

Smart Animal Health – Health indicators for livestock

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Introduction

Background: In Switzerland, financial incentives are provided for farmers to keep their animals with regular access to outdoor areas, sufficient bedding material and improved housing systems. While these incentives have contributed to improved health and welfare of farm animals, the requirements are system-based, and do not include any direct measures of animal health and welfare. In the future, there are plans to expand financial incentives to farms which can demonstrate a high health status of their animals.

Objective: The aim of the project is to develop a method to assess animal health and welfare in farm animals, focusing on animal-based indicators. The indicators shall allow to assess and describe the animal health and welfare status at the level of individual farms, groups of farms and the Swiss livestock population as a whole.

Project duration: 2019 -2021

"Smart Animal Health" indicators permit to:

- » observe changes in the health status of the livestock population over an extended period
- » assess the effectiveness of measures to improve animal health and welfare
- » carry out more targeted animal welfare inspections
- » recognise and promote especially good livestock farms

Included animal species:

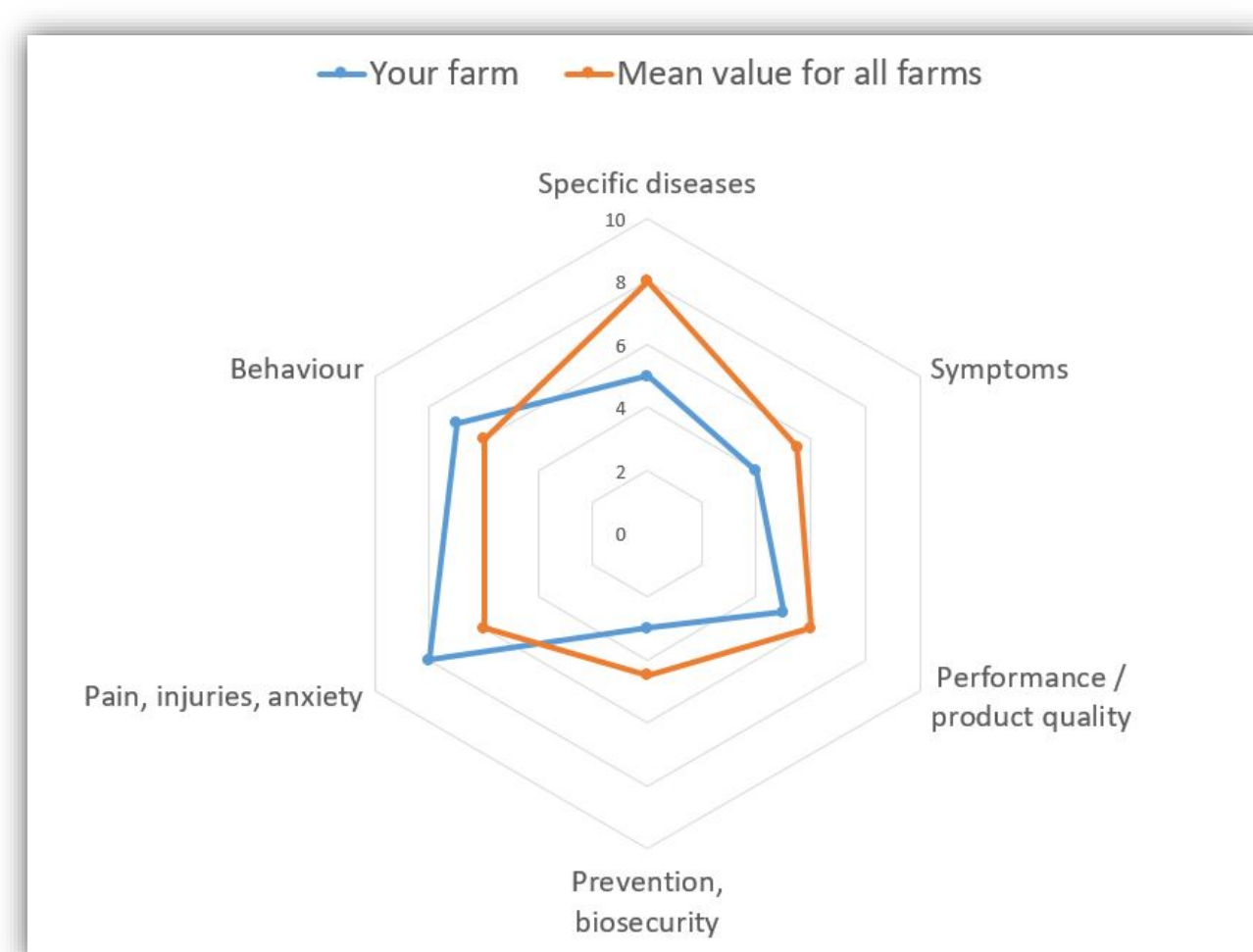


Animal-based health and welfare indicators for livestock

Material and Methods

Workpackages

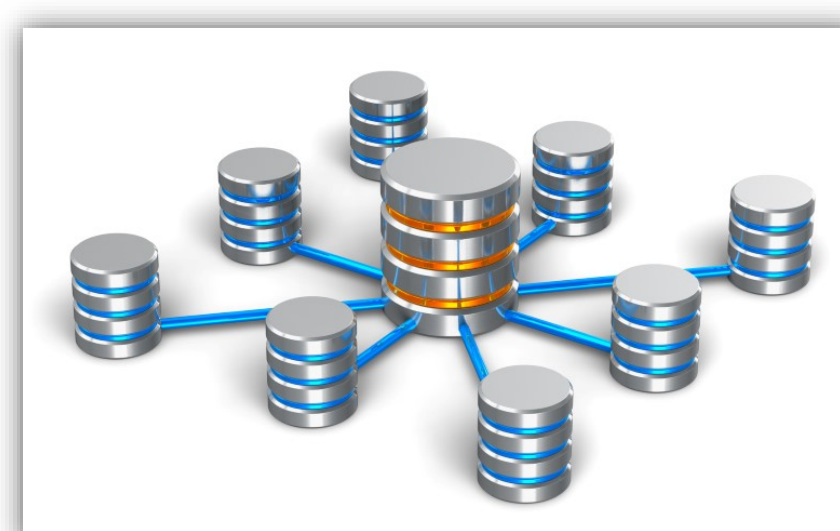
- » WP1 literature review and data analysis
- » WP2 method development
- » WP3 PLF and disruptive technologies
- » WP4 stakeholder involvement



Example for a possible visualization of a single farm's animal health and welfare status in relation to the population mean.

Health indicators are categorized into:

- » Absence of specific diseases, including zoonoses with no clinical signs in animals
- » Absence of clinical signs and syndromes
- » Productivity and product quality
- » Normal behavior, absence of behavioral disorders
- » Freedom from pain, injuries and fear



A crucial part of the project is the linking of separated data bases (e.g. slaughterhouse data, meat inspection, animal movement, laboratory analyses, farm inspections). Data from official sources will be supplemented by private data records. The data linkage will allow for a comprehensive data analysis applying machine learning technologies for the identification of potential associations between attributes of different data bases, which might be indicative to describe animal health and welfare.

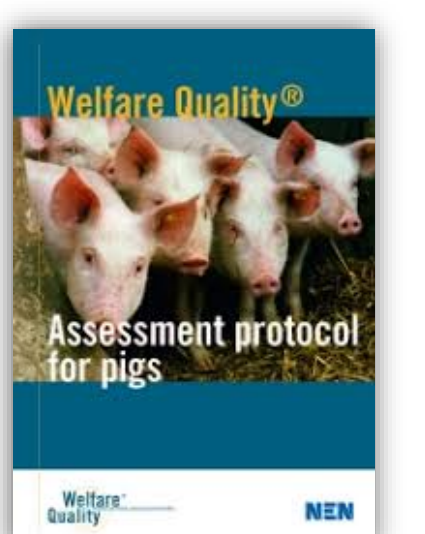
Examples of sensors for dairy cattle: The noseband sensor (RumiWatch) measures rumination, the pedometer (RumiWatch) and the neck sensor (Nedap Rescounter II) determine the activity.



Literaturrecherche	CAB Direct				
	pig	swine	fattening pig	piglet	sow
Schweine					
routinely collected data	36	37	1	3	8
routine herd data	48	49	10	10	16
census herd data	185	138	8	7	67
pre collected data	136	133	12	48	123
national database	149	127	8	16	52
register based	183	174	22	33	164
welfare assessment	580	552	75	80	113
herd health monitoring	295	289	28	72	86
herd health surveillance	356	347	29	45	60
herd health indicators	69	65	11	16	21
herd health performance data	101	98	19	41	53
transport data health	86	80	7	7	15
antimicrobial monitoring	336	324	35	46	28
meat inspection data herd health	45	44	4	5	5
meat inspection data public health	60	58	2	4	1
carcass condemnation herd health	15	16	1	2	5
carcass condemnation public health	36	27	0	0	2
tall biting herd health	19	19	5	5	5

Scientific literature was systematically reviewed according to the PRISMA guidelines including the data bases PubMed, Web of Science, Scopus, CAB Direct und Science Direct.

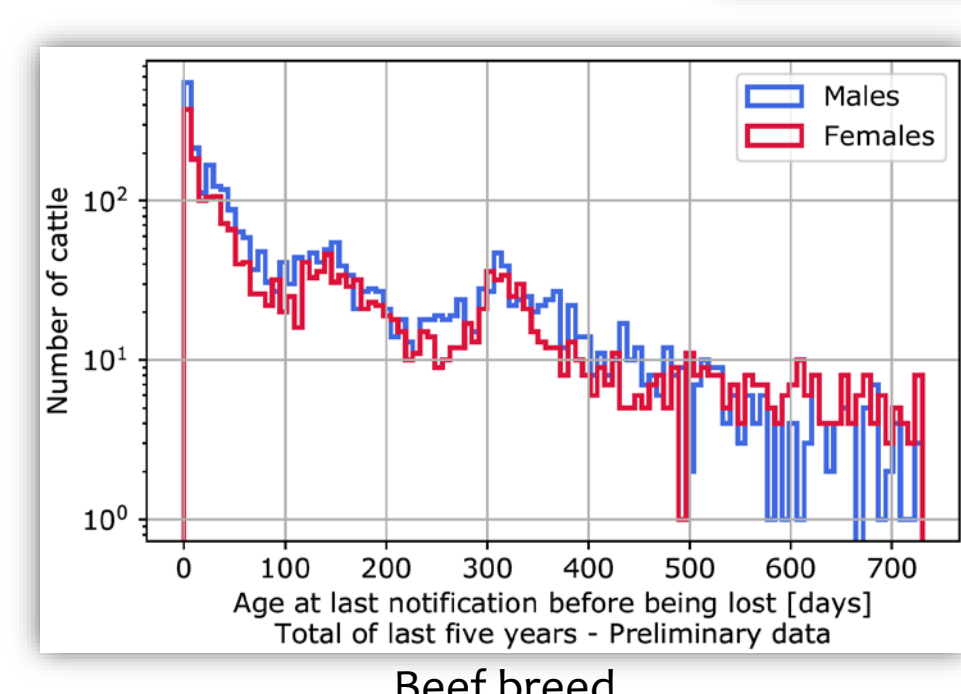
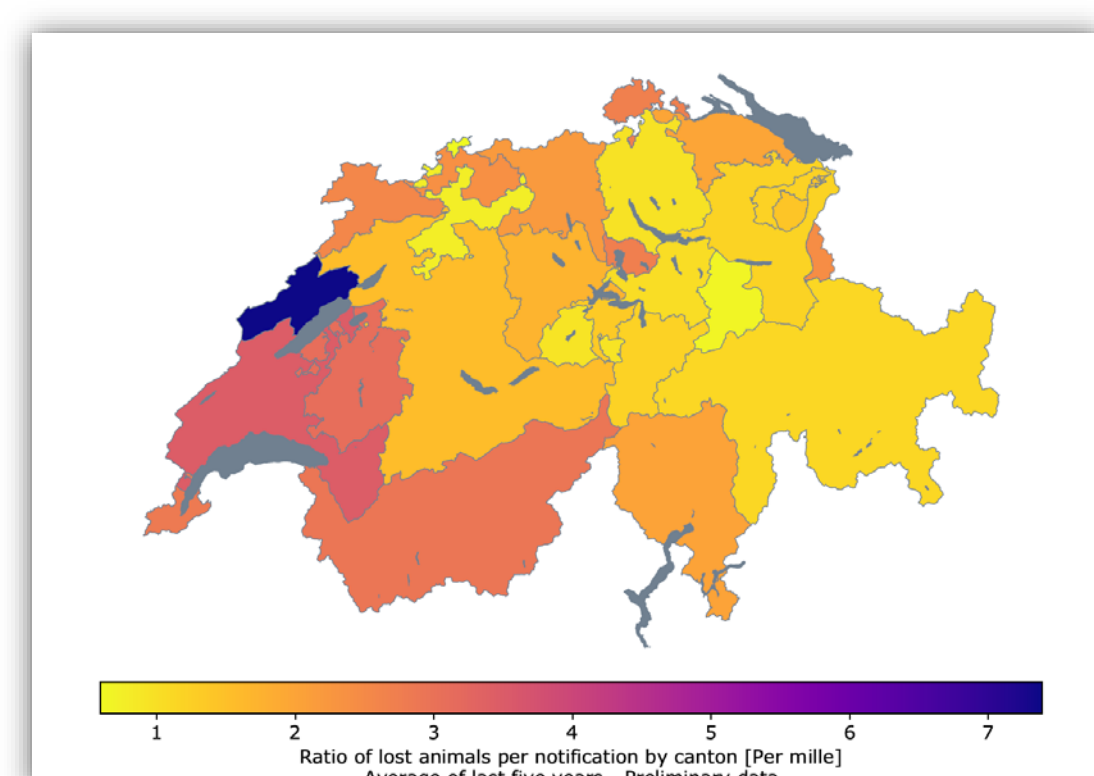
To validate the "smart animal health" method, 30 farms of each animal category are visited to conduct an on-farm assessments of the animal health and welfare status using the Welfare Quality® protocol as reference method.



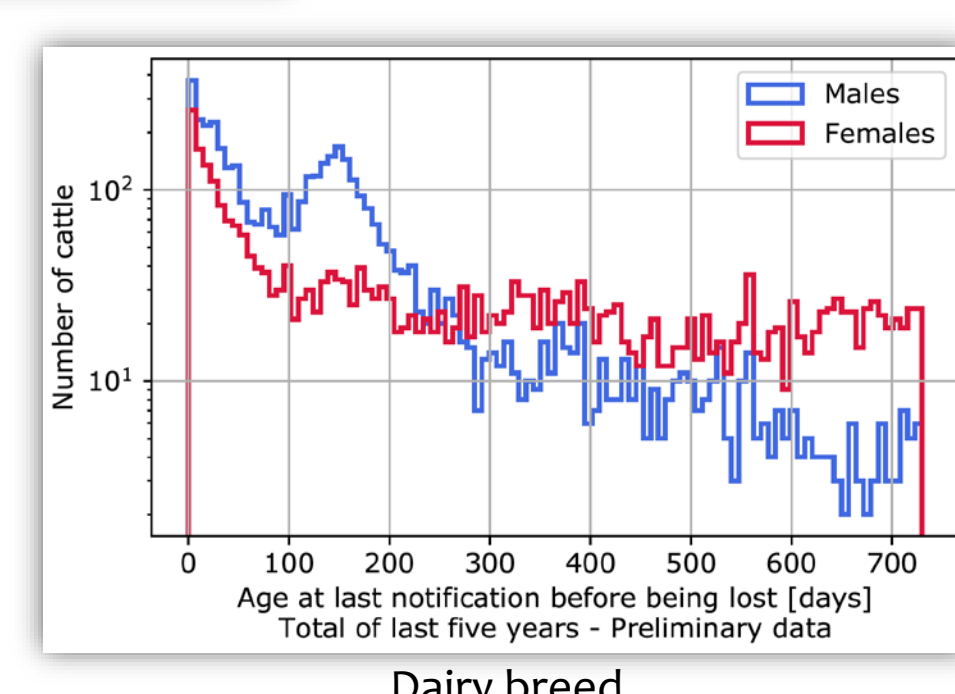
Outcomes

Animal movement data as potential health and welfare indicator – "lost animals"

Workpackage 1 – Thibault Kuntzer and Stefan Rieder, Identitas

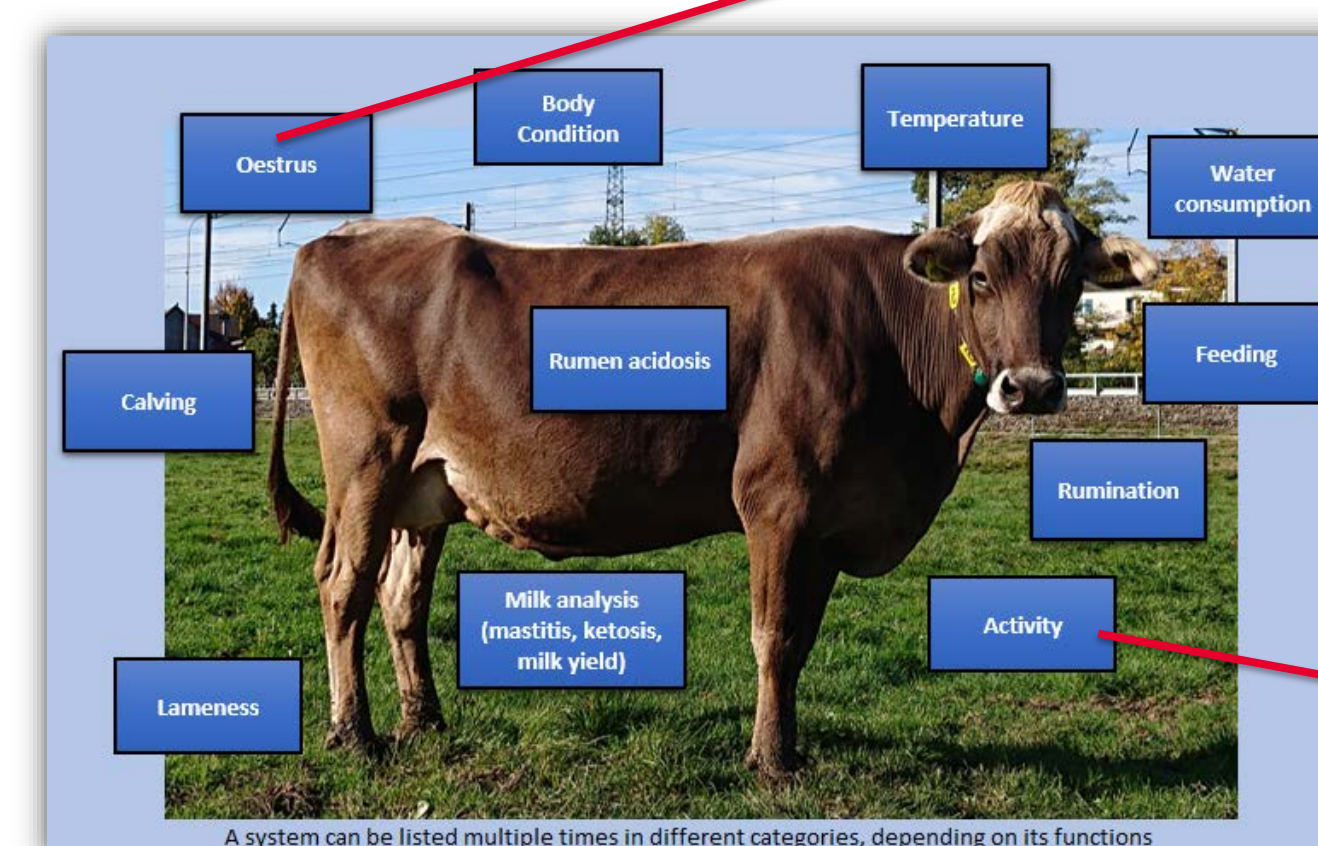


versus



Commercially Available Digital Systems in Livestock Husbandry

Workpackage 3 – Joanna Stachowicz and Christina Umstätter, Agroscope

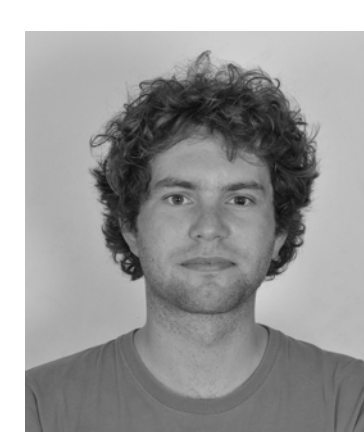


Overview of PLF systems for dairy cows and other species
<https://www.agroscope.admin.ch/agroscope/en/home/topics/economics-technology/smart-farming/digital-systems-livestock-husbandry.html>

System	Manufacturer	Before 01	Range	Measurement	Placement	Alerts	Data availability	Note	Publication
ActivityWatch	DeLaval	< 10 years	< 200m	Activity	Neck	Oestrus Health Lameness	Real-time	No	
AMAS	Affix	5 years	80m in confined environments, 200m in open areas up to 1000m in pasture	Activity	Leg	Oestrus Health Lameness	Real-time	No information, but timely alerts	Mayo et al., 2019
ConSist	IoT Robotics	5 years	Information not provided	Activity Feeding time Lying time	Leg	Oestrus Health Lameness	Real-time		Dobner et al., 2019 Götsch et al., 2018 Mayo et al., 2019
ConSist	Nedap	< 10 years	Up to 1000m	Activity Feeding time Lying time	Neck	Oestrus Health	Real-time	No	
ConSist	Nedap	< 10 years	Up to 1000m	Activity Feeding time Lying time Walking time Number of get-ups	Leg	Oestrus Health	Real-time		Mayo et al., 2019
ConSist	Comanager	< 10 years	1000m	Activity Rumination Feeding time Lying time Walking time Number of get-ups	Ear	Oestrus Health	Real-time		Deinbeck et al., 2015 Mayo et al., 2019
ConSist	GSA	7 years	> 800m	Activity Feeding time Lying time Walking time Number of get-ups Number of days	Neck	Oestrus Health	Real-time	No	
ConSist	SCA	8 years	200-800m	Activity Feeding time Lying time Walking time Number of get-ups Number of days	Neck	Oestrus Health	Real-time		Deinbeck et al., 2015 Mayo et al., 2019

Keywords

- » Animal health and welfare
- » Animal-based health indicators
- » Precision livestock farming
- » Health status monitoring



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