working with farmers), both of which are components of Lot 3, where the gross and net impacts on farm profit were higher.

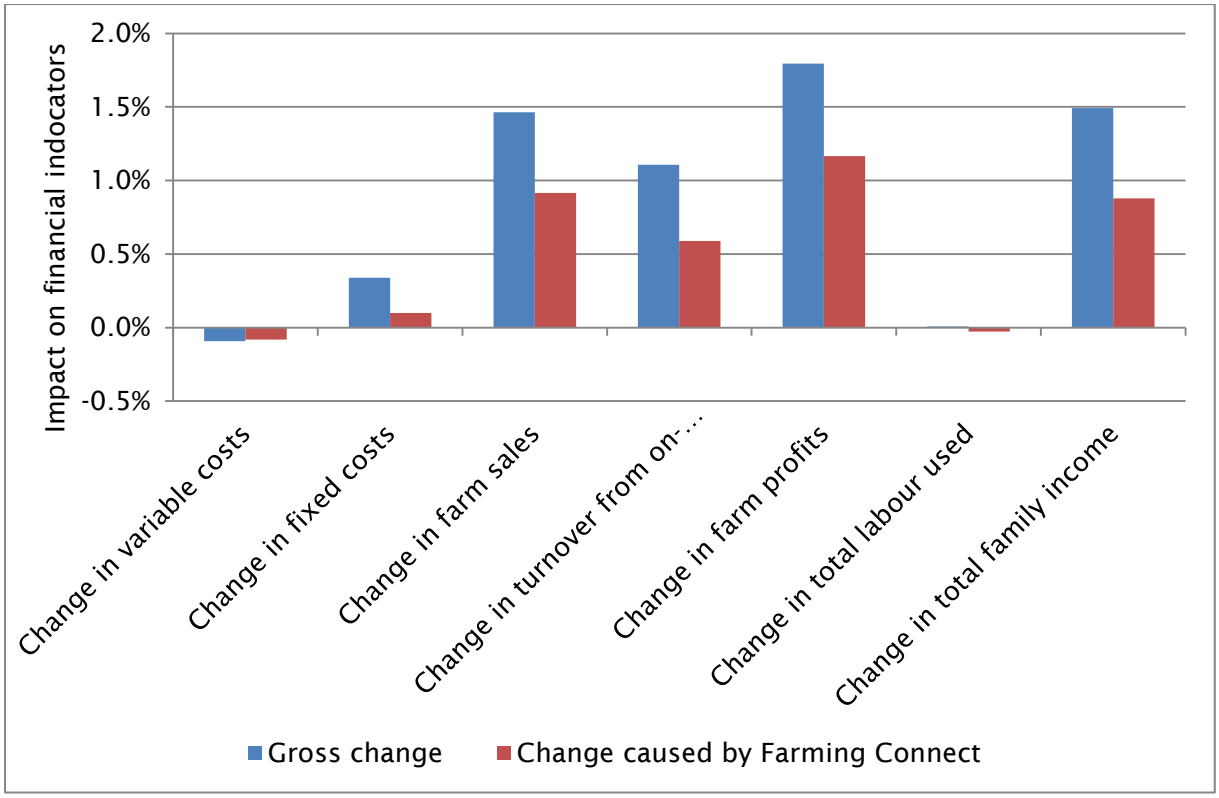


**Figure 2: Impact the Farming Connect sample on financial indicators**

**Table 2: Percentage changes in farm profit associated with FC activities**

| | Lot 1 | Lot 2 | Lot 3 | *Components of Lot 3* | | | | Farming Connect |
|---|---|---|---|---|---|---|---|---|
| | | | | *Agrisgôp* | *FAS* | *SDP* | *WFP* | |
| **Gross change** | 1.3% | 1.1% | 2.2% | 6.9% | 1.2% | 1.3% | 3.0% | 1.8% |
| **Change caused by FC** | 1.0% | 0.7% | 1.3% | 3.7% | 1.0% | 0.5% | 2.1% | 1.2% |

Source: Agra CEAS analysis of follow-up data.

At this point it is instructive to set the results of the Agra CEAS follow-up interviews alongside those from previous evaluations. Direct comparisons are not possible because, as noted above, the SQW ones used turnover as their only indicator (the nearest equivalent in the Agra CEAS work being the value of sales), the coverage of activities is somewhat different within Lots 1 and 2, and the periods covered are not the same. Furthermore, previous evaluations have suffered from small numbers of cases expressing the size of changes. However, and bearing all that in mind, the approximating comparisons, shown in Table 3, suggests that all point in the direction of a positive impact; the Agra CEAS follow-up monitoring tends to generate somewhat lower figures, but the direction is clear.

**Table 3: Near-comparable results – gross impact on the sample (percentage change including zeros and negatives)**

| | | Lot 1 | Lot 2 | Agrisgôp | FAS | SDP | WFP |
|---|---|---|---|---|---|---|---|
| **Agra CEAS** | Profit | 1.3% | 1.1% | 6.9% | 1.2% | 1.3% | 3.0% |
| **ADAS** | Profit | | 1.9% | | | | |
| **Agra CEAS** | Sales | 1.2% | 0.7% | 5.8% | 0.4% | 1.2% | 2.6% |
| **SQW** | turnover | 3.1% | | 5.7% | 3.9% | 4.2% | 5.3% |

Source: Agra CEAS analysis of follow-up data; ADAS (2013) and SQW (2011, 2013 and 2013).

*Surveys of beneficiaries and non-beneficiaries - a quasi-experimental approach*

The Agra CEAS monitoring follow-up exercise, conducted in 2014, and the previous evaluations of FC elements by SQW and ADAS have all employed 'naïve' approaches to establishing the counterfactual. However, in 2013 Agra CEAS also employed a quasi-experimental approach; juxtaposing the two approaches can provide an interesting slant on impacts at the farm level, requiring a deeper examination of the nature of farmers and their use of FC.

The quasi-experimental approach employed a sample of beneficiaries (405 cases) and non-beneficiaries (206 cases) matched for farm size and type, though leaving other characteristics (such as business structure and personality type unmatched (and thus potentially part of the explanation for patterns observed). As far as the beneficiaries are concerned, the 2013 and 2014 samples were drawn from the same population of farms that had made use of FC over the same period. Where results are directly comparable coincidence is high. For example exactly the same percentage (59%) of beneficiaries in both the 2013 survey and the 2014 follow-up sample (n=909) reported that they had made a change to farming practice/acquired a new skill following their involvement with the scheme.

From the pattern of perceptions described above, both from the Agra CEAS analysis of monitoring data and from the SQW and ADAS evaluations that applied to the preceding period, it might have been expected that farmers who participated would be seen to have different patterns in their development of profits and sales/turnovers than farmers that had not. In a changing environment, such as a general downward movement in profitability, one would be looking for Differences in Difference over time if FC was having an impact. This, however, does not appear to be borne out by the findings.

Figure 3 presents changes in the value of sales from the farming enterprise since autumn 2011 as reported by the two samples in 2013. Most beneficiaries and non-beneficiaries said that the value of their sales had fallen. Only a quarter (24% beneficiaries, 26% non-beneficiaries) said that the value of their sales had increased. Key in the context of FC is that there is no appreciable difference between beneficiaries and non-beneficiaries. Almost all beneficiaries (93%) and non-beneficiaries (89%) who said that the value of their sales had decreased said this was nothing to do with anything that they did. Half (52%) of beneficiaries and 69% of non-beneficiaries who said that their sales had increased also believed that this was the result of factors outside their control. A fifth (21%) of beneficiaries and 11% of non-beneficiaries thought that the increase was mainly due to something that they had done while 27% of beneficiaries and 20% of non-beneficiaries felt that it was partly to do with something they had done.

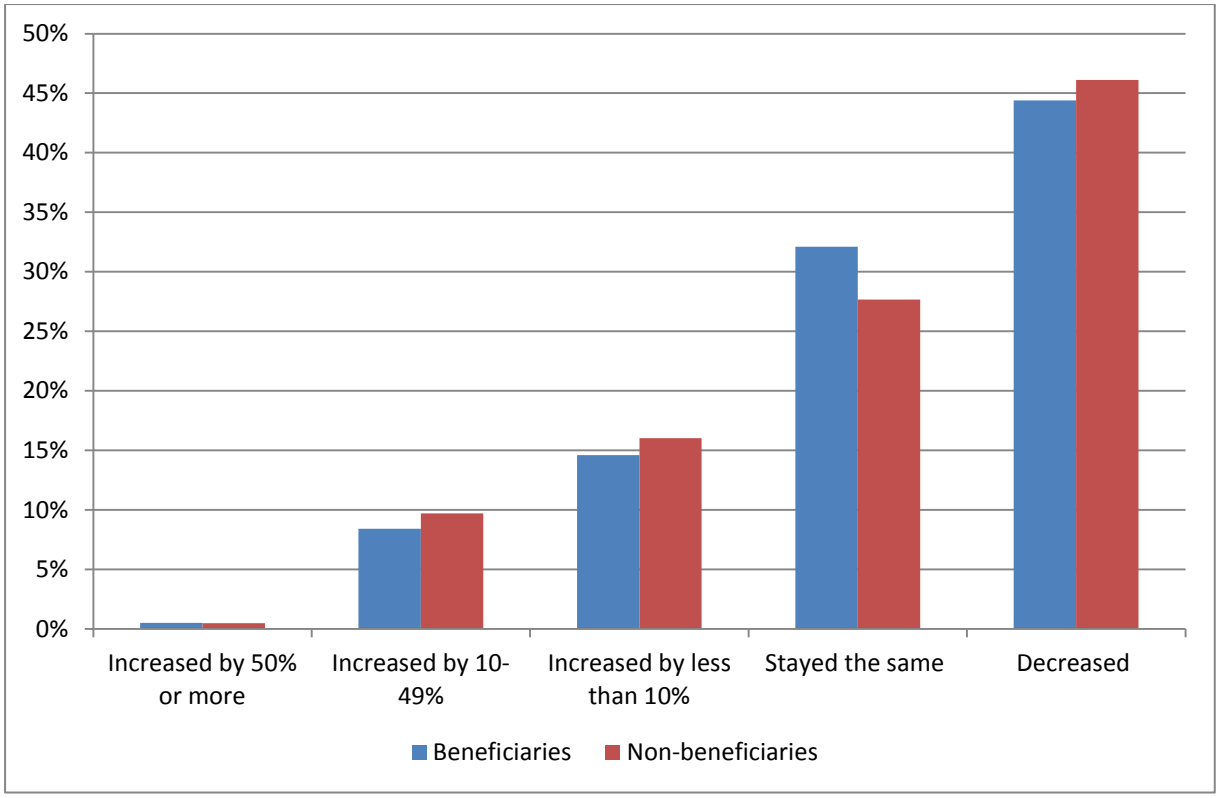


**Figure 3: Change in the value of sales from the farming enterprise since autumn 2011**

Turning to profits, the majority of both beneficiaries and non-beneficiaries said that their profits had decreased since autumn 2011 (61% and 60% respectively) (see Figure 4). However, approximately a third (31% of beneficiaries and 33% of non-beneficiaries) said that their profits from farming had stayed the same. These farmers had either seen sales revenue increase to compensate for increased costs or had seen costs and revenue change in the same way. However, given the smallness of these differences, it is not possible to conclude that Farming Connect had a positive impact on profitability at the sector level, although this does not preclude positive impacts on profitability at the individual level.

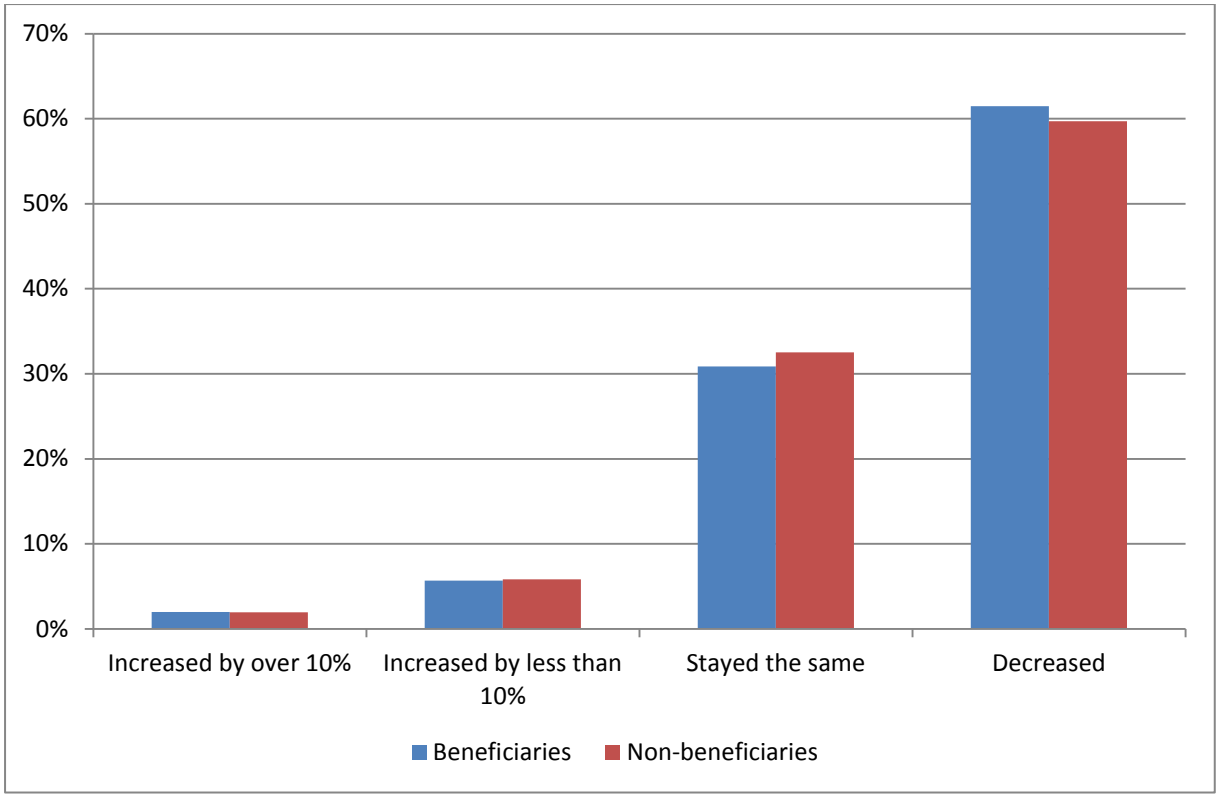


**Figure 4: Change in farming enterprise profit since autumn 2011**

Given the lack of differences shown by the quasi-experimental approach and the broad consistency of the more 'naïve' one based on farmer perceptions, an explanation has to be sought. A possibility is that the perceptions are simply wrong (data error in the absence of ready access to accounts) or reflect 'optimism bias' (perhaps encouraged by a data collection system that involved FC fieldstaff re-contacting farmers to whom they had previously delivered advice or provided information). However, the consistency of the perception-based finding across the different evaluations, some of which did not involve FC staff in data collection, prompts further exploration.

Part of the explanation may be that matching the samples of beneficiaries and non-beneficiaries by farm type and size is not rigorous enough. Differences were seen between beneficiaries and non-beneficiaries in factors such as the business structure (a higher proportion of partnerships and companies among beneficiaries), the extent of on-farm diversified activities and of income from off-farm employment of the farmer (or spouse) (more of both among beneficiaries), a younger age profile among beneficiaries, and a greater involvement among beneficiaries with other RDP schemes.[3] This suggests that FC attracts the relatively dynamic and opportunity-reward type of individual. Thus it is possible that the line of causality is complex; participation in FC activities may

[3] No clear pattern emerged on the differences in current profits earned by the two groups. Among dairy farms the income profile was higher among beneficiary farms, and this was also the situation among beef and sheep farm in Severely Disadvantaged Areas, but in Disadvantaged Areas it was the non-beneficiaries which had the higher incomes. Outside LFAs there was no noticeable difference between the groups on cattle and sheep farms. All reported a downward trend in their incomes.

be a function of the characteristics of the farmer and his or her situation. Other observations and possible explanations are invited.

Nevertheless, this disparity between the messages coming from naïve and quasi-experimental approaches implies that optimistic conclusions about the impact of programmes such as FC must be treated with extreme caution.

**Making aggregate estimates of the value of benefits from Farming Connect**

Given reservations about this most fundamental step in calculation of impact – what happens at farm level - any further progress towards a higher level calculation of the value of economic benefit might, with some justification, be abandoned. However there is substantial policy interest in this value and how it compares with the public cost of providing the KT and advice service. Though we have reservations about the estimate of the level of change at the farm level, despite being more robust than found by previous evaluations, it remains the firmest plank in what is a shaky edifice. On the assumption that the 1.2% impact on farm profit found in the Agra CEAS follow-up sample is valid, the further steps can be illustrated, if not endorsed.

The first step is to convert this average change per participant to an absolute figure. In the absence of information on the actual levels of farm profit among sampled cases (and of the magnitude of changes), resort has to be made to external information. The FBS for Wales can provide a useful benchmark. However, Agra CEAS has evidence from the 2013 survey suggesting that the FBS figures for Farm Business Income are somewhat higher than is reported by FC participants and, indeed, for Welsh farmers as a whole, though experience suggests that the typically conservative Welsh operator is likely to understate the actual position in any verbal response.[4] Thus, using the FBS in order to estimate the absolute value of increases associated with participation in FC may generate an optimistic figure, although the real figure is not less than half the FBS result, which can form the lowest boundary of estimation. Provisional estimates using data from the 2013 survey with the group showing the highest proportion of farms with incomes much below the FBS figures suggest it would be some 30% lower than the FBS figure, providing an intermediate position.

Estimation of the absolute change in farm profit is achieved by multiplying the assessed impact on farm profit (derived from the follow-up sample) by the observed average income in the FBS (a three year all-types average has been taken, at £35,333[5]), with provision for also estimating the lower boundary and an intermediate position:

[4] The 2013 survey asked a sample of FC beneficiaries and a matched one of non-beneficiaries to compare their profits for 2011/12 with those shown in the FBS results for that year (the most recently available at that time) published by Aberystwyth University. Responses from 247 beneficiaries and 101 non-beneficiaries, spread across sheep and beef farms and dairy farms and types of LFA status, found that individual cases of farm incomes above and below the FBS averages for the same farm type and location were experienced; this applied both to FC beneficiaries and to non-beneficiaries. However among FC beneficiaries (the focus of attention here), on balance there were more reporting lower profits than higher ones, though this was more apparent among beef and sheep farms than among dairy farms. While some in each type and LFA status indicated that their profits were less than half the FBS figure, this was a minority.

[5] This makes the simplifying assumption that the structure of farm types within FC matches that within the FBS.

*Absolute increase per participant = 1.2/100 x £35,333 = £424 (or £297 if actual incomes were 30% lower than the FBS average, or £212 at the lower boundary)*

To estimate the overall impact of FC on the profits of all participants, this (per farm) increase must be raised to the level of the total number of FC experiences (taken from FC administrative registers and Welsh Government payment records as 27,487) in the two years being evaluated:

*Increase in total income of the FC population = £424 (£212) x 27,487 = £11.7m (£8.2m on the basis of actual farm profits being 30% lower than FBS averages, or £5.8m at the lower boundary).*

This assumes, of course, that each interaction between the farmers and FC is separable, so that, for example, if a farmer has several interactions there will be multiple benefits on average, each corresponding to a 1.2% increase in farm profit.

This increase will have accrued over approximately two years (this was the period covered in the follow-up interviews). The public expenditure over this period on FC in total or on its component parts was not available to Agra CEAS, but Gareth Williams in his review of FC for the Welsh Government (Williams, 2014) cites £28.5m for the seven years 2007-2013 (an average of £4.1 million per year). Bearing in mind that some elements of FC (such as the annual conference and the preparation of Fact Sheets) are not reflected in the cost of farmer experiences, it seems reasonable to assume that the amount of public spending in this two year period on services covered by the follow-up exercise will have been in the order of £8 million.

Thus some £8 million of public expenditure on FC appears to have generated somewhere between £11.7 million and £5.8m of extra profit (private benefit) at the farm level, with a likely figure in the region of £8.2m. The implication is that this form of support was about as effective as giving the funds direct to farmers as a way of increasing their income. However, no account is taken in this calculation of the persistence of benefits to the incomes of the participating farms beyond the period covered by the follow-up data; neither is account taken of non-private benefits (animal health and welfare, environmental, etc.), nor of second-order benefits such as savings from reduced work place injuries, pollution clean-up costs, etc..

The methodologies used by SQW and ADAS attempted to estimate the wider economic impacts, and Agra CEAS applied a similar approach. The additional income to farm families will be expected to generate further rounds of spending in the wider economy, and there will be implications (some perhaps negative) of the changes to the pattern of agricultural production that give rise to the increased farm profit. The delivery of FC itself (its employment of staff directly and the engagement of consultants, etc.) will form part of the wider picture. The multipliers used by SQW and ADAS (from 1.3 to 1.6, drawn largely from previous SQW studies in the UK) capture these second and subsequent rounds; assuming a conservative coefficient of 1.3 raises the economic impact:

*Overall economic impact from £8 million public spending £11.7m x 1.3= £15.2m (or, using the alternative assumption about the actual level of farm income, £8.2m x 1.3 = £10.7m, or £5.8m x1.3 = £7.5m at the lowest boundary). On the basis of this, the Return on Investment is of the order of 1.9 (1.3 if actual farm profits were 30% less than FBS levels, or 0.9 at the lower boundary).*

Given that there is at present no element of persistence of private benefits or of public benefit built into these figures, it is not unreasonable to suggest that the use of public funds on supporting FC is rational. However, this is dependent on accepting the farmers' perception of change in profits in the face of conflicting quasi-experimental evidence and a number of assumptions, not least of which is the separability of the impacts of single interactions between farmers and FC.

**In conclusion**

We have demonstrated that a system that follows up KT and advice sessions delivered by Farming Connect in Wales by asking farmers questions on impacts is workable and yields information that is useful to government and the deliverers of services, not least that the impact of some activities on farm profits is greater than others. The use of multiple financial indicators (rather than relying on a single one) has brought advantages in terms of seeing how the impacts have been brought about; both changes in revenues and in costs form part of the story. There was concern *ex-ante* that farmers would be unwilling or unable to provide an indication of changes in financial indicators. This misgiving was not borne out by experience. While these questions were not universally answered, it is clear from this pilot exercise that using ranges does appear to be accepted by beneficiaries. Agra CEAS thus recommends that such a follow-up stage is built into the monitoring system for the provision of services. Though the present pilot was concerned with the economic impacts, it would not be difficult to devise a parallel coverage of environmental or animal welfare changes associated with KT and advisory services, possibly using a separate sample to avoid the overload of beneficiaries.

An apparent conflict exists between the results of the naïve approach of asking farmers questions about their perceptions of impacts on financial indicators (which have been consistently positive across several independent evaluations) and the quasi-experimental approach of comparing samples of beneficiaries and non-beneficiaries. While optimism bias in follow-ups is probably part of the explanation, so too is the lack of adequate matching of control groups (farmer personality, business structure, etc.). This deserves further investigation. Part of this might consist of a thoroughly designed experiment to test the basis of differences.

Taking the estimation of impact of KT and advice beyond the level of the farm directly surveyed and the calculation of returns on investment of public funds can be based on impacts found at the farm level. Though this is an imperfect starting point, the further steps in the calculation are, at present, heavily dependent on simplifications and assumptions. In the case of FC, some of these can be remedied by better information. Any further work needs to focus on filling these information gaps.

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