

The Importance of Rearing High-quality Pullets

As concerns about antimicrobial resistance increase, the restriction of antibiotic use in livestock agriculture and research into alternatives is critical to animal health. Managing disease challenges, particularly during the laying cycle, is vitally important, therefore alternatives must be found to optimise health and productivity and maximise profitability. Despite producers' best efforts, birds are often exposed to a range of different viral, bacterial and parasitic pathogens; therefore, the production of a robust and resilient pullet is crucial in ensuring optimal health and lifetime performance. Dr Emma Lund, Technical Support Specialist at Anpario plc discusses the importance of rearing high quality pullets and the impact that natural products, such as oregano essential oil, can have on optimising health and performance.

"It typically takes around four weeks for a chick to develop a mature gut microbiome. This is a critical window of development for the gut; during this time it is of vital importance that a balanced and diverse microbial population is established", explains Dr Lund. The complex gut microbiome of poultry species plays a crucial role in digestion, nutrient absorption, development of the immune system and disease resistance¹. From 1–7 days of age, intestinal crypt and villi development occurs. These intestinal structures are fundamental to feed digestion and nutrient absorption. Establishing a balanced microbiota earlier can reduce the risk of disease and subsequent damage to these structures². Early establishment of a diverse microbiome aids intestinal development, which is vital for future bird performance as a higher ratio of villous height to crypt depth is associated with improved nutrient digestibility and absorption². "Early maturation of the gut microbiota population helps to create a stable gut environment, leading to improved nutrient digestibility. This enhances growth performance and feed conversion ratio from the start, helping to improve lifetime performance, allowing the bird to fulfil its genetic potential", explains Dr Lund.

Rearing high-quality pullets can be challenging; however, ensuring optimal bird health and performance by rearing high-quality pullets can help to reduce antibiotic usage. Oregano essential oil is a highly effective, natural product. "Oregano essential oil naturally consists of over one hundred compounds, such as carvacrol and thymol³. It is well-documented for its antimicrobial action *in vitro*, and its complex and synergistic mode of action when included in the diets of pullets and laying birds can help to promote a healthy, robust gut. When birds are able to deal with a bacterial challenge, this helps to reduce the severity of disease. This in turn supports bird performance", Emma explains. "The presence of these active compounds in 100% natural oregano essential oil, in particular carvacrol and thymol, offers many benefits to the bird." Oregano essential oil has been found to have a role in appetite enhancement⁴ and antioxidant function⁵, as well as in both immunomodulatory⁶ and anti-inflammatory processes⁷. Oregano essential oil has also been shown to have a beneficial effect on the gut microbiota of poultry species,

as a result of its strong antimicrobial activity, reducing the presence of pathogenic bacteria⁸.

A recent trial carried out by North Carolina State University, USA, assessed the effect of oregano essential oil on pullet performance during rearing, and the impact this had on early lay performance. Birds of high health status were assigned to one of two dietary treatments at one day old; a control group with no additives during rearing, or the treatment group with supplementation of oregano essential oil. The trial was conducted at a university facility under controlled environmental conditions with no challenges present.

Despite the impressive health status of the pullets in both the control and treatment groups, those with diets supplemented with oregano essential oil throughout rearing, grew at a consistently quicker rate, particularly during the first two weeks of age. Overall, these birds were heavier than the control-fed birds throughout the rearing phase. The pullets supplemented with oregano essential oil were also a more uniform flock than the control group (Figure 1). This flock were 17% more uniform in body weight overall from 2–16 weeks of age, with particular improvement seen during weeks 2–10 (Figure 1). The birds fed diets containing oregano essential oil were also more efficient, with an overall feed conversion ratio (FCR) of 1.25 versus 1.30 achieved by the control group for the entire rearing phase, despite no differences in feed intake. "These results demonstrate that the supplementation of pullet feed with oregano essential oil improves the efficiency of digestion and nutrient absorption, leading to more efficient pullets within their first few weeks of life", explains Dr Lund.

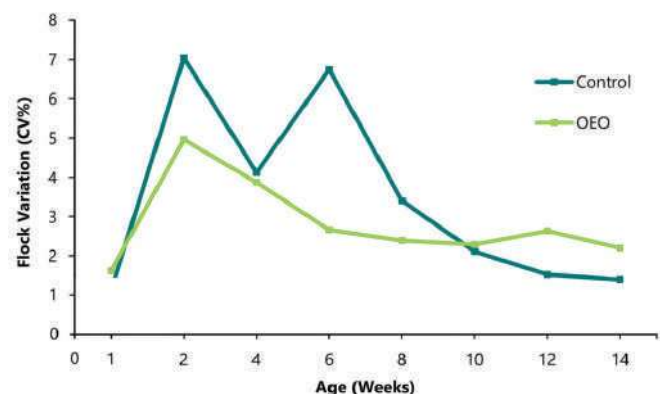


Figure 1. The variation (CV%) in flock bodyweight from 0–16 weeks of age in the control group of pullets and those supplemented with oregano essential oil. (OEO)

High-quality pullets are those which are both robust and resilient, and a high-quality flock is one in which all the pullets are uniform in weight and achieve the breed target for bodyweight. This leads to more uniform egg production over time. "Poor-quality pullets of low uniformity, lower body weight and poor gut health will not be able to meet their genetic potential in the long term", says Dr Lund. Issues which arise during the rearing phase can impact a bird's overall lifetime performance and ultimately producer profitability.

In the first few weeks of egg production, egg size can be variable within the flock, with these early eggs being peewees or small⁹. "Egg size tends to gradually increase to medium, large and extra-large eggs in early lay. There is a correlation between hen weight and egg size, with larger hens producing heavier eggs. This is why achieving an optimum body weight and a uniform flock by the end of rearing can be beneficial to early egg production." "Improving egg production and quality during early lay (18–20 weeks) can help to improve overall producer profitability, as the birds get off to a good start", states Dr Lund. "Therefore, good-quality pullets are likely to outperform birds of lower gut health during this notoriously low production stage, and are therefore fundamental in achieving optimal productivity", suggests Dr Lund. Birds supplemented with oregano essential oil from rearing to early lay demonstrated an increased egg production, with a higher daily egg mass (Figure 2). These birds also produced a lower proportion of peewee eggs and produced a greater proportion of extra-large and large eggs compared to birds fed diets not supplemented with oregano essential oil (Figure 3).

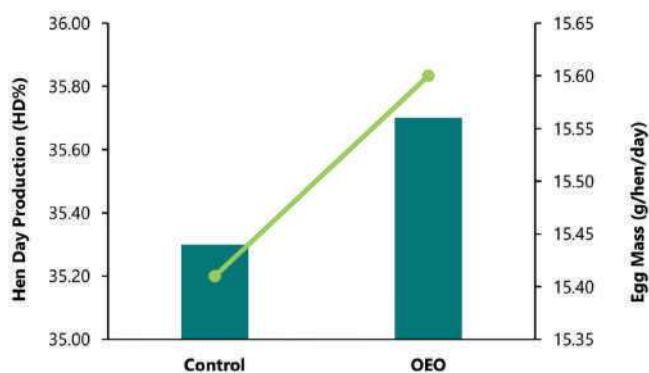


Figure 2. Early lay production (HD%; Hen day production) and daily egg mass during 18–20 weeks.

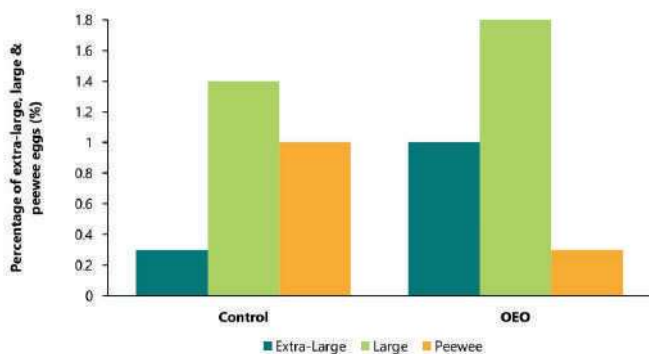


Figure 3. Egg size distribution during 18–20 weeks in between birds offered a control diets and those from the oregano essential oil (OEO; Oregostim, Anpario) treatment group.

"In general, egg consumers have a preference for large and extra-large eggs. Therefore, increasing the egg size at this early stage can improve producer profitability in a period where productivity is usually relatively low", Emma explains. The effect of oregano essential oil supplementation in poultry diets on egg size, as seen in Figure 3, gave a return on investment of 2:1 based on egg value alone¹⁰. "Not only did we see heavier eggs in early lay, but the birds supplemented with oregano essential oil had less variation in egg sizes compared to control fed birds, so the benefits in early production are two-fold." Improved gut health, as a result of the antimicrobial effect of continuous oregano essential oil supplementation starting at the pullet rearing phase, has a role to play in the improved productivity, egg mass and egg size during early lay. The microbiota of a healthy gut will



contribute to the metabolism of both nitrogen and proteins within the diet, helping to provide increased amino acid resources required for egg production¹¹.

"The need for the chick to establish a diverse gut microbiota as quickly as possible is of paramount importance in achieving high-quality pullets, capable of reaching their genetic potential throughout their productive cycle", explains Dr Lund. "The benefits of oregano essential oil will help to ensure the production of high-quality, robust and resilient pullets. These pullets are better able to overcome disease challenges, maintain production performance, and reach their genetic potential", concludes Dr Lund.

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Dr Emma Lund

Dr Emma Lund, Technical Support Specialist at Anpario plc, is passionate about research, with an interest in improving global animal health. Emma's work at Anpario includes the management of global poultry research projects.