

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 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.



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中华人民共和国科学技术部

Ministry of Science and Technology of the People's Republic of China

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HealthyLivestock consortium meeting and industry day in Bologna

“SCIENCE MEETS PRACTICE

To reduce the need for antimicrobials in animals”

On the 23rd of June 2022, the [HealthyLivestock project](#) and [The Schippers Group](#) organized a successful event in Bologna, Italy.

Leading scientists, practitioners, and industry had the opportunity to meet, discuss and get to know the innovations for fighting antimicrobial resistance in livestock farming.

The event was hybrid and hosted almost 50 in-person attendees in Bologna, 80 attendees online via Zoom from European countries and other countries, and nearly 1200 people who joined the broadcast from China.



In the first part, both scientists and industry gave ‘pitches’: short presentations dealing with topics such as Biosecurity, Resilience, Early detection, and Precise and alternative medication.

In the second part of the day, an interesting Round Table discussion was held with the participation of representatives from the industry, practitioners, researchers, the UN Food and Agriculture Organization, and the project advisory board.



The discussion included issues such as:

- The most important development towards the reduction of antimicrobial use (AMU) in animal production of the past decade
- The critical bottlenecks for the further reduction of AMU in animals
- The opportunities for R&D to make the next steps toward reducing AMU in animals
- At the international/global level the differences in AMU in animals are still very large: how to narrow down the gap?

Finally, 2 parallel interactive thematic sessions were held dealing with 4 different topics:

A. Regulation & surveillance & Quality Assurance: a threat or opportunity?

B. Alternatives for antibiotics: do they exist and –if so– which are most promising?

C. Prevention of disease: stockmanship or technical solution?

D. Early detection & precision medication: which novel techniques are feasible and robust in practice?

Click [HERE](#) to access the:

-Event Recordings | Digital posters | Presentations



ARMoR

Fighting Antimicrobial Resistance in livestock farming

The [Horizon Results Booster programme](#) (HRB), is an EC program that contributes to the dissemination and exploitation of the project results to the different stakeholders.

Within this program, [HealthyLivestock](#) joined other EU projects to form a Project Group (PG) named “[ArMoR](#)” –fighting Antimicrobial Resistance in livestock farming. The other projects are, [AVANT](#), [Disarm](#), [Roadmap](#), [AMRILS](#), [BM-FARM](#), and [FARM-CARE](#).

The projects involved in the ArMoR group are all in the field of fighting antimicrobial usage and antimicrobial resistance in livestock farming, and will continue to collaborate and develop joint dissemination activities.

Watch ArMoR project [video](#)

Read ArMoR [factsheet](#)



Early Careers competition in the HealthyLivestock project

Congratulations to Katarina Buckova, Research Assistant, School of Biological Sciences in the Queen's University Belfast, for winning the scholarship award in the early career's competition!!!



HealthyLivestock Technology Transfer Unit, launched a competition to find an early career scientist with an innovative, marketable idea for reducing the use of antimicrobials. This activity is part of the project's Technology Transfer Plan, which promotes the exploitation of good ideas developed in the HealthyLivestock project.

The winner received a scholarship to promote her idea in one or more European countries or places in China of her choice. Katarina and her team tested the effects of fodder beet in combination with jute bags as novel enrichment for pigs on their resilience. Although the authors found that the enrichment had the most pronounced positive effects on pig performance, enriched weaners had less ear lesions and tended to have decreased occurrence of scouring which may reduce use of antimicrobials. She feels very grateful that the scholarship enabled her to present the results of her work at the 55th Congress of the International Society of Applied Ethology in North Macedonia. She is also planning to present the results on other conferences and write the novel literature review on environmental enrichment for pigs.

Read more on Katarina's work in the next article.



The [European Federation of Animal Science \(EAAP\) Annual Meeting in Porto, Portugal](#) provided opportunities to present new ideas in practice through many parallel sessions, a plenary meeting, poster presentations, and discussions about scientific achievements in livestock production all around the world.

Four researchers from the HealthyLivestock project presented and participated in the EAAP conference, where the research community met with the industry, to discuss and plan how to address the multiple challenges that the animal science sector has to cope with in the upcoming years.

Johan THOMAS, Research engineer for livestock housing & energy, Breeding service – French Institute for pig and pork industry

The study *“Early detection of diarrhoea in weaned piglets from individual feed, water and weighing data”* aimed to analyse individual water and feed consumption related to weight of weaned piglets and their link to diarrhoea. The average feed consumption had no significant difference between categories whatever the week, but showed a very significant difference for days 5-7 after the weaning and a significant difference for day 8. As feed consumption seemed to be an interesting indicator to detect early diarrheic weaned animals, we continued the study by using machine learning methods.

Pierre LEVALLOIS, Agronomist - PhD student in animal health (pig husbandry), INRAE

“From biosecurity audit to tailor-made recommendations in pig farms: how to prioritize action points?” used audits to assess biosecurity in pig farms. It concludes that recommendations can target unimplemented practices, with different expected effect (from high to low) on disease prevention according to the pathogen statuses and current health disorders of the farm on top of financial and time costs. This study underlines the importance of integrating the health context in audited farms to provide tailor-made biosecurity recommendations.

Julia Malchow, Doctor of Agricultural Science - Friedrich Loeffler Institute

“Effects of hatching system and enrichment on broiler chickens’ behaviour” aimed to investigate the influence of hatching system and additional enrichment on behaviour. It concludes that both treatments affected different behavioural traits, parameters in various extent: on farm hatched chickens showed more fear in early life. Furthermore, chickens kept in a barren environment were more active.

Katarina Bučková , Research Assistant, School of Biological Sciences - Queens University Belfast

“Effect of novel enrichment on pig resilience” aimed to explore the effects of novel enrichment for pigs in slatted systems, and to investigate the timing of enrichment provision on stress resilience and performance. It concluded that the beet and jute bags provided at weaner stage had positive effect on pig FCR at both stages and finisher BW; the enrichment at weaner as well as finisher stage reduced body lesions during the finisher stage.

Read more [HERE](#)

Recognition and Classification of Broiler Droppings Based on Deep Convolutional Neural Network

Jintao Wang, Mingxia Shen, Longshen Liu, Yi Xu and Cedric Okinda

Digestive diseases are one of the common broiler diseases that significantly affect production and animal welfare in broiler breeding. Droppings examination and observation are the most precise techniques to detect the occurrence of digestive disease infections in birds. This study proposes an automated broiler digestive disease detector based on a deep Convolutional Neural Network model to classify fine-grained abnormal broiler droppings images as normal and abnormal (shape, color, water content, and shape&water). Droppings images were collected from 10,000 25-35-day-old Ross broiler birds reared in multilayer cages with automatic droppings conveyor belts. For comparative purposes, Faster R-CNN (regions with convolutional neural networks) and YOLO-V3 deep Convolutional Neural Networks were developed. The performance of YOLO-V3 was improved by optimizing the anchor box. Faster R-CNN achieved 99.1% recall and 93.3% mean average precision, while YOLO-V3 achieved 88.7% recall and 84.3% mean average precision on the testing data set. The proposed detector can provide technical support for the detection of digestive diseases in broiler production by automatically and non-intrusively recognizing and classifying chicken droppings.

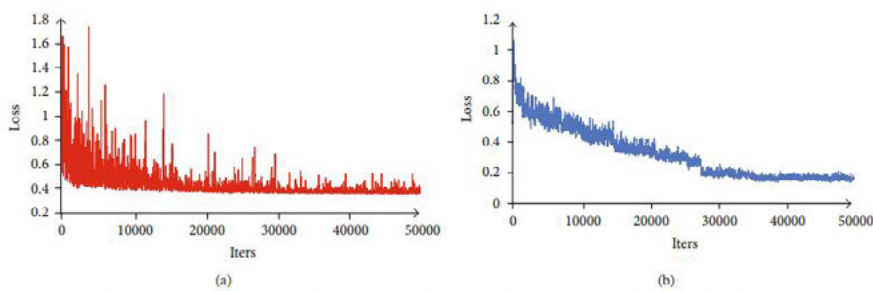


Figure 1: The average loss against the number of iterations for (a) Faster R-CNN and (b) YOLO-V3.

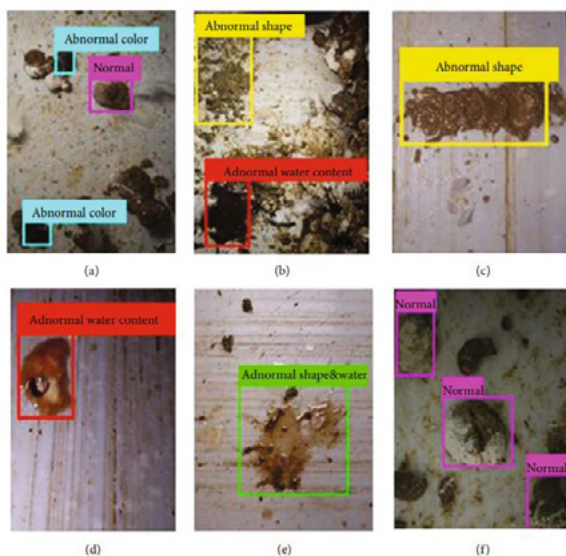


Figure 2: Broiler droppings label recognition during the testing phase based on Faster R-CNN (a) abnormal color and normal, (b) abnormal shape and abnormal water content, (c) abnormal shape and abnormal water content, (d) abnormal water content, (e) abnormal shape and water and (f) normal.

Interview with EU and Chinese farmers



Sergio Visini

CEO and founder of [PIGGLY](#) - BIRLA SOCIETÀ AGRICOLA

Piggly

Close to Mantova in Northern Italy, in Pegognaga, there is an innovative pig farm that focuses very much on animal welfare, the environment, and social and economic sustainability, and it is 100% antibiotic-free. Its name is Birla Società Agricola, better known as Piggly.

Piggly represents a valid and exemplary farm where it is possible to raise pigs with the utmost respect for animals, humans, and the environment. "The growing awareness towards the quality of products and animal welfare, led us to design the first antibiotic-free pig farm in Italy and a new type of system based on the principle of 'functional simplicity' ", says Sergio Visini, CEO and founder. "The Piggly farm started to be operational in 2017 achieving excellent results, either on the zero impact side and on that of antibiotic-free, so much so that today Piggly represents a model for many other farms, as well as a place of interest for the young generation engaging in the agricultural and veterinary sector.

What do you do on your farm to improve housing conditions and how does this affect animals' welfare?

On our farm we largely focus on housing infrastructures: stables provide animals with high standards of comfort in the various stages of the breeding cycle.

Natural ventilation combined with straw bedding is the successful strategy in the most delicate phase of weaning (from 6 kg to 35 kg in weight). In the fattening phase, we allow animals to rest on a solid floor at 75% with thermal insulation material.



Do you use any tools for the early detection of health problems of farm animals?

We have installed sensors for the continuous detection of the concentration of ammonia (NH₃) and carbon dioxide (CO₂).

The data we collect helps us a lot in accommodating the natural ventilation.

Our farming model entails a 'man-animal relationship' factor which is highly considered crucial for the achievement of our farm objectives.

We have designed and invested in a farming process based on 'functional simplicity', also avoiding the installation of redundant technologies which, in our opinion, are an obstacle to the natural animals' behaviour.

Our employees greatly appreciate the simplicity in their daily tasks and can better observe the animals, the environment, and more generally the production process.

After 5 years of farming, we have found a very low level of stress for both the animals and our employees.

Do you use alternative medicines to treat sick animals or to prevent diseases?

We do not use alternative medicines to treat sick animals. Sick animals are about 2-3% of the total and are treated with conventional medicines based on the instructions given by the farm veterinarian.



To further improve the air quality inside the stables, we spray the areas spoiled by faecal material with a mixture of bacteria from the *Bacillus* spp. In this way, we also avoid the use of insecticides and pesticides.

Do you work with health plans together with your farm veterinarian?

Given our Antibiotic-Free status, we adopt targeted vaccination plans and along with the use of vaccines and of autogenous-stabulogenic (obtained from animals from the same herd) ones we can avoid the spread of *Streptococcus* spp. and *Salmonella* spp.

Interview with EU and Chinese farmers



Sun Lihua

Sun Lihua is Director of Environmental Protection Standard Committee of Swine Business of CP Group Animal Husbandry Investment (Beijing) Co., Ltd.

Xianyang CP Group Food Co., Ltd. was founded in 2019. Through advanced technologies and systems, the company is engaged in providing consumers with safe, nutritious and delicious pork.

What measures has the farm taken to improve the farming conditions, and how have these affected the welfare status of the animals?

In the pig farm design and construction process, in addition to the automatic ventilation, environmental control, feeding, drinking and heating facilities, three innovations have been made in the new pig farm. Firstly, the pig farm is completely closed with a constant temperature. It not only reduces energy loss, but also avoids animal stress brought by temperature changes. Secondly, the air quality has been improved through the positive pressure filtered ventilation system. 99% of the air entering the farm is filtered, preventing most of the viruses and bacteria in the air.



At the same time, the EPI high-frequency deodorization and dust removal system is used in the farm. Compared with the previous farms, the suspended particles are reduced by 85%, and the ammonia gas is reduced by 20%. Thirdly, the farm has adopted the scientific group management of sows. Intelligent electronic

feeders are used to provide adequate feeds to pigs based on their needs. What's more, an automatic sorting system is used. Pigs in poor condition can enter the isolation area, which reduces human intervention and the stress response of pigs.

Do you use tools for early monitoring of pig health problems?

The research and development centre of CP Group cooperated with Inner Mongolia Agricultural University and developed a monitoring system covering the temperature detection, backweight measurement and intelligent weighing. Through this system, cough, fever and abnormal behaviour can be timely found, facilitating early treatment of pigs.

Do you use alternative drugs to treat sick animals or to prevent diseases?

Before the farm construction, the farm designers and veterinary professionals had planned carefully to prevent diseases. The slightly acidic electrolyzed water is used for farm disinfection, which can disinfect pigs without damaging their health. Besides, the drinking water of pigs is small molecule water, which not only improves the feed conversion rate, but also increases the protein degradation rate, minimizing the smell of pig manure.



In your opinion, what aspects are most important for reducing antimicrobial usage?

Firstly, the improvement of the pig farm environment is most important, especially the farm's location, air quality, temperature and humidity control and feeding management. CP Group has a strict standard system for improving pig welfare. Before the farm construction, we had fully discussed with all relevant parties. In the farming process, a lot of innovations had been made to improve the farming environment, effectively reducing the disease risks and minimizing antimicrobial usage.



Secondly, the transportation is also an important factor in controlling the spread of diseases. The company is equipped with a cleaning and disinfection centre, which is effective in preventing the spread of diseases.

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