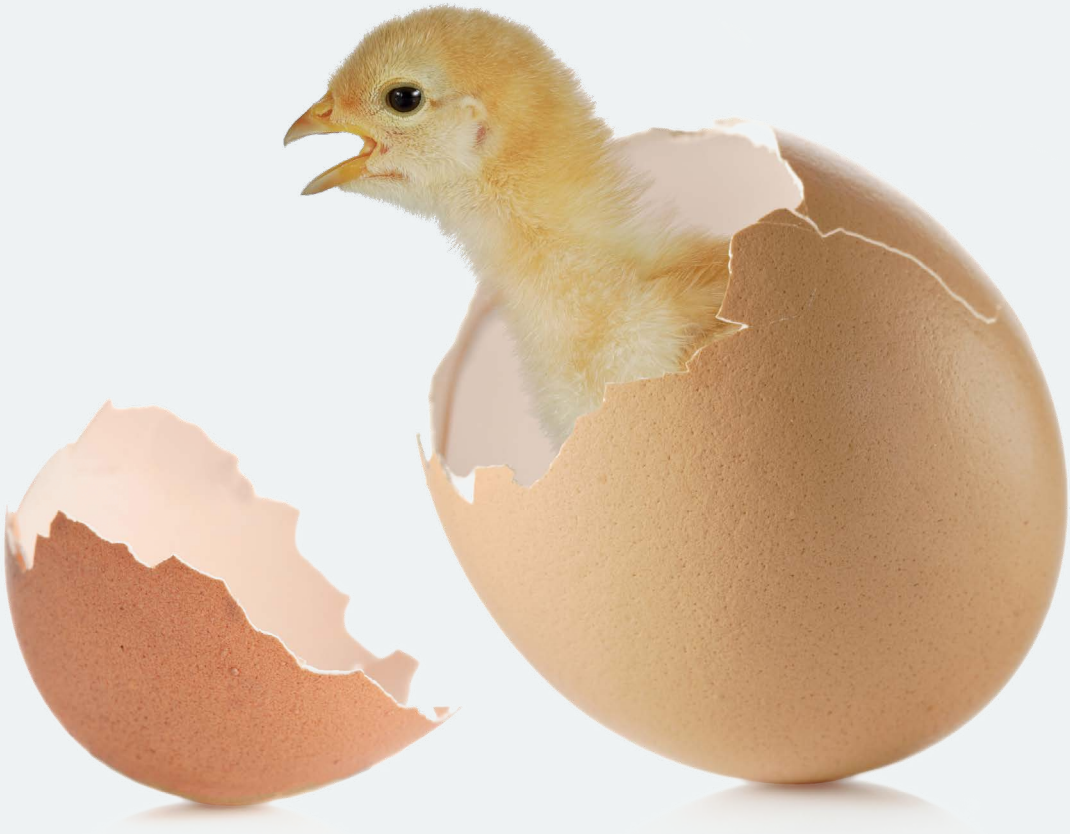
HealthyLivestock

健康畜禽

Tackling antimicrobial resistance (AMR)
by increasing the health and welfare of pigs and poultry
and thereby reducing the need to use antimicrobials.



HealthyLivestock Project Newsletter #4, July 2021

健康畜禽 Healthy Livestock

HealthyLivestock project contributes to fighting antimicrobial resistance (AMR), by reducing the need to use antimicrobials in pigs and poultry. Strengthening biosecurity, enhancing animal resilience, early disease detection methods, and more targeted medication will help to decrease antimicrobial use and consequently reduce antimicrobial resistance. HealthyLivestock brings together Chinese and European experts and allows them to work together in a large research project.

The European Union part of the HealthyLivestock project is funded by the European Union Horizon 2020 research and innovation program under grant agreement number 773436.

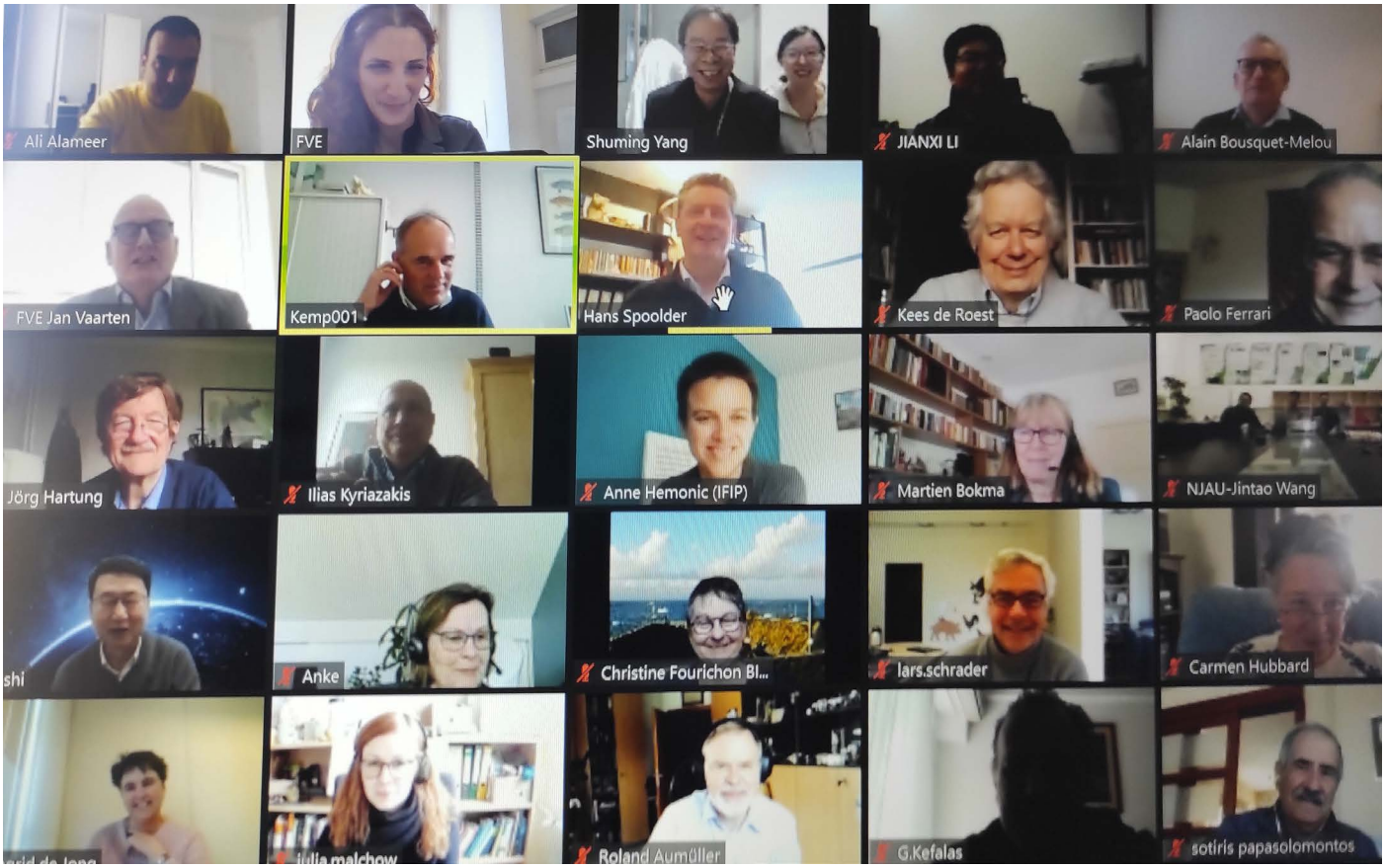
中华人民共和国科学技术部
Ministry of Science and Technology of the People's Republic of China

The Chinese part of the HealthyLivestock project is funded by the Ministry of Science and Technology of the People's Republic of China

HealthyLivestock consortium annual meeting

On 19th of March 2021, HealthyLivestock consortium has met for the third time for a joint annual meeting. Due to the ongoing pandemic, the meeting was a virtual meeting. However, we all wish to meet again in person and aim for a regular meeting in 2022.

Members of our Scientific Advisory Board has joined us for the meeting and the consortium partners presented and discussed the news, the results, outcomes, and the progress of the research. The meeting was recorded and available clicking here.



HealthyLivestock research presented in the "Recent advances in animal welfare science VIII"

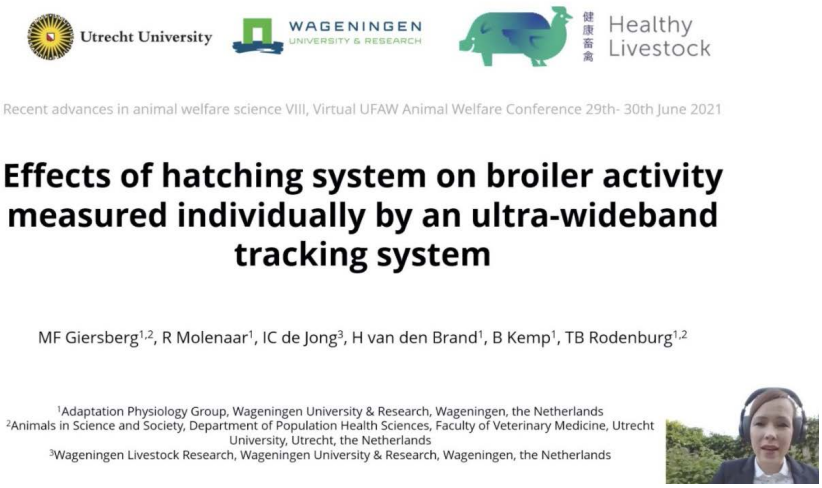
Virtual UFAW Animal Welfare Conference 29th- 30th June 2021

During the Virtual UFAW Animal Welfare Conference Dr. Mona F.Giersberg presented a study conducted by Wageningen University & Research and the Faculty of Veterinary Medicine of Utrecht University about the "Effects of hatching system on broiler activity measured individually by an ultra-wideband tracking system".

Broilers usually hatch in hatcheries without access to feed and water until placement at the farm, which can affect their health, resilience and welfare. Therefore, alternative concepts have been developed, such as providing chickens with early nutrition in the hatchery or hatching eggs on-farm. However, information on the resilience and welfare of chickens hatched in these systems is limited. Changes in broiler activity are a promising indicator for various resilience and welfare threats. Sickness and lameness for instance have been

associated with lower activity levels in broilers. With modern sensor technology, it is possible to automatically record group- but also individual activity patterns. The aim of this study was to assess the effects of hatching system on broiler activity in general and after the challenging situation of vaccination.

To read the poster please click here.



HealthyLivestock in the '5th International Conference on Responsible Use of Antibiotics in Animals'

HealthyLivestock together with other EU funded projects: AVANT, DISARM and ROADMAP joined forces in a dedicated session in the conference. The joint session titled 'SOCIO-ECONOMIC, TECHNICAL AND REGULATORY DIMENSIONS OF SUSTAINABLE CHANGE IN ANTIMICROBIAL USE IN ANIMAL PRODUCTION' and included interesting presentations about the aim of the projects and current achievements of their activities. Click here to watch the session.

A general introduction to the HealthyLivestock project was presented by the project coordinator Hans Spoolder and can be watched by clicking here.

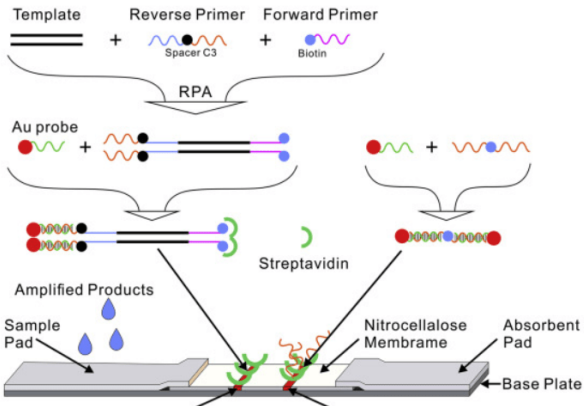
From the EU and the Chinese part of the project's research, interesting presentations were introduced by Dr. Ingrid de Jong (Wageningen Livestock Research in the Netherlands) about: "Does the peri-hatching

environment affect broiler chicken resilience?" and by Prof. Yang Shuming (Institute of Quality Standard and Testing Technology for Agro-Products in China) about: "Case study – integrated technology application of early diagnosis & immunity improvement in chicken farms".

HealthyLivestock Research News from Europe and China

Rapid on-site detection of Salmonella pullorum based on lateral flow nucleic acid assay combined with recombinase polymerase amplification reaction

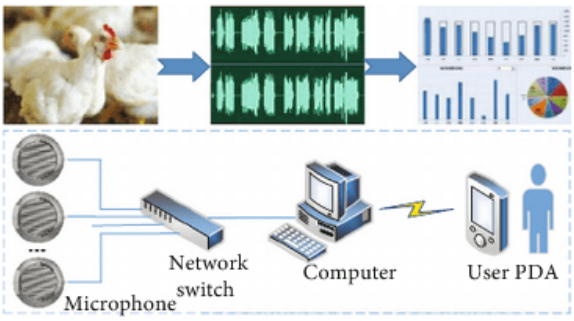
Rui Liu; Zhiying Wang; Xiaoxia Liu; Ailiang Chen; Shuming Yang



Caused by Salmonella pullorum, pullorosis is a bacterial disease threatening the poultry industry and has been listed by the Chinese government as the bacterial disease to be eliminated. However, the increased antimicrobial resistance caused by the use of antibiotics for treating pullorosis, damages the sustainable development of poultry. Abuse of antibiotics may cause global drug-resistant problems. Hence, early diagnosis of young chickens and accurate treatment of sick chickens are urgently needed. Traditional serotyping for Salmonella detection is costly and labor-intensive, whereas other commonly used plate agglutination test methods often cause physical injury of chickens due to the blood sampling. Therefore, a rapid and nondamaging detection method is of great significance for early diagnosis, which is the key step in accurate medication and elimination of pullorosis. Click here for the full article.

A Novel Method for Broiler Abnormal Sound Detection Using WMFCC and HMM

Longshen Liu; Bo Li; Ruqian Zhao; Wen Yao; Mingxia Shen; Ji Yan



Broilers produce abnormal sounds such as cough and snore when they suffer from respiratory diseases. The aim of this research work was to develop a method for broiler abnormal sound detection. The sounds were recorded in a broiler house for one week (24/7). There were 20 thousand white feather broilers reared on the floor in a building. Results showed that the developed recognition algorithm, using wavelet transform Mel frequency cepstrum coefficients (WMFCCs), correlation distance Fisher criterion (CDF), and hidden Markov model (HMM), provided an average accuracy, precision, recall, and F1 of 93.8%, 94.4%, 94.1%, and 94.2%, respectively, for broiler sound samples. The results indicate that sound analysis can be used in broiler respiratory assessment in a commercial broiler farm.

Click here for the full article.

The effect of a synbiotics containing lactulose and Bacillus coagulans on Weaned Piglets

Zuyan Zhao; Yunnan Yang: Weijiang Zheng: Wen Yao

In the early stage of weaning, due to changes in the environment and feeding, combined with the incomplete intestinal development, it's easy for the piglet to experience a functional disorder in the intestinal immune system, leading to diarrhea, reduced feed intake and reduced daily weight gain. With the ban in growth-promoting antimicrobial, it is necessary to find a safe and effective anti-stress preparation to alleviate the piglet's symptoms.

Probiotics, prebiotics or synbiotics are considered ideal alternatives to antibiotics. Bacillus coagulans can help regulate the digestive tract microbiota and enhance immunity. It is called "King of probiotics" because of its high stability, high efficiency and non-toxic effect in gastrointestinal tract. Lactulose is a chemical prebiotic composed of galactose and fructose. Taking a supplement of lactulose can stimulate the growth of weaned piglets, improve the apparent digestibility of nutrients, reduce the amount of E.coli and ammonia emission in feces.

Nanjing Agricultural University carried out a research on the effect of a synbiotics containing lactulose and Bacillus coagulans on weaned piglets. Through the comparative study on 24 weaned castrated pigs (control group, aureomycin group and synbiotics group), the following conclusions were made: the synbiotics can greatly reduce the feed conversion ratio of weaned piglets, partly improve the apparent digestibility of nutrients, alleviate intestinal injury induced by lipopolysaccharide, reduce the resistance rate of E.coli in feces, but can increase the risk of antibiotic resistance genes (ARGs) enrichment. Therefore, it is suggested to evaluate the relevant risks before using probiotics additives.

New Chinese Veterinary Drug

Jianxi Li: Kai Zhang

According to the theory of veterinary syndrome differentiation, the research team of Lanzhou Institute of Husbandry and Pharmaceutical Sciences of CAAS (LIHPS) identified effective TCM ingredients and developed three TCM drugs: Changshan Powder, Huazhijin Powder and Shenjiangzhili Mixture.

1. Changshan Powder for the prevention and treatment of chicken coccidiosis

Changshan Powder is a pure traditional Chinese medicine preparation composed of Dichroae Radix and Radix sophorae flavescentis, which mainly treats chicken and pig coccidiosis. It has an antibacterial effect against common pathogenic bacteria such as Staphylococcus aureus, Escherichia coli, Bacillus

subtilis, Salmonella paratyphi B, proteobacteria, Pseudomonas aeruginosa, Streptococcus pus, Streptococcus, Candida albicans and Aspergillus niger.

A pilot production line of Changshan Powder has been established. Expansive clinical trials were carried out in Shandong, Tianjin, Guangxi and Yunnan provinces, with a cure rate of 84.26% and an efficiency rate of 93.18% in over 200,000 chickens.

2. Huazhijin Powder for the prevention and treatment of mycoplasma synoviae infection

Mycoplasma synoviae infection is an infectious disease of chicks caused by mycoplasma synoviae, characterized by joint swelling, inflammation of synovial sac and tendon, and enlargement of vital organs. Huazhijin Powder is a pure traditional Chinese medicine preparation, composed of Stephaniae Tetrandrae Radix and Saposhnikovia divaricata (Trucz.) Schischk. The clinical trial was carried out in Gansu and Shandong provinces with 100000 chickens. After taking in a dosage of 2g per bird per day for four days, the infection rate of 45-day-old chickens reduced by 20%, and the infection rate of 75-day-old chickens reduced by 50%, reducing the elimination rate of farming companies and the usage of antibiotics.

3. Shenjiangzhili Mixture for the prevention and treatment of piglet's yellow and white dysentery

Yellow and white dysentery is an infectious disease with enteritis and sepsis caused by pathogenic E. coli. Yellow dysentery mainly occurs in neonatal piglets one to three days old, characterized by thin yellow feces and rapid death. White dysentery mainly occurs in piglets ten to thirty days old, characterized by thin creamy white or greyish white feces.

Shenjiangzhili Mixture is a pure traditional Chinese medicine preparation composed of sophora flavescens and dried ginger, mainly treats yellow and white dysentery of piglets. Since May 2020, the clinical efficacy verification tests had been carried out in Gansu, Sichuan, Hebei, Ningxia and Jiangxi provinces. After 2-3 days, the diarrhea of piglets stopped, and their appetites became normal. More than 5,000 piglets were treated with a cure rate of 78.6% and an efficiency rate of 89.2%.

Automated quantification of contact behaviour as means of detecting health and welfare problems in pigs

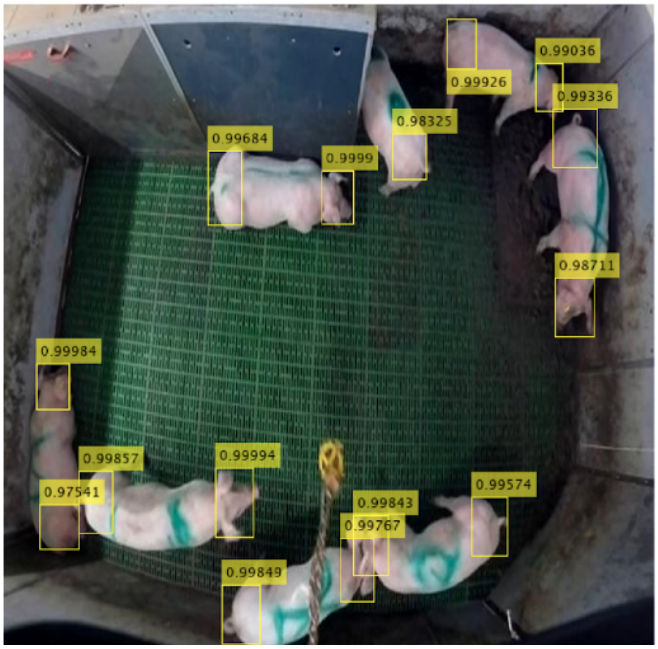
Ali Alameer; Ilias Kyriazakis

Pigs within a group engage in frequent contact with their conspecifics, to express several behaviours, such as grooming, play or sexual interactions. The frequency of such contact may be affected by several factors, e.g., the prevailing husbandry conditions or the age of the pig. With other things being equal, change in the frequency of contact between pigs within a group (i.e. pen) may be indicative of a change in the physiological or health status of one or more pigs within the group, or indicative of the occurrence of abnormal behaviour, e.g. a tail-biting outbreak. In both cases, change the health and welfare state of the pig will require treatment, including medication, and the earlier this treatment is applied the higher the likelihood of its success.

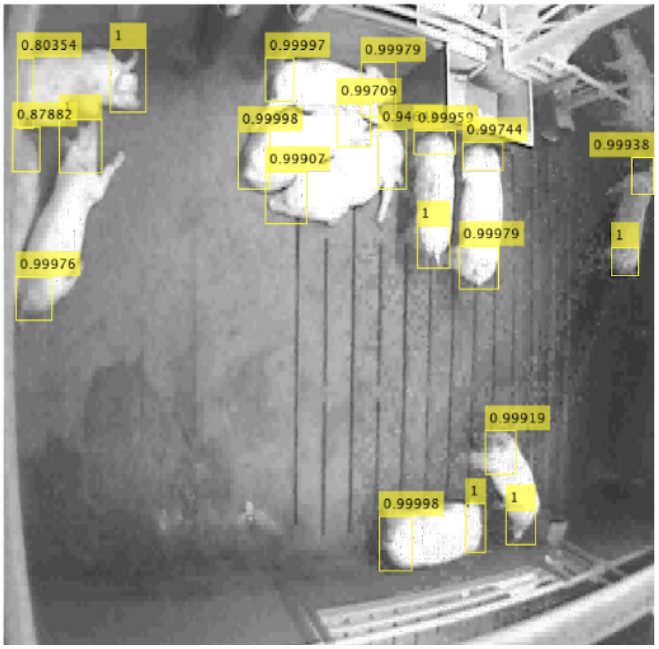
As part of the work conducted under WP3, we developed a deep learning-based framework that detects and identifies the frequency of interaction, e.g. pig head to another pig rear, between pigs within a group. The ultimate aim of the work was to apply the method as early detection for health and welfare problems within a group of growing and finishing pigs. The proposed system is based on state-of-the-art machine vision and deep learning architectures for feature extraction, such as the YOLO and ResNet50, coupled with a lightweight

processing stage that scans over pigs to score said interactions. The proposed system monitors the pigs using inexpensive 2D cameras fixed at the ceiling of a pen. It automatically and accurately detects and distinguishes between individual pig parts, i.e., head and rear, to then investigate and score any possible contact between the targeted pig body parts.

a) AFBI Experimental Dataset



b) AUPF Experimental Dataset

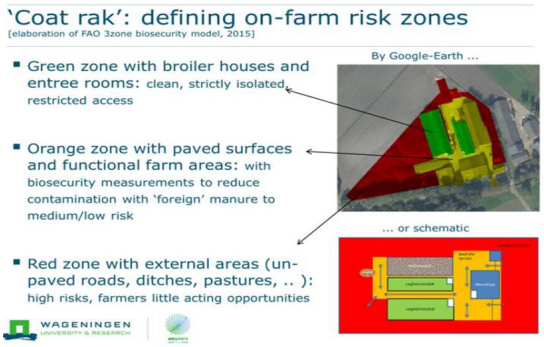


We first demonstrated the ability of our automated system to score interactions (contact) between individual pigs with an average accuracy of 92.65% ± 3.74%, under a variety of settings, i.e., camera models (e.g., infrared) with different angles of view, farms/pens, stocking density and pigs with/without marking. We then validated the method capabilities to identify changes in these measures at the group-level using data with known tail-biting outbreak episodes; when outbreaks occurred, we automatically detected significant deviations (from the preceding day) in the number of the interactions between the pigs within a pen.

We suggest that the method is able to accurately monitor pig interactions under challenging commercial conditions, without the need for additional sensors. In the next phase, the method will be extended to apply as an early warning method for the detection of changes in contact behaviour of pigs and quantify whether this enables early intervention.

Use of a health plan on high welfare pig and broiler farms

A tool to assess existing risks, to make farm specific herd health plans for mitigating these risks, and to monitor the effects of risk mitigation measures - **WP1**



Input parameters to assess the risk for the introduction of pathogens on farms, the spread of pathogens over the farm, and the exposure of susceptible animals. Output parameters, in particular animal-specific biomarkers, were used for monitoring the impact of risk mitigation interventions. The output parameters can also be used for the early detection of breaches of the risk mitigation measures.

Click here for the full article.

Day-old chicken quality and performance of broiler chickens from3 different hatching systems

Carol Souza da Silva; Roos Molenaar; Mona F. Giersberg; T. Bas Rodenburg; Johan W. van Riel; Kris De Baere; Iris Van Dosselaer; Bas Kemp; Henry van den Brand; Ingrid C. de Jong.

In on-farm hatching systems, eggs are transported at d 18 of incubation to the broiler farm, where chickens have immediate access to feed and water after hatching. In hatchery-fed systems, newly hatched chickens have immediate access to feed and water in the hatchery and are transported to the farm thereafter. Conventionally hatched chickens can remain without access to feed and water up to 72 h after hatching until placement on the farm. The current study compared day-old chicken quality, performance, and slaughter yield of broiler chickens that were on-farm hatched (OH),hatchery-fed (HF), or conventionally hatchery-hatched (HH).

Click here for the full article.

Tackling antimicrobial resistance (AMR)
by increasing the health and welfare of pigs and poultry
and thereby reducing the need to use antimicrobials.

Food Chain Partners

Academic Partners

You are all welcome to share this newsletter widely!

For further information please follow us and **contact us** on:
Web: HealthyLivestock.net
Twitter: @HLSProject
LinkedIn: #Healthy Livestock
Facebook: HealthyLivestock Project

For the Chinese version of the newsletter click here