

Veterinary Public Health Institute Annual report 2009

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Universität Bern | Universität Zürich

vetsuisse-fakultät

Title:

Sampling for a research project on Salmonella, antimicrobial resistance and animal health in different housing systems for laying hens.

Veterinary Public Health Institute

Annual Report 2009

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1. Preface

Synergy through partnership

According to a definition of the World Health Organization (WHO), veterinary public health (VPH) is „the contribution to the complete physical, mental, and social well-being of humans through an understanding and application of veterinary medical science“. Or, expressed in simpler words: VPH comprises the activities of veterinary medicine which are of importance for public health. In the first instance, one might think of diseases transmissible from animals to humans (zoonoses), and of food safety from stable to table. Nevertheless, a more comprehensive view also includes animal welfare in the area of activities of veterinary public health. VPH is thus a core activity of the public veterinary service. For this reason, the Swiss Federal Veterinary Office (BVET) has over the last 10 years implemented disciplines of VPH such as epidemiology, monitoring and surveillance systems, data management and risk assessment. At the same time, an intensive collaboration on many of these tasks developed with the two veterinary faculties in Bern and Zürich. In parallel, VPH has evolved internationally to a more and more independent discipline within veterinary medicine. This resulted in the idea to merge the common interests of university research and public veterinary service in the area of VPH, and to found a common institute as a real joint venture.

The VPH Institute is a university institute and is part of the department for Clinical Research and VPH of the Vetsuisse faculty Bern. It is located in the same building as the Swiss Federal Veterinary Office in Bern-Liebefeld. The institute went into service on July 1, 2009. The present document is its first annual report. This shows the great potential for synergy which a collaboration of public veterinary service and university research presents for the area of Veterinary Public Health.

Prof. Urs Würgler
Rector of the University of Bern

Prof. Hans Wyss
Director BVET and
a.i. Head of VPH-Institute



Signing of the cooperation treaty between the University of Bern (rector Urs Würigler, left) and Swiss Federal Veterinary Office (director Hans Wyss, right) for the foundation of the Veterinary Public Health Institute.

2. The VPHI presents itself

Veterinary Public Health (VPH) is a discipline that in recent years has become increasingly important. Significant economic losses caused by outbreaks of emerging and re-emerging animal diseases have stimulated a need for state of the art research in monitoring and surveillance methodology, disease control and prevention efforts. At the same time, animal diseases transmissible to humans (zoonoses) such as SARS, BSE and Avian Influenza have increased public awareness for such threats. Almost 70% of the newly emerging human diseases are zoonoses, i.e. have an animal origin. This clearly emphasizes the strong link between animal and public health, and the importance of applied research in the field.

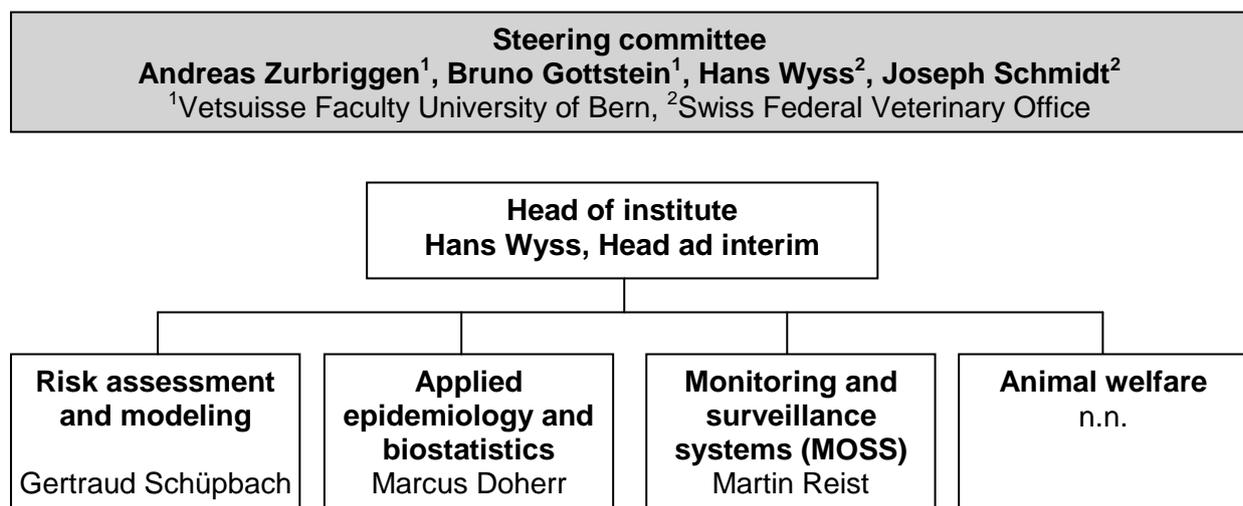
The VPH Institute of the University of Bern, established on July 1, 2009, represents the discipline at the Vetsuisse Faculty, University of Bern, and the Swiss Federal Veterinary Office (BVET) in research, teaching and consulting. The VPH Institute is a cooperation of the University of Bern and BVET.

Mission

The collaboration between academia and veterinary services shall contribute substantially towards animal health and food safety, thus improving public health in Switzerland.

The VPHI will cover undergraduate and graduate education, research and services on VPH-related topics for the Vetsuisse Faculty of the University of Bern, the Federal Veterinary Office, and other partners. These tasks shall be performed in collaboration and coordination with all other VPH stakeholders.

Organizational chart



The working group **risk assessment and modeling** uses epidemiological methods to improve our understanding of disease processes in populations. Risk assessment is a scientific method for estimating probability and consequences of an undesired event. Examples are the risk of introducing a disease via the import of animals or animal products into Switzerland, or the risk for humans to acquire bacteria with resistance to antibiotics through consumption of food of animal origin. Stochastic and deterministic models can predict the spread of diseases in animal populations and, for zoonotic diseases, also the transmission to humans. This can be used to predict the magnitude of an epidemic, to estimate the success of interventions, and to compare the economic effects of different strategies for surveillance and control of diseases.

In the working group **applied epidemiology and biostatistics**, basic methods for design and statistical analysis of studies are established and made available to internal and external projects. Recent methods such as Bayesian statistics for the evaluation of diagnostic tests and analysis of surveys in the absence of a perfect diagnostic test are established and their applicability for research questions of the institute evaluated.

The working group **monitoring and surveillance systems (MOSS)** develops and refines models for the efficient, effective and targeted surveillance of zoonoses, contagious animal diseases and food safety. The focus is on the one hand on the refinement of risk-based approaches, and on the other hand on optimizing the benefit cost ratio of surveillance by evaluating new sample materials such as bulk milk. This also includes further development of monitoring and surveillance towards early detection of new or re-emerging contagious animal diseases and zoonoses. Another focal point is the development and evaluation of new approaches to the control of production diseases, taking benefit-cost aspects as well as awareness, knowledge and attitude of farmers into consideration.

The working group **animal welfare** develops scientific basics for the wellbeing of animals. In our society, people see animals not only as food source, but also as partners and companions. Therefore, animal welfare has an important part in the public veterinary service. Animal husbandry does not only have to guarantee good animal health and a high safety of the food produced, but also to fulfill the needs of the animals. As a supplement to the work of other Swiss scientific institutions active in this field, the working group animal welfare of the VPHI shall mainly cover the area of animal welfare in companion animals. In the year 2009, the position of head of this working group was open. This field of activity was therefore covered by several experts of the Vetsuisse faculty and external experts.

Team

In the year 2009, Prof. Hans Wyss was the ad interim head of the institute. The position of head of institute will be advertised in spring 2010. On 1.1.2010, the team of the VPHI consisted of three lecturers, three post docs, five graduate students, three residents of the European College of Veterinary Public Health (ECVPH) and two guest scientists. Researchers from five different countries work at the VPHI.



The team of VPHI (from left to right): Myriam Harisberger, Norikazu Isoda, Martin Reist, Gertraud Schüpbach, Antonella Reber, Sarah Blickenstorfer, Patrick Presi, Marie B. Lefevre Sangiao, Menga Rossetti, Elena Di Labio, Martin Balsiger, Anna Fahrion, Lothar Kreienbrock, Hans Wyss, Marcus Doherr. Missing in the picture: Salome Dürr and Sonia Menéndez.

Cooperation partners

VPHI has a close collaboration with the different institutes of the Vetsuisse faculties Bern and Zürich. Teaching and research in epidemiology is coordinated with the **department of epidemiology at the Vetsuisse faculty Zürich**, which started operations in October 2009 with its new head Prof. Paul Torgerson. In 2009, first constructive meetings were held to coordinate teaching and research. This collaboration shall be expanded in 2010.

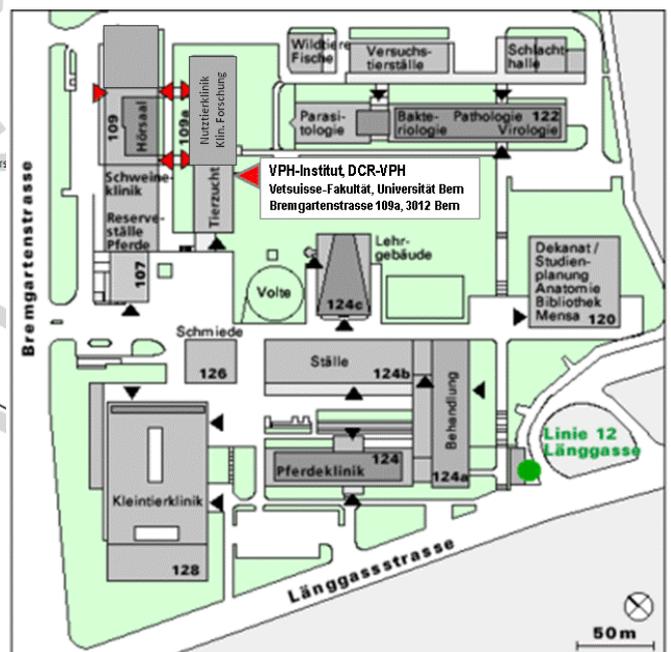
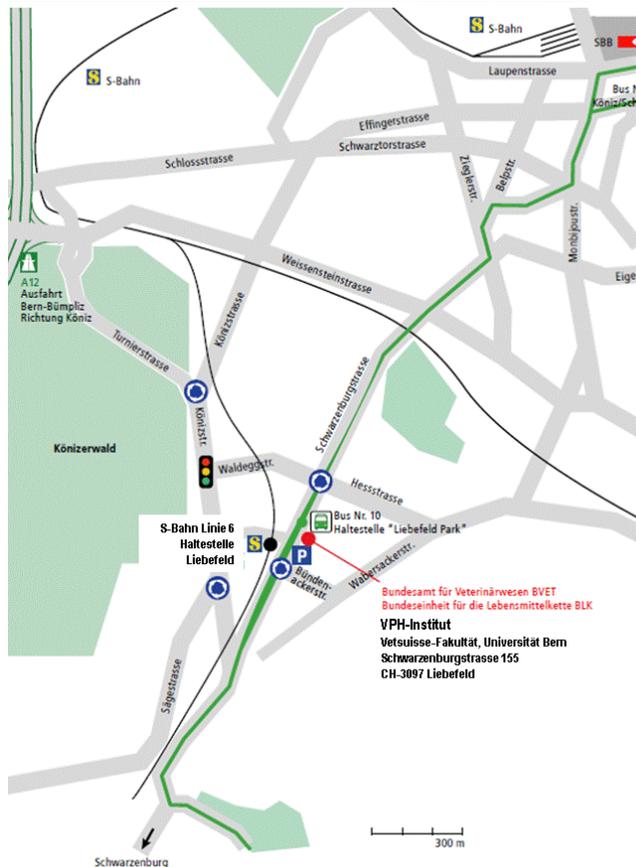
The cooperation with the **Swiss Federal Veterinary Office** allows utilization of data from the veterinary services for research questions, and the research results can be directly implemented into practice. Applied research is also performed in collaboration with the other Federal Offices and the agricultural research stations.

International research cooperations are also an integral part of the research of VPHI. In 2009, VPHI was part of four European research consortia. Existing contacts with the Department of Biometry, Epidemiology and Information Processing (IBEI) of the **TiHo**

Hannover were strengthened. The head of this institute, Prof. Lothar Kreienbrock, spends most time of his sabbatical (Nov 2009 – Feb 2010) at VPHI. Collaboration with the **Royal Veterinary College (RVC)** exists for training of residents of the ECVPH and Graduate students. In 2009, a master's student of the RVC completed his project and thesis at the VPHI.

Map and contact address

You can reach the VPHI at the location Bern-Liebefeld (in the building of the Swiss Federal Veterinary Office) and at the location Vetsuisse Bern (animal hospital).



Location Liebefeld:
 Schwarzenburgstr. 155, 3097 Liebefeld

Location Animal hospital:
 Bremgartenstr. 109a, 3012 Bern

Contact address: Veterinary Public Health Institute, Schwarzenburgstr. 155, CH-3097 Bern-Liebefeld, Tel.: +41 (0)31 631 2322 | Fax +41 (0)31 323 8389 | Email: info@vphi.unibe.ch | www.vphi.ch

3. Teaching

Veterinary public health is a discipline which has gained importance over the last decades. With the **increase in professionalism** of veterinary services there is an additional demand for specialists in animal health surveillance, control of contagious animal diseases, food safety and animal welfare. At the same time, practicing veterinarians and farmers also need knowledge on the contribution of animals to public health.

For this reason, the VPHI is involved in teaching students of veterinary medicine and agriculture as well as in graduate education and professional training. The aim of VPHI is to continually improve the quality of its lectures and courses through regular feedback by course participants and self-evaluation of possibilities for improvement.

Courses undergraduate education veterinary medicine

- **Basic Epidemiology**
1. Year, 20 hours, Vetsuisse-Faculty, University of Bern
- **Veterinary Public Health I - Clinical Epidemiology**
3. Year, 23 hours, Vetsuisse-Faculty, University of Bern
- **Veterinary Public Health II - Control of contagious animal diseases and animal welfare legislation**
4. Year, 2-week intensive course, Vetsuisse-Faculty, University of Bern. This course is also given by the same lecturers with almost identical content at the Vetsuisse faculty Zürich.
- **Animal welfare**
In 2009, the VPHI did not offer any courses in animal welfare. This is planned for 2010 or 2011, as soon as the position of professor for animal welfare is filled.

Courses graduate education, University of Bern

- **Graduate School Course "Introduction to Epidemiology & Biostatistics"**
2-week intensive course for students enrolled in the graduate schools of the University of Bern, other young scientists, and external participants (in English).
- **Course Statistics with NCSS**
A 2-day course (given twice per year) which teaches basic statistics using the software package [NCSS](#). The target audience is undergraduate students, graduate students and scientists (in English).

Activities in professional training

- **Training of official veterinarians**
Two days of teaching (courses in spring and autumn) in the module animal health with the topics monitoring and surveillance, epidemiological outbreak investigation, and sample size calculation.

External courses

- **TiHo Module Courses**
Contribution to 2-day course animal health surveillance of the module courses of the Institute of Epidemiology, Biometry and Data processing of the Veterinary University Hannover.
- **Swiss College of Agriculture**
Participation in the education (half-day course on zoonoses and antimicrobial resistance).

Prospects

- Combination of the courses on epidemiology (1. Year, 20 hours) and biostatistics (1. Year, 20 hours, currently taught by external lecturers) into one course on epidemiology and biostatistics. This course should be taught in collaboration with the epidemiology group of the Vetsuisse faculty Zürich (Prof. Paul Torgerson) at both Vetsuisse faculties in Bern and Zürich.
- Coordination of the contents of all courses offered by the institute at the Vetsuisse faculties in Bern and Zürich.
- Coordination of all courses on animal welfare and ethics at the Vetsuisse faculty Bern (after the position of professor for animal welfare is filled)
- Contribution towards the relevant course modules of the Twinning-Project Switzerland-Kyrgyzstan coordinated by the Swiss Federal Veterinary Office.

4. Research

The VPHI is actively involved in research on risk assessment and modeling, applied epidemiology, monitoring and surveillance systems and animal health economics with focus on animal health, zoonoses and animal welfare. Our projects deal predominantly with research questions with practical relevance for the veterinary service and the institutes of the Vetsuisse faculty. The research topics are strategically planned to complement the VPH research of the Vetsuisse faculty Zürich, the animal welfare research of the Centers for Proper Housing, and of the corresponding institutes of the Swiss Federal Institute of Technology (ETH). Through the cooperation and direct communication of university research and public veterinary services, the results of our research can be directly implemented into practice. Therefore, the research of VPHI contributes substantially towards animal health and food safety, thus improving public health in Switzerland.

Current research projects 2009

Qualitative requirements for the development of the national control plan. Assessment and optimization of the process control concept

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Food safety is an important public health issue. Therefore, the way and frequency of the controls along the food chain should be performed according to the risk they represent and based on transparent criteria. According to the analysis of national and international risk-based approaches for performing controls along the food chain, a multi-annual national control plan (MANCP) was developed for Switzerland. The BLK, BVET, BAG and BLW are responsible for the development and optimization of this plan. The next MANCP's can be used as an instrument to document the strategies for the different areas of control (plant health, animal welfare, animal health and food safety). The MANCP defines the control in different operation units (e.g. farms) categories based on a risk assessment. This assessment is a comprehensive tool to distribute operation units into different risk categories depending on the hazards they have. The distribution in risk categories is based on static criteria. The operation's risk category will determine the 'baseline control frequency' of the static criteria. The assignment of an operation within a risk category takes place due to dynamic criteria. These reflect the specific properties of an operation. The dynamic criteria will then be translated in 'in-between control frequencies'.

The aims of this project are to assess the efficiency of the MANCP and to provide tools for optimizing the process control. Due to the broad spectrum of operation categories covered by the MANCP, the project will focus on the hazards of processes from the dairy production along the food chain. The structure of the risk assessment will be challenged performing a sensitivity analysis to identify the most significant risk factors and help define priorities for risk mitigation. New approaches will be developed to establish a link between the risk assessment and the control frequencies.

The following questions will be addressed: 1) How reliable is the risk assessment used to define risk categories for the different operation categories? 2) How to convert risk categories into control frequencies? 3) What dynamic criteria should be used and how should they influence control frequency?

BVD Eradication programme – What to do next? Epidemiological model for the comparison of surveillance strategies

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Bovine virus diarrhea / mucosal disease (BVD / MD) causes an annual economic loss of about 8-10 million francs in Switzerland (Rüfenacht et al, 1997). Calculations showed that the eradication of BVD is only cost effective if it can be achieved within a few years (Schaller et al, 1997; Valle et al, 2005). Results from past studies in Switzerland have shown that in Switzerland the prevalence of antibody-positive animals is high and the pathogens (BVDV) occur throughout Switzerland, with a prevalence of approximately 0.8%. The identification of suspicious herds on the basis of antibody determination in milk or blood samples does not allow the discrimination between herds with or without persistently infected (PI) animals, as antibody-positive animals are present in almost all herds.

To eradicate BVD (Bovine Viral Diarrhoea) in Switzerland, the whole Swiss cattle population was tested for virus detection between January 2008 and January 2009. Antigen-positive animals identified by ELISA or rRT-PCR methods were slaughtered, and movement restrictions were applied to avoid new herd infections. In total, 2 million animals were tested and 17'000 PI (persistently infected) animals were identified and slaughtered. Since October 2008 till the end of 2010, all new-born calves are systematically tested for antigen. Theoretically all PI animals should have been eliminated by the end of 2009. However, due to human failures, test characteristics, and other problems, this theoretical target cannot be achieved. Therefore, in 2010 a national surveillance programme will start to estimate the remaining level of the disease and to detect further infected animals to finally eradicate BVD. Our objective was to evaluate and compare surveillance strategies that can be implemented in the field to achieve this eradication.

Therefore, an epidemiological model was developed to represent BVD virus spread within and between herds at a national scale, based on data collected mainly during the eradication programme. The model is stochastic with a time step of 14 days, the maximal time period to follow the presence of transiently infected animals. Within herd, animals are allocated to compartments according to their age (calves, young heifers, pregnant heifers, lactating cows and dry cows) and health status (susceptible, protected by maternal antibodies, transiently infected, recovered carrying or not a PI foetus, PI). Between herds, BVD virus spread occurs through animal movements, known to be of major importance for re-infection of BVD-free farms. In Switzerland, two main types of movements exist. In summer, numerous farms send cattle to a commune pasture where animals coming from different herds are mixed during 2 to 4 months. In addition, more than 1'000'000 movements between farms occur yearly for an average population size of 1.5 million cattle. A static network represents contacts on summer pasture, whereas between-herd movements generate a dynamic contact network. In the output, the model predicts the dynamics of PI prevalence and of the antibody prevalence in the population.

Surveillance methods considered in the field are blood testing of young calves for antibodies (starting in 2010) and milk testing of young heifers for antibodies (starting in 2011), in addition with antigen testing of newborn calves that should be extended at least till the end of 2010 (intermediary output of the model). Different surveillance scenarios are compared using the epidemiological models, by combining the three methods in different ways and proportion, as well as changing the infection source (PI calves or PI pregnant cows). For each of the control strategies, when a recovered animal is detected, the whole herd is tested and PI animals are slaughtered. The efficacies of each surveillance scenario are then compared using different outputs of the model such as the evolution of PI's in the population, the evolution of the antibody prevalence, the number of samples collected.

The next step is to account for test characteristics of the different surveillance tests and to consider control costs. This will be achieved by the first semester of 2010.

Assessment of the capacity for the monitoring of antibiotic resistance, mastitis pathogens, epizootics and zoonoses by bulk milk samples

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³ Clinic for ruminants, Vetsuisse Faculty, University of Bern, ⁴ Federal veterinary office, Bern

The aims of the Swiss Federal Veterinary Office (FVO) in the field of animal health are “to control and monitor diseases which pose a risk to livestock, can be transmitted to humans, have serious economic consequences or compromise international trade” (FVO homepage). The most important livestock species in Switzerland is cattle with 33% of the whole agricultural production value. The most important production branch in cattle is milk production with 22% of the whole agricultural production value (Agrarbericht 2006, BLW). Some examples for conducted or forthcoming surveillance of important cattle diseases in Switzerland are active surveillance of infectious bovine rhinotracheitis (IBR) and enzootic bovine leucosis (EBL), analysis of abortions for bovine brucellosis and the eradication program of bovine viral diarrhoea (BVD) starting in 2008. The main aims of disease surveillance in cattle in Switzerland are to monitor diseases that compromise international trade in the case of IBR and EBL, to monitor a zoonotic disease in the case of bovine brucellosis and to control a disease with serious economic impact in the case of BVD. Forthcoming, the early detection of emerging or reintroduced highly contagious diseases such as Bluetongue or Foot and Mouth Disease will become an important aim. In Switzerland, current surveillance programs for IBR and EBL in cattle are conducted based on the analysis of single animal’s blood samples. In other countries (examples are Germany, Denmark, Norway Sweden), in contrast, surveillance or eradication programs often utilise diagnostic of herd bulk milk samples. With the reorganization of the milk quality control service in Switzerland (all tests by Qualitas AG Zug and Suissselab AG Zollikofen), such bulk milk samples get available for routine surveillance with low operating expense.

Development and evaluation of a model for risk-based sampling to substantiate freedom from disease

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³Institute of Virology, Vetsuisse Faculty, University of Zürich

Substantiation of freedom from disease in a country is the basis of free trade with animals and animal products. The yearly collection of blood samples is time-consuming and expensive. To minimize the costs of sampling to substantiate freedom from disease, but with the same significance, we propose a new approach involving a model for targeted risk-based sampling. With this method, farms having a high risk with regard to animal diseases should be targeted for sampling.

This new approach is currently being developed for IBR (infectious bovine rhinotracheitis). A literature review of IBR was conducted, followed by an epidemiological analysis. Five relevant risk factors for an IBR infection in Swiss cattle farms have been identified: “animal contacts (cattle shows and markets, common pasture in the alps)”, “higher-than-average animal movements on farm”, “farms close to the country border”, a “high density of cattle farms in the vicinity” and “importation of foreign cattle”. The weighting of the risk factors was done with odds ratios and relative risks from the literature. With the help of the information contained in the Swiss animal movement database (TVD), we were able to identify the corresponding risk factors for each Swiss cattle farm.

This theoretical approach could partly be tested in a real-life scenario, during the IBR outbreak in the Jura region in the summer of 2009. The next step in the project consists of an epidemiological analysis of the second model disease, EBL (enzootic bovine leucosis), with the aim to combine both diseases in one model for targeted sampling.

Vaccination concepts for the control of highly contagious animal diseases as part of the Swiss animal health strategy

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With recent outbreaks of highly contagious animal diseases, targeted use of vaccines in disease control has been increasingly stipulated by several countries in Europe. Current knowledge on epidemiological, economical and socio-ethical aspects of the control of the respective animal disease is needed in order to make a comprehensive decision about the use of vaccines in the control of highly contagious animal diseases.

The aim of the project is to provide a decision-making basis for the control of the highly contagious animal diseases FMD, CSF, HPAI, NCD and for bluetongue disease (BT) by elaborating scientific syntheses on the epidemiological, economical and socio-ethical aspects of disease control. Particularly, it is shown for which animal diseases and under which circumstances the use of vaccines can be indicated in Switzerland. The project is divided into 6 work packages: overview of existing international knowledge, epidemiology of animal disease outbreaks with/without vaccination, vaccines, socio-ethical analyses, economical analyses and logistics of a vaccination campaign. The knowledge gained in this project provides the basis for the choice of the control strategy for the selected animal diseases and, therefore, serves to optimize animal disease control in Switzerland.

Within the scope of the project, a simulation model was developed to evaluate the effect of different vaccination strategies on the BT disease dynamics for Switzerland and to determine the farm-level vaccination coverage needed to protect cattle and sheep herds from an infection with BT virus serotype 8 (BTV8). Model parameters were estimated using German BTV8-outbreak data and used together with Swiss population and Swiss temperature data in the simulation model. The results of the simulations show that especially during the first outbreak of BTV8 in a naïve population, vaccination can considerably reduce the size of the epidemic depending on the level of vaccination coverage reached. In a closed population, eradication of the disease by vaccination is possible. However, if annually a new infection is introduced into the population from outside, vaccination cannot fully protect the population from a yearly infection with BTV8. Vaccination coverage completely prevents the spreading of the disease only at higher altitudes. The results indicate that the epidemiological situation and the control measures taken in neighboring countries have an essential impact on the success of the eradication of BTV8 in Switzerland.

Evaluation of the effect of different vaccination strategies on the disease dynamics of bluetongue disease in Switzerland

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Bluetongue virus serotype 8 (BTV8) appeared for the first time in Northwestern Europe in summer 2006. The huge scale of the BTV8-epidemic in the following year led to the decision to implement vaccination campaigns for cattle, sheep and goats in several European countries. In Switzerland, cattle and sheep have been compulsory vaccinated against BTV8 since June 2008.

Within the scope of the project, a simulation model was developed to evaluate the effect of different vaccination strategies on the BT disease dynamics for Switzerland and to determine the farm-level vaccination coverage needed to protect cattle and sheep herds from an infection with BTV8. Model parameters were estimated using German BTV8-outbreak data. Together with Swiss population and temperature data (stratified by altitude level) the estimated parameters were used in the simulation model. The results of the simulations show that especially during the first outbreak of BTV8 in a naïve population, vaccination can

considerably reduce the size of the epidemic depending on the level of vaccination coverage reached. In a closed population, eradication of the disease by vaccination is possible. However, if annually a new infection is introduced into the population from outside, vaccination cannot fully protect the population from a yearly infection with BTV8. Vaccination coverage completely prevents the spreading of the disease only at higher altitudes. The results indicate that the epidemiological situation and the control measures taken in neighboring countries have an essential impact on the success of the eradication of BTV8 in Switzerland.

Vaccination of Swiss cattle against BTV8: is there an influence on somatic cell count and reproductive parameters?

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The occurrence of Bluetongue Virus Serotype 8 (BTV8) in Northwestern Europe in 2006 and its rapid spread within Europe resulted in the decision of various European countries to launch an either voluntary or mandatory vaccination campaign for cattle, sheep and goats. In Switzerland, early in 2008 the decision was taken to vaccinate all cattle, sheep and goats as early as vaccines could be made available by the industry. The mandatory vaccinations were carried out in summer and fall of 2008 using three available inactivated BTV8 vaccines. The Swiss veterinary authorities, in parallel to the field vaccination program, launched several research projects on including one study on assessing the potential effect of the vaccination on dairy production and reproduction parameters at the population level. In the context of that project, milk production data including bulk milk somatic cell count measurements for the periods 2007 and 2008 were provided by two central laboratories (Qualitas AG, Suisselab AG). Reproduction data of about 497'000 cows including lactation number, calving and subsequent insemination dates were made available by the Swiss Cattle Breeding Association. In a first analysis, relevant data during two periods in 2007 (spring and summer) were compared with the same periods in 2008, where the second (summer) period in 2008 covered the time of the field vaccination. In both years distinct differences in somatic cell counts as well as various reproduction parameters (time between calving and first resp. last recorded insemination, number of attempted inseminations, 56-day non return rate) could be seen between summer and spring period. There was no evidence that these parameters were significantly elevated at the population level during the vaccination period in summer 2008. There was no significant difference in the prevalence of milk samples with elevated somatic cell counts (>350'000 cells/ml) between the time periods. However, the cell counts in milk samples below this legal cutoff were higher in vaccinated than non-vaccinated farms. This indicates that there is no measurable BTV8 vaccination-related negative effect on fertility and somatic cell counts at the cattle population level.

Salmonella and Antimicrobial Resistance in Alternative Housing Types for Laying Hens in Switzerland

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The European Union will ban housing of laying hens in conventional cages in 2012.

Therefore knowledge on risk factors for infection with Salmonella and resistant bacteria in alternative housing types is required. The objectives of this study were to determine the prevalence of Salmonella and antimicrobial resistance in *E. coli*, *E. faecium* and *E. faecalis*, and to identify risk factors for their prevalence.

A cross-sectional study on 99 farms (10 floor-raised, 42 “wintergarden” and 47 free-range) was carried out from May 2007 to April 2008. Each farm was visited once, and 40 cloacal swabs, 5 faecal samples and 2 poultry mite samples were collected. Information on potential risk factors concerning housing and management was recorded by questionnaires. All samples were examined for detection of Salmonella. Additionally indicator bacteria were isolated and examined for relevant antimicrobial resistances. For each antimicrobial with more than 15% resistance a risk factor analysis was carried out by logistic regression. Since all samples were tested negative for Salmonella, the study demonstrates that egg production with a low prevalence of Salmonella is feasible in “non-cage systems”.

Antimicrobial susceptibility testing revealed more than 15% of resistance to sulfamethoxazole, tetracycline and ciprofloxacin in *E. coli*, to tetracycline, tigecycline and erythromycin in *E. faecalis* and to ciprofloxacin, erythromycin, tetracycline and the combination dalbopristin- quinupristin in *E. faecium*. In the risk factor analysis, none of the analysed factors showed a consistent association throughout the different models. But several models indicate that the herd size could have an impact on the resistance of *E. coli* to certain antimicrobials (OR's from 4.8 to 8.9).

Ethics for Vets – can ethics help to improve animal disease control?

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¹ VPH Institute, Bern, ² Institute Technology-Theology-Natural Sciences, Munich

³ Ethics Center, Jena

During major animal disease outbreaks in the EU controversial discussions arose about the ethical soundness of mass culling. In contrast to numerous publications about ethical issues and laboratory animals/animal experiments, literature concerning ethical deliberations in the case of mass culling as a means of outbreak control remain scarce. Veterinarians in charge of decision about and implementation of mass culling actions find themselves in an area of conflict in between the officially required animal disease control policy and a public that is increasingly critical. Those veterinarians are faced with the challenge to defend the relevant decisions against all stakeholders, inclusively themselves. With the aim to identify ethical components and dilemmas of animal disease control for veterinarians, four interdisciplinary workshops with veterinarians and ethicists from Switzerland, Germany and Austria were organized. Results comprise the identification of areas of conflict and potential approaches for situations with potential ethical dilemmas e.g. the concept of responsibility from Ropohl and different (decision-) matrices.

Sarcoptic mange in red foxes (*Vulpes vulpes*) from Switzerland – influencing and concomitant factors

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Sarcoptic mange, caused by the mite *Sarcoptes scabiei*, has been described in many domestic and wild mammal species worldwide. This highly contagious skin disease can have devastating effects in affected wild populations and is of particular concern in endangered species. It remains unclear why the clinical and pathological picture of sarcoptic mange shows notable variations between animal species and partly between individuals. The aim of the present study was to assess the importance of a range of potential influencing factors such as host age and gender, season, concomitant diseases, geographical origin including epidemiological picture, hunting management and climate, and mite genetics on the presence and severity of mange in the red fox (*Vulpes vulpes*) in Switzerland. From November 2004 to February 2006, 153 mangy, 124 healthy and 14 non-mangy but diseased foxes from different geographic areas of Switzerland (mainly BE, FR, VS), selected upon the occurrence patterns of sarcoptic mange, were submitted to a complete post-mortem examination. Mites collected from the skin of mangy foxes were identified as *S. scabiei* and genetically analyzed.

Of all the factors considered in this study, significant differences between the pathological type (severity) of mange were detected for the geographical origin of the foxes and the presence of severe infestation of endoparasites. The more severe and chronic forms of sarcoptic mange were more often observed in BEO and FR, where the disease arrived relatively recently, compared to VS, where mange has existed for a longer period of time. This suggests that animals from an area where mange has been endemic for a long time, are more likely to be resistant to the disease, and thus to recover, possibly indicating a selection process. Genetic analysis of the sampled fox population will probably enhance this hypothesis of the natural selection of more resistant animals.

Mortalität und Morbidität ausgewählter züchterisch relevanter Krankheiten in Berner Sennenhunden in der Schweiz – eine historische Populationsstudie

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In a cohort of Bernese Mountain Dogs selected from dogs in the Swiss dog register SHSB of the Swiss Cynological Society (SKG), the total and disease specific mortality and morbidity will be recorded, with focus on diseases with relevance for breeding. Mortality and morbidity will be compared to published data from other countries and different dog breeds. The Bernese Mountain Dog Club of Switzerland (KBS) provides all existing data for Bernese Mountain Dogs born in Switzerland in the years 2001 and 2002 which are relevant for the project aims. Dogs participating in the study must be registered in SHSB and chipped. A short questionnaire on demographical information is sent to the dog owners, and they are asked to assist with extracting the relevant disease data from the records of their veterinarian. These records are collected for further analysis. In collaboration with clinicians, the relevant disease diagnoses and causes of death are extracted from the records. Subsequently, general demographic parameters of the target population and the dogs included in the study, the incidence of each diagnosis and cause of death, and the survival time until onset of disease or death are described for the cohort, and compared to published data.

Prospects

In the near future, the research collaborations of VPHI should be further expanded. The following research topics are planned for the next years:

- Modeling of control measures for mastitis in dairy cows (funding approved, project starts 2010)
- Early detection of human health risks associated with antimicrobial usage and resistance in food animals (pre-proposal EU project EMIDA ERA-Net approved, full proposal will be submitted 2010)
- Risk analysis of vector-borne infections in Europe (pre-proposal EU project EMIDA ERA-Net approved, full proposal will be submitted 2010)
- Risk-based surveillance programmes and early warning systems for efficient detection of threats in the animal food production chain (collaboration as project partner in a project of the National Veterinary Institute, Oslo, Norway, project starts 2010)
- Early disease detection by combining precision farming tools and molecular diagnostic methods for improving animal health and welfare (pre-proposal EU project EMIDA ERA-Net approved, full proposal will be submitted 2010)
- Basic survey on health prophylaxis and management measures of Swiss dairy farms (co-investigator in an approved research project of the Swiss College of Agriculture, Zollikofen)
- Early diagnosis of European Foulbrood by real time PCR (pilot project) (co-investigator in an approved research project of the agricultural research station ALP Liebefeld and the Institute Galli-Valerio, Lausanne)
- Climate change in Switzerland: which climate factors influence the emergence of contagious animal diseases and zoonoses? (co-investigator in a project proposal of the department of epidemiology, Vetsuisse Faculty Zürich, project currently under review by the research commission of the Federal Veterinary Office)
- Development of a research programme on a topic of animal welfare and ethics (after the position of professor for animal welfare is filled)

5. Services

In addition to research and teaching, the third important task of our institute is consulting and services. This includes in first priority consulting on applied epidemiology and statistics for students and colleagues at the Vetsuisse faculty Bern, for the Federal Veterinary Office (BVET), and the partners of these institutions. Additional tasks are to suggest fundamentals for the design of disease control programmes, and monitoring and surveillance systems. The VPHI also develops risk assessments for the Federal Veterinary Office. The scientific networking with the European Food Safety Agency (EFSA) and contributions to various commissions (of the faculty, the university and external) is also described here.

Services for the public veterinary service

- **Cloning of animals: impact on animal health and welfare. A short review**
 - This overview on the consequences of cloning on health and welfare of animals was initiated by the Federal Veterinary Office in order to evaluate the need for specific legislation on this topic. The review includes animal welfare and food safety, as well as social and ethical aspects. Whether specific legislation will be needed will depend on the developments in research, the usage of the technology in agriculture, and international trade regulations.
 - Client: BVET
 - Status: completed, publication manuscript in preparation
- **Monitoring usage of animal pharmaceuticals: consulting for the recording and analysis of usage data** (Central analysis of indicators for the agricultural environment, ZA-AUI)
 - Since 2009, data on usage of animal pharmaceuticals are recorded as part of the central analysis of indicators for the agricultural environment of the Federal Office of Agriculture (<http://www.blw.admin.ch/themen/00010/00070/index.html?lang=de>). These data provide important information on trends regarding usage of animal pharmaceuticals, and can be analyzed by animal species, active substance and indication for usage.
 - Client: BVET
 - Status: in progress (until 2013)
- **Survey on injuries due to dog bites**
 - To support targeted measures to prevent dog bites, BVET has published a statistics on dog bite injuries of humans and animals since 2006. Statistics are based on reports to the cantonal authorities. A survey among practicing physicians and veterinarians will be performed with the aim to evaluate data quality of these reports in order to allow a better interpretation of the dog bite statistics.
 - Client: BVET
 - Status: in progress (until summer 2010)
- **Risk assessment “Freedom from disease 2009“**
 - Freedom of Switzerland from enzootic bovine leucosis, infectious bovine rhinotracheitis / infectious pustulous vulvovaginitis, brucellosis of sheep and goats, Aujeszky’s disease and porcine reproductive and respiratory syndrome is demonstrated in an annual risk-based survey. In a „Freedom from disease 2009“ risk assessment in collaboration with the Federal Veterinary Office, the probability of introducing each disease into the country was estimated for the year 2010. The results of the risk assessment were used to determine the sample size necessary for demonstrating continued disease freedom for the year 2011.
 - Client: BVET
 - Status: in progress (until March 2010)

- **Demographical characteristics and routine investigations of swine farms positive for Salmonella in the EU baseline survey**
 - Follow-up study on pig breeding farms with positive faecal samples in the EU baseline study on Salmonella, including analysis of additional samples for Salmonella.
 - Client: BVET
 - Status: completed
- **Infectious bovine rhinotracheitis in the canton Jura: Epidemiological outbreak investigation**
 - In the summer of 2009, an outbreak of IBR occurred in the canton Jura. An epidemiological investigation of the outbreak was performed with the objective to identify possible sources of introduction of BoHV-1, and to prevent further spread of the disease. In parallel, the virus responsible for the outbreak was isolated and characterized at IVI, in collaboration with the Institute for Virology of the Vetsuisse-Faculty University of Zürich. This information was used to obtain additional information on the origin of the virus.
 - Client: BVET + Service Vétérinaire du Jura
 - Status: completed, manuscript submitted for publication
- **Risk profile African Horse Sickness**
 - During her VPH internship, a 5th year veterinary student compiled a risk profile on the significance of African Horse Sickness for Switzerland.
 - Client: BVET
 - Status: completed
- **Risk profile African Swine Fever**
 - During his VPH internship, a 5th year veterinary student compiled a risk profile on the significance of African Swine Fever for Switzerland.
 - Client: BVET
 - Status: completed
- **Twinning between the Kyrgyz State Veterinary Department and the Swiss Federal Veterinary Office**
 - This „twinning project“ between the Federal Veterinary Office and the Kyrgyz State Veterinary Department (SVD) was started as a World Bank project to advance the veterinary service, animal health and agricultural production. The goal is to lastingly improve the competences of SVD regarding public and private veterinary services and public health through a longer term collaboration. The VPHI offers valuable technical and organizational support for this collaboration (training and mentoring on topics of epidemiology, veterinary public health, ...).
 - Client: BVET, World Bank
 - Status: in progress (until end of 2012)

Services for the Vetsuisse faculty

- **Statistical and epidemiological consulting**
This consulting service has resulted in the epidemiological and statistical co-supervision of more than 20 dissertations submitted in 2009, and in co-authorship in more than 20 peer-reviewed publications accepted in 2009.
- Vetsuisse Faculty Assembly (PD/TP-Representative BE: M. Doherr)
- Vetsuisse Research Commission (PD/TP- Representative BE: M. Doherr)
- Commission for the promotion of young scientists of the University of Bern (Representative of faculty BE: M. Doherr)

- Commission of the information technology services of the University of Bern (Representative of faculty BE: M. Doherr)
- Commission of the information technology group of the faculty, Vetsuisse Bern (President: M. Doherr)
- Vetsuisse commission for the succession of Prof. Kähn, horse medicine ZH (PD/TB-Representative BE: M. Doherr)
- Commission for teaching the discipline epidemiology, Vetsuisse Faculty (Representative of faculty BE: M. Doherr)

Services for third parties

- **Pork meat chain risk assessment, ILRI, India and Vietnam**
 - Risk assessment field work (November and December 09) in north-eastern India (state of Nagaland) and in Hanoi and Hatay regions of Vietnam, conducting the sampling and data collection for a project implemented by the International Livestock Research Institute (ILRI) with local partners. The study aimed to assess risks to consumer and animal health in the pork meat chain, following a “farm to fork”-approach. Different instruments were used to gain insight in:
 1. Pathogens in pigs and on pork meat → identify structures and different pork meat value chains in the observed districts; selecting sampling points and carrying out the collection of meat samples and samples at slaughter (blood, faeces); setup of a laboratory, introduction and conduct of rapid tests for the most common bacteria, parasites and antibiotic residues;
 2. Habits, food-safety-related knowledge and proceedings of farmers, slaughter persons, transporters, butchers, and consumers → village visits and participatory risk assessment with farmers; slaughterhouse and market visits and data collection from the different stakeholder groups through checklists and questionnaires.
 - Client: International Livestock Research Institute
 - Status: in progress
- Representation in the EFSA-Panel Animal Health & Animal Welfare (AHAW) and several AHAW-Working groups (M. Doherr)
- Expert in the EFSA Working group for the analysis of the EU baseline study on MRSA in breeding pigs (G. Schüpbach)
- Swiss representative in the International Society for Animal Hygiene (G. Schüpbach)
- President of the common panel ISVet (Information system for the veterinary services Switzerland) (M. Reist)
- Examination board training for official veterinarians (M. Reist)
- Board of experts research foundation 3R (M. Reist)

Prospects

The services offered by the VPH institute were already utilized intensively by various clients during the first half year of existence of the institute. This demonstrates not only the great importance of veterinary public health for veterinary medicine and the public veterinary service, but also the importance of services within our institute. A comparably high level of activities can be expected for the future. Once the position of professor for animal welfare has been filled, we will also be able to offer services in this field.

6. Events / Conference contributions / Publications

Events organized

Annual conference Monitoring BVET and Veterinary Public Health Institute, Bern, 26. November 2009

(http://www.vetsuisse.unibe.ch/vphi/content/forschung/jahreskonferenz_2009/index_ger.html)

Ethics-Workshop Gwatt III, 22.-24.10.2009

EWDA-VSF Symposium on Livestock Revolution and Global Biodiversity, Vetsuisse Faculty, Univ. Bern, 26. März 2009 (<http://www.livestockandbiodiversity2009.org/>)

Conference contributions as first author (Abstracts)

1. Di Labio E et al.: Simulation model to estimate the necessary vaccination coverage to protect herds from bluetongue virus serotype 8 infection (Abstract, International Society for Veterinary Epidemiology and Economics, Durban SA, 10-14. August 2009)
2. Di Labio E et al: Estimation of the necessary vaccination coverage to protect cattle and sheep farms from bluetongue virus serotype 8 infection (Poster, Society of Veterinary Epidemiology and Preventive Medicine Annual Meeting, London, 1.-3. April 2009)
3. Di Labio E et al: Evaluierung des Effekts verschiedener Impfstrategien auf den Bluetongue-Seuchenverlauf in der Schweiz. (Abstract, DVG-Fachgruppentagung Epidemiologie & Dokumentation, Giessen, 2.-4. September 2009)
4. Doherr MG et al: Estimating the true prevalence with stratified (multistage) surveys using imperfect diagnostic test systems: is that possible? (Abstract, International Society for Veterinary Epidemiology and Economics, Durban SA, 10-14. August 2009)
5. Doherr MG et al.: Survey for Salmonella abortusovis IGG antibodies in Swiss sheep flocks using a modified ELISA (Abstract, International Society for Veterinary Epidemiology and Economics, Durban SA, 10-14. August 2009)
6. Doherr MG et al.: Vaccination of Swiss cattle against BTV8: is there an influence on somatic cell count and reproductive parameters? (Abstract, International Society for Veterinary Epidemiology and Economics, Durban SA, 10-14. August 2009)
7. Doherr MG et al: Querschnittsuntersuchungen und Serum-Banken - Aufwand, Ertrag und Chancen. Frühlingstagung TVL und EpiForum, Luzern, 22. April 2009
8. Doherr MG & Glardon O: Plenarveranstaltung zu Evidence-based Medicine. GST - VETS 2009, Zürich, 10. September 2009
9. Dürr S et al: Simulation model to estimate the required vaccination coverage protecting herds from Bluetongue Disease in Switzerland (Poster, European College of Veterinary Public Health Annual Meeting, Leipzig, 7.-9. October 2009)
10. Fahrion A et al: Killing of animals – ethical perception of different scenarios by veterinarians (Poster and oral presentation, European College of Veterinary Public Health Annual Meeting, Leipzig, 7.-9. October 2009)
11. Fahrion A et al: *Toxocara canis* and *T.cati*: Infestations in their definitive hosts in Central Europe. (Abstract, Oral presentation, Parasitologic talks „Pet borne diseases“, Austrian Society of Tropical Medicine and Parasitology, Vienna (A), 05. June 2009)
12. Harisberger M et al.: Salmonella and antimicrobial resistance in alternative housing types for laying hens in Switzerland (Abstract, International Society for Veterinary Epidemiology and Economics, Durban SA, 10-14. August 2009)

13. Harisberger M et al.: Salmonella and Antimicrobial Resistance in Alternative Housing Types for Laying Hens in Switzerland (Poster, European College of Veterinary Public Health Annual Meeting, Leipzig, 7.-9. October 2009)
14. Harisberger M et al.: Salmonella and Antimicrobial Resistance in Alternative Housing Types for Laying Hens in Switzerland (Oral presentation, Safehouse Meeting, Athens, 7.-8. September 2009)
15. Hartnack S. et al. Risikoanalyse, Monitoring und diagnostische Tests - eine Dreiecksbeziehung? Frühlingstagung TVL und EpiForum, Luzern, 22. April 2009
16. Hartnack S. et al.: Ethics for Vets – Can ethics help to improve animal disease control? (Poster, Society of Veterinary Epidemiology and Preventive Medicine Annual Meeting, London, 1.-3. April 2009)
17. Presi P et al.: Epidemiological model to compare different surveillance strategies to maintain BVD free status following the eradication programme conducted in Switzerland (Abstract, International Society for Veterinary Epidemiology and Economics, Durban SA, 10-14. August 2009)
18. Reist M. & Schüpbach-Regula G. Research on Antimicrobial Resistance in Switzerland. EMIDA ERA-NET Consortium & SCAR CWG Animal Health & Welfare Meeting. Prague, 16 - 18 March 2009.
19. Schüpbach-Regula G. Harmonisiert versus Risikobasiert: Welche Überwachung liefert die besten Grundlagen für die Bekämpfung? (Oral presentation, Workshop Epidemiologische Nutzung von Monitoringprogrammen, Berlin, 4. November 2009)

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