

Transfer of good practices within vocational trainings in scientific institutions of agricultural sector (acronym VOTRIS).

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Sierk F. Spoelstra¹, W. A. (Wim) Zaalmink¹, Krzysztof Paleczny²

¹Agro Management Tools, Wageningen University and Research, The Netherlands.

²National Research Institute of Animal Production, NRIAP, Poland.

Participating institutes

1. National Research Institute of Animal Production, NRIAP (PL).
2. Agro Management Tools, Wageningen University and Research (NL).
3. Vyzkumny Ustav Zivocisne Vyroby, V.V.I. Uhrineves (CZ).
4. Lietuvos Sveitkatos Mokslu Universitetas, LSMU (LT).
5. Agricultural institute Stara Zagora, Research Institute/Centre, (BL).

Summary

During five meetings (referred to as “training events”), research institutes in the field of animal production from Bulgaria, Czech Republic, Lithuania, The Netherlands and Poland exchanged their *modii operandi* in knowledge production and knowledge transfer. Good practices of knowledge transfer to the end user were identified as well as weaknesses, opportunities and threats present at specific institutes’ activities in the field of knowledge transfer. The training participants had opportunity to raise their qualifications by improvement of their knowledge, skills and competences in relation to the transfer-of-knowledge. With the shift from a focus on improving production efficiencies to more complex sustainability problems “demand driven” and contextual modes of knowledge production and transfer complemented the more traditional “sending” of results.

Introduction

The transfer of knowledge between science and practice is an important matter for the European economy. Research institutes, by their scientific work, have an important role in the development of the agricultural sector. Crucial for effective use of knowledge is communication between scientific and agricultural domains. Despite constant efforts and care of quality level in knowledge transfer, there are still obstacles and problems encountered. From the part of the end user main obstacles are expression of their need for research (“demand articulation”) and translation of research results in the process of adaptation. In addition more practical hindrances could be present such as time availability, costs, travel distance, educational and cultural barriers.

Thus the important issue in transfer of knowledge becomes the methodology of barrier-breaking between science and end users. This brings questions about know-how of successful transmission of scientific information to the end user, but also the opposite, the ability of receiving feedback. The main goal of the VOTRIS project was to identify and exchange successful modes of knowledge transfer exemplified by good practices and allowing participants in the project to improve their knowledge and competences to organise activities aiming at knowledge transfer.

The institutes in the VOTRIS-project perform research in the field of animal production. By being placed in between university and application, having a task in producing knowledge that support national policy goals and being subordinate to a government they should be characterised as intermediary research institutes (Gudbrandsen, 2011). This applies also for the Lithuanian and Netherlands institutes which are part of a veterinary university faculty and contract research organisation, respectively. These do not teach students and focus on research for and knowledge transfer to the livestock production sector. The Netherlands contract research organisation stems from privatised governmental research institutes and is linked to the University.

By their historical developments the institutes take different positions in the national agricultural knowledge systems. Relationships with other research and extension organisations differ considerably between countries. Country wide public extension services are present in Poland, Lithuania and in some degree in the Czech Republic. In the other countries private farm advisors are present and advising is linked to marketing activities of commercial enterprises.

The research performed by the participating institutes underwent important changes during the last 40 years. In the middle European countries large scale collectivised agriculture has been replaced by privatised family or company farming. This demanded research and transfer of knowledge of state of the art farming technologies and skills. Scientific disciplines involved included breeding, nutrition, growing, harvesting and preserving feed crops

and also general animal and farm management. In this process of change the first emphasis was on improvements of production and production efficiencies. A situation comparable to the situation in western European countries where this process of modernisation started earlier. In western European countries the shadow sides of a one sided focus on production efficiencies in the form of externalities became increasingly apparent. Research gradually focused more on reducing externalities, such as obnoxious odours from livestock production, ground water pollution with nitrate, emissions of ammonia, impaired animal welfare and more recently environmental footprint, emission of greenhouse gases and fine dust.

Initially such problems were predominately researched as single issues. Later attempts were made to find integrated approaches. Taken together with farm profitability the challenge becomes to produce food in a way that fits in sustainable development. Or taking the vocabulary of Beck (1992) instead of simple modernisation with a focus on production efficiency a multiple modernisation optimizing on –in principle- People, Planet and Profit aspects is needed. Production efficiency can largely be enhanced by developing and transfer of general knowledge and technology. This in contrast to “sustainability”, which by its multiple dimensions demand more context specific solutions, eventually in the form of innovations.

An important insight is that the idea of sending results from research to knowledge users (farmers and professionals in upstream and downstream industries), known as linear knowledge production and knowledge transfer (Godin, 2006) could be effective in times of simple modernisation because of expected return on investments in improvements in efficiency. However, when complex issues are addressed generally profitability is reduced. As an example one could think of a combined reduction in emissions and improving animal welfare. Over the last 30 years or so theories have evolved that include another way of knowledge production and knowledge transfer. These are characterised by demand driven knowledge production, involvement of stakeholders, involvement of various scientific disciplines, aiming at innovation or social learning (e.g. Gibbons et al 1992; Hirsch-Hadorn et al., 2007). For adaptation accompanying legal or market measures are needed. Legal measures could be a set of obligatory standards (e.g. by EU standards for organic production), a subsidy or a ban (e.g. EU ban on traditional cages for laying hens). In categorising the different models of knowledge transfer we adopted the representations of Ingram et al. (2018; Figure 1) using the terms science-driven linear knowledge translation, co-translation and demand driven co-production of knowledge.

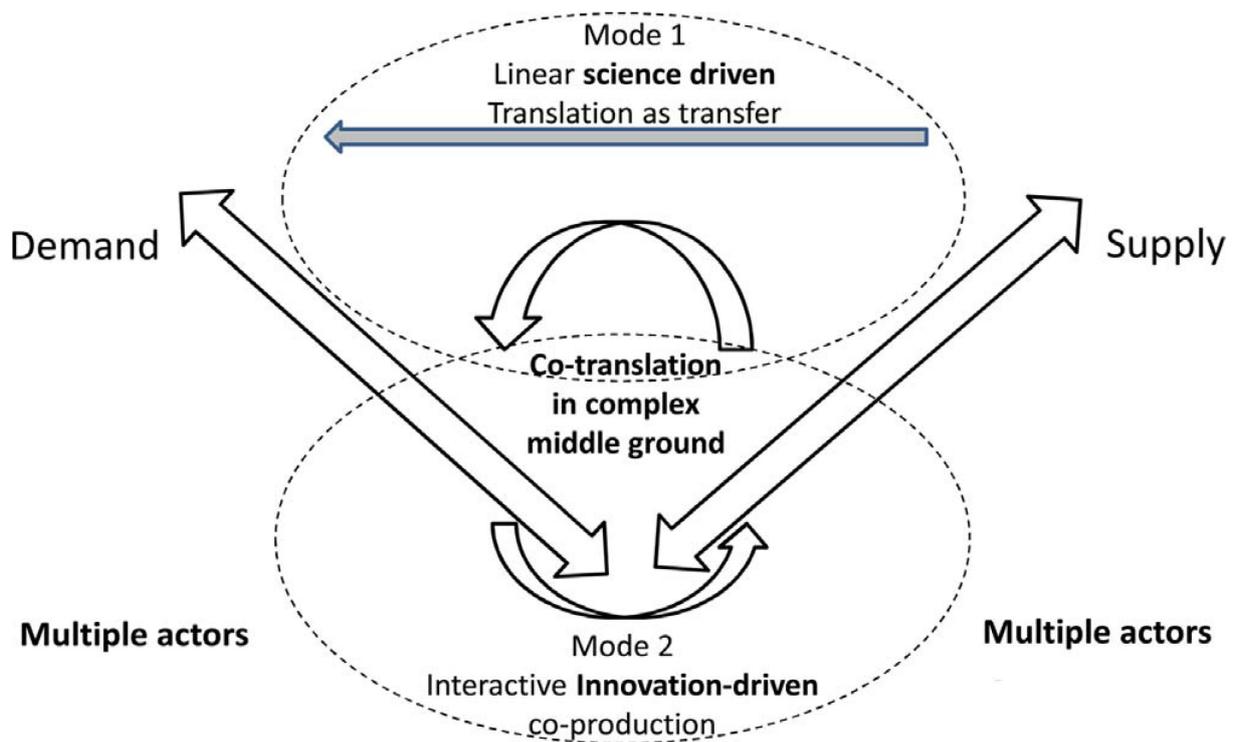


Figure 1. From linear science driven transfer of knowledge (translation) to contextual learning (co-production) (from Ingram et al., 2018; see also www.valerie.eu)

Methods

To identify good practices of knowledge transfer the following approaches have been used.

1. Short-term joint staff training events. In each country a 3 day meeting was organised with at least 5 participants of each institute. This activity was made available by the Erasmus+ Key Action 202. All 5 training events were arranged according to a similar scheme, aiming at following outcomes:

- The participant would be able to recognize capabilities of visited institute, main fields of research activities, good practices within the educational services, know-how in the field of agricultural extension.
- The participant would be able to analyse and pick-up the good practices and valuable know-how to be transferred to the home institution of the participant.
- The participant would be able to evaluate, which of the capabilities, good practices and know-how solutions are efficient, valuable and able to be transferred to the home institution.

During the training of VOTRIS project the host institute presented itself by lectures about the organisation, ongoing research, visits to facilities and

excursion to farms and companies. The nature of vocational training and knowledge transfer was often addressed implicitly.

2. The questionnaire. After each meeting a questionnaire was sent to each participant to identify and evaluate good practices from the last previous meeting. During the last meeting the accumulated list of good practices was presented and jointly evaluated.

3. The survey. During the project practices of knowledge transfer were identified and in the final survey management of the institutes (Survey part 1) and staff of the institutes (Survey part 2) were asked for their opinions on effectiveness in knowledge transfer and on commercialisation.

VOTRIS results

Good practices

Based on the paper of Ingram et al. (2018; compare Figure 1) the good practices identified were listed in categories according to the mode of translation of research to practice. The basic idea is that “to bridge the gap between scientific results and the end user” a translation is needed. To be adapted in a professional context, the scientific results have to be translated into a language and form (*e.g.* technology, improved breed, computer application) that can be understood and applied by the end users. Placing an identified good practice in a category of knowledge transfer is to a certain degree arbitrary as the borderlines between the categories are not sharp.

Table 1. gives an overview of good practices identified in the VOTRIS project. Often similar practices were present in different institutes or complementary practices were recognised.

Linear translation.

The predominant approach of translation in VOTRIS was linear science-driven. All institutes offer conferences, seminars, training events, workshops, consultancy, apprenticeships, internships and web sites and web tools. Research results were also made fit for publication for the farmers press, leaflets, lectures, websites and specific training and courses (including courses in carcass evaluation and claw trimming to contribute to improved dairy herd management).

Co-translation.

In all institutes interactions with end users or organisations representing end users, such as farmers organisations, was considered desirable for receiving feedback on research and to formulate research needs which are more in line with needs of end users (Kuipers et al, 2005). Especially having (access to) an experimental farm as a research facility in which experimental work could be combined with demonstrations, organising trainings and courses was considered advantageous for knowledge transfer. This could be further

improved by having the possibility of video conferencing and links with an external extension service.

Practices of co-translation also included web-tools to be used by farmers and advisers to calculate and compare farming scenario's for e.g. crop and animal productivity, nutrient efficiencies, nutrient losses and greenhouse gas emissions. Such tools could be used by farmers individually, but also in a group setting led by an advisor or researcher.

Co-production.

Approaches of co-production such as actor driven innovation processes using an approach with multi-stakeholder involvement were limited. The examples listed most often intended to support initiatives of farm development. Either of individual farmers (Interactive Strategic Management, Beldman et al., 2013) or a group of farmers (Networking, Wielinga and Vrolijk, 2009). The approach of Reflexive Interactive Design also focused on the farm level but included in the research process stakeholders from the supply chain, governmental and non-governmental organisations (Spoelstra et al., 2012).

Role of web based tools.

In all forms of knowledge translation web tools played a role. Predominately as a standalone practice to make research results available on a web site as a report, extension paper or instructive movie. These were sometimes combined with a platform for questions and discussions.

Less frequently formats were used in which interactivity was organised by a combination of web tools, including technical and economic simulations models) and group activities with end users and stakeholders (see for examples Table 1: "ANCA", "Farm Profit"). The nature of these activities varied considerably. This could be classical learning to get an better understanding of aspects of animal husbandry, a group process in search of adapting new research findings or in farmer and industry led innovation processes.

Knowledge transfer to the general public.

Interestingly, nearly all institutes have traditions in which they inform the general public about their research. These included giving information connected to a dairy shop in town owned by the institute, organising annually an open day for children living in the nearby metropole, having a learning path for visitors within the laboratories, experimental farms and other facilities of the institute and participating in an annual animal health show for the general public, cooperation with schools, participation in fairs and organisation of farm animals exhibitions.

Table 1. Good practices identified during VOTRIS meetings and the Survey are listed in the order from "linear science - driven" ("sending") to co-production ("demand driven innovation").

1.Linear science -driven translation	Reference
<i>Single actions of translation of scientific results</i>	All institutes

<p>The most common way of knowledge transfer was to translate scientific results into a single or a few single products. This could be a written document (leaflet, article in a professional magazine, item on a website), a contribution in the media (radio, tv or You Tube item), an oral presentation (lecture, training) and eventually a pilot or demonstration</p>	
<p><i>Combined use of different media, demonstrations and field days.</i> For introduction research findings into practice a concerted action to reach many potential users was organised. In essence it combined publicity in papers, in the agricultural press with attention in traditional (radio, tv) and social media and organising direct contact with potential users. The latter by organising -spread over the country in cooperation with the national extension service- demonstrations and field days. In each case records were kept of actions and number of attendants allowing evaluation.</p>	<p>LSMU (It)</p>
<p><i>Free walk housing for dairy cows</i> The “Freewalk” housing system for dairy cows is an example of an open front barn with the animals walking on a composting mixture of manure and bedding. Research on feasibility, performance and risk is done on an experiment station with communication of results to the sector. Adaptation depends on pioneer dairy farmers and possibly farm construction firms.</p>	<p>https://www.freewalk.eu/en/freewalk/Results/Literature.htm</p>
<p>2. Co-translation</p>	
<p><i>Annual Nutrient Cycle Management tool (ANCA)</i> is a web based model that allows dairy farmers to improve farm management with respect to mineral efficiencies, emissions of greenhouse gases and ammonia.</p>	<p>https://www.wur.nl/en/article/Annual-Nutrient-Cycling-Assessment.htm</p>
<p><i>The Knowledge Transfer Centre “De Marke”</i> The centre focuses on nutrient cycling and greenhouse gas emissions on dairy farms. It links results of its experimentation to those of about 70 private farms. Furthermore it offers demonstrations, training courses and field excursions if needed supported by video conferencing.</p>	<p>https://www.wur.nl/en/-Research-Results/Research-Institutes/livestock-research/Innovation-centres-and-facilities/Knowledge-Transfer-Centre-De-Marke</p>
<p><i>FarmProfit</i> FarmProfit is a free software that allows its users to calculate various economic parameters related to the production of basic animal and crop commodities (In Czech).</p>	<p>http://www.farmprofit.cz/default.html;jsessionid=3A1F5F2A08ED39D468BCB8CFBBBE0F41</p>

<p><i>Experimental stations</i> Experimental stations are established as educational farms providing trainings, workshops and demonstrations, also with use of modern media allowing for remote contact by video connection. Direct broadcasting or streaming from the learning centre or even the cowshed/chicken coop/piggery provides opportunity of widening the audience and collecting feedback at the same time.</p>	<p>Instytut Zootechniki PIB Zakład Doświadczalny Pawłowice (PL); Experimental farm Dotnuva, Kedainiu distr. Dotnuva (LT)</p>
3. Co-production	
<p><i>Interactive Strategic Management</i> “How should I develop my farm” is the basic question of a group of farmers that receive guidance of a researcher /process facilitator to analyse the present situation technically, economically and socially as to his and his families wishes and capabilities. Supported by an interactive ICT model and a process facilitator direction and steps to improve the individual farm are identified.</p>	<p>Beldman et al., 2013</p>
<p><i>Networking</i> Starts with group of rural entrepreneurs having a joint vision. For realisation many obstacles have to be overcome. These could include a group process, acquiring new knowledge and technology, exploring new markets and acquiring finances. In Networking the group is accompanied by a researcher capable of facilitating a group and managing the learning process</p>	<p>Wielinga and Vrolijk, 2009</p>
<p><i>Reflexive Interactive Design (RID).</i> RID is based on an inventory of the needs of actors such as farmer, animal, citizen and consumer. These needs forms the basis for a design process together with stakeholders to find realistic alternatives. To maximise social learning designs are preferably realised by farmers or other entrepreneurs receiving scientific support and financial support for excessive entrepreneurial risks</p>	<p>Bos et al. 2012, Spoelstra et al., 2012</p>

The survey.

In total 130 members of staff responded to the Survey with in total 676 answers. Of the respondents 60-65% found lectures, demonstrations and interactive workshops effective in translating knowledge. Consulting and approaches in which farmers learn from farmers were considered effective by 40% and 47 % of the respondents, respectively. The lowest effectiveness was indicated for forms of blended learning (22%), remote learning (24%), use of social media (28%), confronting farmers with outsiders (30%), networking (30%), and dissemination papers (32%). There were some marked differences

between the institutes. Set up of the Survey and responses per institute are presented in the Annexe.

Organisation of specific forms of knowledge transfer, including educational services, was in most institutes dependant on additional finances. These could come from governmental funds, collective and private financing in addition to the fees charged to participants.

Management of the institutes were neutral towards a business model of educational services (which means services paid by participants to bring profits to the institute). They did not consider it as an obvious way to go. At the same time 60% of responding staff declared that educational services could be a good source of income for the institute.

Four out of five institutes had a team or a department dedicated to organisation and execution of knowledge transfer. It seems to be a sign of awareness and importance of the issues related to the transfer of knowledge. Also four out of five institutes have a portfolio (coherent offer) of educational services, and all managers found the portfolio to be valuable to attract attention of potential customers. The exception is the full contract research organisation where all activities, including research and knowledge transfer, is paid for by a commissioner, be a governmental or private organisation.

Discussion

The participating scientific institutes emphasized the importance knowledge transfer and provided broad ranges of activities aimed at farmers, agricultural advisors, companies and other institutions of agricultural sector also including governmental administration. Emphasis was on training, interactive workshops, demonstrations and lectures. This indicated that the approach of linear knowledge transfer dominated. In some institutes researchers reported on the results of their research, but considered knowledge transfer to be a task of either the communication department or the external extension service. During the meetings it was increasingly recognised that direct contacts with and feedback from the end user was more effective in knowledge transfer than one way sending of information. Also the respondents to the Survey confirmed that collecting feedback from end users was a challenge. Direct contact with farmers and receiving information through contacts with the extension service and stakeholders were indicated as desirable approaches.

The process of interaction with end users in the phase of formulating research ("demand articulation") was identified as a challenge for most institutes. Demand articulation on main lines was apparently done by governmental and advisory boards of the institutes, leaving researchers within their own disciplines relatively independent in formulating their research. Similarly little attention was paid to evaluation of the impact and the outcome of finished research and related actions of knowledge transfer.

The survey showed that use of web based applications in knowledge transfer and in remote learning were not judged as very effective. This despite the frequent use of web based applications, such as web sites, e-mail, video-conferencing, discussion platforms, and management tools (see Table 1). As many researchers indicated that they did not consider knowledge transfer as their task it seems likely that they were not fully aware of the potential of web based approaches (Ahmed, 2018). It should also be noticed that researchers mostly had a disciplinary background, and did – with exceptions- not consider knowledge transfer as their task and consequently were not familiar with theories and practices of knowledge transfer and neither with interactive forms of knowledge production (see *e.g.* Gibbons et al., 1994; Hirsch-Hadorn, 2007; Ingram et al., 2018).

Responses given in the survey, despite variation across participants, show that staff responsible for communication and knowledge transfer are aware of possibilities web based ways of organising interactivity offers but seem hesitant to experiment by applying them. By being placed in different organisational units they apparently are not in a position to act as a facilitator between researchers and stakeholders.

Especially in the model of linear knowledge translation institutes struggle with the question who should pay for the costs of training and other forms of knowledge transfer. In case of official and compulsory courses to acquire qualification for a certain job it is clear that the commissioner or the student pay for the cost. But in many other cases when actions of knowledge transfer are not organised within the tasks of the institute and have not been foreseen in the research budget it could be a challenge. It has been experienced that farmers rarely are prepared to pay for consultancy and training. So it seems advisable to incorporate knowledge transfer within the budget for research or find a distant commissioner as for example financing by a collective, firm or government. In case of co-translation and even more so with co-production this problem is none existent, as interactivity has become an essential part of the research itself.

Examples of practices of co-translation start with involvement of end users and other stakeholders in demand articulation and giving feedback on research results. Also research visions and ideas that are investigated (as *e.g.* patented technologies, new animal housing system, animal welfare improvements) and which could be adapted in practice, bear in first instance science-driven characteristics and possibly count on the idea of superiority of scientific knowledge for acceptance in practice.

In the case of co-production, the positions of farmers and researcher have changed. Farmers have become a partner in the knowledge system alongside with partners from industry and NGO's and less an end user of research. Here also new dilemmas arise, such as should risky pilot scale experiments be performed by an institute or by an entrepreneur. Should a researcher engage in multidisciplinary or even transdisciplinary research, should he or she act

as a process manager and be responsible for the process of interaction with several participants and stakeholders in such a project and should he or she take the role of process facilitator in group meetings (Wielinga and Vrolijk, 2009).

Theories and practices that involve co-production (as transdisciplinary science, sustainability science) are still in development and are far from being codified and generally accepted as is the case with well-known scientific disciplines. It is even doubtful whether such codification will occur as every context with its particular actors differ. In every context again new shared visions and knowledge has to be agreed upon. Tools derived from elsewhere can be helpful to form joint scenarios and visions, to guide multi stakeholder processes, in monitoring of progress and eventually evaluation of outcome (*e.g.* Hirsch-Hadorn et al., 2007; Van Mierlo et al., 2010).

General conclusion

The VOTRIS project has shown different institutional configurations and practices of knowledge production and transfer. With increasing complexity of research problems vocational training and knowledge transfer by methods which rely on “sending” research results to the end user are complemented by activities in which the end user is actively involved in forms of co-translation or co-production.

Probably due to a combination of not being aware of the potential and organisation of knowledge transfer in separate organisational units web based applications are under used.

The VOTRIS project revealed that research institutes developed approaches to translate scientific knowledge to the end users, but relatively seldom the approaches are described, evaluated and published.

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Annexe

The survey results per country

The survey was executed among staff of each partner institute.

ion involving those of the personnel who are active in the field of transferring knowledge from science to practice, throughout organisation, execution, being a lecturer of any kind of educational services provided by the specific entity.

Survey. An link to a questionnaire was send to either management (part 1) or staff (part 2) of the participating institutes. The questionnaire contained either a multiple choice from which a list of options (*italics*) or questions with a five point Likert-type scale of agreement (agree totally, agree, neutral, disagree and disagree totally).

Table 2. Questions posed in the Survey.

Part	1.	Questions
Management		<i>What kind of educational services does your institution provide?</i>
		<i>What form does your institution provide the educational services?</i>
		<i>What are the sources of financial support for your institution to provide educational services?</i>
		Does your institution provide the educational services in a business model (services paid by participants to bring profits for the institution)?
		Should the educational services be provided in a business model (services paid by participants to bring profits for the institution)?
		Do you find a business approach in providing the educational services (services paid by participants to bring profits for the institution) to be available/successful route to go?
		Do you think the educational services could be a good source of incomes for your institution?
		Does your institution have a dedicated team/department responsible for organisation of educational services?
		Does your institution deliver the offer (portfolio) of provided educational services?
		Do you find the idea of the offer (portfolio) of educational services to be usable for your institution (attracting attention of customers/trainees)?
Part 2. Staff		<i>Which method of know-how transfer do you find to be effective nowadays?</i>
		Do you think the remote training (e-learning) have the same educational effectiveness as the 'traditional' methods?

	Do you believe the e-learning with its technical innovations is able to fully replace 'traditional' training events (in agricultural sector)?
	Do you think the social media can be effective way of providing educational services?
	How do you get information from trainees about their needs?
	Does the institution aim to contribute to change farmers mindset?
	Should the educational services be provided in a business model (services paid by participants to bring profits for the institution)?
	Do you think the educational services could be a good source of incomes for your institution?

To assure more clarity responses were grouped by the country origin.

Full list of management responses Survey part 1. is available under the link:

<https://docs.google.com/forms/d/1FyfFdwjfqHTSfGt-AniOTxyqFMxyWmd4LYTgVjirXiQ/viewanalytics>

6. National Research Institute of Animal Production, NRIAP (PL).
7. Agro Management Tools, Wageningen University and Research (NL).
8. Vyzkumny Ustav Zivocisne Vyroby, V.V.I. Uhrineves (CZ).
9. Lietuvos Sveitkatos Mokslu Universitetas, LSMU (LT).
10. Agricultural institute Stara Zagora, Research Institute/Centre, (BL).

Summary of responses of Survey part 2 per country.

Total number of collated responses: 130

Agricultural Institute Stara Zagora, Bulgaria.

Number of collated responses 27

Respondents in the Bulgarian Institute find traditional not-very-interactive methods of transferring knowledge like: demonstration (82%), training (74%), lecture (63) to be the most effective ways of spreading information among the end users.

Nearly 56% declare that in their opinion e-learning has the same educational effectiveness as the 'traditional' methods, although answers to the question about ability of total replacement of traditional methods by remote training

are distributed more equally still with positive indication of capabilities of the innovative methods.

Feedback from trainees is collected mainly through cooperation with other institutions (85%) and direct talks with potential trainees (78%). Majority of respondents declare that the Institute contributes to the changes of farmers mindset.

The vast majority sees the educational services as possible source of incomes for their institution.

Full list of responses is available under the link:

https://docs.google.com/forms/d/17JIurKpiGdUBN_ZmAYl_WQr1ykbVioM3hl9DnqrxiEQ/viewanalytics

Vyzkumny Ustav Zivocisne Vyroby, V.V.I. Uhrineves, Czech Republic

Number of collated responses 33

Interactive workshops (67 % of respondents), demonstration (64 %) and consultation on requests (61 %) were indicated as the most effective methods of transfer knowledge. Remote training (e-learning) was evaluated as intermediary effective (52 %), 11 respondents considered modern learning methods less efficient and 5 respondents considered them to more efficient than traditional ones. Accordingly, almost 73 % of respondents were sceptical of the possibility to replace traditional learning methods by web based applications. As for the role of social media 36 % of responses were neutral and 42 % respondents did not consider them to be efficient. The needs of trainees are usually obtained via direct communication with potential participants (88 %) and/or in cooperation with other institutions (73 %). The opinion of 70 % of respondents is that they contribute to changing the mindset of their trainees. Nearly 46 % of respondents agree that educational services should be paid by participants but 42 % of them think that this source of income should not represent a substantial part of the total Institute's income.

Full list of responses is available under the link:

<https://docs.google.com/forms/d/1GEZzy7LdUfMhrTuGGizrG3WiSqgh0ZzYjsj9aCWxUIE/viewanalytics>

Lietuvos Sveitkatos Mokslu Universitetas, LSMU, Lithuania

Number of collated responses 22

Respondents in Lithuania indicated that the research institute organises a wide range of educational activities such as: conferences, seminars, workshops, training events, demonstration activities and remote learning/e,

social media, provide information in popular magazines and other dissemination papers. However, 50% of respondents do not think that remote training can successfully change traditional methods and 45.5 % respondents think that it cannot be as successfully applied as traditional methods. The main information about what trainees needs the Institutes still receive through direct talks with potential trainees and in cooperation with institutions such as breeders associations, advisory centres etc. The majority of respondents believe that research institutes can contribute to change farmer's mindset and that this can be applied in a business model (41%). At the same time 50% of respondents think that services paid by participants could bring profit for the Institution.

Full list of responses is available under the link:

<https://docs.google.com/forms/d/1hMo-ZIWOaA11D0G27Fr7-dzR1jpG6Vuf5g8OGzW0-wk/viewanalytics>

National Research Institute of Animal Production, NRIAP, Poland

Number of collated responses 25

Respondents indicated that they consider interactive workshops (72%) to be the most effective method of know-how transfer. Right after it placing training, consultation on request and learning farmers from farmers with result of 68%. Demonstration and social media were chosen by 56% and 52% of respondents respectively.

Evaluation of modern methods of knowledge transferring was by far more critical. Only 20% of respondents agreed with statement that remote training has the same educational effectiveness as traditional (classroom/direct) methods. 56% were neutral and 24% were sceptical. Even worse result was achieved for question about ability of replacing traditional methods by e-learning. Only 4% of respondents believe that remote learning has potential to fully replace methods used before Internet revolution, whereas 56% are sceptical and 40% are negative about the issue. What is especially interesting, much more expectations regarding the effectiveness is assigned to social media, resulting 60% respondents "agreed" or "strongly agreed" with question whether social media can be effective way of providing educational services. It appears that the direct (traditional) channels of spreading information raise more trust and confidence also in the group of professional educators and scientists who appreciate direct contact with end user and ability of instant feedback. It is worth to note that 76% of respondents prefer to get information about trainees needs by means of cooperation with other institutions of agricultural sector (associations, advisory centres), 72% get feedback talking directly with potential trainees and 64% use questionnaires after the training.

60% of respondents finds the Institute to be contributing to change farmers mindset.

Personnel of the institute in Poland is convinced that educational services should be provided in a business model and it could be a source of incomes for the institution.

Full list of responses is available under the link:

https://docs.google.com/forms/d/1YSmdQBTO34z3dYHjgXav7SaIdrJrBFL_O_q0zkF2All/viewanalytics

Agro Management Tools, Wageningen University and Research, The Netherlands.

Number of collated responses 23

Respondents indicate interactive methods to be the most useful with an emphasis on interactive workshops (>90%). Other interactive approaches were “farmers learn from farmers” and “networking” Providing “training”, and “confronting farmers with outsiders” and “publishing in popular (farmers) magazines” (50-60%) held an intermediate position in the judgement of successful means of knowledge transfer.

Demonstration, social media, blended learning, dissemination papers, lectures and confronting farmers with outsiders all scored near 30% or below and were considered as being less effective..

The institute in The Netherlands works on a contract basis only, all activities of knowledge transfer is paid for. Seldomly the farmer is charged individually. Costs of knowledge transfer could be covered by collective, governmental or private enterprise. Often knowledge transfer is a part of the research project or even an intrinsic part of research approach by including stakeholders in the research process. In the latter approach research aims co-production of new knowledge and mutual learning.

Full list of responses is available under the link:

https://docs.google.com/forms/d/1qKnLd6kLHs5xIJP43fc_r8gRmbi9KLIYXgBL_NkdCc/viewanalytics