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Europe Needs Consistent Teaching of the Economics of Animal Health

Europa braucht eine einheitliche Lehre von der Tiergesundheitsökonomie

L'Europe doit enseigner l'économie de la santé animale de manière cohérente

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The limited resources available for animal health surveillance, control and prevention measures, implies a global need for people educated in the value added to daily life by economics education. Cogent, well-organised teaching of economics applied to animal health (EAH) is critical for a number of far-reaching societal reasons. With the increasing demand for animal protein products in developing countries, the growth of intensive animal production systems globally and the rise of companion animal consumerism, the need for veterinarians as consultants who possess a range of economic skills in animal health appears to be greater than ever before. Indeed, there is an increasing demand for disease impact assessments and improvements in the allocation of resources for disease surveillance, control and prevention measures where economics can add value (Davis, 2014). This demand reflects the increasing tendency for cost-benefit analysis and risk-based criteria in the formulation of government and international policy objectives. Bodies such as the World Organisation for Animal Health (OIE) and departments of agriculture in national governments are also demanding economists work together with veterinarians and animal scientists. Discussions have intensified on who should bear the costs of animal health (and disease); and cost-sharing frameworks, which require economic expertise, are being developed to redistribute the financial burden of disease events (Rushton *et al.*, 2007; Rich and Perry, 2011; Schwabenbauer, 2012). Moreover, emergence and re-emergence of animal diseases is strongly related to people's behaviour and an understanding of incentives through the use of economics allows more refined approaches to disease management.

While teaching and training on the use of EAH has been offered since the 1980s (Howe, 1988), it has never been formally institutionalised within the educational courses for animal health professionals such as veterinarians and animal scientists. Furthermore, traditional agricultural economics has become a limited part of many academic institutions reducing the exposure of the economics profession to the range of issues posed by the subject of animal science. An inventory of the current EAH teaching and

education activities delivered throughout the world is lacking. Furthermore, there is also a lack of ownership for standardising curricula by key professional bodies such as The European Association of Establishments for Veterinary Education (<http://www.eaeve.org>) and the International Veterinary Student's Association (<http://www.ivsa.org.uk/>). With this knowledge, there is a requirement for mapping the needs of people using economics in animal health now and in the future. Such information could inform the standard setting process for veterinary curricula and the development of future educational materials.

In this article, we summarise the key findings of a European survey published by Waret-Szkuta *et al.* (2015) about EAH current offerings and demands and discuss the implications in terms of education provision, development of professional skills and policy making. We close with an action plan developed from the survey findings and stress the point that increasing pressures on the animal health industries require economic input in policymaking.

Data collection and analysis

Three online questionnaires for different target groups were developed and distributed to 646 European selected contacts via e-mail and the NEAT network website (<http://www.neat-network.eu>). The first target group included educational institutions such as veterinary or agricultural schools and universities as well as curriculum-setting bodies. The second target group included non-educational private organisations including veterinary organisations, industry bodies (farm and food organisations), producers, service providers, consulting agencies and supply chain associations. The third target group included public bodies encompassing government and other public agencies, research institutes, international organisations and non-governmental organisations. The questionnaires were piloted among 12 contacts from Italy, Germany, France and Finland recruited by NEAT partners. The final sample size achieved was 236, a response rate of 37 per cent: 78 educational institutions (including schools, faculties or departments of veterinary medicine, agriculture, food science and biomedical science; there were no replies from curriculum setters), 81 private organisations and 77 from public bodies.

Table 1: Survey distribution and sample details

	Surveys e-mailed to NEAT contacts	Responses received	Response rate (%)
Veterinary and agriculture schools, universities and curriculum-setting bodies	233	78	33
Non-educational private bodies	280	81	29
Public bodies and government departments	133	77	58
Total	646	236	37

Data were treated confidentially and only the core study group had access to individual responses that were anonymised for analysis. Data were retrieved and statistics obtained using Modalisa 7.0. Ethical approval (URN 2013 0080H) was received from the Ethics and Welfare Committee of the Royal Veterinary College, London, UK.

Box 1: The NEAT consortium

The NEAT consortium (see: <http://www.neat-network.eu/>) aims to develop and strengthen educational materials and delivery methods to animal health professionals. It is a group of animal health economists and professionals with a particular interest in the field; all 60 partners (mainly from European countries) of the project have strong links through training, research and consultancies to the animal health services and/or livestock sectors of Member States. The immediate aim of NEAT is to provide an overview of the *status quo* of education and training activities and techniques in EAH and to investigate the needs and expectations of end users. Once this has been determined, the long-term aim of the consortium is two-fold: i) to develop a diverse set of EAH teaching materials that are suited to the varying skill levels and interests of the animal health profession, and ii) to be influential in embedding sustained EAH education into veterinary curricula. We thank all the respondents to the questionnaires and NEAT partners for their involvement in the questionnaire administration.

Findings

The survey conducted was the first to: 1) assess the extent, content and format of EAH education currently delivered; and 2) analyse current and future needs and expectations of people using EAH. Overall, there were three key findings that revealed critical issues for further consideration.

Key finding 1: Current content of EAH education is highly variable and does not always meet current and future demands.

- Whatever the type of organisation, there is a clear demand for more expertise and further education opportunities in topics such as the economic impacts of animal diseases and the support to public policy-level decision making (as demonstrated in Tables 2 and 4). The majority of respondents believed these needs are going to increase whatever the topic cited and whatever the timespan considered: short, medium or long term.
- 73 per cent of respondents said their organisation did not offer teaching or education in EAH, which raises the question of whether animal health policies are being developed and implemented with the appropriate skills.

- EAH is not offered at 41 per cent of the educational institutions surveyed and other organisations only provide courses of higher specialisation: post-graduate training (27 per cent) and/or internal training/seminars (21 per cent). The majority of respondents (74 per cent) reported having poor information about the training opportunities available in their country or elsewhere.
- There is great variability in education and training offered by the different educational institutions surveyed (Table 3). It appears that the lack of curriculum standardisation has resulted in educators teaching their more-favoured or the most traditional topics (e.g. agricultural or rural economics). The consequence being disparate, and sometimes conflicting, approaches to generic curricula and, additionally, limited exchanges to run or promote them (41% of the teaching delivered by educational institutions was reported as not involving any collaboration). While a diversity of EAH skills is positive for inspiring creative approaches to research and policy development, the basics of EAH appear to be neglected and hidden within examples of other disciplines.

Table 2: Proposed EAH topics for future training needs

Topics at the level of farm, firm or individual person / Directly related to your organisation
Production costs (including all inputs, outputs), profit maximisation
Economic impacts of animal disease
Accountancy, finance
Pricing, marketing related to food, feed and veterinary services
Investment analysis
Topics at the level of sector, market or national economy / Concerning the wider market or economy
Economic impacts of animal disease
Market or sector analysis
Market price analysis (price trends, price formation)
Supply chain analysis, supply chain management
Consumer behaviour, demand analysis theory, consumption
Cost-effectiveness analysis, cost–benefit analysis
Support to public or sector-level decision making
Project or programme evaluation, policy analysis, policy impacts

Table 3: Topics covered in EAH curricula of educational institutions

Topics/subjects	Number of answers*	Frequency (%)
Introduction to economics, basic concepts	27	93.1
Accounting, finance	8	27.6
Firm-level economics, production and costs functions, profit maximisation, supply decisions	21	72.4
Demand theory, consumption, consumer preferences	16	55.2
Sector-level economics, simultaneous analysis of demand and supply in one sector, analysis which focuses on agriculture	16	55.2
Economics at the level of national economy, analysis covering other sectors in addition to agriculture	6	20.7
Economics of public policies and public interventions, decision-making of public bodies	3	10.3
International trade	1	3.4
Practical examples on how to apply economics in animal health issues	9	31.0
Analytical derivation of economic results	2	6.9
Survey responses received regarding contents of curricula	29	-

Note: *Multiple answers were possible and non-response indicates that the item was not covered by the educational institution.

Table 4: Percentage of respondents being of the opinion that more expertise is currently needed in their organisation for a topic of EAH

Topics	Proportions of respondents believing their organisation needs more expertise in the topic (%) *		
	Educational institutions	Private organisations	Public bodies
Calculating production costs and revenues	26.9	69.2	46.8
Estimating the (economic/financial) impacts of animal disease	59.0	77.2	71.4
Pricing of products and inputs, including data relating to food, feed, veterinary services etc.	37.2	62.0	40.3
Market or sector analysis	30.8	67.6	33.8
Market price analysis (e.g. trends, price building)	29.5	65.8	24.7
Supply chain analysis and/or management	24.4	64.5	35.4
Consumer behaviour analysis	35.9	64.5	44.2
Cost-effectiveness and/or cost-benefit analysis	43.6	76.0	52.0
Problem analysis to influence public policy decisions	43.6	60.8	58.5
Project and /or programme evaluation in the public sphere	38.5	55.9	48.1

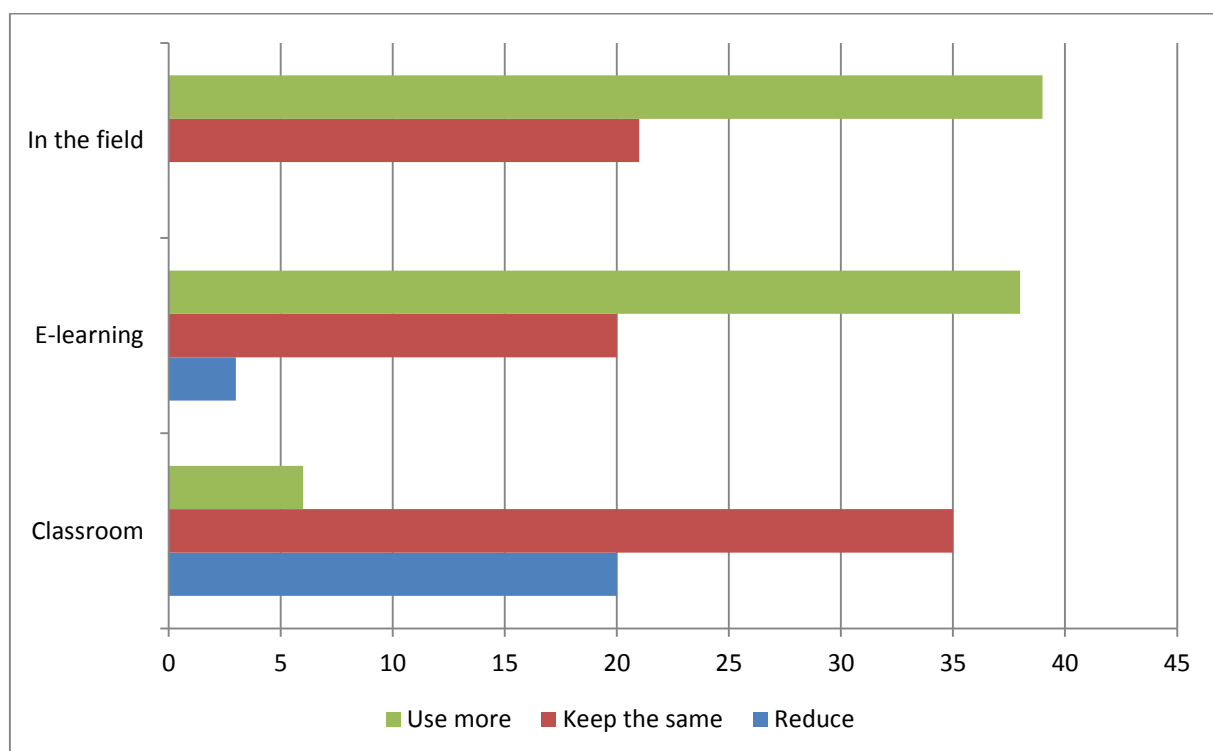
Notes: *The % of respondents that want the topic to have more emphasis ("add") is reported for educational institutions. The % of respondents believing the need of expertise in the topic is "medium" and "a lot" is reported for the two other categories.

Furthermore, the advent of key funding bodies (like research councils and OIE) calling for interdisciplinary research has accentuated the need for a collaborative approach to developing and disseminating knowledge. Therefore, harmonising EAH curricula across education and training sectors would ensure that future policies are developed from a recognised and economically-solid platform of understanding with the added benefit of providing a common language between EAH and other animal health professionals.

Key finding 2: Training in EAH is inconsistently offered and information about the existence of educational opportunities is scarce.

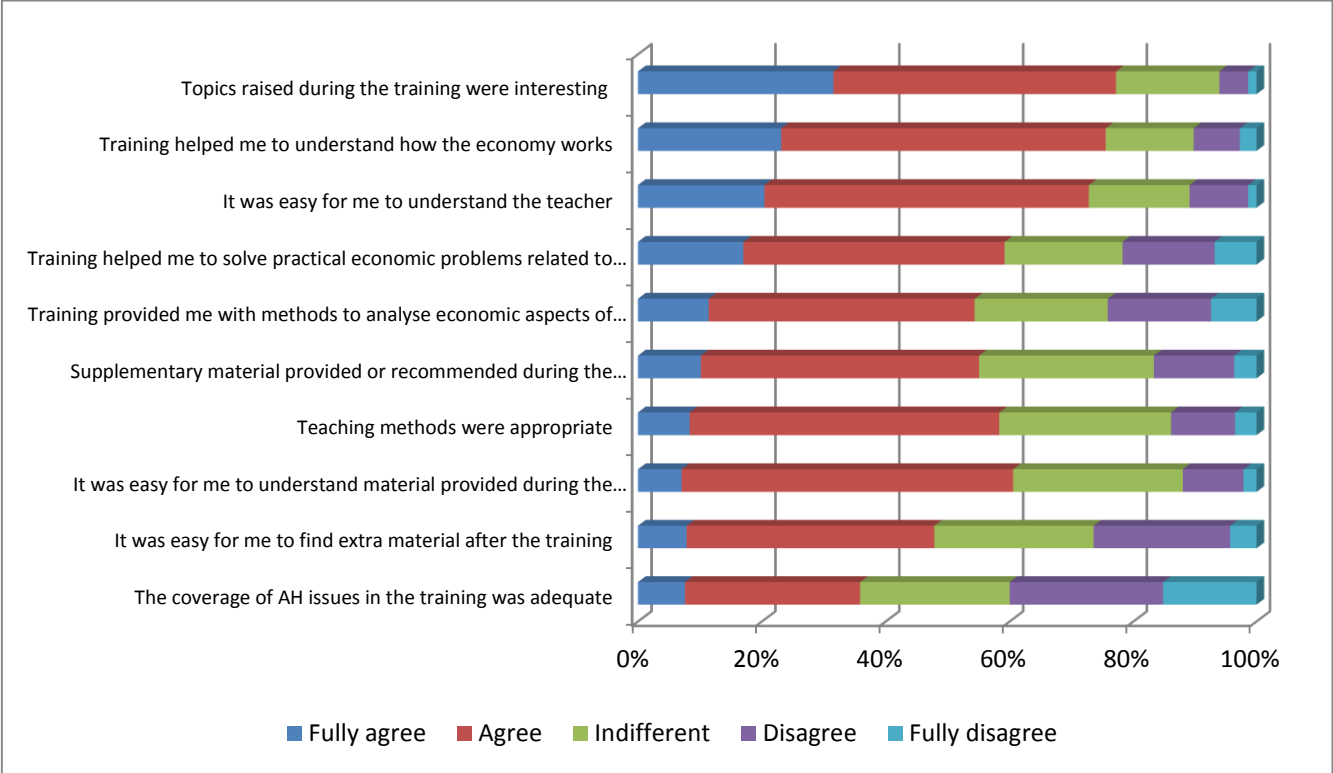
- There is a potential and concerning gap between the EAH training delivered in veterinary curricula and EAH demands of end-users (compare Tables 2 and 3). This finding should be considered by educational institutions and funding bodies in allocating resources so that a growing number of future policies on animal health issues are made by people with appropriate skills.
- There is a clear inventory of topics that will need to be included in future curricula (Table 2).
- There is scope to increase the use of e-learning and field training, as non-classroom teaching approaches to date have been under-utilised (Figure 1). In the case of a curriculum review, practical and technologically-advanced approaches to the delivery of teaching material should be emphasised.

Figure 1: Learning format that respondents from educational institutions would like to see used less, the same or more (n=61)



Further evidence that policymakers are insufficiently prepared to develop effective policies is presented in Figure 2, where 58 per cent of survey participants either fully disagreed or disagreed that the coverage of animal health issues in EAH training is adequate.

Figure 2: Opinions of respondents to the statements regarding training in EAH that they have received (n=138 respondents)



The current training identified by the respondents focuses mainly on introductory economic topics and farm-level issues (Table 3). However, results suggest that a greater utilisation of fundamental economic approaches and analytical skills, like cost–benefit analysis and impact assessments, in the teaching of EAH might be warranted.

Regarding factors determining the future needs in EAH, the most important topics were concerns about human health followed by national or international food laws, regulations and policies. However, many respondents from veterinary organisations and industries (54 per cent) considered structural changes (e.g. in herd/flock size, farm size, food industry concentration, international trade patterns) as very important factors determining changes in EAH needs.

Key finding 3: The working environment of the survey respondents appears to affect their expectation about the problems that economics can solve.

- Participants working for educational and public institutions (59 per cent and 71 per cent, respectively, Table 4) showed that their dominant concern is related to how animal health impacts on society. Results show that more EAH education is needed on estimating the impacts of animal disease via methods such as impact assessments, decision tree analysis and partial budget analysis.
- Private veterinary organisations and industry bodies were more concerned with the need for more expertise in using economics for general management (for example, 76 per cent believed more skills are required in cost-effectiveness and/or cost–benefit analysis, and 61 per cent believed that skills are required in problem analysis to influence public policy decisions). The importance of understanding markets was also highlighted in their responses.

The different demands for EAH expertise reflect that the majority of the people working in educational institutions will be involved in research and will be considering how people make decisions and how this influences animal disease outcomes. While these researchers have extraordinary analytical abilities, their work runs the risk of being too theoretical and potentially overly-complex. The consequence is that analyses lack the clarity needed for the application to real-world decision-making processes. The complexity of much economic analysis is therefore a substantial barrier to the development of a cogent, streamlined, user-friendly curriculum that allows for understanding basic economics and policy-making skills to be developed from a day-one, first-principles perspective.

Next steps to improving EAH education

Our survey results provide an overview of EAH education: the current situation, current needs and future needs. Findings of this survey showed disparate approaches to EAH. First steps for fostering well-informed policymakers and technical advisors of the future are:

1. **Advocacy** for change to the decision makers on veterinary curricula on the value that can be added by consistent education with regard to the use of EAH: more economic thinking is required to make sound decisions on animal health policies;
2. **Agreement** between economists and animal health professionals on what the core content of the curricula should include with regard to economics;
3. **Institutionalising** agreed EAH content in veterinary curricula by the European Association of Establishments for Veterinary Education, American Veterinary Medical Association, the UK's Royal College of Veterinary Surgeons and others;
4. **Development** of core materials that cover the agreed core theoretical concepts and cases by combining theory and application of existing economic tools; including the development of a new peer reviewed journal and/or teaching text book;

5. **Implementation** of novel teaching tools and practical approaches to delivering theoretical and conceptual EAH teaching/training material at undergraduate and postgraduate levels through the use of case studies and participatory exercises, such as computer tutorials that are supported by class discussions.

The world has a genuine need for improved animal systems – whether that is in the global provision of improved livestock production systems or improved household-level provision of healthcare for companion animals. The allocation of resources such as government funds for vaccines and labour to administer prophylactic treatments is critical in both contexts and these findings show that a great deal more theoretically-based EAH knowledge needs to be offered to veterinary and animal health students in a practical, useable manner. New EAH material cannot be confined to universities but also needs to reach government agencies and commercial entities through media, such as e-learning, as an existing demand from these groups was identified.

Policymakers at government level need to be aware of the need to expand clinical knowledge into EAH. At the macro level, policymakers should prioritise the inclusion of EAH in their disease interventions and analysis activities to ensure that their conclusions are robust and beneficial to wider society. Finally, it has been recognised that animal health policymakers need greater support in their formative years of education and the results of this research provide an action plan for immediate implementation.

Implementation of the above five-point plan will give a long and sustainable life to EAH and animal health professionals of the future will be enthusiastic and properly-equipped with skills to understand and manage resource allocation.

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Summary

Education in the use of economics applied to animal health (EAH) has been offered as part of various veterinary degree programmes since the 1980s. However, it has never been institutionalised in undergraduate curricula for animal health professionals and there is no systematic information on current teaching and education activities. An online survey was conducted in Europe to assess existing teaching programmes and the expectations of people using economics in animal health. The main conclusion is that there is insufficient EAH education on offer and there are disparate approaches to EAH-related curricula. Respondents expressed concerns regarding for example the limited education relating to assessing economic impacts of animal diseases, evaluation of intervention decisions, or using economics

for general business management and understanding markets. Both public and private organisations predicted an increasing importance in the use of EAH in the future. The overarching implication is that EAH teaching methods and materials need to be developed and philosophically embedded into animal health curricula to ensure that future policy decisions regarding animal health are based on strong, well-founded knowledge of resource allocation.

Die Lehre von der Tiergesundheitsökonomie wird seit den 1980ern als Bestandteil verschiedener Studiengänge im Bereich der Veterinärmedizin angeboten. Die Inhalte der Studienordnungen für die Bachelor-Studiengänge für Veterinärmedizin wurden jedoch nie vereinheitlicht, und es liegen keine systematischen Angaben zur aktuellen Lehre und Ausbildung vor. Zur Beurteilung des bestehenden Lehrbetriebs und der Erwartungen derer, die sich im Bereich der Tiergesundheit der Ökonomie bedienen, wurde eine europaweite Online-Umfrage durchgeführt. Dabei ergab sich im Wesentlichen, dass das Lehrangebot in der Tiergesundheitsökonomie nicht ausreichend ist und dass es disparate Ansätze für Studiengänge mit Bezug auf Tiergesundheitsökonomie gibt. Die Bedenken der Teilnehmenden galten z.B. dem knappen Lehrangebot im Bereich der Bewertung wirtschaftlicher Auswirkungen von Tierseuchen, der Evaluation von Interventionsentscheidungen sowie der Anwendung der Ökonomie auf die Allgemeine Betriebswirtschaftslehre und das Marktverständnis. Sowohl öffentliche als auch private Organisationen sagen voraus, dass die Anwendung der Tiergesundheitsökonomie zukünftig zunehmend an Bedeutung gewinnen wird. Die allgemeine Schlussfolgerung lautet, dass die Lehrmethoden und -materialien im Bereich Tiergesundheitsökonomie entwickelt und philosophisch in den entsprechenden Studienordnungen verankert werden müssen, um sicherzustellen, dass politische Entscheidungen in Bezug auf Tiergesundheit in Zukunft auf fundiertem Wissen um die Verteilung der Ressourcen basieren.

Depuis les années 1980, divers cursus vétérinaires comprennent des cours sur l'application des sciences économiques à la santé animale (ESA). Ce sujet n'a cependant jamais été institutionnalisé dans les premiers cycles des programmes à destination de professionnels de la santé animale et il n'y a pas d'information systématique sur les cours et les activités éducatives actuellement disponibles. Une enquête en ligne a été menée en Europe pour évaluer les programmes éducatifs existants et les attentes des personnes appliquant les sciences économiques à la santé animale. La principale conclusion est que l'offre éducative en ESA est insuffisante et que les approches des cursus incluant les ESA sont disparates. Les répondants s'inquiètent par exemple de la disponibilité limitée de l'offre éducative concernant l'évaluation des incidences économiques des maladies animales et celle des interventions, ou l'utilisation des sciences économiques dans la gestion générale des entreprises et la compréhension des marchés. Les organisations publiques et privées ont prédit l'importance croissante de l'utilisation des ESA dans l'avenir. La principale conséquence est la nécessité de développer les méthodes et outils d'enseignement des ESA et de les inclure de façon philosophique dans les curricula sur la santé animale afin de s'assurer que les décisions de politique futures au plan de la santé animale se fondent sur une connaissance solide et argumentée de la répartition des ressources.

“More economic thinking is required to make sound decisions on animal health policies.”

“Wir müssen die Ökonomie mehr einbeziehen, um fundierte politische Entscheidungen zur Tiergesundheit treffen zu können.“

"Les politiques de santé animale doivent d'avantage s'appuyer sur le raisonnement économique."





