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Section	Fields (of activity)

Evaluation of the added value of real-time community based surveillance (CBS) and its OneHealth approach for early disease detection and response

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Key words
Community-based surveillance, Equinella, seroprevalence, equine surveillance, Switzerland, Chad

Aim of the study
The aim of the study was to evaluate the added value of community based surveillance (CBS) systems with and without a One Health approach in addition to current systems, using the equine community in Switzerland and the agro-pastoral community in Chad as examples. Specifically, we a) analytically described 5.5 years of Equinella data (a voluntary, veterinary-based surveillance system for equine in Switzerland), b) investigated the perception of Swiss equine owners towards a CBS system and tested a CBS system for the same population, and c) estimated the seroprevalence of three zoonoses and symptom incidences in humans and animals in Chad as a baseline for an ongoing longitudinal cohort study to evaluate a new One Health CBS system.

Material and methods
Data generated by Equinella (www.equinella.ch) from Nov 2013 onwards were downloaded in April 2019 to assesse data validity, representativeness and timeliness of the system, activeness of participating veterinarians and descriptively analyze the incoming reports in space and time. An online questionnaire was sent to 7500 equine owners to investigate their perception towards and motivation to participate in a CBS system where they can actively report clinical signs observed in their equine on a voluntary basis. Using regression models, factors influencing the perception and motivation for a CBS system were identified. Further, the CBS tool, called Equi-Commun, was developed as online community-based reporting tool, made public by print and social media as well as presented on conferences, and launched in November 2018. In November 2019, the reason of non-usage of Equi-Commun was assessed by qualitative telephone interviews with ten horse owners. In Chad, a cross-sectional survey was conducted collecting serum samples and symptom incidences of humans and animals by interviews in 52 villages and nomadic camps in two rural regions, Yao and Danamadji. Serum samples were used to estimate true seroprevalence of brucellosis, Q fever and Rift Valley fever using Bayesian statistics accounting for test non-perfect characteristics and clustering design. Association of prevalence between humans and animals was assessed.

Results and significance
The data validity of Equinella was found to be very high. Roughly 50% of the Swiss equine population is under surveillance, although varying between cantons. Timeliness of report submission was found to be one week (median). The most often reported clinical sign and disease was fever and strangles, respectively. Although reports were recorded constantly over the past 5,5 years, the activeness of registered veterinarians was moderate. In 2018, only 28% of them reported at least one case and amongst the remaining, only 58% confirmed non-observation of cases at least once via the monthly received reminder emails. In total, 1078 (14%) of the equine owners responded to the online questionnaire and the perception towards a CBS system was mainly positive (43% of the respondents, compared to 30% negative and 27% undecided statements). Women, French speaking owners and those visiting their equines on a daily basis have a more positive perception towards the

system, whereas owners working professionally with horses have a negative perception. However, Equi-Commun was not used by the equine owners (only four reports were recorded within a year). The phone interviews revealed that equine owners did not accurately remember the concept of Equi-Commun. Less prominently, they expressed concern about data privacy after reporting and/or stated a good health status of their equines as a reason for not participating. This leads to a low potential reporting rate, demanding a constant need for active communication. The experiences gained through Equi-Commun and the evaluation of Equinella highlighted the importance of continuous communication with involved stakeholders for successful implementation and maintenance of CBS systems. The associated costs for such activities have to be balanced by the expected benefit.

Q fever and Rift Valley fever antibodies were found to be prevalent in humans and animals in the examined populations in Chad, whereas brucellosis seroprevalence was negligibly low. Despite the zoonotic potential of the disease, association on village or camp level between seroprevalence in humans and animals could only be observed for Rift Valley fever in one region, Danamadji. We thus could not generate evidence for association of seroprevalence in the human and animal population for brucellosis and Q fever. On the other hand, analysis of retrospectively reported symptoms in human and animal collected via a questionnaire survey revealed that the order in incidence per symptoms and season is predominantly the same in the animal and human population. A real time surveillance system in humans and animals following a One Health approach has thus been implemented in Yao and Danamadji. So far, it shows a large potential of engaging community health workers in human and veterinary medicine for reporting cases by mobile phones. However, the originally defined objective to collect a large enough database on real time clinical cases in humans and animals to evaluate the potential of earlier detection of health issues in the population could not be achieved. The reasons for this are related to personnel changes within the large health program PADS with which we collaborate. In addition, the project has been pushed back in the last year by the COVID-19 pandemic. However, the development of technical tools that aroused due to the pandemic, particularly in terms of contact tracing, provides opportunities to facilitate rapid flow of information (e.g. via SORMAS tool, https://sormasorg.helmholtz-hzi.de). We are currently aiming for a PhD fellowship to move forward with this promising syndromic One Health surveillance project.

Publications, posters and presentations

Publications in peer-reviewed scientific journals
Özcelik R., Graubner C., Remy-Wohlfender F., Dürr S. and Faverjon C. 2020. Evaluating 5.5 years of Equinella: a veterinary-based voluntary infectious disease surveillance system of equines in Switzerland. Frontiers in Veterinary Epidemiology and Economics, https://doi.org/10.3389/fvets.2020.00327

Peer-reviewed conference papers
Özcelik R., Remy-Wohlfender F., S. Dürr S., Potenzial Tierhalter-basierter Meldungen von Symptomen für die Früherkennung von infektiösen Krankheiten in der Schweizer Pferdepopulation. Agroscope Science | Nr. 84 / 2019, 14. Jahrestagung Netzwerk Pferdeforschung, Avenches, Switzerland, 2019 (https://www.newsd.admin.ch/newsd/message/attachments/56521.pdf, pages 38-39)

Oral presentations at conferences (* presenting author)
Özcelik, R*, Abakar F.M., Counotte M., Abakar N., Abdelrazak F., Kimala P., Dürr S., Linking the seroprevalence of brucellosis, Rift Valley fever and Q fever between humans and animals and to community-based observation of human and animal symptoms in two rural regions in Chad. Canadian Association Veterinary Epidemiology and Preventive Medicine Annual Conference, Saskatoon, Saskatchewan, Canada, June 2020 (postponed to November 2020 due to COVID19)
Özcelik R*., Küker S., Remy-Wohlfender F., Visschers V., Dürr S., Investigating opportunities for community-based surveillance of equines in Switzerland. International Conference on Animal Health Surveillance, Copenhagen, Denmark, May 2020 (postponed to November 2020 due to COVID19)
Özcelik R.*, Remy Wohlfender R., Dürr S., Gesundheitsüberwachung der Schweizer Pferdepopulation mittels Equinella: ein Tierarzt-basiertes freiwilliges Meldesystem für Pferdekrankheiten. DACH Epidemiologie Tagung, Freising, Germany, September 2019
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Özcelik R.*, Abakar F.M, Issa R., Bakary A.N., Kimala P., Youssouf S., Kordina M.M., Warembourg C.M., Dürr S., Simultaneous observation of human and animal symptoms in Yao and Danamadji, Chad. DACH Epidemiologie Tagung, Insel-Riems, Greifswald, Germany, September 2018

Özcelik R.*, Remy Wohlfender R., Dürr S., Tierhalter-basierte Symptomüberwachung der Schweizer Equidenpopulation für die Früherkennung von infektiösen Krankheiten. DACH Epidemiologie Tagung, Insel-Riems, Greifswald, Germany, September 2018

Poster presentations at conferences (* presenting author)

Özcelik R.*, Remy Wohlfender R., Dürr S., Potential of and challenges towards establishing community-based surveillance in the Swiss equine population, poster flash Graduate School of Cellular and Biomedical Sciences (GCB) Annual Symposium, Bern, Switzerland, January 2020

Özcelik R.*, Abakar F.M, Issa R., Bakary A.N., Kimala P., Youssouf S., Kordina M.M., Warembourg C.M., Dürr E., Community-based observation of human and animal symptoms in Yao and Danamadji, Chad. European College of Veterinary Public Health Annual Conference, Edinburgh, Scotland, October 2019

Özcelik R.*, Remy-Wohlfender F., Dürr S., Faverjon C., Surveillance of the Swiss equine health: the value of Equinella, a veterinarian-based voluntary reporting system, Annual Meeting of the Society for Veterinary Epidemiology and Preventive Medicine, Utrecht, Netherlands, May 2019

Özcelik R.*, Abakar F.M, Issa R., Bakary A.N., Kimala P., Youssouf S., Kordina M.M., Warembourg C.M., Dürr E., Simultaneous human and animal syndromic surveillance in Yao and Danamadji, Chad. Poster flash Graduate School of Cellular and Biomedical Sciences (GCB) Annual Symposium, Bern, Switzerland, January 2019

Özcelik R.*, Abakar F.M, Issa R., Bakary A.N., Kimala P., Youssouf S., Kordina M.M., Warembourg C.M., Dürr E., Simultaneous observation of human and animal symptoms in Yao and Danamadji, Chad. Poster flash and poster prize, Veterinary Public Health Annual Conference Zurich, Switzerland, November 2018

Özcelik R.*, Abakar F.M, Issa R., Bakary A.N., Kimala P., Youssouf S., Kordina M.M., Warembourg C.M., Dürr E., Simultaneous observation of human and animal symptoms in Yao and Danamadji, Chad. International Society for Veterinary Epidemiology and Economics ISVEE 2018, Chiang Mai, Thailand, November 2018

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