FP7-funded project

PROHEALTH Newsletter No. 3 | April 2016

# PROHEALTH events in 2016

## Upcoming conferences, national meetings and training workshops

With PROHEALTH in its third year, exciting results are emerging from the scientific work-streams. Many of our project findings will be showcased at prominent European conferences in 2016. But knowledge from PROHEALTH will also be made available for farmers and vets at national level, through dedicated stakeholder workshops. These aim to ensure that the scientific outputs are communicated in a form that can be applied on the farm.

PROHEALTH also has a training scheme called 'Individual Pig Care', which will be provided free of charge in 5 countries over the course of the project, starting in 2016.

### 2016 Conferences

PROHEALTH will have a major presence at three main conferences this year – namely EAAP, IPVS and ICPD.

We will have dedicated half-day conference sessions at ICPD in Wageningen (20th–24th June), and EAAP in Belfast (29th August – 1st September) where we have invited renowned key-note speakers from the EU and US, supported by a number of other internal and external speakers. In total, PROHEALTH members have submitted 26 abstracts for these three conferences!

### National stakeholder meetings

We will be holding two national events during 2016, in Poland and France. The aim of these events is to help increase the application of scientific findings on farms.

PROHEALTH organised its first ever national stakeholder event in Warsaw in 2015, which was highly successful, with an audience predominantly interested in poultry. As a result, we will be continuing the momentum of last year's event by hosting a 'Poultry Technical Conference' at Warsaw University on the theme of 'One Health' in sustainable poultry production. The event will be a full day session on June 17th, for which we expect around 200 attendees.

SPACE 2016, otherwise known as the International Livestock Fair, takes place in Rennes from the 13th–16th September. SPACE attracts a very large audience, so it will be a good opportunity to communicate PROHEALTH findings to French stakeholders. One of our local partners, INRA, organises conference sessions at this event which are intended to showcase research partnerships and study results. The possibility to include a PROHEALTH session into the INRA conference programme is currently being explored.

The full event details including programmes will be available shortly on the events page of the PROHEALTH website and via PROHEALTH's Twitter feed.

### Individual Pig Care Programme

With intensification of production systems and tight profit margins farmers face ever increasing challenges if they are to monitor animal health and recognise disease symptoms among large batches of animals.

For this reason, the PROHEALTH partners PigCHAMP Pro Europa and Zoetis have devised the 'Individual Pig Care' (IPC) programme. ▶▶

PROHEALTH project
www.fp7-prohealth.eu

### Key Facts

22 European partners:
12 industry, 10 academic
Project duration:
01/12/2013 – 30/11/2018
Project coordinator:
Prof Ilias Kyriazakis,
Newcastle University, UK

The programme aims to reduce the incidence of disease on farms by offering a digitalised health scoring mechanism for pig herds. The stockmen score pig health using digital pens and paper, and the data are automatically uploaded to an analysis dashboard, which identifies signs of deteriorating health between individual batches of pigs. The 'Individual Pig Care' programme has been shown to help lower dramatically economic losses by reducing the incidence of disease. It therefore also reduces the use of prophylactic antimicrobials.

PROHEALTH strongly supports the implementation of the IPC programme to improve animal health and welfare in pig production systems. This year we will therefore start to offer IPC trainings for farmers. The detailed schedule for these trainings will be published soon.

# Piglet neonatal mortality: Is the cause the same on all farms?

## Conclusions from a PROHEALTH study on French pig farms

Piglet mortality is one of the main issues of concern for the pig industry worldwide, resulting in decreased sow performance and significant economic losses. According to different studies on piglet mortality, crushing and stillbirths are considered as the most important causes of death. The risks for each specific cause of piglet death have not been fully explored. Moreover, current literature does not capture the differences which exist between individual farms and the contribution of these differences to the problem of mortality.

A study conducted by PROHEALTH on French pig farms provides new insights into this issue. All 146 farms sampled for this analysis have reported neonatal mortality issues and were part of an audit which has been conducted by CCPA group. The analysis included a total of 7,928 dead piglets from 40,101 born. An average of 18.1 ± 5.62 sows were sampled in each farm randomly, all the dead piglets of the sampled sows were necropsied. We found that six main causes of mortality represented 85% of the total piglet deaths, up to 48h after birth. These causes are, in order of significance:

1. Death during farrowing 23%
2. Non-viable underweight piglets 21%
3. Death before or during farrowing with signs of sepsis 17%
4. Mummification 11%
5. Crushing 8%
6. Starvation 5%
7. Others 15%, which includes acute diseases, death before farrowing with signs of autolysis, anaemia etc.

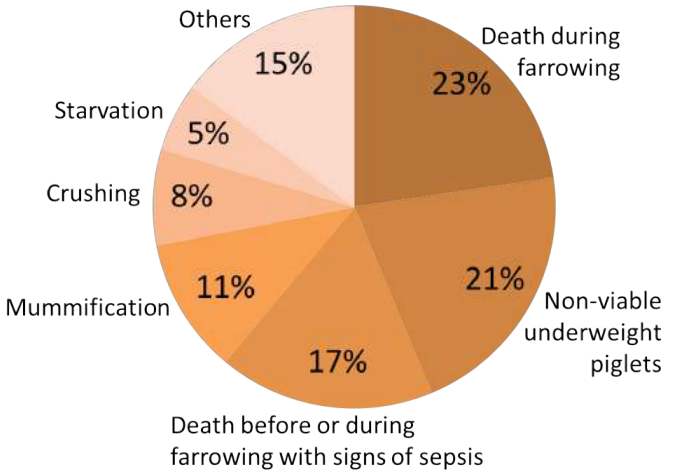


*Figure 1: The main causes of neonatal piglet mortality*

Whilst crushing is a well-known cause of piglet mortality, it is actually not in the top three causes of mortality as might have been anticipated. Deaths which occurred either before or during farrowing were the main cause of loss and should be given more attention in terms of remedial strategies.

Stillbirth resulting from death during farrowing was the leading cause of piglet mortality. However, stillbirths have a number of different causes and can be classified into 3 different categories (Figure 2):

- Deaths during farrowing (52%)
- Deaths before or during farrowing with signs of sepsis (39%)
- Deaths before farrowing with signs of autolysis on the internal organs (9%)

Our findings suggest that different factors contribute to the cause and potential prevention of stillbirth:

- Deaths during farrowing were reduced during the night, but this was not the case for the other causes of stillbirth. As farrowing assistance was not given during the night, this observation suggests that inappropriate management practices during farrowing may contribute to this specific cause of death.
- Deaths before farrowing were associated with lower piglet weights compared to the other causes of stillbirth.

If piglets survive the farrowing process, they are still at risk from death caused by starvation and crushing. We noticed a reduction in post-farrowing deaths from starvation during the daytime hours. This underlines the importance of farrowing and post-farrowing assistance which is provided during working hours, for example to encourage piglets to consume colostrum.

The weight of the piglet, the parity of the sow, the litter size, the cause of death of littermates and season were all identified as potential other risks for certain causes of piglet mortality. This highlights the importance of defining which pattern of piglet mortality is present on the farm.

We developed a methodology, based on statistical analyses, to classify the farms. The criteria considered for the classification of each farm were: the percentage of the 6 most common causes of neonatal piglet death identified in the study, the average weight of the dead piglets and the average litter size of the sows. Based on these criteria, we identified 3 different categories of farms (Figure 3). This classification will enable a better understanding of the similarities and differences between pig farms. We can then target their specific weaknesses and develop strategies better suited to help them reduce piglet deaths.

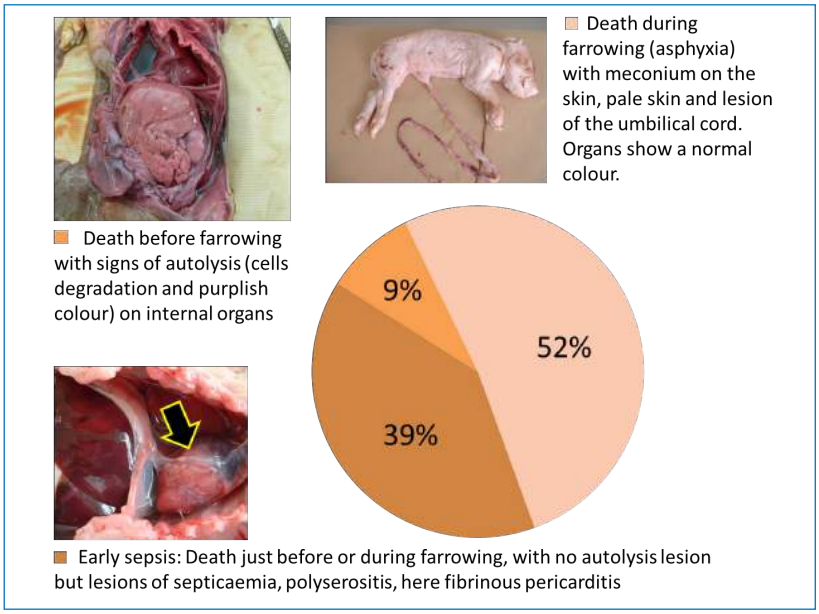


*Figure 2: Three different categories of stillbirths have been identified*

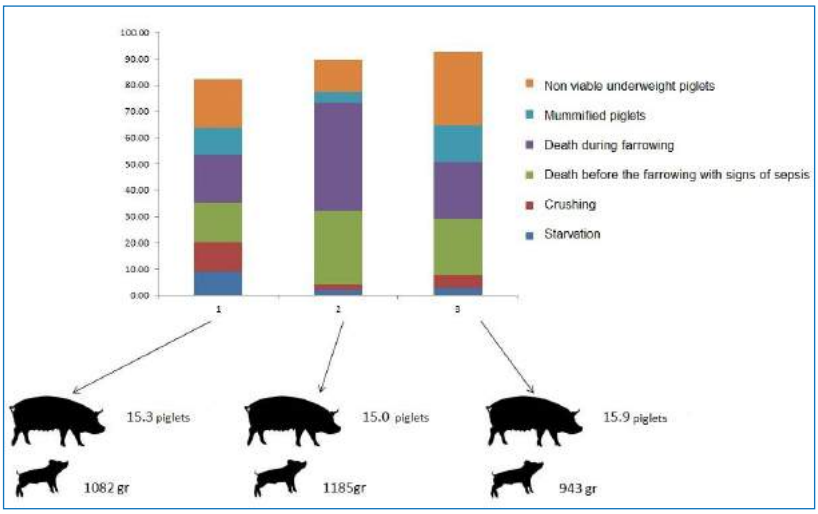


*Figure 3: The farms have been grouped into 3 different categories according to the pattern of mortality they experienced. The figure shows the average percentage of each cause of mortality, the average litter size and the average dead piglet weight for each farm category*

# Foot health in broiler breeders

## An important factor for disease management

In intensive poultry production systems good foot pad health is crucial to obtaining high levels of animal welfare and high production yields. Often foot pad health is seen to decline over the production period. It is known that in intensive production systems suboptimal litter quality and high body weight are risk factors in maintaining good foot health. In broiler breeders poor foot pad integrity may subsequently result in an increase in mortality due to septicaemic infections, including infection of the heart valves (endocarditis), and joint infections (arthritis), or decreased egg production due to pain and discomfort. The most frequently isolated bacteria from these infections are staphylococci and enterococci, which are both part of the natural flora of the skin or the gut. In order to cause disease these bacteria need a port of entry to enter the blood stream of the host. This leads to the hypothesis that foot pad lesions may serve as port of entry for these infections.

PROHEALTH has investigated the role of foot pad health in relation to development of disease caused by staphylococcus and enterococcus bacteria in broiler breeders. We followed four parent flocks throughout the whole production period (20-60 weeks) by post mortem and bacteriological examination and evaluation of the foot pads. The foot health of the flocks at the end of production was also investigated (Figure 2). The flocks exhibited normal performance regarding production and mortality, and no unexpected disease outbreaks were observed. The litter quality in all the flocks at the end of the production period were dry and loose, and with no history of major deterioration in quality. No systematic record of body weight was recorded in the flocks.

In total, around 60% of all the investigated birds had lesions in their foot pads. The lesions ranged from mild thickening of the skin (hyperkeratosis) to ulcers with tissue loss (necrosis) and/or infections in the foot pad (bumble foot). When the foot pad quality was considered in relation to age, we observed that the ratio of dead birds with foot lesions of any severity increased dramatically after 40 weeks of age, starting below 40% in young birds (20-29 weeks) and rising to almost 80% in birds more than 50 weeks old. This confirms that the foot health in broiler breeder flocks deteriorates dramatically with increasing age. Just before the flocks were sent to slaughter more than two thirds of the hens demonstrated lesions in the foot pads with ulcerations in about a third of the examined hens. Overall there was relatively large variation between the four flocks whether the foot pad lesions were observed in the dead birds or in live birds in the flocks just before slaughter. Similarly, death caused by staphylococci and enterococci infections increased throughout the production period, peaking at 40–49 weeks of age where almost 20% of the mortalities were due to these infections. The most frequent infection manifestations were joint infections (arthritis), sepsis, infections of the heart (endocarditis) and bumble foot.

To link the foot pad lesions directly to the findings caused by staphylococci and enterococci we performed a series of infection studies where foot pads were investigated for a role as port of entry for the bacteria (Figure 1). Deposition (inoculation) of bacteria in the dermal layer of skin of ▶▶

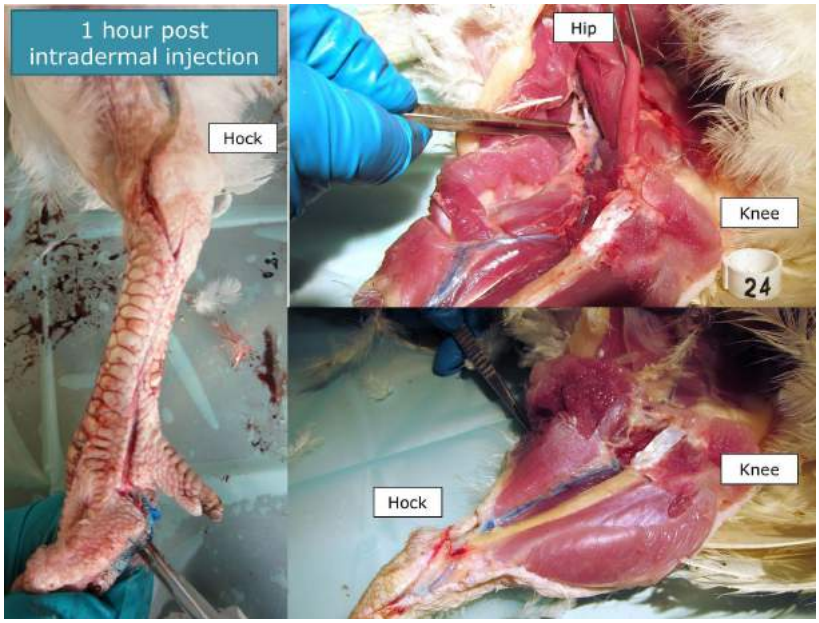


*Figure 1: Visualisation of the flow and distribution of blue ink, one hour after injection in the dermis part of the skin of a broiler breeder (under anaesthesia and subsequent euthanisation). The blue colour can be followed up along the connective tissue of the vascular bundle, which contains the blood vessels and nerves supplying the leg. The blue colour extends as far as to the hip level after one hour.*

the foot pad led to lesions identical to the lesions we observed from the field. The vast majority of the birds receiving a high dose of staphylococci displayed lesions distant from the injections site (e.g. joints, liver, spleen and heart), whereas low doses led to less severe lesions in fewer birds.

For enterococcal infections the overall appearance was comparable to the staphylococci infections, however fewer birds showed systemic lesions. All of the birds receiving either staphylococci or enterococci had considerable inflammation at the injection site in the foot, some with obvious abscess formation in the dermal layers of the skin. Furthermore Eschericia coli, the most common bacterial cause of death in intensive poultry production, were similarly investigated. When E. coli was injected in the skin of the foot pads none or minor lesions at the injection were demonstrated, indicating that E. coli primarily infects via the oviduct and airways.

Thus the link between foot pad integrity and generalised Gram positive bacterial infections was observed, with suggestions of strain and dose variation in the outcome of the infection.The nature of the foot lesions is being further characterised, in order to develop a scoring system for use in live birds during production.

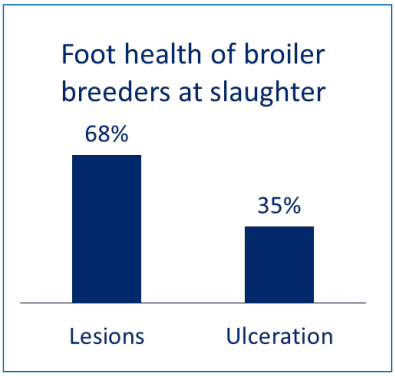


*Figure 2: Percentage of birds with foot pad lesions and the more severe foot pad ulcers in four flocks of apparently healthy 60 week old broiler breeders.*

# Production diseases: the costs to poultry producers

## Results of an extensive literature survey

### Background

Diseases in poultry flocks can lead to substantial economic losses through reduced revenues, for example, from reduced volume or quality of meat or eggs produced, and increased costs of inputs such as feed and labour. However, although this fact is understood, there is little consensus about the level of the economic losses resulting from individual production diseases. In addition, while the costs of prevention measures and treatments may be known, the economic savings they make are often not well understood. Consequently, large numbers of poultry producers may not be implementing economically optimal disease prevention and treatment measures. This problem is likely to become more acute as pressure to reduce the use of antimicrobials in the treatment of poultry diseases increases.

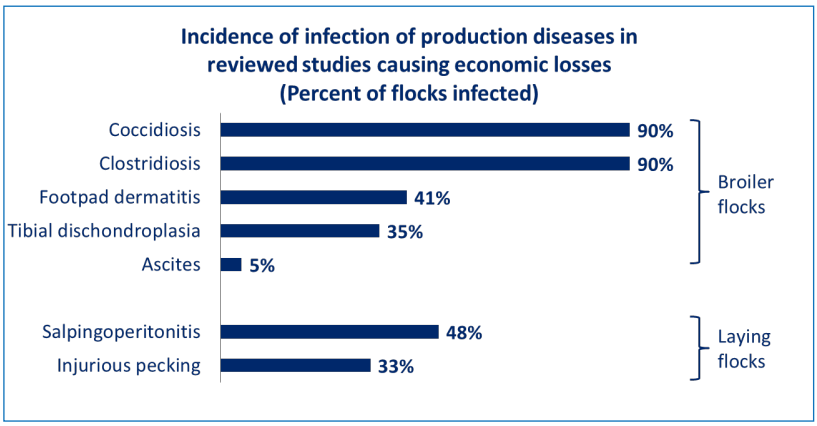


*Figure 1 (Note: No incidence data were available for keel bone damage or Infectious Bronchitis)*

### Survey of recent studies

To explore the full economic impacts of poultry production diseases the PROHEALTH project carried out an extensive survey of recent studies, collecting information on the costs of uncontrolled disease, and the benefits resulting from various prevention or treatment measures. Data for a number of production diseases were available from studies relevant ▶▶

for modern, commercial poultry production. The studies varied considerably in terms of scale, from a few birds in a single pen, to tens of thousands of birds across multiple farms. Here we report estimated costs for seven different poultry diseases.

## The cost of poultry diseases

The economic risks from production diseases are related to the level of incidence and severity. The incidence of the production diseases recoded in the studies reviewed is shown in Figure 1. Here, incidence is based on the percentage of birds in flocks that have a sufficiently severe form of a disease to have negative economic impacts. The most prevalent diseases in reviewed studies were enteric diseases, i.e. coccidiosis and clostridiosis. While clinical forms of diseases obviously have more severe symptoms, including mortality, sub-clinical forms can also lead to substantial economic losses, for example, in the form of impaired feed conversion ratio, leading to higher feed requirements for growth in broilers and egg output in laying hens.

The costs of production diseases vary with the disease causing the infection and the severity of each disease. For each of the reviewed diseases, costs were assessed for broilers (Figure 2) and laying hens (Figure 3). Economic losses per bird in laying hens appear larger than for broilers, because the disease is impacting over a far longer production period in laying hens than in broilers. Total economic losses from uncontrolled keel bone damage average around €4 over the life of a laying hen, while losses from uncontrolled Infectious bronchitis reach €3.2 per laying hen. Losses on this scale would, in most years, make the affected flock unprofitable. Among the reviewed diseases affecting broiler flocks, uncontrolled clostridiosis incurred the greatest losses at around

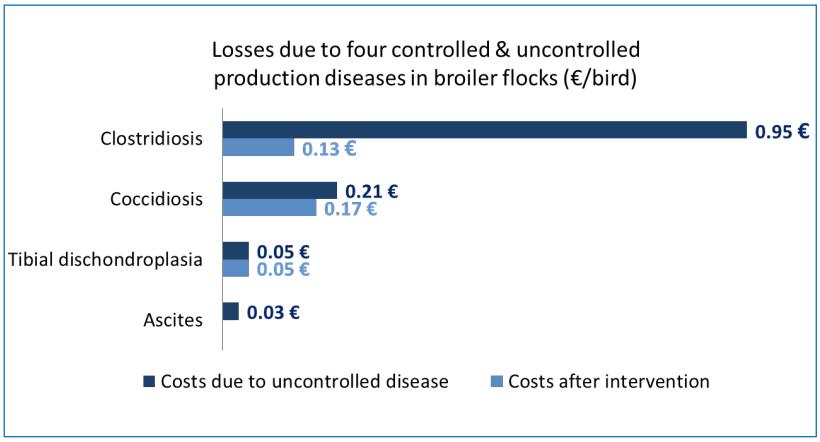


*Figure 2*

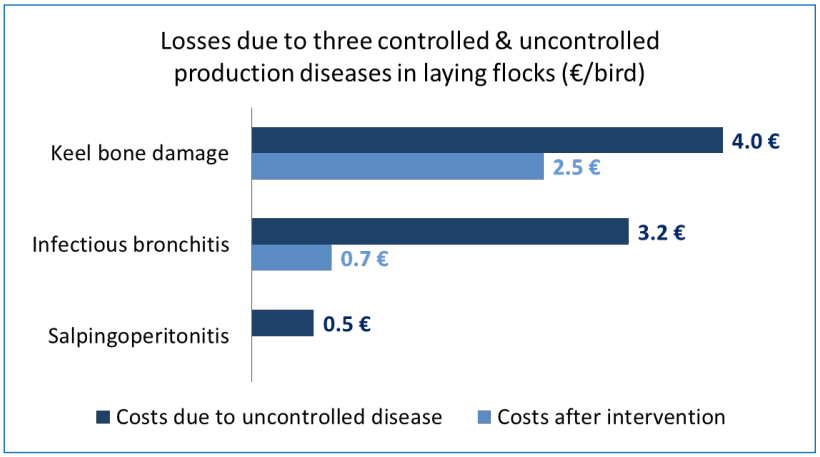


*Figure 3*

€1 per broiler bird (slaughtered at 2kg liveweight), while losses from uncontrolled coccidiosis amounted to €0.21 per broiler.

Figures 2 and 3 also reveal that some disease losses can be reduced by prevention or treatment measures. For example, interventions for Salpingoperitonitis, ascites and clostridiosis can go a long way to reducing losses. However, in the cases of coccidiosis and keel bone damage, studied interventions were much less effective.

## Implications

The results highlight the fact that farms suffering from production diseases can make substantially less profit than disease-free farms. However, these losses can often be reduced by a range of interventions, such as vaccinations, better litter management, or improved nutrition and hygiene.

The economic benefit of interventions to control production diseases varies greatly according to disease and the particular intervention chosen. As some of these interventions have been observed to reduce disease incidence or severity of multiple diseases, the next step in the PROHEALTH project is therefore a broader investigation into the most useful interventions for reducing disease-related economic losses in poultry farming, especially where these interventions have the potential to reduce the use of antimicrobials.