Institution: Harper Adams University
Unit of Assessment: 6 – Agriculture, Veterinary and Food Science
a. Context

The primary users of applied research and knowledge exchange conducted at Harper Adams are agri-food supply chain businesses and government. Advisors and consultants are major beneficiaries, with a large multiplier effect through the primary producers, land managers and other practitioners they advise. The main types of impact are on improved productivity, on safety and on the environment. Impacts involve development of new products and processes, optimising the use of existing products and processes and influencing government policy and regulations. These impacts have arisen from research across all the centres and groups, without any specific type of impact relating to one particular centre or group.

b. Approach to impact

An important vehicle for staff to achieve impact is through the long-established series of Continuing Professional Development (CPD) courses organised and administered by the University. The main CPD courses are run for external organisations in order for advisors to gain and maintain accreditation. These include: BASIS courses for crop protection advisors, FACTS courses for agronomists, and AMTRA courses for animal health advisors. More-recently, these have been augmented by participation in the AgriFood Advanced Training Partnership (ATP): one of four higher level training partnerships that have been awarded funding by the BBSRC for five years to deliver postgraduate training to businesses in the agrifood sector. ATP training is delivered by four leading internationally recognised university and research institute partners: The University of Nottingham, Harper Adams University, Cranfield University and Rothamsted Research, as well as industry partners including Campden BRI and Cambridge University Farm.

Staff teaching on these courses include active researchers who use their own research in course materials. Full-time teaching staff also use examples and material from research of colleagues. In addition to regular CPD courses, many bespoke short courses are devised for individual companies which draw upon the University's research findings. Approximately, 4,000 delegates attend CPD and bespoke courses annually.

Since most of the research is applied and conducted in collaboration with beneficiaries or with sponsorship from a beneficiary, knowledge exchange is built-in to the research from the beginning and may include, for example, presentations to practitioners by the researcher at sponsor's and independent events and conferences, contributing to technical documentation, and writing articles for professional and technical journals. Examples of these approaches to impact are exemplified by a project funded by the dairy farming levy company, DairyCo. This project is in collaboration with the Royal Veterinary College; University of Nottingham; University of Bristol; Westpoint Veterinary Group; Scottish Agricultural College; and Lambert, Leonard & May. One of the main contributions to Knowledge Transfer (KT) from HAU has been an annual Dairy Tech Event*:* this is a farmer orientated annual technology transfer event held using the Harper Adams dairy herd. In any one year, up to 1,000 people have attended a Dairy Tech event. HAU staff also work closely with DairyCo KT staff in developing a range of other KT outputs designed to achieve impact e.g. information sheets disseminated by DairyCo.

A newer approach to achieving impact developed in the latter part of the assessment period is the creation of membership-based centres such as the Soil and Water Management Centre and the National Centre for Precision Farming. These act as a direct conduit for informing members of research results from Centre staff. Since these centres are a recent development and are an important part of the strategy for enhancing future impact, they will be covered in section C below.

The University Farm is a major resource for achieving impact, as the vehicle for demonstrations and knowledge transfer events e.g. the Dairy Tech Event described above. A commercial-scale anaerobic digester is a recent addition to the farm facilities which has enhanced impact of AD research by enabling knowledge transfer events to be more attractive to potential AD users wishing to see commercial operation. Research results have been disseminated, in association with a visit to the commercial unit, to 2,000 visitors in the first two years of its operation. Other facilities are widely used for practical demonstrations related to research. For example, a pathway to impact for

research on incorporation techniques for nematicide in soil makes use of the covered soil hall. Training events for farmers on how to set up nematicide incorporation equipment are led by the researcher, in conjunction with the research sponsor. The soil hall provides an environment free from adverse weather, but at a realistic scale where operating incorporation machinery can be used exactly as in the field environment.

The major institutional resource facilitating public dissemination of research and impact is the hosting of all research paper outputs from Harper Adams staff in the Harper Adams-led open-access repository called OpenFields (see www.openfields.org.uk). While for copyright reasons (and in common with all repositories) many research papers may only be listed as an abstract, wherever possible a freely downloadable version of the paper or other outputs is made available for academic and external users. In addition, other useful literature such as conference papers, and technical and advisory materials arising from research are also included for free dissemination. Harper Adams employs specialist Technical Authors who work with academic staff and researchers to maximise the impact of research projects by producing project reports and technical notes which emphasise the applicability of the research. OpenFields currently hosts over 200 of these specialist publications, and they are the most popular type of material to be downloaded. Provision is now made in research proposals to fund the production of such outputs.

OpenFields has been in full operation for 4 years, and it now contains 3,350 quality assured research and technical items which are widely used by practitioners and professionals in their work. Usage has increased as the repository has become more widely known in our client industries, and online page views (e.g. of research abstracts) are running at a rate of around 50,000 per annum, with 17,000 annual downloads of specific items, where these are available under copyright. OpenFields is fully funded by Harper Adams and does not require user registration or paywall barriers as our intention is that research findings are made as freely available as possible.

c. Strategy and plans

The strategy for enhancing impact in the next REF period is focused on two major strands: co-location on the campus of agri-business research facilities, and developing our membership-based research centres (SWMC and NCPF). Further centres are planned, and dialogue is ongoing with potential partners for the proposed Agri-Tech Strategy Centres. HAU has adopted a proactive role in proposing an integrated structure for six agri-tech centres and is in dialogue with the Leadership Council. The Agri-Tech Strategy emphasis on industry involvement with the centres will be facilitated by the fact that HAU works with over 500 companies in the agri-food supply chain.

The construction of the first business facility, the Dairy Crest Innovation Centre, will commence in 2014. Dairy Crest is a major UK food business, and the co-location of the centre (approximately 45 research staff) at HAU will enable strong collaborations between staff of the two organisations in food product research and development.

The Soil and Water Management Centre (SWMC) will be used as an example of the membership-based centre approach. The SWMC at Harper Adams University is an academic Centre operating in partnership with industry. Its industry partners are nine leading companies in the agri-food sector, involved in machinery manufacture, tyre manufacture, soil analysis, agronomy advice, and fertiliser distribution. Their membership of the Centre ensures the industrial relevance of the ongoing research, and provides a pathway to the implementation of outputs within the industry. The Centre is structured into five themes, with theme leaders providing leadership on the direction and development of research programmes within each theme. Academic staff interact with the industry partners, as appropriate; and a two-way channel of communication exists which ensures that the focus of each theme remains relevant to the needs of the industry, while also providing a clearly defined and seamless commercialisation (industry implementation) pathway. This academic-industry partnership enhances the quality of the work undertaken and provides a sharp focus with respect to output targets and funding opportunities.

It is common practice for SWMC research trials to be extended to working farms, thus providing a pathway to test systems under real on-farm conditions. Furthermore, where outputs prove suitable for on-farm use, knowledge exchange programmes are put in place, where both demonstrations and workshops are conducted on selected farms; providing an opportunity for the wider farming community to see the systems in operation. There is currently a programme of knowledge exchange workshops, presented at various locations across the country during winter and spring. These are given by university staff and industry partners, and provide a very effective knowledge exchange

pathway. SWMC staff also participate in events organised by the member companies and this is an important pathway to ensuring impact. An example of this approach is the planned farmer event 'Discover AGCO' at the National Exhibition Centre, organised by a machinery manufacturer member company. SWMC will run a programme of seminars for farmers at this event on results of SWMC research, and expected attendance is 15,000.
The Centre is currently developing a web portal, whereby its activities will be displayed, to provide a channel through which the wider community can interact. Specifically, the Centre will open up formal membership of the Centre to the farming community, agronomists and other practitioners, on an annual fee basis. This will provide a gateway to the wider farming community, and another pathway to transferring the outputs into practice on farms.

d. Relationship to case studies

The case study on mycotoxins is a good example of the project-specific approach to impact involving close liaison with a sponsor. The Food Standards Agency was the government funder of this work and the PI worked closely with the sponsor to develop the code of practice for the industry. The levy company HGCA was another sponsor and the PI worked with HGCA to develop KT material to help disseminate the code of practice to the industry.

The case study on nitrate pollution illustrates a government-funded project which led to a legislative change affecting the industry in order to benefit the environment. Although the immediate impact was through a government department, HAU has played an important role in dissemination of the legislative change through CPD courses for fertilizer industry advisors (FACTS). During the period equivalent to the current REF (2009-2013), 208 advisors enrolled at HAU for FACTS training courses, leading to subsequent cascading to farmers through the advice given on fertilizer use. Research impact has also been achieved through the staff involved in the research developing bespoke short courses for the Environment Agency (EA) advisors who deal directly with farmers, advising on pollution control. The success of these courses has led to the recent award of a contract from the Environment Agency to deliver further training to EA staff.

Similarly, WiRE has achieved impact through various training courses.