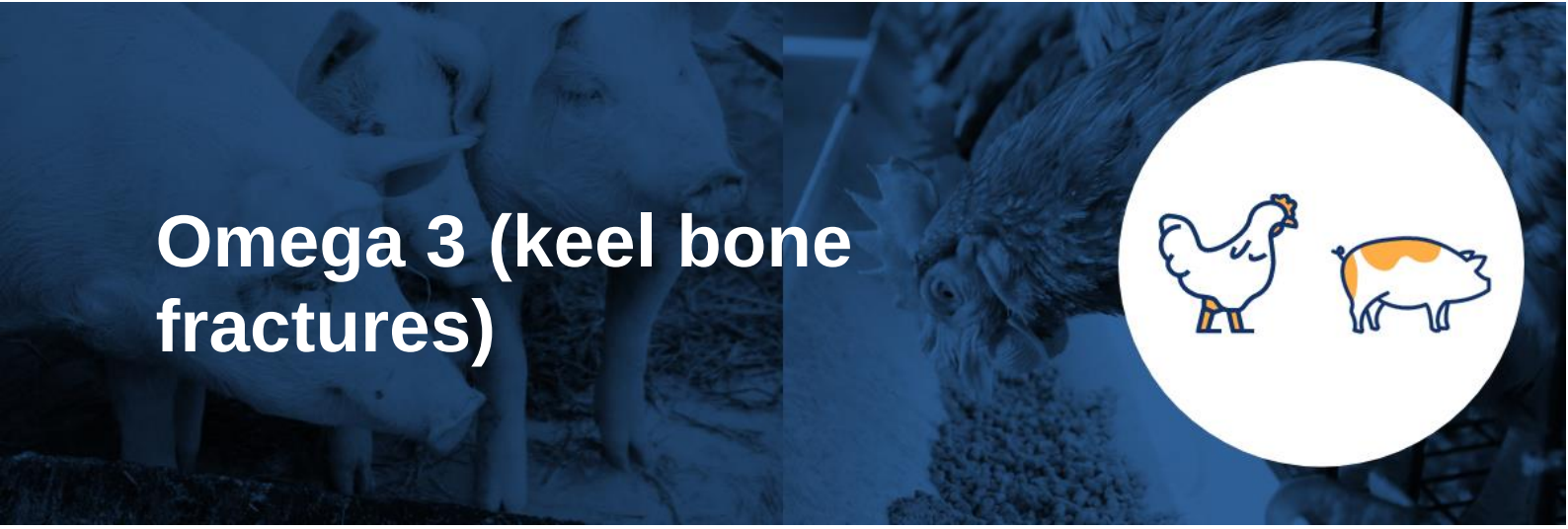

Omega 3 (keel bone fractures)

Last update: 2 June 2023

- **Type of challenge**: Animal welfare.
- **Challenge**: Keel bone fractures.
- **Action:** Strengthening keel bone; supporting bone development.
- **Animal category**: Broilers.
- **Technique**: Adding omega 3 fatty acids (eg via linseed, fishmeal or algal oil) to the feed (to improve calcium uptake) while adding calcium to the feed (the ration for laying hens should contain between 2 – 2.5% Ca).
- **Mode of action**: Regulation of the function of bone cells and calcium metabolism; increased calcium balance and small intestine absorption, resulting in increased intestinal availability of calcium.
- **Potential efficacy:** Omega 3 fatty acids reduce keel bone fractures by 40-60% and increase bone strength, toughness & stiffness, bone density, volume & trabecular thickness, bone remodelling.
- **Nature of evidence of efficacy**: Peer-reviewed scientific publications (meta-analysis).
- **Factors impacting on efficacy**: The source of fatty acids, chain lengths and also the covariate response of dietary Calcium; housing system and laying environment (the bone of poultry in non-cage systems does get stronger but the risk of fractures is greater whereas in cage systems, it is the opposite as bones are weaker but the risk of fractures lower); rearing phase impacting the motor skills; animal characrteristics (age, weight, breed, genome, productivity, bone strength).
- **Mode of use:** Via concentrate feed formulation.
- **Requirements/limitations**: None.
- **Economic consequences**: Depending on the source of omega 3 used, the feeding cost may increase; avoidance of lower zootechnical performancemay compensate for it.
- **Other considerations**: Diets with excessive quantities of omega 3 fatty acids (or very high levels of C20/22 form), may affect health and livestock performance (decreasing egg quality and contra effects on keelbone fractures).
- **References**:
  - Toscano *et al.* (2015). *The effects of long (C20/22) and short (C18) chain omega-3 fatty acids on keel bone fractures, bone biomechanics, behavior, and egg production in free-range laying hens.* Volume 94, Issue 5, 1 May 2015, Pages 823-835. https://www.sciencedirect.com/science/article/pii/S003257911932471X
  - Thanabalan *et al.* (2022). *A Meta-Analysis on the Significance of Dietary Omega-3 Fatty Acids on Bone Development and Quality in Egg- and Meat-Type Chickens*. Frontiers. https://doi.org/10.3389/fanim.2022.875944

- Tarlton, J. F., L. J. Wilkins, M. J. Toscano, N. C. Avery, and L. Knott (2013). *Reduced bone breakage and increased bone strength in free range laying hens fed omega-3 polyunsaturated fatty acid supplemented diets.* Bone 52:578–586. https://pubmed.ncbi.nlm.nih.gov/23142806/

- **Other techniques:** Macrominerals supplementation (Ca).

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