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An analysis of practice change and the use of behavioural insights in agriculture and horticulture – identifying what works

Practice use report

for AHDB

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Contents

1. Introduction

This Practice Use Report aims to provide real life examples of behavioural intervention and methods that have resulted in practice change in AHDB's target audience of farmers and growers across its six sectors. The purpose of this report is to widen AHDB's understanding of the possible behavioural interventions and methods that have been successfully and unsuccessfully used in practical situations to address or develop a desired behaviour. The report will inform the production of further case studies.

The examples presented in this report aim to identify the practical application of behaviour change theory and campaigns used to create practice change and the behavioural factors behind the change. Each example identifies what worked (and did not work) to change practices. They also include information on the target groups and any wider social influencers. Also, the strength of the evidence is identified and if available, baseline and uptake statistics are presented to demonstrate the change in practice and the timescales for the change to take place.

The examples were drawn from a Rapid Evidence Assessment (REA) report that critically appraised the quality of evidence relating to 'what works' and specifically what AHDB behavioural change methods work in practice. Based on a rigorous REA protocol, which defined the criteria for the searching and screening stages, a total of 107 pieces of evidence were selected for the critical appraisal (88 peer review studies and 21 grey literature reports). These represented relevant evidence for the period 2013-present, from UK, Europe, North America, Australia and New Zealand.

A framework for the REA analysis was developed based on the behaviour factors that AHDB use for behaviour analysis and the working methods considered during intervention development. This Practice Use Report is structured around these behavioural change intervention working methods which are summarised in Table 1.

AHDB WORKING METHODS	
Provide information and advice • Knowledge transfer • Concrete Action Perspective • *Checklists* • Messengers with authority • Messengers as role models • *Personalise message* **Stimulating the target audience** • Interpersonal Communications • Implementation intervention • Gamification • *Entertainment Education* **Feelings** • Emotions • Framing • *Priming* **Values and norms** • Descriptive norm • Injunctive norm • Identity	**Nudges** • Default nudge • Feedback nudge • Stimulus nudge • *Kludge* **Small triggers /prompts** • Prompts • Friction costs • *Foot in the door* • *Substitution* **Rewards and losses** • *Present bias* • *Reciprocity* • *Scarcity*

• Commitment and Consistency • *Cognitive Dissonance*	

The final section of the report presents a separate review of the ethics around the use of behaviour change theories and provides recommendations for its application with AHDB and the agriculture and horticultural industries.

2. Knowledge Transfer

Knowledge transfer: one to one advice

Knowledge transfer means to communicate the functional and affective benefits of the desired behaviour. Here one to one advice is presented as an example of KT but in the context of a programme combining different KT methods. It should be noted that one to one advice might also be interpreted as *messengers with authority*, and as *interpersonal communication* (both 1:1 and one to many); also that farm advisers utilise different behavioural methods themselves such as prompts, concrete action perspectives (tools).

Name of initiative/study: Catchment Sensitive Farming Evaluation - Enabling action by farmers to reduce agricultural pollution

Highlights

- Holding-specific, one-to-one, advice is most effective for building trust and confidence.
- The CSF Office was a person whose advice farmers could trust, was helpful and encouraging.
- Improved water quality can in a large part therefore be attributed one-to-one advice.

Relevant programme: Cross sector; Environment

Source: Environment Agency (2019) Catchment Sensitive Farming Evaluation Report – Water Quality, Phases 1 to 4 (2006-2018). Natural England publication, June 2019.

Aims and context

Launched in December 2005, the Catchment Sensitive Farming (CSF) partnership is an advice-led initiative enabling action by farmers to reduce agricultural pollution. CSF has operated over four phases.

A total of 127 different measures have been advised. The majority relate to soil management (25 per cent) fertiliser management (23 per cent) manure management (20 per cent) and farm infrastructure (16 per cent). Pesticide management (7 per cent) livestock management (5 per cent) and land use (1 per cent) were advised to a more limited extent. Targeted advice refers to management of dirty water, soil and nutrient management plans, soil compaction and capping, livestock fencing, and farm tracks. CSF also facilitated delivery of Countryside Stewardship (CS) by bringing together land management and capital works to address water, alongside other, environmental objectives.

Details of behavioural method used

Significant importance has been placed on building relationships across the farming community using a combination of one-to-one and group engagements. Targeted and locally-tailored farm advice provided through a network of CSF Officers (CSFOs) is a central pillar of CSF. Group events provide a useful way of introducing farmers to CSF, before importantly following-up with holding-specific one-to-one advice.

Target group:

CSF delivery is focused primarily within the CS High Priority Areas for Water, covering ca. 35 per cent of England. Advice is targeting areas where action is most needed, these relate to geography and management rather than sector.

Wider technical and social influencers (advisers, family members, community, peer groups) and intermediaries (knowledge brokers)

CSF is a partnership organisation, as such farmers who engage with it will be exposed to large numbers of intermediaries, activities and events.

The practical application of behaviour change theory

CSF Officers (CSFOs) operate in each catchment. They operate on the ground locally, building long-term relationships with farmers visiting farms, targeting the hard to reach through individual farm visits and agricultural events across the country. They help with bespoke, technical advice and grant support to enable farmers to take voluntary action to create a healthy farmed environment. The CSFO role can be considered to be quite specialist when compared with other Lead Adviser roles in Natural England and this is reflected in the range of high-quality technical training available to CSFOs (e.g. BASIS).

Evidence of change

Results

This Catchment Sensitive Farming (CSF) Evaluation Report covers phases 1 to 4 from 2006 to 2018. After twelve years, the evaluation demonstrates that CSF has made significant progress in delivering its water quality objectives. Three phases of farmer surveys have been undertaken. Overall, 82 per cent of engaged holdings have received one-to-one advice, 57 per cent have been engaged through a group event and 5 per cent through a clinic. The evaluation found that holding-specific, one-to-one, advice is most effective for building trust and confidence. 70 per cent of one-to-one engaged farmers state they have trust and confidence in CSF, compared to 50 per cent of those attending only group events (Ipsos MORI, 2014 cited by Environment Agency (2019).

Strength of evidence

The evaluation is based on extensive farmer surveys by Ipsos MORI at each phase, as well as technical reports. There have been 19,776 farms engaged in the programme overall.

The behavioural factors behind the change associated with the application of human behaviour change science interventions

CSF farmers surveyed agreed universally that CSFO have a good understanding of the issues relating to water pollution from farming activities; understood the needs of their farm; provided practical suggestions; was a person whose advice they could trust; was helpful and encouraging rather than telling them what to do; listened to them; provided them with new information; understood the range of grant mechanisms available for their farm. 80 per cent of CSF-engaged farmers indicated that working with their CSFO increased the priority they give to water pollution. The 128,691 measures advised through one-to-one farmer engagements have an overall implementation rate of 59.6 per cent. The impacts reported such as improved water quality can in a large part therefore be attributed one-to-one advice.

A long-term relationship is typical of many one-to-one advisory associations. There is evidence that the ‘quality’ of farmer engagement with CSF and the outcomes of that engagement are important to the delivery of long-term, pro-environmental, behaviour change. Farmer motivation to remain engaged and continue positive management practices was identified, whilst there is no direct attribution to one-to-one advice, arguably this had helped in this regard.

This mix of group events followed-up with more specific one-to-one advice is seen as optimal for effective delivery. The CSF evaluation report attributed a number of benefits to the combination of approaches.

Effectiveness of implementation was linked to farmer understanding of how an action reduced water pollution. This suggests that the advice delivered through CSF successfully raised awareness of water pollution and how it can be mitigated. Planned action to address water pollution also correlates with the belief that a farmer’s own farm contributes to water pollution.

Knowledge Transfer: training, one to one advice and discussion Groups (Interpersonal communication)

Knowledge transfer involves communicating the functional and affective benefits of the desired behaviour

Name of study/initiative: The role of agricultural education and extension in influencing best practice for managing mastitis in dairy cattle

Highlights

- Formal agricultural training and liaison with agricultural extension services were positively related to the uptake of milk recording by farmers.
- Those farmers who undertook agricultural training were 10 times more likely to monitor milk quality compared to those who had not.
- Those farmers who were in contact with an extension service and also participated in a discussion group were seven times more likely to use milk recording than those who did not fall into this category.
- Although extension contact alone was also positively related to the uptake of milk recording, the effect was much larger when farmers were also involved in participatory extension, such as a discussion groups.
- Those farmers engaging with agricultural education and extension were more likely to utilise other innovative management practices such as AI.
- It was concluded that a synergistic approach involving education, extension and diagnosis in the prevention and control of mastitis in dairy cattle is effective.

Relevant programme(s): Animal health and welfare, Dairy

Source: Dillon, E.J., Hennessy, T. and Cullinan, J., 2016. The role of agricultural education and extension in influencing best practice for managing mastitis in dairy cattle. The Journal of Agricultural Education and Extension, 22(3), pp.255-270.

Aims and context

The role of agricultural education and extension in influencing the adoption of best practice with regard to herd-level mastitis management is important to understand. This study assessed the importance of training, one to one advice and discussion groups. Somatic cell count (SCC) is an indicator of herd health with regard to mastitis and is negatively related to productivity and profitability. Data was used from farm-level Farm Accountancy Data Network (FADN) data for Ireland over a five-year period (2008–2012) and panel data regression methods used to quantify the role of agricultural education and extension in reducing SCC and in influencing farmer best practice with regard to herd health, such as milk recording.

Details of behavioural method used

Target group

The study was interested in dairy farmers who had received agricultural training, one-to-one extension advice and had participated in a discussion group.

The practical application of behaviour change theory

The Knowledge transfer model was combined with the Health Belief model, by using training and one-to-one advice can provide 'cues' to action that can activate health behaviour when appropriate beliefs are held. These 'cues' include a diverse range of triggers including social influence and education campaigns. Discussion groups, which consist of a group of local farmers who meet regularly on farms to see, discuss and learn about technologies and practices that may be applied on their own farms (Parminter 2010) are popular in Ireland and are used widely to transfer knowledge. Farmers who are members of discussion groups are more likely than non-members to adopt new technologies, achieve higher physical performance in their farming enterprise and generate higher profit levels.

Evidence of change

Results

The proportion of farmers participating in milk recording increased over the period from 39% in 2008 to 49% in 2012. A 10% increase over four years.

Strength of evidence

The study was based on an annual sample of over 300 specialist and mixed dairy farms involved in Teagasc National Farm Survey (1,623 observations in total over the 5-year period of 2008–2012), providing robust evidence.

The behavioural factors behind the change associated with the application of human behaviour change science interventions

The results of this study suggest that relevant cues in modifying behaviour in relation to the management of mastitis in dairy cattle include agricultural education and extension service contact. Both formal agricultural training and liaison with agricultural extension services were positively related to the uptake of milk recording by farmers. The results suggested that those farmers who undertook agricultural training were ten times more likely to monitor milk quality compared to those who had not. Furthermore, those farmers who were in contact with an extension service and also participated in a discussion group (36% of the sample) were seven times more likely to use milk recording than those who did not fall into this category. Although extension contact alone was also positively related to the uptake of milk recording, the effect was much larger when farmers were also involved in participatory extension, such as a discussion groups. In addition, the study found that those farmers engaging with agricultural education and extension are more likely to utilise other innovative management practices such as AI.

It was suggested that the cumulative effect of particular management practices, such as milk recording, engagement with an extension agent, or participation in a dairy discussion group is effective in herd health.

Knowledge transfer: training workshops

Knowledge transfer is where the functional and affective benefits of the desired behaviour are communicated.

Name of study: FarmSafe Awareness Workshops

Highlights

- Those who participated in workshops had a high level of safety knowledge, but only a small improvement in their attitudes toward farm safety.
- Farmers who sent someone else to the workshop had a significantly higher safety and environment score than those who did not. It may be that having two people interested in safety - with one attending training - is enough to signal change
- Using an implementation intentions approach during training workshops may be more successful at having a long-term impact as developing plans appears to result in change
- Future programmes may be more successful at achieving change where they are comprehensive, include environmental and enforcement features, and target multiple farmers per farm.

Relevant programme: N/A – on-farm safety but the method used is relevant to the AHDB programmes.

Source: Morgaine, K. C., Langley, J. D., McGee, R. O., & Gray, A. R. (2014). Impact evaluation of a farm-safety awareness workshop in New Zealand. Scandinavian Journal of Work Environment & Health, 40(6), 649-653. doi:10.5271/sjweh.3446

Aims and context

Farming is a hazardous occupation, with farmers at risk of injury and even death. The aim of this study was to hold workshops with farmers over two years to evaluate the efficacy of these for changing attitudes towards farm safety.

Details of behavioural method used

Target group

Livestock farmers in New Zealand

The practical application of behaviour change theory

5-hour interactive education sessions were implemented to "capture the hearts and minds" of farmers and farm workers, and bring about a change in attitudes and behaviours. Participants were encouraged to share their experiences of any risks they take, farming-related injuries, and any safety measures they already used.

Evidence of change

Strength of evidence

More than 10,000 farmers participated in 630 workshops over the two years of the study. Whilst the robustness of the research methods were clear, the robustness of the evidence was limited, as the paper was a short communication piece so lacked detail.

The behavioural factors behind the change associated with the application of human behaviour change science interventions

The safety training workshops were tailored to farmers and well conducted but that was not enough to change safety practice. Those who participated in the workshops had a high level of safety knowledge, but only a small improvement in their attitudes toward farm safety. Farmers who sent someone else to the workshop had a significantly higher safety and environment score than those who did not. It may be that having two people interested in safety - with one attending training - is enough to signal change.

The poor outcome in terms of behaviour change was not attributed to the training approach, however, it is noted that the Farm- Safe agencies have implemented further educational programs which focus on making an action plan for the farm, and farm skills development courses, which may have a longer-term cumulative impact. Using an implementation intentions approach during training workshops may be more successful at having a long-term impact as developing plans appears to result in change.

It is expected that future programmes may be more successful at achieving change where they are comprehensive, include environmental and enforcement features, and target multiple farmers per farm.

3. Concrete Action Perspective

Concrete Action Perspective: environmental standards

The concrete action perspective gives the farmer concrete tips and pointers in order to give them the confidence that they will be able to perform the desired behaviour.

Name of initiative/study: The effect and impact of LEAF Marque in the delivery of more sustainable farming: A study to understand the added value to farmers.

Highlights

- LEAF Marque generates action plans, policies and review dates and this was valued by all participants, it reached beyond their initial motivations for joining the system and helped them develop their enterprises.

Relevant programme(s): Environment, cross-sector

Source: Reed, M., Lewis, N. and Dwyer, J.C., 2017. The effect and impact of LEAF Marque in the delivery of more sustainable farming: A study to understand the added value to farmers.

Aims and context

Leaf Marque is an environmental assurance system that recognises sustainably farmed products. It is an industry recognised global system and certification covers the whole farm businesses. The approach is of the whole farm business (Integrated Farm Management – IFM) for more sustainable production using new technology whilst enriching the environment and engaging communities. IFM aims to stimulate continuous business improvement and innovation.

The report is a qualitative study that aim to evaluate the impact and added value to farmers (economic, environmental and social) when adopting LEAF Marque.

Details of behavioural method used

Target

The LEAF Marque is targeted at diversified farm businesses, farms on estates and farmers with complex configuration of owned, renter and leased land. Farms are both in the UK and internationally.

Wider technical and social influencers (advisers, family members, community, peer groups) and intermediaries (knowledge brokers)

Research and development, technical and quality assurance managers.

The practical application of behaviour change theory

Farmers who comply with the LEAF Marque Standard must complete the LEAF Sustainable Farming Review. This uses a structured approach that gives the farmer concrete tips and pointers. LEAF Marque's online management tool provides guidance to support farmer implementation of IFM (including IPM) and their preparation for LEAF Marque certification as well as generates action plans, policies and review dates.

Evidence of change

Results

In energy efficiency, 54% of participants reported making savings, with reported savings of between £10,000 - £17,000 per year. LEAF Marque provides participants with valuable market opportunities; mostly through access to higher value supply chains, 97% of participants reported improved access to market opportunities, with 23% receiving a price premium. 69% of respondents said that LEAF Marque helped with regulations or accreditation schemes. Respondents report falls of between 8 - 20% in the use of plant protection products and a rise in the use of biological controls.

Strength of evidence

Thirty-seven interviews with LEAF Marque certified businesses, interviewed between December 2016 and February 2017. Twenty-five of these interviewees took part as anonymous contributors, while twelve were presented as case studies.

The behavioural factors behind the change associated with the application of human behaviour change science interventions

Along with other supporting activities (e.g. training, networking) farmers who comply with the LEAF Marque Standard have to complete of the LEAF Sustainable Farming Review. This online management tool provides guidance to support their implementation of IFM (including IPM) and their preparation for LEAF Marque certification as well as generates action plans, policies and review dates. The evaluation of the impact of LEAF Marque found that it allowed managers of the business to engage in a critical reflection on the strategic direction of their activities, resulted in savings for members and change in practice (e.g. general decrease in the use of plant protection products and increased testing of soil). As one farmer explained, the LEAF process became a “subconscious thing - because you write the plan, you do it” and that it formed an important backstop to his process of developing the farm, making him more confident. Another farmer had been able to work out that their fuel use had improved from 77 litres per hectare in 2008, to 59.49 litres per hectare in 2014 and that “the LEAF review made us do it”.

4. Use of Messengers

Messengers who are role models: mentors

The use of a messenger who has similarities with farmers can change behaviour by demonstrating to the farmers that they too can make the behaviour change.

Name of initiative/study: Farming Connect in Wales: Mentoring for improved business management

Highlights

- Mentoring provides a professional approach to business management and development
- Mentoring gave farmers the skills and confidence to implement business plans effectively
- Mentoring worked best in combination with other approaches
- Uptake of mentoring was low, there may be an image problem

Relevant programme: Cross sector (mainly beef and sheep), Business

Source: Pates, R. and Hindle, R. 2020. Evaluation of the Knowledge Transfer, Innovation and Advisory Services Programme (Farming Connect) . Cardiff: Welsh Government, GSR report number 14/2020

Aims and context

A key objective of Farming Connect is to increase the emphasis on business-focused behaviour and therefore improve the profitability, competitiveness and environmental performance of farm, forestry and food businesses, and by extension, promote the economic growth and development of rural areas. The mentoring is part of a wider package of support and intends to help professionalise the industry specifically targeting farmers who are: new entrants; businesses considering significant strategic change in direction (diversification, added value, expansion, new enterprises), individuals looking to exit the industry; and businesses or individuals facing difficulties or hardship.

Details of behavioural method used

The Mentoring Programme was established in 2016 to enable farmers to receive guidance and advice from their peers on a wide range of topics. All eligible mentees can access 22.5 hours of fully funded mentoring services (flexibly delivered) with their chosen farming mentor, over an 18-month period.

Target group:

Farmers registered with Farming Connect can apply (if they meet simple eligibility requirements). There are 9,576 unique businesses/holdings registered with Farming Wales Connect, representing one-quarter of all agricultural holdings across Wales. Farm businesses are primarily the Beef (37%) and Sheep/Goats sectors (36%).

Wider technical and social influencers (advisers, family members, community, peer groups) and intermediaries (knowledge brokers).

Farming Connect offers a range of other advice including 1:1 advisers, demonstration farms and focus farms.

The practical application of behaviour change theory

Mentoring is one way of utilising the influence of role models as respected and relatable peers. Mentors are “able to share their knowledge, experience, and impartial views to help you identify your goals and

fulfil your potential". Farmers were free to choose a mentor from an online directory which lists the farmers who act as mentors.

Evidence of change

Results

Uptake of mentoring was low. Mentoring only constituted a small proportion of overall beneficiary engagement, for example, "1-2-1 Mentoring" (n=491 engagements by n=144 beneficiaries),

Strength of evidence

Although the review of the programme was comprehensive and robust, the case study evidence came from consultations with just two mentees and their mentors.

The behavioural factors behind the change associated with the application of human behaviour change science interventions

Case study evidence showed that practical advice and guidance enabled new practices to be implemented immediately, and that one farmer avoided taking uninformed and inappropriate decisions which would have led to costly mistakes. The mentor case studies also provide good examples of a more professional approach to business management and development, particularly in the use of business plans, and giving farmers the skills and confidence to implement these effectively.

The aspects of mentoring that worked well were:

- Provides practical advice from a trusted source with relevant experience;
- Mentee driven - mentors support mentees in the direction the mentee wants to go, rather than instructing which direction they should take; and
- Often mentors provide reassurance, in addition to advice in a practical, "everyday" context.

However, mentoring is under-utilised to date due to lack of understanding of its potential value and a "taboo"/image issues around having a mentor as it is seen to suggest some inadequacy on the part of the farmer.

Where beneficiaries had engaged with more than one aspect of Farming Connect, it was often the combination of complementary support from different parts of Farming Connect that made the real difference to business performance overall. In addition, some of the more intensive aspects of support appeared to be particularly important in delivering change, such as Agri Academy, mentoring and Agrisgôp. Mentoring is built into a wider progressive programme or 'journey' for example the Agri Academy encourages reflection and innovation, which is then followed by mentoring support to implement new processes.

Messengers who are role models: pioneering farmers

The use of a messenger who has similarities with farmers can change behaviour by demonstrating to the farmers that they too can make the behaviour change.

Name of initiative/study: The Teagasc/Irish Farmers Journal BETTER Farm Beef Programme (FBP) BETTER is an acronym for Business, Environment and Technology through Training, Extension and Research

Highlights

- Farmer 'role models' had high credibility as pioneering farmers among their peers in demonstrating the use and adaptation of technologies.
- Esteem generated by peer-to-peer relationships works both ways: farmers learn best from fellow farmers, and pioneering farmers are conscious of their social roles

Relevant programme: Business, Beef

Sources: Macken-Walsh, A., Crosson, P. and Murray, A., 2012. A qualitative study of Irish beef farmers' production decisions: summary and implications for extension. *Teagasc: Carlow, Ireland*.

Aims and context

The aims of BETTER FBP were (1) to establish a national programme to demonstrate the potential to increase the financial returns on beef cattle farms through improved technical efficiency, (2) to improve levels of technical efficiency on livestock farms on a national basis by communicating the key messages generated from the national programme through various media channels, including the Irish Farmers Journal, (3) to provide a better understanding of how and why technologies are adopted by farmers, thus leading to improved design and implementation of advisory programmes, and (4) to provide clear signals for further research by identifying critical areas where the level of current knowledge is lacking.

Details of behavioural method used

The participating farms received an intensive level of advisory support through the programme overall but the approach centred its extension activities on pioneering farmers.

Target group:

The programme was launched in 2008 with sixteen suckler beef cow farms with a strong commercial focus participating in the initial phase of the programme (in 2012 the programme was extended to include 35 farms).

Wider technical and social influencers (advisers, family members, community, peer groups) and intermediaries (knowledge brokers).

The research found that farmers were socially isolated and that importantly there is a need for extension support to acknowledge the social needs of farmers as without social support structures, farm development, productivity and profitability can be very low down on their list of priorities.

The practical application of behaviour change theory

Recruiting pioneering farmers on the project was based on an understanding that the role of pioneering farmers – who are willing to take risks – is crucial, and targeting strategic extension activities to support

the learning that occurs in the interactions between pioneering and 'non-pioneering' farmers is likely to have effective results.

Evidence of change

Results

The programme overall was successful, results from the first phase of the BETTER FBP showed average increases in farm output and gross margin by 49% and 118% respectively. It was estimated that 66% of the gains made resulted from improvements in technical efficiency, with the remaining gains due to price inflation.

Strength of evidence

The results come from in-depth sociological case studies of 5 farmers participating in the BETTER Farm Beef Programme and of 5 counterpart non-participating farmers (in which few or no new technologies were in use). They undertook detailed case studies with narrative interviews which examined the life experiences and 'mindsets' of the farmers with a view to identifying the factors that were implicated in the farmers' approaches to agricultural production and farm development.

The behavioural factors behind the change associated with the application of human behaviour change science interventions

With regard the effect of role models, the farmers interviewed had been pioneering farmers far in advance of participating in the BETTER FBP and this longstanding role among their peers and in their communities (and their social legitimacy as pioneers) was critical to their roles in the programme and their functions in contributing to the programme's broader extension objectives.

The pioneering farmers interviewed were able to withstand the scrutiny of peers and were quite comfortable to discuss the technologies with their peers. The farmers themselves had a strong sense of confidence in their own capacities to make informed and discerning judgements in relation to which technologies to test on their farms. They attached great prestige and esteem (cultural capital) to their abilities in that regard. Participation in the BETTER FBP constituted a deepening and progression of their sense of confidence and esteem in their abilities.

The use of pioneering farmers – those who are genuinely recognised as pioneering farmers by their peers – can play an important role in technology transfer. Furthermore, the research found that esteem generated by peer-to-peer relationships works both ways: farmers learn best from fellow farmers, particularly those who are credible; and pioneering farmers are conscious of their social roles and themselves have a sense of prestige and esteem in guiding other farmers related to their self-image. As one said:

> *"If we, if the BETTER farm (shows) … watches me achieve its goal of taking farmers from the average gross margin … and other farmers can see the benefits of it, it's worth everybody's while"*

In the case of the BETTER FBP, through publicity in the national media, the farmers participating in the BETTER Farm Beef Programme developed a national profile.

Current practices are largely based on habit and tradition, the main triggers or motivations for change are lifestyle preferences outside of farming. An important message for extension programmes is to highlight these potential rewards from farm development. Showcasing the 'real life' stories and experiences of other farmers is a useful tool in this regard.

Interacting methods

A combination of approaches was effective: with expertise channelled through extension services acting as a powerful knowledge enable; addressing cultural and emotional aspects of farming was strongly influential on all farmers studied and providing social support. Understanding the critical social and

cultural ‘triggers’ that influence farmers’ behaviour is important for fostering change at farm level through extension practice.

5. Interpersonal Communication

Interpersonal communications: participatory discussion groups

Interpersonal communication is where the target group are stimulated to talk to each other about a particular subject. Participatory group meetings are used to facilitate interpersonal communication by stimulating the participants to talk to each other about the practice change.

Name of study/initiative: The Dairy Efficiency programme (DEP): - Financial incentives for encouraging farmers to participate in extension programmes

Highlights

- Farmers with larger, more intensely farmed holdings were more likely to participate in discussion groups.
- Even after controlling for this self-selection bias, the economic returns to discussion group members are positive, on average €310 gross margin per hectare (or an approximate 12% increase), thus supporting government targets to enrol more farmers in discussion groups.
- However, farmers who joined a discussion group after an incentive to join was introduced did not significantly benefit from the extension programme, suggesting changes in farmer motivation to join and the types of farmers joining.

Relevant programme: Business, Dairy

Sources: Lapple, D., Hennessy, T., & Newman, C. (2013). Quantifying the Economic Return to Participatory Extension Programmes in Ireland: an Endogenous Switching Regression Analysis. Journal of Agricultural Economics, 64(2), 467-482. doi:10.1111/1477-9552.12000.

Lapple, D., & Hennessy, T. (2015). Assessing the Impact of Financial Incentives in Extension Programmes: Evidence From Ireland. Journal of Agricultural Economics, 66(3), 781-795. doi:10.1111/1477-9552.12108

Aims and context

The Irish government launched the Dairy Efficiency programme (DEP) in 2010 to promote efficiency in the dairy sector through the adoption of best practice in relation to grassland, breeding and financial management. The scheme encouraged more farmers to participate in discussion groups by offering a financial reward for participation.

This study explores the impact of incentives to participate in the programme using data from Ireland. The performance of farms participating in an extension programme before and after a financial incentive was offered for participation is assessed to identify the impact of the programme changes when the incentive is offered. The study contributes to the wider literature on agricultural extension and incentivised education programmes in general.

Details of behavioural method used

Target group

Dairy farmers of all sizes in Ireland focused specifically on milk production.

The practical application of behaviour change theory

Participatory discussion groups are a key method used to encourage interpersonal communication. They are characterised by an extension agent acting as a facilitator rather than an instructor, and farmers engage in problem solving and interact with their peers in a group, which sharpens their decision-making

abilities and management skills. The approach allows farmers to take ownership of problems, to draw on the non-scientific knowledge of the group and thereby empower them to adopt new technologies.

In Ireland, the participatory extension approach was introduced in the form of discussion groups in the early 1980s and has grown in popularity in recent years. The discussion groups studied here consisted of 12–15 dairy farmers who meet several times a year usually at demonstration farms, but also at farms of discussion group members. During these discussion group meetings, farmers share ideas and information among themselves while examining different parts of the farm where the meeting is hosted. To encourage membership in discussion groups, the Dairy Efficiency Programme not only funds the facilitation of these groups but also provides farmers with a payment of approximately €1,000 per year for participation.

This study used a switching regression approach to model whether participation in discussion groups is likely to result in change.

Evidence of change

Results

The results showed that farmers who joined before a financial incentive to join discussion groups was introduced significantly improved their farm performance, while farmers who joined after the incentive did not significantly benefit from the extension programme. Farmers that participated in discussion groups, before any financial incentive was offered, had statistically significantly higher yields and gross margins per cow than non-participants. These farmers received a return from discussion group membership of €150.70 gross margin per cow and were also able to achieve higher milk yields of 355 litres per cow.

Strength of evidence

The study used a subsample of 311 specialist dairy farms from the Irish FADN data which are collected through the Irish National Farm Survey (NFS), providing robust evidence.

The behavioural factors behind the change associated with the application of human behaviour change science interventions

The findings revealed that participatory discussion groups are effective extension. The authors suggest that with financial incentive the motivation for participation changes and consequently different types of farmers choose to participate which affects the economic impact of the programme. They question the ‘value for money’ and effectiveness of an incentivised extension programme.

Interpersonal communications: participatory groups

Interpersonal communications are where the target group are stimulated to talk about a particular topic with one another.

Name of study/initiative: Agrisgôp - Action Learning to enable organisational change in rural businesses

Highlights

- Agrisgôp programme uses Action Learning to strengthen management capabilities, develop new business ideas, instigate positive change and resolve issues.
- A small group of farmers regularly meet with an experienced facilitator and each group member is given the opportunity to develop an idea or resolve an issue with the support of the group.
- A strong ethos of confidentiality is important for quickly establishing trust within the group and instilling commitment to the group and the process.
- Surveys undertaken comparing pre-, mid-, and post-group participation found significant differences being in confidence, communication, applying new information, attitude to change and business strategy

Relevant programme(s): Business, Cross-sector

Source: Owen, W., 2017. Action Learning to enable organisational change in rural businesses. *Studies in Agricultural Economics*, *119*(1), pp.41-47.

Aims and context

The study aimed to determine whether, through Action Learning, the Welsh Agrisgôp programme positively affected participants' capability and capacity to become more effective managers and therefore develop more viable and sustainable businesses. The study focused on identifying any differences in confidence, communication skills, resistance to change, ability to apply new information to and develop long term strategies for their businesses as a result of participating in the programme.

Details of behavioural method used

Target group

All farmers in Wales registered with the Farming Connect Programme.

The practical application of behaviour change theory

The Agrisgôp programme uses Action Learning to strengthen management capabilities, develop new business ideas, instigate positive change and resolve issues. Action Learning is a group-coaching method that involves a group of committed individuals who regularly meet with an experienced facilitator, with each group member being given the opportunity to develop an idea or resolve an issue with the support of the group. Other group members are encouraged by the facilitator to ask clear, open, neutral questions with a view to supporting the group member to develop their own solutions.

Evidence of change

Strength of evidence

A longitudinal mixed-measures approach was adopted over 3 years. Three different questionnaires were developed and completed by over 1,000 Agrisgôp group members pre-, mid- and post-group participation, providing robust evidence.

The behavioural factors behind the change associated with the application of human behaviour change science interventions

Under the Agrisgôp programme the group's relationship with their leader typically lasts 15 months from start to finish (although in practice this can vary from three months to three years), with groups meeting at least six times and usually between 12 and 15 times, normally on a monthly basis. The vast majority of groups have eight members; however, the range is between six and ten. One of the main characteristics of the Action Learning process is a strong ethos of confidentiality, which not only very quickly establishes trust within the group but also instils commitment to the group and the process.

Baseline and uptake statistics, to demonstrate the change in practice and the timescales for the change to take place

Surveys undertaken comparing pre-, mid-, and post-group participation found significant differences being in confidence, communication, applying new information, attitude to change and business strategy.

The study attributed the following factors to the Agrisgop group intervention:

- Increased confidence (49 per cent)
- Improved communication skills (51 per cent)
- Were more able to apply new information to their business (52 per cent)
- Had a more positive attitude to change (52 per cent)
- Were more likely to have a long-term business strategy (13 per cent).

Interpersonal communications: participatory groups

Interpersonal communication is where the target group are stimulated to talk to each other about a particular subject. Participatory group meetings are used to facilitate interpersonal communication by stimulating the participants to talk to each other about the practice change.

Name of study: Evaluating the effect of Focus Farms on Ontario dairy producers' knowledge, attitudes, and behaviour toward control of Johne's disease

Highlights

- The study showed that the participatory-based, experiential learning approach employed by Focus Farms (FF) was an effective method for improving the adoption of on-farm management practices for Johne's diseasr (JD) control.
- Participants in the FF process reported improvements in attitude and perception toward JD control and exhibited improved knowledge levels
- The proportion of FF participants who reported making at least one on-farm change (81%) was significantly higher than that of control respondents (38%).

Relevant programme(s): Animal health and welfare, Dairy

Source: Roche, S.M., Jones-Bitton, A., Meehan, M., Von Massow, M. and Kelton, D.F., 2015. Evaluating the effect of Focus Farms on Ontario dairy producers' knowledge, attitudes, and behavior toward control of Johne's disease. Journal of dairy science, 98(8), pp.5222-5240.

Aims and context

The aim of the study was to evaluate a participatory-based, experiential learning program, Ontario Focus Farms (FF), which aimed to change dairy producer behavior to control Johne's disease (JD) in Ontario, Canada. The goals were to (1) assess the effect of FF on participating dairy producers' knowledge, attitudes, and behavior with regard to JD control; (2) compare changes in these factors among FF participants to changes among a group of nonparticipating dairy producers; and (3) describe the characteristics of producers who made at least one on-farm management change.

Details of behavioural method used

Target group

Dairy producers in Ontario who were recruited to voluntarily participate in FF via their veterinarians.

The practical application of behaviour change theory

Ontario Focus Farms (FF) aims to influence producer behavior by addressing their knowledge and attitudes. FF uses the principles of adult education and experiential and participatory learning theory and follows 4 key principles: (1) participatory, self-directed, and collaborative, based on group-identified priorities; (2) honest communication and trust; (3) planning, action, and implementation; and (4) reflection. Practically, FF is implemented as a series of meetings, with group sizes between 7 and 12, which are facilitated by professionally trained veterinary practitioners.

A regional veterinarian, trained in facilitation, was used in each meeting to create a comfortable, supportive, and trusting learning environment. Facilitators ensured meetings were self-directed by participants, meaning that each group controlled the content discussed and learning activities used,

through goal setting, prioritization, and discussion. Each meeting was a combination of a half day of on-farm tours and activities and a half day of roundtable discussions and indoor activities. Although the specific content of each group meeting focused on various issues surrounding JD and JD control, other issues of interest to the farmers were discussed. Common activities included:

- exemplar farm tours (as chosen by groups)
- meeting with technical or content experts (as requested by groups)
- roundtable group discussions
- participant presentations on their farm-specific issues
- group work or learning activities (e.g., “think-pair-share,” - collaborative learning strategy where participants work together to solve a problem or answer a question “JD Jeopardy game” -a quiz where participants are presented with an answer and them must phrase their response with a question)
- test result interpretation
- demonstrations and discussions of various on-farm management practices and
- planning or brainstorming sessions focusing on problems common to the group and on producer-specific issues

Evidence of change

Results

More than 50% of FF respondents believed that their level of knowledge about JD control had increased to at least a moderate level. However, the results of a knowledge assessment (i.e., quiz), to understand how much producers actually knew about JD control before and after the intervention period, showed that most respondents possessed sufficient knowledge with respect to JD control before the intervention and therefore knowledge may not have played a significant role in influencing the behaviour change. When compared with control respondents, a higher proportion of FF respondents exhibited increased concern regarding JD on their farm at Q2 compared with Q1. Furthermore, 87% of FF respondents reported increased confidence in dealing with JD on their farm as a result of the FF process.

Strength of evidence

39.8% (70/176) of FF and 14.6% (52/357) of control participants responded to both the pre- and post-intervention questionnaires.

The behavioural factors behind the change associated with the application of human behaviour change science interventions

Overall, 81% of FF respondents reported making at least one on-farm management change to address JD, as compared with only 38% of control respondents. Also, FF respondents significantly changed their risk score in 4 out of 5 risk areas and had an average reduction of 13 points in their overall risk score between before and after risk assessments. Management changes particularly focused on calf management and specifically removing calves more quickly after birth and feeding colostrum sooner and in larger quantities.

From a Health Belief Model perspective, it is concluded that FF respondents would be more likely to adopt changes because they appeared to express greater concern for JD, had greater awareness of JD, perceived themselves as more knowledgeable, felt empowered (i.e., subjective knowledge), and thought JD measures were practical (reduced barriers, increased benefits).

Interpersonal communications: motivational interviewing

Interpersonal communication is where the target group are stimulated to talk to each other about a particular subject. Motivational interviewing was used to facilitate interpersonal communication between veterinarians and farmers.

Motivational interviewing - a communication strategy to promote the uptake of advice on mastitis and herd health management.

Highlights

- Motivational interviewing was found to improve veterinarians' communication skills in veterinary herd health management
- Training can successfully help veterinarians to become skilled at motivational interviewing
- Veterinarians should use motivational interviewing instead of relying on giving advice without exploring the expectations and requirements of their clients

Relevant programme: Animal health and welfare, Dairy, Beef

Source: Scrase, A., & Reyher, K. (2015) Motivational interviewing – a communication strategy to promote the uptake of advice on mastitis management. *Proceedings of the British Mastitis Conference (2015)*.

Svensson, C., Emanuelson, U., Bard, A. M., Forsberg, L., Wickstrom, H., & Reyher, K. K. (2019). Communication styles of Swedish veterinarians involved in dairy herd health management: A motivational interviewing perspective. Journal of Dairy Science, 102(11), 10173-10185. doi:10.3168/jds.2018-15731

Svensson, C., Wickstrom, H., Emanuelson, U., Bard, A. M., Reyher, K. K., & Forsberg, L. (2020). Training in motivational interviewing improves cattle veterinarians' communication skills for herd health management. Vet Rec, 187(5), 191. doi:10.1136/vr.105646

Aims and context

It is vital that veterinarians have strong communication skills to encourage farmers to change how they manage their herds to maximise health. Motivational interviewing has been successful in the medical field, so this study aimed to explore whether a 6-month training programme for vets would increase their ability to use this technique.

Details of behavioural method used

Target group

The target group comprises cattle veterinarians in Sweden who voluntarily offered to participate in MI training. They were selected from the main categories of dairy cattle veterinarians involved in herd health management. These included practitioners employed by the District Veterinary Organization (Swedish Board of Agriculture); self-employed practitioners; and field veterinarians employed by regional dairy associations.

The practical application of behaviour change theory

Motivational interviewing is a conceptual model which supports interpersonal communication as it explores and resolves ambivalence to address the motivational processes that facilitate change. It evokes a person's own desires, reasons and willingness to change as a means of clarifying and

strengthening their positive intent. Critical to this process is the relational context of empathy, acceptance and partnership, which facilitates the spontaneous emergence of the language of change, combined with technical communication skills that shape and enhance. This technique has been proven to stimulate behaviour change in other contexts (e.g., tobacco use, alcohol abuse).

Veterinarians in UK attended six workshops consisting of 6-8 participants, with a total of 36 hours of training over 6 months. These workshops involved training followed by role playing activities.
The participants' MI skills were evaluated before and after training using audio recordings of roleplay conversations with professional actors.

Evidence of change

Strength of evidence:

The three papers explored the potential of motivational interviewing for changing farmers' behaviour surrounding cattle welfare, but did not measure the extent of behaviour change, thus no evidence of change is identified here.

Scrase & Reyher (2015): 0 participants (review of MI for reducing mastitis)

Svensson et al (2019): 42 cattle veterinarians involved in role-playing conversations

Svensson et al (2020): 38 cattle veterinarians involved in MI training evaluation.

The behavioural factors behind the change associated with the application of human behaviour change science interventions

The analysis by Svensson et al., (2019) showed that veterinarians in the role-play and on-farm conversations relied predominantly on giving information, questions, and persuasion in their consultation approaches. Veterinarians gave advice without exploring the client's need for the advice or how the information was perceived. They found a significant reduction in so-called relational scores (Empathy plus Partnership) and an increase in MI-nonadherent behaviours (Persuasion plus Confront) as years of veterinary experience increased. Results showed that there was room for improvement in the communication style of veterinarians involved in herd health management. However, all participants improved their MI skills after training in at least one parameter (Svensson et al., 2019).

Veterinarians who participated in the workshops for Svensson et al (2019) agreed that their new skills surrounding motivational interviewing were relevant to their roles, with high satisfaction rates relating to the workshops. This indicates that vets see motivational interviewing as a potential way of encouraging farmers to change their practices.

6. Implementation Intentions

Implementation intentions (and Interpersonal communication): motivational interviewing

Implementation intentions refer to activities that stimulate the target group to formulate concrete plans to implement the desired behaviour in specific situations

Motivational interviewing (MI) is a conceptual model which supports interpersonal communication which explores and resolves ambivalence to address the motivational processes that facilitate change. This technique has been proven to stimulate behaviour change in other contexts (e.g., tobacco use, alcohol abuse).

Name of study/initiative : Enabling behaviour change in laying hen farmers using motivational interviewing

Highlights

- MI resulted in 80% of farmers making changes to their resource management and resource provision (90% of free-range farmers and 50% of enriched cage farmers)
- The MIs used implementation intentions by asking farmers to plan changes. Many of these planned changes (67%) had been implemented 9 months after the motivational interviewing was carried out
- MI can help to raise awareness about injurious pecking and motivated many farmers to make changes, thus this approach may be applicable in other sectors when improving animal health and welfare
- Implementation intentions appear to help farmers to plan actions and understand how they can uptake measures to improve animal health and welfare on-farm.

Relevant programme: Animal health & welfare, poultry

Source: Baker, P., Stokes, J., Weeks, C., 2020. Enabling behaviour change in laying hen farmers using Motivational Interviewing, Presented at the 1st International Electronic Conference on Animals, p. 20.

Aims and context

This study looked at the effectiveness of Motivational interview (MI) on the uptake of strategies for reducing injurious pecking in flocks of laying hens (both free range and in enriched cages).

Details of behavioural method used

Target group

Laying hen farmers who are members of the Lion Code assurance scheme (90% of the industry). A representative selection of 3 poultry housing systems and 9 breeds were included. There were 24 free-range flocks (including 1 organic) which were housed in either single-tier, flat-deck (N=11) or multi-tier aviary systems (N=13) with flock size from 3,000 to 16,000 birds. Four flocks were housed in enriched (colony) cage systems and 1 in barn aviary system (flock size range 70,000 to 124,000).

The practical application of behaviour change theory

Motivational interviewing (MI) as described above can lead to implementation intentions. MI was used here to facilitate farmer ownership over maintaining feather cover by co-developing bespoke Feather Cover Action Plans (FCAP) (implementation intention).

Each farmer participant was interviewed by a facilitator experienced in using MI. The facilitator helped the farmer to identify their strengths and aspirations, evoking motivation for change by promoting their own

autonomy in decision making. Two visits took place: the first was to determine motives, learning styles and incentives and co-develop a FCAP, whilst the second interview gathered updated information on farmers' attitudes, motivation, reflection and barriers regarding managing injurious pecking and measured the uptake of the FCAP.

Between visits, further support was given to the farmers by providing a written copy of their FCAP and farmer-led information about management strategies, resources and interventions, with ongoing monitoring and motivating their progress in adopting their FCAP.

Evidence of change

The approach resulted in 80% of farmers making changes to their management and resource provision, with 90% of farmers of (FR) and half of those using (EC) making changes. Up to 9 actions were planned in their FCAP (average 3 on FR farms) and 67% of all planned changes had been achieved on average 9 months later.

Strength of evidence:

The study involved 29 flocks of free range, aviary and enriched cages. Despite the topic being on hens, which is not an AHDB sector, the approach used here is highly relevant and could be applied to other sectors.

The behavioural factors behind the change associated with the application of human behaviour change science interventions

The aspect of MI that worked well were:

- It helped to ensure that the implementation intention approach was successful by encouraging farmers to develop action plans
- The use of 1:1 MI with an experienced facilitator likely stimulated farmers to adopt new strategies
- MI and implementation intentions in combination led to most farmers (80%) making changes, with more than two thirds of planned changes implemented 9 months after the action plan was developed
- Developing an FCAP (implementation intention) led to positive changes in flock management when supported by MI facilitation.
- Most farmers recognized that the project had inspired them to adopt new actions

Whilst the MI and implementation intention method worked well, however, some farmers were restricted by time and financial constraints. Farmers were also, in part, motivated to change as they wanted to improve animal welfare, profitability, and customer relations.

7. Gamification

Gamification: exploring the social influence of investment decisions

Gamification makes use of gaming techniques in an environment where it is not usually done in order to motivate the target group.
Simulation games are those which allow participants to make decisions which have consequences for their resources. These provide an experimental setting which reflects the complexities of real life whilst allowing participants to make changes which they would not be able to do in real life.

Name of initiative/study: The social influence of investment decisions: A game about the Dutch pork sector.

Highlights

- A simulation game was used to explore the effects of social interaction on investment strategies in pig farmers.
- Players adopted investment strategies under the influence of social interaction where there was a clear financial benefit.
- Communication between participants during simulation games is key for encouraging high adoption rates.
- The gaming methodology influenced participants and triggered them to apply their tacit knowledge.

Relevant programme(s): Business ; Pork

Source: Ambrosius, F. H. W., Hofstede, G. J., Bokkers, E. A. M., Bock, B. B., & Beulens, A. J. M. (2019). The social influence of investment decisions: A game about the Dutch pork sector. Livestock Science, 220, 111-122. doi:10.1016/j.livsci.2018.12.018.

Aims and context

Pig farmers are under pressure due to volatile market prices and the rising cost of production. Therefore, they need to change their production methods and invest accordingly. The aim of the study was to use a simulation game to analyse the effect of social interaction on investment strategies in intensive livestock production systems with Dutch pig farmer.

Details of behavioural method used

Target group

Pig farmers in the Netherlands and others associated with the sector (advisors and successors). Younger farmers or successors were particularly motivated to participate.

The practical application of behaviour change theory

A simulation game was used as a method to capture social interaction and diffusion processes at the same time. Simulation games provide an experimental setting that can grasp the complexity of a real-world system, while offering a higher degree of control over several variables compared to a real-world system. Furthermore, a gaming environment has the ability to derive information about behaviour, which might have been hard to derive from individual interviews. They have also been promising in gathering information on possible effects of social interaction on decision-making:

The game was designed to stimulate interaction and trigger the imagination of those playing it. Contextual factors also did not pose limiting factors in the game. The goal of the game was to avoid bankruptcy by managing their farm and manage the acceptance of the practices they were using collectively.

Evidence of change

Strength of evidence

In total, 7 sessions were played, each of which had 4-8 farmers and/or participants who were affiliated to the sector as an advisor or successor (total n = 39). There was bias in selection of participants as noted below.

The behavioural factors behind the change associated with the application of human behaviour change science interventions

The simulation game was used to analyse adoption decisions and social interaction in 4 ways:

- To gain insight in the differences in diffusion of investment strategies, the percentages of participants who adopted an investment during the game session were compared.
- To gain insight into other possible causes for differences in diffusion of investment strategies, other than the effect of social interaction, the relation between the type of investment strategy and type of diffusion i.e., no adoption, low adoption, or high was explored.
- To gain insights into the role of individual differences versus group differences regarding arguments for and against each investment strategy, the communication between participants during the session was analysed.
- To gain insight into the processes of influence as a consequence of social interaction, the arguments participants used that were a consequence of social interaction, e.g., social learning, or the arguments that participants used to guide other participants decisions, e.g. coordination were explored. Insight into the effect of opinion leadership on diffusion was gained, by identifying the opinion leader(s) in each session and exploring their influence on adoption of investment strategies among other participants.

The simulation game encouraged participants to share arguments for and against adoption of investment strategies that have proven to be important factors in real-life investment decisions in previous research. To gain knowledge about farmer-specific behaviour, it was important to select participants that were familiar with the case presented, because they can 'fill in the blanks', i.e. they reflect on criteria that are not represented in the game, such as experience of other farmers in real life and labour conditions associated with a certain investment.

The use of a game caused a bias in selection of participants. Farmers who declined the invitation to participate in this research argued it was something radically different from the meetings they normally have, that it would not be taken seriously by their farmers, or that the topic of the game, i.e. innovation and sector acceptance, was a sensitive subject in their area. Furthermore, younger farmers or successors were especially willing to play the game. Participants, therefore, were more likely to be open to new experiences, or relatively young and willing to play games. Also, some of the players already knew each other through existing groups which was likely to have influenced decisions in the game through existing norms on good investment strategies and management of sector acceptance.

The simulation game resulted in the following findings:

- The only investment strategies which resulted in high adoption under the influence of social interaction were those with a financial benefit.
- Communication between gaming participants led to higher adoption.
- Opinion leaders play a key role in encouraging high adoption rates of investment strategies.
- The simulation game encouraged participants to discuss investment strategies using arguments which are important when making real-life decisions.
- Creating realistic games can trigger the tacit knowledge of the players.

Gamification: a board game for forage management

Gamification makes use of gaming techniques in an environment where that is not usually done, in order to motivate the target group by means of gaming elements.

Name of study/initiative: A conceptual framework to support adaptation of farming systems – development and application with Forage Rummy

Highlights

- French farmers played a co-designed board game, forage rummy
- Researchers evaluated whether forage production and animal feeding requirements matched and whether the discussions while playing the game would stimulate farmers to increase their capacity to adapt.

Relevant programmes: Dairy, Beef Sheep, Business, Environment (climate change resilience)

Source: Martin, G. (2015). A conceptual framework to support adaptation of farming systems - Development and application with Forage Rummy. Agricultural Systems, 132, 52-61. doi:10.1016/j.agsy.2014.08.013

Aims and context

Climate change requires farmers to become more resilient and adaptive. The aim of this study was to develop farmers' ability to adapt in the face of climate change through playing a board game within a participatory workshop.

Details of behavioural method used

Target group:

The game has been played in 50 workshops with over 200 livestock farmers.

Wider technical and social influencers (advisers, family members, community, peer groups) and intermediaries (knowledge brokers)

Other farmers attending the workshops, agricultural consultants, workshop facilitators

The practical application of behaviour change theory

Forage rummy is a board game which was developed using a participatory approach with farmers and agricultural consultants. It was designed for use by consultants and researchers with small groups of farmers (2-4) in workshops. The game allows players to design and evaluate livestock systems which are adapted to various scenarios (e.g., climate change). During the game, the facilitator asks questions to stimulate thought and interaction between players. Through the iterations of design and evaluation of potential solutions to their problem situations, farmers build their own personal knowledge and are more likely to use it as it is meaningful to their future.

The conceptual framework for the game is based on a hybridization of soft and hard approaches. Hard approaches are mainly science-driven and rely on simulation models, and soft approaches rely fully on stakeholders' knowledge. The hard approaches enable integration of up-to-date scientific knowledge while soft approaches ensure local relevance, thanks to stakeholders' knowledge.

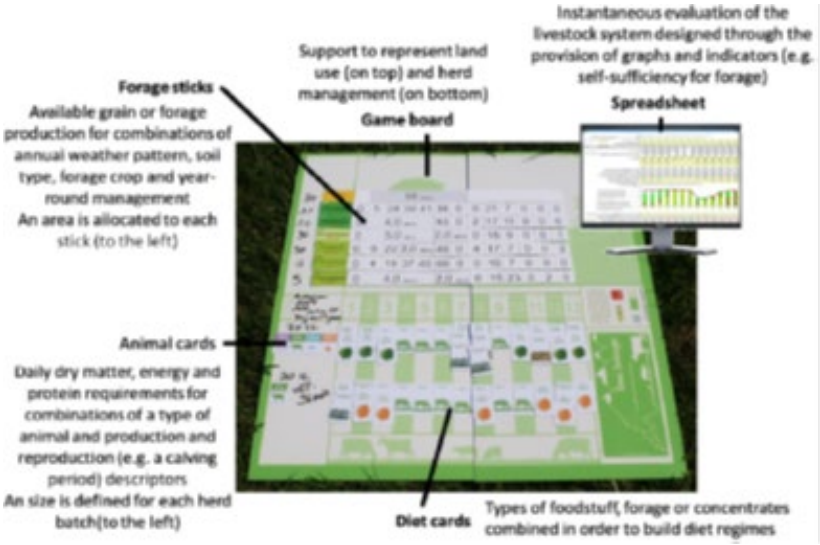
Evidence of change

Strength of evidence:

Over 200 farmers have attended around 50 workshops to play forage rummy. This paper draws on qualitative evidence from evaluations provided by farmers and agricultural consultants who have played the game.

The behavioural factors behind the change associated with the application of human behaviour change science interventions

Farmers' groups use their empirical knowledge to select and combine sticks and cards representing forage crop and grassland production and animal feeding, production and reproduction from a range of possibilities to design a livestock system. The system designed is instantaneously evaluated using a spreadsheet informing among other things about the matching of forage production and animal feeding requirements



This paper does not investigate whether playing forage rummy led to on-farm change, but farmers found playing forage rummy useful for enabling them to gain a better understanding of the challenges they're facing at the farm scale and for giving them an opportunity to share knowledge with their peers. The game has proven successful in stimulating farmers' thinking and discussions and consequently their adaptive capacity. Negative comments about the game were rare.

Gamification: experimental simulations

Gamification makes use of gaming techniques in an environment where that is not usually done, in order to motivate the target group.

Name of study/initiative: Willingness to comply with biosecurity in livestock facilities: Evidence from experimental simulations

Highlights

- Gamification was used to determine whether farmers in USA would be more compliant with biosecurity practices where the infection risk was higher.
- Farmers were significantly more likely to use 'shower in-shower out' when the infection risk was 15% than when it was just 5%
- The findings suggest that delivering messages which convey disease infection risk, include uncertainty and are delivered repeatedly to reduce psychological distancing, can increase biosecurity compliance

Relevant programme(s): Animal health and welfare, Pork

Source: Merrill, S. C., Moegenburg, S., Koliba, C. J., Zia, A., Trinity, L., Clark, E., . . . Smith, J. M. (2019). Willingness to Comply With Biosecurity in Livestock Facilities: Evidence From Experimental Simulations. *Frontiers in Veterinary Science*, 6. doi:10.3389/fvets.2019.00156.

Aims and context

Biosecurity is key for reducing the risk of disease but non-compliance occurs due to time constraints faced by land management. The aim of the study was to examine how 'serious gaming' containing information about infection risk can affect compliance with biosecurity practices.

Details of behavioural method used

Two 'serious' games were developed to help the researchers to capture compliance with livestock biosecurity practices.

The game was played on an online platform, with participants acting as workers in a swine production facility. They were confronted with experimental treatments with varying levels of infection risk if they did not follow the biosecurity protocol. Players would earn 'money' by taking part in various activities. To access these activities, participants had to decide whether to comply with a biosecurity practice before doing the task – complying would reduce infection risk, non-compliance would reduce the time cost.

Target group

The participants were the general public in Vermont, US, with several students participating due to the experiment taking place on a University campus, however the eventual target group is USA livestock farmers.

The practical application of behaviour change theory

No specific theory is referred to in the paper but the methods align with the theory that increased perceived risk will result in behaviour change.

Evidence of change

Strength of evidence

Over 300 participants took part in the games, providing large scale evidence, however participants were not farmers.

The behavioural factors behind the change associated with the application of human behaviour change science interventions

The factors which result in compliance with biosecurity protocols are complex, but 'risk' is clearly a strong behavioural factor affecting whether a farm worker complies – people generally tend to be averse to thinking a negative outcome will occur if the likelihood of this happening is low. Certainty was also important, with an experienced farmer delivering a risk message taken more seriously than those delivered by a less experienced farmer. The game produced the following results:

- Increased situational uncertainty and risk led to increases in behaviour compliant with biosecurity practices.
- Increasing the infection risk within the game resulted in significantly more compliance, with higher risk resulting in more 'shower in-shower out' biosecurity practice. Where infection risk was 5%, 46% of players complied. Meanwhile, where risk was 15%, 76% of participants were compliant.
- Changing uncertainty messaging from an advisor surrounding risk also had a small overall increase in compliance.

8. Feelings

Emotions: treating lameness

Triggering emotional responses can influence behaviour change by linking positive feelings to the desired behaviour, or negative feelings to the undesired behaviour

Name of study/initiative: Associations between sheep farmer attitudes, beliefs, emotions and personality, and their barriers to uptake of best practice: the example of footrot

Highlights

- This is the first study to investigate farmer personality, emotions, empathy, attitudes and beliefs towards a livestock disease.
- Emotions and personality are associated with differences in farmer management of footrot and prevalence of lameness.
- Future interventions could target emotions that are associated with the required behaviour.

Relevant programme: Animal health & welfare, Sheep

Source: O'Kane, H., Ferguson, E., Kaler, J. and Green, L., 2017. Associations between sheep farmer attitudes, beliefs, emotions and personality, and their barriers to uptake of best practice: the example of footrot. Preventive veterinary medicine, 139, pp.123-133.

Aims and context

This study in England looked at the influence of farmers' emotional reaction and (compassion and empathy) to footrot in their sheep on the uptake of best practices. The findings have implications for farmer interventions.

Details of behavioural method used

Target group

Although not a target group for a particular intervention, these farmers were considered representative of the sorts of farmers who could be targeted in future initiatives. Farmers for the study were identified as having English lowland flocks with at least 200 ewes.

The practical application of behaviour change theory

Although not applying emotions as a behavioural method, there is evidence from this study that farmers demonstrate different emotions in connection with farm management. The study was based on the theory of planned behaviour and investigated how farmers' attitudes, beliefs, emotions and personality are associated with management of livestock disease using the example of footrot in sheep.

Evidence of change

Results

97% of farmers reported having lame sheep. Analysis identified three classes of farmers based on their behavioural approaches to the treatment and control of lameness and footrot in sheep. They differ with respect to time to treatment, type of treatment and culling strategies, specifically:

1. Best practice— compliant group - treat FR within 3 days of sheep becoming lame; use injectable and topical antibiotics; avoid foot trimming, 11%
2. Slow to act, 57%
3. Slow to act, delayed culling, 32%

Strength of evidence

The study was based on a large-scale survey of farmers (n=1260) providing robust evidence. Self-reported management behaviours were collected and farmers' beliefs and emotions towards footrot and farmer personality traits.

The behavioural factors behind the change

The study demonstrated that emotions and personality are associated with differences in farmers' management of footrot and prevalence of lameness.

Negative emotional reactions were linked to a higher prevalence of lameness (Classes 2 and 3). The grouping was associated with beliefs, knowledge and emotions. Those farmers who expressed negative emotions (feelings of frustration, anger, misery) towards footrot were more likely to be in the slow to act, delayed culling class and these emotions were associated with greater risk of lameness. However, in this case it is not just sadness/anger, but a sense of hopelessness expressed as well.

There was no significant association between trait empathy and farmer group or prevalence of lameness. Of the five personality domains, conscientiousness was the strongest personality predictor of performance and was associated with lower prevalence of lameness. Across the classes, the possibility of targeting conscientious behaviours to motivate change was discussed. The authors suggest that modern personality theory and evidence shows that personality traits can change in response to specific training.

Emotions can be used to gain insight into farmer cognitions, emotions and behaviours towards adopting new practices for the treatment and management of footrot. It was suggested that interventions could target particular emotions associated with target behaviour. Given the emotional factors linked to non-compliance, it was proposed that adapted cognitive behavioural therapy and guided self-help approaches for non-clinical contexts to treat emotional problems can be effective, as can mindfulness.

Lameness was associated with both negative emotions and feelings of hopelessness; it is unknown whether future interventions can use education on the best managements and understanding of prevention to improve uptake of best practice or whether a focus on overcoming negative beliefs and instilling a feeling of perceived control may be key in influencing a change in behaviours related to the management of footrot.

9. Values and Norms

Descriptive norm: benchmarking

The concept of descriptive norms demonstrates that the desired behaviour is displayed by the majority of other people (who are important to the target group). There is evidence from a number of studies of the influence of descriptive norms on behaviour, mostly in the livestock sector. The following example illustrates the use of benchmarking to foster peer comparison which is underpinned by descriptive norms.

Name of initiative/study: Benchmarking motivates Canadian farmers to improve dairy calf management

Highlights

- Peer comparison motivated farmers
- Farmers changed ingrained habits
- Farmers had sense of pride in doing well
- Benchmarking shifted the social norms among farmers around calf management

Relevant programme: Animal health & welfare, Business

Sumner, C.L., von Keyserlingk, M.A. and Weary, D.M., 2018. How benchmarking motivates farmers to improve dairy calf management. Journal of dairy science, 101(4), pp.3323-3333.

Aims and context

Dairy calves often receive inadequate colostrum for successful transfer of passive immunity and inadequate milk to achieve their potential for growth and avoid hunger, but little is known about what motivates farmers to improve calf management around these concerns. The aim of this research was to assess if and how access to benchmarking reports, providing data on calf performance and peer comparison, would change the ways in which farmers think about calves and their management.

Details of behavioural method used

Target group:

Dairy farmers with a Holstein herd and more than 100 milking cows, who were clients of a specific veterinary clinic.

Wider technical and social influencers (advisers, family members, community, peer groups) and intermediaries (knowledge brokers).

The herd veterinarian was key to this project.

The practical application of behaviour change theory

Benchmarking is the process of measuring performance using specific indicators and then comparing performance with that of peers with the intention of improving on those indicators. As such benchmarking applies the concept of descriptive norms which demonstrates that the desired behaviour is displayed by the majority of other people (who are important to the target group). In addition, the researchers used the theory of planned behaviour (TPB) to develop the interview guide for semi-structured interviews. The TPB constructs (attitudes, subjective norms, and perceived behavioural control) are key to understanding a person's motivation to perform a behaviour.

During the study, each farm received two reports 10 weeks apart. These reports described serum total protein from calf blood samples and average daily gains (as estimated from heart-girth tapings) and information on management practices on all study farms. The reports provided data on the individual

calves and graphically presented data to facilitate interpretation. Each report was presented by the herd veterinarian who used examples of other study findings (e.g., on the effects of increasing milk ration on calf growth) and props (e.g., a colostrometer for testing colostrum quality) to facilitate the discussion.

Evidence of change

Results

Farmers were interviewed before and after receiving their benchmarking reports to gain an understanding of how they perceived access to information in the reports. Qualitative analysis was undertaken to identify major themes. Seeing their own data in relation to other farms was linked to farmers' feelings of confidence in knowing how well they were managing their calves. Receiving the data was either confirmatory, or surprising and challenged perceptions about their calves. Attitudes toward using data from benchmarking were mostly positive before and after receiving the reports. Farmers made changes to their calf management when they became aware of issues following delivery of the benchmark reports, using the data to inform their decision-making.

Strength of evidence

18 dairy farmers in the lower Fraser Valley (British Columbia, Canada) each received 2 benchmark reports that conveyed information on the transfer of immunity and calf growth for their own calves and for other farms in the region.

The behavioural factors behind the change

Benchmarking encouraged farmers to make changes in their calf management by identifying areas needing attention and promoting discussion about best practices. Collectively, the responses suggest that benchmarking motivated farmers to improve calf management because of the intrinsic ((i.e., value in itself) and instrumental value (i.e., value as a process) of having access to data and peer stock comparisons. This instilled a sense of confidence and having control over the outcomes (self-efficacy). Benchmarking allowed farmers to change ingrained habits, to think 'outside the box' and to prompt new thinking regarding calf nutrition. Peer comparison also motivated farmers based on a sense of pride in doing well (cultural capital), although this was valued less if participants believed that the performance differences were related to different strategies at work on the different farms.

Benchmarking calf management shifted the social norms among farmers around calf management. Before receiving benchmark reports, farmers indicated that calf management was not typically discussed among farmers. Access to data and peer performance encouraged a shift toward calf management as a topic for farmers to include in their interactions with other farmers.

The data also supported farmer efforts to enact change and strengthened their role as a decision-maker as the reports were used to help convince a family member that increased milk allowance would be beneficial. However, making changes based on access to data in the first report led to the expectation that there would be improvements, and this led to a sense of ambivalence if these were unrealized. A key feature of the study design was the cooperation of the herd veterinarian in delivering the reports.

Descriptive norm: Salmonella control measures

The concept of descriptive norms demonstrates that the desired behaviour is displayed by the majority of other people (who are important to the target group).

Name of initiative/study: Changes in perceptions and motivators that influence the implementation of on-farm Salmonella control measures by pig farmers in England

Highlights

- Study looked at social norms, attitudes and self-efficacy as motivators to control Salmonella in pigs.
- Little evidence of the anticipated dissemination of information through the networks.
- At least a third of the farmers reported that successful interventions on a farm would attract their attention.
- As farmers already believe that social norms would be supportive of actions to control Salmonella on farms, a focus on motivators that affect attitudes and belief in self-efficacy may be more effective.

Relevant programme: Animal health & welfare, Pigs

Source: Marier, E., Smith, R.P., Ellis-Iversen, J., Watson, E., Armstrong, D., Hogeveen, H. and Cook, A.J., 2016. Changes in perceptions and motivators that influence the implementation of on-farm Salmonella control measures by pig farmers in England. Preventive veterinary medicine, 133, pp.22-30.

Aims and context

The aim of the study was to identify the intrinsic factors that impeded pig farmers' intention to control Salmonella. In particular, the aim was to see if farms that were implementing interventions, whether or not these were successful, would influence their close contacts' opinion over time.

Details of behavioural method used

Four different intervention methods for farm Salmonella control were used. One farm added Bio-Mos® to the lactating and dry sow ration to reduce Salmonella levels in piglets. The second intervention farm switched from pelleted to coarsely ground meal feed in the grower pigs. The third farm used alive-attenuated Salmonella Typhimurium vaccine for the sows (Salmoporc STM®) and fed weaned piglets & grower pigs with liquid acidified feed. The fourth farm vaccinated piglets at weaning using a live Salmonella vaccine (AviPro®vac T) given orally by mixing the vaccine with their gruel.

Target group:

Pig farmers in England who were predominantly indoor farrow-to-finish farms and registered to a quality assurance scheme.

Wider technical and social influencers (advisers, family members, community, peer groups) and intermediaries (knowledge brokers).

Farmer peers and veterinarians

The practical application of behaviour change theory

Based on a 'pathway to disease control' model, three intrinsic factors known to influence motivation –, social norms, attitudes and self-efficacy – were evaluated.

Social norms - The farmers were asked how they thought various peers would feel if they applied an intervention on their farm and whether they would be supportive. The hypothesis was that the outcome of intervention trials would influence the opinion of other farmers in the region. A successful intervention would motivate farmers to implement the intervention whilst a negative or inconclusive outcome would deter adoption. It was assumed that the intervention farmers and their private veterinarians would be trusted disseminators of the outcome to other farmers and could enhance uptake of successful.

Attitude - The farmers were asked to rate how important it was to control Salmonella in pigs for them, for public health and for the pig industry and whether control of Salmonella in pigs was a necessity.

Belief in self-efficacy - The farmers were asked about how an intervention would affect the burden of Salmonella in pigs if it was implemented. They were asked to consider whether the intervention would have an effect on their Zoonosis National Control Programme (ZNCP) scores in the short and long term and how the implementation of an intervention would affect public health in subsequent years.

Evidence of change

Results

Interviews were first conducted between August 2008 and May 2009 (phase 1). The second interviews were carried out between June and October 2010, once the intervention trials were completed. None of the four intervention farms thought that the trials had helped to reduce the Salmonella level in their pigs. At the second interview, 37% (17) of the farmers thought that implementing Salmonella control would not change their ZNCP score (or Salmonella level) both in short and long term perspective and near 20% (9) thought they could induce a small reduction. The distribution of belief in self-efficacy in Salmonella control both phases was positioned between a vague positive effect and a ‘no change’ perception. Farmers with a low ZNCP score (<10%) identified the ZNCP score and their veterinarian as their main motivators in taking action in both phases. Farmers with higher ZNCP scores identified their veterinarian, a problem with their pigs, scientific evidence that a measure is effective and a variation in the ZNCP score as their main motivators. Customer demand was also mentioned as a motivator by farmers with the highest ZNCP scores (>50%).

Strength of evidence (number)

A total of 46 farms were included in the study: four farms that had implemented interventions, 33 close contact farms (known to the intervention farmers) and nine randomly selected control farms.

The behavioural factors behind the change) associated with the application of human behaviour change science interventions

Descriptive Social norms - The interventions yielded inconclusive results, and there was little evidence of the anticipated dissemination of information through the networks. Consequently, the perceptions of the intervention were not informed by new knowledge from these trusted sources. Instead, farmers reached their own conclusions about the impact from these interventions and this may have adversely affected their confidence in self-efficacy.

At least a third of the farmers reported that successful interventions on a farm would attract their attention, which suggests that a structured and planned communication strategy to disseminate results from effective disease control initiatives is important. As the study indicated that farmers already believe that social norms would be supportive of actions to control Salmonella on their farms it was suggested that a focus on motivators that affect their attitudes and their belief in self-efficacy would be more effective.

Injunctive norm: farmers' decision-making surrounding antibiotic use

An injunctive norm is where a message links a desired behaviour with social approval.

Name of study/initiative: Understanding farmers' naturalistic decision making around prophylactic antibiotic use in lambs

Highlights

- Qualitative analysis identified perception of social judgement as one of the five categories that influenced farmers risk perceptions around prophylactic antibiotic use in lamb (others included anticipated regret, negative emotions and experiential avoidance; economic considerations; farmer identity; perception of capability).
- Farmers were worried about the impact on their image if consumers or animal rights activists were aware of others using antibiotics as a prophylactic.
- However, farmers who use antibiotics as routine in their lambs appear resistant to the social pressures around antibiotic stewardship.
- For successful behaviour change, it is particularly important to de-normalise the use of prophylactic antibiotics around lambing time.

Relevant programme: Animal health & welfare, sheep

Source: Doidge, C., Ferguson, E., Lovatt, F., & Kaler, J. (2020). Understanding farmers' naturalistic decision making around prophylactic antibiotic use in lambs using a grounded theory and natural language processing approach. Preventive Veterinary Medicine, 186, 105226.

Aims and context

The aim of this study was to analyse internet forum posts in the UK to understand whether injunctive norms amongst other factors (including identity) affect farmer decision making surrounding the use of prophylactic antibiotics in neonatal lambs.

Details of behavioural method used

Target sample

Sheep farmers via an internet forum

Use of behavioural change theories

This study used a grounded theory approach for analysis which led to the development of a new theoretical framework which illustrates the factors which affect sheep farmers' risk perceptions surrounding the use of prophylactic antibiotics in neonatal sheep. The behavioural determinants affecting perceptions of the risk of treating, or not treating lambs prophylactically related to perceptions of social judgement, good farming identity, economic considerations, perception of capability, anticipated regret, negative emotions and experiential avoidance. This is conceptualised in the figure below.

Evidence of change

Strength of evidence

Data were analysed from 431 posts by 133 different users of an online discussion forum, providing evidence form a large number of forum contributors.

The behavioural factors behind the change associated with the application of human behaviour change science interventions

The study identified how the appropriate use of prophylactic antibiotics in neonatal sheep had become part of a good farmer identity. In particular, injunctive norms appeared to affect farmers' choices surrounding prophylactic antibiotic use through perceived approval from people other than farmers, such as with vets and consumers and policy-makers. Some farmers were uneasy about admitting to a reliance on antibiotics due to concern around what consumers would think, indicating that social norms can influence these farmers. Messages which remind farmers of their moral obligations for antibiotic stewardship may, therefore, be useful for changing their behaviour. However, the study also found that farmers who use antibiotics routinely were resistant to injunctive norms and were less likely to follow their vets' advice.

The study also explored whether identity affects farmer behaviour surrounding prophylactic antibiotic use in neonatal sheep, identifying the perception of a conflict between two good farming identities, i.e. "A good farmer doesn't need to rely on antibiotics" and "Animal welfare is the priority" which has useful implications for designing effective messaging.

Injunctive norm: the role of veterinarians for reducing antimicrobial use

An injunctive norm is where a message links a desired behaviour with social approval.

Name of study/initiative: Decision-Making of Swiss Farmers and the Role of the Veterinarian in Reducing Antimicrobial Use on Dairy Farms.

Highlights

- Veterinarians appear to have a strong influence on farmers when persuading them to change practices, with the vet's opinion having a significant effect on their likelihood to use antimicrobials
- The notion that 'other farmers have reduced their antimicrobial use' (descriptive norm), however, was not an important factor affecting whether farmers were motivated to change
- The injunctive norm had only a minor influence on their intentions. Farmer responses in the questionnaire were mostly neutral or negative with regard to the role of social pressure from family, colleagues or other consultants in decision-making.

Relevant programme: Animal health & welfare, Dairy

Source: Gerber, M., Durr, S., & Bodmer, M. (2020). Decision-Making of Swiss Farmers and the Role of the Veterinarian in Reducing Antimicrobial Use on Dairy Farms. *Frontiers in Veterinary Science*, 7. doi:10.3389/fvets.2020.00565.

Aims and context

Reducing farmer reliance on antimicrobials is important due to increasing concern relating to resistance. The aim of the study was to investigate what motivates dairy farmers to reduce antimicrobial use on-farm.

Details of behavioural method used

A questionnaire survey was sent to farmers who participate into the ReLait project, the aim of which is to reduce the use of antimicrobials. Likert scale questions were used to gauge the extent to which descriptive or injunctive norms (e.g., 'Other farmers are trying to reduce antimicrobial use, which motivates me', 'my vet is putting pressure on us to use less antimicrobials').

Target sample

Dairy farmers in Switzerland who are members of the ReLait project

Use of behavioural change theories

The study was not based on any specific behavioural change theory but aimed to understand the dairy farmers' motivations to reduce antimicrobial use and decision-making factors that influence a reduction in antimicrobial use by implementing preventive measures. This provided insights about injunctive norms.

Evidence of change

Strength of evidence

A structured questionnaire was sent by mail to all participants (n= 59) of an ongoing antimicrobial reduction project among dairy farmers in the Canton of Fribourg, Switzerland.

The behavioural factors behind the change associated with the application of human behaviour change science interventions

The study found that veterinarians are highly influential in farmer decision-making concerning animal health and treatment according. However, veterinarians were not viewed by farmers as important motivators for reducing antimicrobial use. Therefore, Swiss veterinarians were encouraged to be aware of their influence on farmers' decisions and to use that influence to more clearly promote antimicrobial reduction on dairy farms. Farmers were also mostly neutral or negative with regard to the role of social pressure from family, colleagues or other consultants in decision-making. This finding suggests that the injunctive norm has only a minor influence on the intentions of dairy farmers.

The study also found that using a descriptive norm which states that 'other farmers are already reducing their antimicrobial use' did not appear to change farmers' intentions and was not a strong factor for encouraging change.

Injunctive norm: animal disease surveillance and reporting

An injunctive norm is where a message links a desired behaviour with social approval.

Name of study: Development of behaviour change strategies for animal disease surveillance and reporting

Highlights

- The study identified several potential interventions to increase producer surveillance and reporting of emergency animal diseases.
- A producer survey identified the presence of perceived injunctive and descriptive norms in relation to monitoring and reporting emergency animal diseases.
- It was concluded that intervention strategies that capitalise on social rewards of approval and social sanctions of peer disapproval are likely to be effective.
- Other reported intervention strategies relate to increasing a sense of responsibility, increasing self-efficacy and increasing access to vet.

Relevant programme(s): Animal Health and Welfare, Sheep, Beef, Dairy and Pig

Source: Wright, B., Jorgensen, B. and Smith, L., 2016. Development of behaviour change strategies for animal disease surveillance and reporting. *Behaviour Works Australia*.

Aims and context

The aim of this Australian study was to inform the development of behaviour change strategies to increase producer surveillance and reporting of emergency animal diseases.

Details of behavioural method used

Target group:

Farmers from the sheep, cattle and pig industries in Australia

The practical application of behaviour change theory

The study identified several potential interventions to increase producer surveillance and reporting of emergency animal diseases. One of these interventions related to the use of social norms and more specifically injunctive social norms (perceptions of what behaviours are approved of or disapproved of by others) and descriptive social norms (perceptions of how other people actually behave). Other proposed intervention strategies related to increasing a sense of responsibility which is an important precursor to acting and increasing perceived behavioural control which is an individual's perceived ease or difficulty of performing the particular behaviour.

Evidence of change

Strength of evidence

A number of pieces of evidence were used in the study. A literature review was undertaken regarding producers' surveillance and reporting of animal disease, with particular attention paid to emergency or notifiable animal diseases. Organisations were interviewed for a practice review which sought to

establish approaches taken towards improving surveillance and reporting behaviours, and provide insight into how these have worked, or not worked, in practice. Three focus groups were also conducted, covering the sheep, cattle and pig industries. A survey was conducted with 200 Australian producers from the sheep, beef, dairy, and pig industries to measure behavioural intentions.

The behavioural factors behind the change associated with the application of human behaviour change science interventions

The study identified that producers thought most other producers in their district would expect them to report clinical signs of emergency animal diseases as soon as they were found. The producers perceived a social norm to exist for monitoring and reporting suspicious clinical signs of disease. They believed that these behaviours are expected of them by other members of their community and that the expectations placed upon them are not unreasonable. Thus, it is considered the normal thing to do. The study concluded that, if social norms are related to behavioural intentions, intervention strategies that capitalise on social rewards of approval and social sanctions of peer disapproval are likely to be effective. For example, using social networks to communicate information and provide support. The use of field days (where producers come together on farm) to communicate “role model stories” describing behaviour change successes is another suggested option.

Other recommendations related increasing a sense of responsibility for monitoring emergency animal diseases and for dealing with emergency animal diseases. When individual producers feel responsible for dealing with emergency animal diseases in their livestock, they are more likely to engage in behaviours related to monitoring and following up with a private vet when suspicious clinical signs of disease are detected.

Increasing perceived behavioural control, so that producers knew what to do if they suspected an emergency animal’s disease. It was recommended that to increase perceived behavioural control, a farm trial of biosecurity surveillance actions/procedures that demonstrates how easy it can be for producers may assist. Alternatively, access could be provided to other resources (e.g., information about identifying diseases most likely to occur in the livestock).

Another recommendation was increasing access to vets, as the greater the distance to preferred vet was, the less likely producers were to report intentions to monitor and report to a private vet. Strategies to address access could involve (i) resourcing and skilling producers to a level that enables them to identify clinical signs of disease in their stock without the need to consult with a vet in the first instance, and (ii) using communications technology to connect veterinary expertise with remote producers.

Injunctive norm: determinants of farmers' biosecurity attitudes and behaviour

An injunctive norm is where a message links a desired behaviour with social approval.

Name of study: Application of multiple behaviour change models to identify determinants of farmers' biosecurity attitudes and behaviours.

Highlights

- Dairy farmers were more likely to be carrying out direct biosecurity measures if they were influenced by the opinion of vets and milk buyers. Where these actors use injunctive norms to encourage biosecurity behaviour and make it clear that it is important that they implement biosecurity measures on their farm, farmers appear more likely to adopt these measures.
- 82% and 83% of participants agreed or strongly agreed that they care what their vets and milk buyers think of them in relationship to the biosecurity measures they use. The opinions of other actors were considered less important (Defra (52%), AHDB Dairy (40%), Other vets (39%), Farm technicians (37%),

Relevant programme: Animal health & welfare; dairy

Source: Richens, I., Houdmont, J., Wapenaar, W., Shortall, O., Kaler, J., O'Connor, H., & Brennan, M. L. (2018). Application of multiple behaviour change models to identify determinants of farmers' biosecurity attitudes and behaviours. Preventive Veterinary Medicine, 155, 61-74. Retrieved from https://core.ac.uk/download/162667853.pdf

Aims and context

Using biosecurity is vital for ensuring good animal health and welfare on cattle farms. Many farmers in UK, however, do not appear to implement biosecurity measures. A number of large-scale studies in the livestock sector endorse the importance of social norms for encouraging practice uptake, thus this study explored the value of injunctive norms for increasing biosecurity measure uptake.

Details of behavioural method used

A cross-sectional study with postal questionnaires resulted in 757 usable responses. Questions were asked about the extent to which a host of biosecurity measures were used, the influence of various stakeholders (e.g. veterinarians, industry bodies) in informing biosecurity choices, and the perceived control farmers felt they had over biosecurity on their farms. Farmer attitudes towards biosecurity were also explored.

Questions relating to injunctive norms included 19 Likert-scale statements such as 'I feel pressure from people around me to implement biosecurity measures', 'My vet thinks it is important that I implement biosecurity measures on my farm' and 'The opinion of my milk buyer is important to me in relation to the implementation of biosecurity measures on my farm'.

Target sample:

Levy-paying dairy farmers in Great Britain, accessed through the AHDB.

Use of behavioural change theories

This study did not directly apply injunctive norms, it used two behaviour change models: the transtheoretical model of behaviour change (Figure 1; Prochaska and DiClemente, 1982) and the theory of planned behaviour (Ajzen, 1991).

Figure 1. Schematic diagram illustrating the stages of the transtheoretical model of behaviour change.

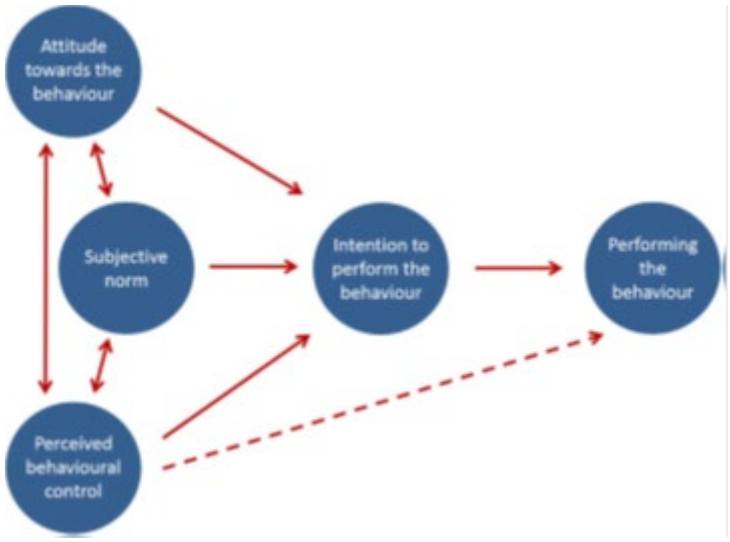


Figure 2. Schematic illustrating the theory of planned behaviour (from Brennan et al., 2016).

Evidence of change

This study was not focused on evidence of change but found that normative beliefs were important for encouraging farmers to implement measures for preventing disease transmission. Veterinarians appear to play a key role in using subjective norms.

Strength of evidence:

908 of 2505 (36.2%) of potential participants participated, 757 of which were included in the analysis. The sample was selected using a random sampling technique to ensure an approximately representative sample of farmers in each region of Great Britain.

The behavioural factors behind the change associated with the application of human behaviour change science interventions

- Dairy farmers appear to be affected by social norms when making biosecurity decisions.
- Veterinarians and milk buyers appear fundamental for encouraging the uptake of biosecurity measures.

10. Combined Approaches

Implementation intentions; Knowledge transfer and Framing: lameness in sheep

Implementation intentions refer to activities that stimulate the target group to formulate concrete plans to implement the desired behaviour in specific situations, framing means referring to something in such a way that positive or negative associations become attached to it.

Name of study/initiative: A comparison of the efficacy of three intervention trial types: postal, group, and one-to-one facilitation, prior management and the impact of message framing and repeat messages on the flock prevalence of lameness in sheep

Highlights

- Delivering an implementation intention message based on 'six steps to sound sheep' was most successful in reducing lameness where messages were delivered through one-to-one meetings, followed by group meetings and a postal intervention.
- The biggest behavioural change was in relation to foot trimming.
- Gain framing using positive messages made no difference in prevalence of lameness
- Some farmer types received intervention messages differently from others,

Relevant programme: Animal health & welfare; sheep

Source: Grant, C., Kaler, J., Ferguson, E., O'Kane, H., & Green, L. E. (2018). A comparison of the efficacy of three intervention trial types: postal, group, and one-to-one facilitation, prior management and the impact of message framing and repeat messages on the flock prevalence of lameness in sheep. Preventive Veterinary Medicine, 149, 82-91. doi:10.1016/j.prevetmed.2017.11.013

Aims and context

Sheep farmers consider lameness an important welfare problem and footrot causes the majority of lameness in sheep in England. An intervention message, 'six steps to sound sheep' was developed through evidence and expert opinions . It promoted (1) catch sheep within three days of becoming lame, (2) inspect feet without foot trimming, (3) correctly diagnose the cause, (4) treat sheep lame with footrot or interdigital dermatitis with antibiotic injection and spray without foot trimming, (5) record the identity of treated sheep, (6) cull repeatedly lame sheep. The aim of the paper was to evaluate the effectiveness of three knowledge-transfer intervention trial types (postal, group, one-to-one) in promoting the six steps to treat sheep.

Details of behavioural method used

Target group

Randomly selected sheep farmers, members of the National Sheep Association (NSA) that were categorised into: those who use best practice; those that followed best practice but treated sheep within a week rather than 3 days; and those more likely to use traditional managements.

The practical application of behaviour change theory

The study evaluated the effectiveness of different knowledge transfer processes in delivering the six steps intervention message. It also assessed framing the message positively (highlighting the gains from

best practice adoption)) or negatively (focusing negatively on losses incurred by not adopting best practice).

Evidence of change

Results

Between 2013 and 2014, the reduction in: mean prevalence of lameness; proportional between flock reduction in lameness; and within flock reduction in lameness was greatest in the one-to-one (from 7.6% to 4.3%, 35%, 72%) followed by the group (from 4.5% to 3.1%, 27%, 55%) and then the postal trial (from 3.5% to 3.2% , 21%, 43%).

Strength of evidence

The number of useable responses for the surveys were 29, 51 and 779 for the one-to-one, group and postal trials respectively, providing robust evidence.

The behavioural factors behind the change associated with the application of human behaviour change science interventions

An implementation intention message, 'six steps to sound sheep' was developed and used to disseminate best practice when treating footrot in sheep. This message was then disseminated using three delivery mechanisms: one-to-one, group and postal trials. All farmers received the gain framed intervention message. Authority figures (researchers and veterinarians) were used to relay the intervention message.

One-to-one facilitation: Farmers were visited and the researcher discussed best practice and whether a strategy could be used to help the farmer to adopt the 6-step guide. The visits lasted 1 - 2.5 hours. The farmer was sent a letter summarising the discussion and detailing flock specific advice within two weeks of the visit. Follow up visits were also organised the following year to determine whether farmers had changed their practices surrounding footrot.

Group intervention trial: NSA members were invited to attend a group meeting. Discussion was then encouraged afterwards. The change in behaviour resulting from the group intervention was likely because farmers had the opportunity to discuss the recommendations with a veterinarian who has expert research and practical knowledge of sheep lameness. These veterinarian used facilitation to help farmers find solutions to adopt the recommendations in their systems.

Postal intervention trial: Participants were assigned to several trials (1 = control, the six steps were only disseminated after the end of the study; 2 -7 = received loss of gain framed messaged, once, three times, or seasonally.

There was a marginally greater reduction in lameness in farmers using most of Six steps but they were slow to treat lame sheep pre-trial than those not using Six steps at all. The greatest behavioural change was a reduction in therapeutic and routine foot trimming whilst uptake of antibiotic treatment was low. The greatest positive attitude change was an increase in negative attitudes towards foot trimming. All three intervention trial approaches were effective to promote best practice to treat sheep with footrot with one-to-one facilitation more effective than group and postal intervention trials, as these farmers received greatest exposure to the intervention message. This is consistent with health literature, which attributes the effectiveness of one-to-one intervention messages to greater focus, effort and emotional investment by participants, helped by the bond formed with the researcher.

There was no significant effect of message framing, although they hypothesised that farmers open to new ideas or already using some or all of best practice to treat footrot might consider the risk and uncertainty about the outcome of adopting best practice as low and thus respond to gain framed messages whilst farmers resistant to change, using traditional techniques might consider the risk and uncertainty high and

thus respond to loss framed messages. There was also no further reduction in lameness in groups receiving repeated or seasonal messages. This may be because farmers were receiving messages from other sources or because there is fatigue in receiving repeated messages.

Messengers with Authority, and Emotions: voluntary disease schemes

A messenger who is regarded by the target group as an authority can send the signal that the behaviour is good/desired.

Triggering emotional responses can influence behaviour change by linking positive feelings to the desired behaviour, or negative feelings to the undesired behaviour

Name of study/initiative: Exploring the role of voluntary disease schemes on UK farmer bio-security behaviours: Findings from the Norfolk-Suffolk Bovine Viral Diarrhoea control scheme

Highlights

- A high proportion of the scheme participants had joined because their vets had advised them to, highlighting the importance of vets in the frontline of bio-security engagement.
- There was no difference in farmers' priority to livestock disease, motivation, or knowledge acquisition in relation to BVD between those in the BVD scheme and those outside the scheme.
- BVD is largely perceived to be the fault of individual farmer and often entails social disapproval (disjunctive norm).
- There was a reluctance to share animal health information in order to avoid feeling embarrassed or ashamed.

Relevant programme(s): Animal health and welfare, Beef

Source: Azbel-Jackson, L., Heffernan, C., Gunn, G. and Brownlie, J., 2018. Exploring the role of voluntary disease schemes on UK farmer bio-security behaviours: Findings from the Norfolk-Suffolk Bovine Viral Diarrhoea control scheme. PloS one, 13(2), p.e0179877.

Aims and context

The aim of the study was to examine differences in bio-security attitudes and behaviours among two groups of farmers residing in Norfolk and Suffolk: those enrolled in a Bovine Viral Diarrhoea (BVD) scheme (The Norfolk and Suffolk BVD Eradication Scheme) vs. those who are not. The authors investigated a range of factors hypothesized to have an influence on bio-security behaviours: BVD control measures employed, livestock disease priorities, motivation for scheme membership, perception of the scheme benefits and wider knowledge acquisition. The goal of the scheme did not relate to the formation of farmers groups or group participation per se. Instead, the scheme was led by local veterinarians who encouraged the farmers to participate. Scheme participants were expected to test their cattle annually for BVD.

Details of behavioural method used

Target group

The BVD scheme was aimed at Beef farmers in the counties of Norfolk and Suffolk, UK and all participants were identified via their vets.

The practical application of behaviour change theory

The BVD scheme relied on the use of Messengers with Authority, i.e. veterinarians, to encourage farmers to participate in the scheme to eradicate BVD. Addressing farmers emotions in relation to

embarrassment and shame about animal health issues is likely to improve the impact of disease control schemes.

Evidence of change

Results

The sharing of information about animal's health was limited with 36% of in scheme farmers and 34% of out of scheme farmers reported sharing the information about animal health with members of their social network).

Strength of evidence

The study findings were based on a survey of 100 cattle farmers (53 scheme members vs. 47 out of scheme farmers) among cattle farmers in Norfolk and Suffolk, providing robust evidence.

The behavioural factors behind the change associated with the application of human behaviour change science interventions

A high proportion of the scheme participants had joined because their vets had advised them to, highlighting the importance of vets as messengers with authority in in the frontline of bio-security engagement. However, the authors did not find an association between participation in the BVD scheme and farmers' priority to livestock disease, motivation, or knowledge acquisition in relation to BVD. Although scheme membership did appear to influence perceptions regarding the importance of specific bio-security measures employed. They suggest that although vets are important in promoting disease control activities, the manner and means by which farmers are engaged could be improved.

BVD is largely perceived to be the fault of individual farmer and often entails social disapproval (disjunctive norm). The scheme farmers reported that sharing information about animal's health to be a very sensitive subject. Wider animal health issues were also not disclosed, 75% of the in-scheme farmers and 72% of out of scheme farmers explained their choice to not share animal health information in order to avoid feeling embarrassed or ashamed. The authors concluded that a more holistic approach to disease control that accounts for and addresses critical attitudinal and behavioural barriers at the farm level, such as feelings of embarrassment or shame, are likely to improve the impact of disease control schemes.

Interpersonal communication and Concrete Action Plans: red meat livestock farm business

Name of initiative/study: Action Group Network Red Meat Profit Partnership (RMPP)

Highlights

- Action Group membership led to production changes and increased farm business skills and confidence to make changes on-farm
- A growth in knowledge, increased skill levels, stronger and wider connection and improved wellbeing were created through: compulsory KPI benchmarking, completing an individual Action Plan, subject matter experts and follow-up support

Relevant programme(s): Beef and lamb; Business

Source: Brendon Patchett, Bewsell, D., Grigg, J., 2020. RMPP Action Network Final Report: Positive change using small group learning. Red Meat Profit Partnership

Aims and context

Red Meat Profit Partnership (RMPP) is a programme (2013-2020) to help the pastoral red meat livestock sector in New Zealand increase its productivity and profitability. RMPP worked with farmers and sector businesses to develop, test and put new ideas, new technology solutions and new ways of working into action on farms and between farms and red meat processors. An Extension Design Project which ran from 2014 to 2018. Four aspects of it are summarised: agricultural extension, understanding farmer attributes, a pilot extension programme and financial results achieved by farmers.

Details of behavioural method used

Target group:

Farmers in red meat livestock sector in New Zealand

The practical application of behaviour change theory

The programme included a network of facilitators, connectors, mentors, primary contact farmers and subject matter experts. Facilitation and subject matter expert roles were separated, allowing facilitators to focus on group dynamics and engagement and the subject matter experts on the delivery of their subject matter. These formed around a chosen topic or idea to address a farm issue. Facilitators also had 'Action Hubs' to share experiences, top-up knowledge, build supportive connections and to aid the development of facilitation capability. Seven Rural Professional Action Groups formed. A number of behavioural change methods were used.

Interpersonal communications, implementation intentions & checklists - An 'Extension Plan' of annual activities and goals was decided amongst the groups, then renewed to encourage reflection and to remain relevant for the group. The farm business goals related to extension goals.

Commitment and consistency - Farmers committed to making Farm Action Plans, calculating 2/3 KPIs and completing evaluation surveys every six months (this review was later removed).

Incentive / carrot – Initially $4000 NZD was given to each group towards approved activities.

Knowledge transfer – 78 out of 216 groups completed a half-day workshop on farm financials. Interactive learning module initiated amongst other learning resources. Visiting of experts.

Role model messengers – Trusted, respected industry leaders were used for farmer enrollment.

Priming – As part of an advertising campaign, a series of videos and explanatory animations promoted and explained how Action Groups work to farmer and facilitators.

Evidence of change

Results

The results from the RMPP six monthly surveys showed most farmers agreed they had made production changes and increased their farm business skills and confidence to make changes on-farm, as a result of being involved in an Action Group.

By August 2020, 19% of Action Groups remained active while 6% had, or were in the process of, transitioning to self-funding or had met their group objective. 3% have disbanded for various reasons, 14% of participants had left a group, but 13% joined another group. The average rating for the group given by farmers was 78 out of 100 as it was supportive, well organized and strongly focused.

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Strength of evidence

A seven-stage evaluation ran throughout the programme, including 6-monthly surveys, interviews with 30 farmers, facilitator self-reflections, case study creation, overall impact and financials.

The behavioural factors behind the change associated with the application of human behaviour change science interventions

Farmers that thought about Farm Action Plans at the start of the process, (particularly their goals) made the Extension Plan activities and focused on meeting them. A growth in knowledge, increased skill levels, stronger and wider connection and improved wellbeing were created through: compulsory KPI benchmarking (descriptive norm), completing an individual Action Plan (quantifies progress for the farmer), subject matter experts and follow-up support, helping farmers capture, assimilate and apply technical knowledge to their business. The facilitator was central to connecting the farmers with the right subject matter expert and bringing out in-house knowledge within the group. Farmers also found that a skilled and successful mentor was valuable.

Facilitators created structured groups, where farmers shared their experience and experts visited. This led to a greater confidence to enact change through listening to other farmers' struggles, and renewed enthusiasm through increased measuring, analysis and seeing performance increase.

216 Action Groups were created, with 1,868 farm businesses and 107 facilitators having facilitated the groups. A pilot study (2015-2018) prior to the programme being rolled out (in late 2017-2020) also included 75 farm businesses and 5 meat processors. The farmers' value of facilitators in supporting the groups increased from 37-51% between the first few years of the programme.

The evaluation showed that the benefits to participating farmers in Action Groups is another $24/ha or $17,712 per farm of profitability, each year, building over an eight-year period from joining.

Negative aspects
Some facilitators struggled to get the right balance of being farmer-led while needing to lead farmers.

Not all Action Group members could attend, and facilitation lacked direction, and in some cases, members struggled to provide the required financial information. Those that left groups said they didn't have enough time. Farm Action Plans had a low rate of completion, which were thought by farmers to need more one-to-one sessions.

Interpersonal communication, Concrete action perspective and Implementation intention: reducing antimicrobial use

Concrete action perspectives *are where the target group are given concrete tips and pointers in order to give them the confidence that they will be able to perform the desired behaviour.*

Implementation intentions *refer to activities that stimulate the target group to formulate concrete plans to implement the desired behaviour in specific situations. (This method is closely related to the Concrete Action Perspective.) Farmer Action Groups demonstrate implementation intentions as the groups prepare plans which identify concrete actions to be implemented.*

Interpersonal communications *are where the target group are stimulated to talk about a particular topic with one another.*

Name of study: A participatory, farmer-led approach to changing practices around antimicrobial use on UK farms

Highlights

- Farmer-led approaches using implementation intentions, concrete action perspectives and interpersonal communication in group discussions appears key for encouraging farmers to change their behaviour in relation to antimicrobial use.
- Antimicrobial use changed over the 2 years of the study, with 21 out of 30 participants reducing their usage of the highest-priority critically important antibiotics.
- The concrete action perspective approach was highly successful, with co-developed action plans resulting in implementation rate of more than 50% within one year.
- All farms had implemented at least one recommendation by the end of the study.
- Peer-peer learning during interpersonal communications were valued highly by farmers, with these farmer action groups resulting in attitude shifts.

Relevant programme: Animal health & welfare

Source: Morgans, L., Reyher, K. K., Barrett, D. C., Turner, A., Bellini, J., Elkins, P., & Clarke, T. (2019). Changing farmer and veterinarian behaviour around antimicrobial use. Livestock, 24(2), 75-80.

Morgans, L.C., Bolt, S., Bruno-McClung, E., van Dijk, L., Escobar, M.P., Buller, H.J., Main, D.C.J., & Reyher, K.K. (2021) A participatory, farmer-led approach to changing practices around antimicrobial use on UK farms. Journal of Dairy Science, 104, 2212-2230.

Aims and context

There is a need to prevent antimicrobial resistance due to the human and animal health implications resistance would cause. One way of doing this is by reducing antimicrobial use. A farmer-led approach using a combination of implementation intentions, concrete action perspective, and interpersonal communication in group discussions were explored.

Details of behavioural method used

Target group

Dairy farmers in South-West England who were from a variety of types of dairy farms; herd sizes varied from 60 cows to 500, calving patterns varied from spring and autumn blocks to all-year-round calving systems, some had robots while others had large teams of staff to manage.

The practical application of behaviour change theory

A qualitative case study using mixed methods was used to examine the efficacy of the three methods used to reduce antimicrobial use amongst dairy farmers.

Interpersonal communication: The 5 Farmer Action Groups (FAG) established in the South West of England aimed at reducing antimicrobial usage and improving herd health and welfare used Action Plans (Morgans et al, 2019). The farmers met approximately every six weeks to discuss medicine usage. A participatory action research approach was used, whereby the facilitators were participants in the process to encourage co-creation and collective action.

Concrete action perspective: The outcome of each meeting was for the farmers to co-create an Action Plan for the host farm of concrete practical measures to achieve antimicrobial reduction without adverse impacts on herd health/welfare. The Action Plans and host farm were re-visited several months later to discuss how well the Action Plans had been implemented.

Implementation intention: The farmer action groups demonstrate implementation intentions as the groups prepare plans which identify concrete actions to be implemented.

Evidence of change

Results

Antimicrobial use changed over the 2 years of the study, with 21 out of 30 participants reducing their usage of the highest-priority critically important antibiotics.

Strength of evidence

Thirty participants took part in the study, with 58 farmer action groups carried out in total, providing robust evidence (Morgans *et al.*, 2021)

The behavioural factors behind the change associated with the application of human behaviour change science interventions

Implementation intention

- All farms had implemented at least one recommendation by the end of the study
- Peer-to -peer learning during interpersonal communications were valued highly by farmers, with these farmer action groups resulting in attitude shifts

Concrete action perspective

- The farmers involved had implemented changes such as re-designing sheds to reduce the incidence of disease and increasing discussions with their veterinarians. On average more than half of the actions had been attempted by the second FAG meeting.

Interpersonal communications: participatory group meetings

- Farmers involved have implemented changes. They became confident in trialing new treatment protocols and initiating conversations with their vets about antimicrobial products used on their farm.
- The sharing of successes and challenges within a cohesive group of farmers and hearing from other like-minded farmers has given participating farmers the confidence to reduce reliance on antimicrobials.
- Feedback from the participants has been overwhelmingly positive. Farmer participants felt empowered and encouraged by the peer-to-peer learning environment.

Knowledge transfer (training, one to one), and Descriptive norms: pasture management practices

Knowledge transfer means to communicate the functional and affective benefits of the desired behaviour. The concept of descriptive norms demonstrates that the desired behaviour is displayed by the majority of other people (who are important to the target group).

Name of study/initiative: Understanding Tasmanian dairy farmer adoption of pasture management practices: A theory of planned behaviour approach

Highlights

- Attitudes towards pasture measurement were predominately positive across the farmer subgroups (pasture measurement tool users and non users).
- A lack of knowledge and skill development in how to use pasture measurement tools and complete the calculations can block intentions leading to adoption behaviour
- Only the farmers who had been supported (one to one and training) through an intensive period progressed from a positive intention to tool adoption and improved pasture management.
- A negative descriptive norm was identified amongst farmers due to a perception that experienced farmers do not need to measure pasture or be involved in extension activities
- Some tool trialers and non-users said they are not influenced by how other farmers are managing their pasture
- This negative influence limited their intention to measure pasture and engage in the learning process required to overcome perceived control factors and change practices.

Relevant programme: Animal health & welfare

Source: Hall, A., Turner, L., & Kilpatrick, S. (2019). Understanding Tasmanian dairy farmer adoption of pasture management practices: a Theory of Planned Behaviour approach. Animal Production Science, 59(10), 1941-1950.

Aims and context

Improving pasture management can increase the efficiency and profitability of dairy farming. Although the role of extension has been to increase farmer awareness and knowledge focusing on training farmers to use pasture measurement tools, many farmers have never used a pasture measurement tool, only trialled/tested a tool, and/or do not implement recommended pasture management practices (64% of Tasmanian dairy farmers own a pasture measurement tool, however only 48% currently use a tool to measure pasture). The theory of planned behaviour was used to understand what influences farmer decision making and behaviour surrounding pasture management.

Details of behavioural method used

Target sample

Dairy farmers in Tasmania.

The practical application of behaviour change theory

The authors used the theory of planned behaviour to explore the key factors influencing pasture management behaviour. This theory posits that behavioural beliefs, related to attitudes, normative beliefs, related to social influences, and control beliefs, related to the perceptions about the ease or difficulty of implementing the behaviour, influence intention.

Evidence of change

Strength of evidence

A parallel study involved 167 Tasmanian dairy farmers (38% return rate) who participated in a quantitative survey. This study is based on semi-structured interviews with a subsection (30) of survey participants, which discussed pasture management (current and past), grouped into non users, triallers, non-intensive-users, and intensive users (adapters).

The behavioural factors behind the change associated with the application of human behaviour change science interventions

Attitudes towards pasture measurement were predominately positive across the farmer subgroups.

A lack of knowledge and skill development in how to use pasture measurement tools, complete the calculations can block intentions leading to adoption behaviour. Perceived control factors limiting behaviour change, included tool data inaccuracy and challenging calculations associated.

Only the Adaptor farmers who had been supported (one to one and training) through an intensive period of using a pasture measurement tool and learning the underlying pasture management principles, had progressed from a positive intention to adoption, improved pasture management, and practice change.

A negative descriptive norm was identified amongst farmers due to a perception that experienced farmers do not need to measure pasture or be involved in extension activities, with these efforts seen as useful for younger farmers only.

Despite being encouraged initially to measure pasture and not continuing, many Triallers farmers mentioned that they are no longer influenced by what other farmers do in terms of their pasture management. Similarly, there were several Non-user farmers who noted that they were not influenced by pasture management practices of other farmers. Encouraging farmers in the Triallers subgroup to return to measuring pasture through demonstration of what others are doing is therefore likely to have limited impact.

This negative influence limited their intention to measure pasture and engage in the learning process required to overcome perceived control factors and change practices.

Interpersonal Communications, Concrete Action Perspective, Use of Authority and Role Model Messengers

Name of initiative/study: Health Grown Potato Programme for improving regional agroecosystem sustainability

Highlights

- Openness, respect and reflection in a farmer-led process key to engaging more farmers

Relevant programme(s): Plant health, potatoes

Source: Duff, A.J., Zedler, P.H., Barzen, J.A. and Knuteson, D.L., 2017. The capacity-building stewardship model: assessment of an agricultural network as a mechanism for improving regional agroecosystem sustainability. Ecology and Society, 22(1).

Aims and context

Twenty years of experience working with growers enrolled in the Wisconsin Healthy Grown Potato Program has demonstrated the potential for an agricultural network to advance regional agroecosystem sustainability. The network originated as a collaboration between the Wisconsin Potato and Vegetable Growers Association (WPVGA) and the World Wildlife Fund. At a National Potato Council meeting, these two groups identified a shared interest in advancing environmental stewardship on potato farms and subsequently signed a Memorandum of Understanding in 1997. An ecolabel (Healthy Grown®) was created, with higher environmental growing standards than those of the government, in order to generate a price premium for enrolled producers to offset the added costs of the program and help to facilitate its expansion. The partnership aimed to help achieve 5 shared sustainability goals including production and non-production land for biodiversity enhancement, conservation and ecosystem services.

Details of behavioural method used

Target groups

WPVGA and more regional farmers of the ‘Central Sands’ area in Wisconsin.

Stakeholders

Wisconsin Potato and Vegetable Growers Association (WPVGA), World Wildlife Fund (WWF), University of Wisconsin, International Crane Foundation, Defenders of Wildlife, USDA Agricultural Research Service, Private Lands Conservation LLC and consumers.

The practical application of behaviour change theory

The Capacity-Building Stewardship Model used in the programme applies an evolving, modular farm stewardship standard to the entire farm—croplands and noncroplands. The model demonstrates an effective process for facilitating communication and shared learning among program participants, including agricultural producers, university extension specialists, non-profit conservation partners, and

industry representatives. The Model reveals an important mechanism for building regional commitment to conservation, with agricultural producers in a leadership role as architects, adopters, and advocates for stewardship behaviour.

Creating feedbacks within the model has been shown to be important for advancing the agricultural production standard. Farm-scale feedback advances the stewardship capacity of enrolled producers through a conservation planning process that is responsive to the circumstances of each farm.

Evidence of change

Strength of evidence

No information given as to how many farmers participated in the stewardship model. The study is only based upon one use of the model. In 2015, more than 3400 cultivated hectares were enrolled in the program, which represents more than 20% of Wisconsin's fresh potato production.

The behavioural factors behind the change associated with the application of human behaviour change science interventions

The open aspect of the programme and its goal development was key for allowing an iterative process of reflection and renewal, both from issues raised by farmers and new science developments. The growers therefore developed an attitude of "managing the farm as a whole" from 1997 – 2004. The study found that this openness and respect was vital to engagement.

Interpersonal communications, participatory groups – A participatory approach was used to connect enrolled producers in the programme with support extension professionals from the University of Wisconsin-Extension and agricultural industry representatives, and non-profit conservation scientists. Participants from the program attend meetings and events where they could communicate the accomplishments and lessons of the network in practice, however, they found that it is often the unplanned conversations and interactions that circulate the expertise and shared experience of the network actors.

Concrete action perspective/Commitment and consistency - A farm stewardship plan is produced alongside an ecologist, including non-production land, to highlight priority actions for conservation / enhancement. Farmers, however, asked for a more holistic, long-term planning system however, which was piloted in 2016.

Messengers with authority: The involvement of an interdisciplinary team of scientists as participants was important for ensuring the science-based credibility of the Healthy Grown Potato Program. This also ensures practice change message, certainty, accuracy, and science-based credibility are important.

Role model messengers - The involvement of engaged and knowledgeable producers who are influential within the state potato and vegetable industry benefited the Programme. The following conditions in key agricultural producers to contribute to the success of the network of were identified: (1) described as "early adopters" (i.e., producers who are particularly receptive to trying new practices); (2) hold leadership positions within their community or industry; (3) own or manage lands that are strategically important to meeting regional conservation goals; (4) own or manage significantly large or profitable operations, and are thus instrumental in affecting regional stewardship outcomes.

Barrier: Dedicated staff time to expanding the programme through additional 'modules' of farm management (e.g. groundwater conservation), has been the biggest barrier to progression.

The network has expanded cropland enrolment to 3400 ha but found it harder to expand the non-production land. There is 100 ha non-production land involved. The area represents more than 20% of Wisconsin's fresh potato production. However, the ecolabel has not been able to generate enough profit to pay back growers for their investments in environmental stewardship or advance the programme.

11. Ethical considerations and recommendations for use of behavioural change interventions

Applying behavioural change theories and behavioural insights to motivate farmers to adopt practice changes may raise some ethical concerns.

A number of studies have considered the ethics of behavourial change approaches (Dessart et al, 2019 [1]; OECD, 2019[2]; Sunstein, 2015[3]). These studies have been reviewed and key elements of concern identified to provide recommendations for AHDB to ensure ethical considerations are applied when implementing behavioural change interventions.

Based on our review, four criteria can be used to assess whether an intervention raises any ethical concerns. It is recommended that AHDB review their interventions against these criteria before implementing.

1. Do the interventions promote or undermine the welfare of the farmer?

AHDB should consider whether the interventions increase, or at least do not undermine the welfare of the farmer. Considerations should, for example, be given on the impact of the intervention of the farmer's financial welfare, or their social welfare, in terms of quality of life, health and wellbeing.

2. Do the interventions promote or undermine the farmer's autonomy?

AHDB should consider whether adopting a particular practice change robs farmers of their free will (i.e. can they refuse to make the changes?). Behaviourally informed campaigns can promote autonomy by equipping farmers with the right information (e.g. about the real costs and benefits of new practices), framed in the right way, to allow them to reach better decisions by themselves. Behaviourial interventions should ideally allow farmers to reflect or deliberate on the information provided. However, if the interventions leverage nudges (i.e. unconscious manipulation), such an approach is considered more questionable from an ethical perspective.

3. Do the interventions compromise the farmer's dignity?

AHDB should ensure that the interventions treat farmers with respect, avoiding infantilisation and stigmatisation. One way to ensure this outcome is to engage farmers in dialogue, facilitating a process of co-production and a sense of partnership between AHDB and the farmers in the development of the behaviourial interventions methods.

4. Do the interventions involve any manipulation or deception?

The use of interventions such as nudges may reflect what external organisations or institutions want to see change rather than engage with the farmers' actual preferences in a meaningful way. Any use of covert intervention, which tries to influence the farmers' behaviour without revealing the normative goals

[1] Dessart, F.J., Barreiro-Hurlé, J. and van Bavel, R., 2019. Behavioural factors affecting the adoption of sustainable farming practices: a policy-oriented review. Eur. Rev. Agric. Econ, 46(3), pp.417-471.

[2] OECD., 2019. Tools and Ethics for Applied Behavioural Insights. OECD Publishing.

[3] Sunstein, C.R., 2015. The ethics of nudging. Yale J. on Reg., 32, p.413.

and motivations that lie behind the intervention should be avoided. The intervention should be clearly communicated, including being transparent about its purpose and nature.

Blumenthal-Barby & Burroughs (2012)[4] provide a useful summary of some ethical considerations in relation to specific nudging behaviourial methods.

Norms and messengers – these methods make use of the principle that we are strongly influenced by what others do and by who communicates the information. Some ethically relevant dimensions that need to be considered when using norms, comparisons, and messenger effects to influence farmer decisions or behaviours are:

- There is a temptation, especially in cases where what most people are doing or deciding is considered unwise, to construct a narrative about what the majority of people are doing that is untrue or a misrepresentation.
- In the use of messenger effects, consideration should be given to the power differentials that may be involved between the messenger and the person nudged. If the messenger is, for example, an authority figure such as a vet, then the nudged farmer may accept the messenger's recommendations unquestioningly. Unquestioning acceptance does not promote autonomy or well-being. Care should be taken to be aware of and manage these effects.

Priming – this method is used to influence behaviour by subconscious cue. Some ethical considerations for use with Priming are:

- Whether it is fairly easy for people to go in a direction other than the one in which they are primed.
- Whether subconscious priming is done for good and evidence-based ends.
- Whether there is a justification for using subconscious priming instead of rational argument.

Default nudge – this method involves introducing conscious changes to the architecture of choices in order to push the target group in a particular direction. Some ethical considerations for use with default nudges are:

- Whether people are aware of the existence of the default and whether it is fairly easy for people to opt out.
- Whether the expected benefits of the default outweigh any anticipated harms, where harm is construed not just physically but also psychologically, socially, and financially.
- Whether there are injustices or harms brought about to vulnerable or marginalized populations by the default and whether attempts have been made to mitigate those effects.

A final ethical consideration is the extent to which placing the responsibility for behavioural change on the individual is fair. It is important to recognise that farmers are part of a wider system and therefore, changes to other parts of the system may also be required to achieve the desired behavourial change.

[4] Blumenthal-Barby, J.S. and Burroughs, H., 2012. Seeking better health care outcomes: the ethics of using the "nudge". *The American Journal of Bioethics*, *12*(2), pp.1-10.